The Cambridge South East Transport Order

Transport And Works Act 1992

Transport And Works (Applications And Objections Procedure) (England And Wales) Rules 2006

Appendix 10.2 – Bat Surveys

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Cambridgeshire South East Transport Strategy (CSET): Bat Activity Survey

Executive Summary

Contents	Summary
Site Location	The site comprises a linear route which extends from the Cambridge Biomedical Campus in Cambridge, through to the A11 beyond the village of Babraham. The site is centred at OSNGR TL 48499 51169. The most north-western point is OSNGR TL 45829 55102. The most easterly point is OSNGR TL 53005 49788.
Proposals	Phase 2 of the Cambridge South East Transport (CSET) project proposes a new off-road public transport route linking the Cambridge Biomedical Campus via Great Shelford, Stapleford and Sawston to a new travel hub near the A11/A1307/A505 junction with connections to Babraham, the Babraham Research Campus and Granta Park.
Scope of this Survey(s)	Bat activity surveys to assess the usage of the site by foraging and commuting bats.
Results	Records of six bat species were returned from the desk study, with seven European Protected Species Licences (EPSL) granted for bats within 2km of the site boundary. At least eight bat species were recorded on site and the site has been valued at Regional level for commuting bat and District - Regional level for foraging bats. The majority of activity was by common pipistrelle bats; with soprano pipistrelle being the next most frequently recorded bat species. All other species recorded were under ten passes per transect or were recorded during the listening point surveys. Barbastelle bats were recorded during the walked transect surveys of Transect 7 in August, and Transect 4 in October. They were also recorded on Transect 4 in August, on Transect 3 and Transect 7 in October.

Glossary

ACIEEM	Associate Member of Chartered Institute of Ecology & Environmental Management
BCT	Bat Conservation Trust
CPER	Cambridgeshire & Peterborough Environmental Records Centre
CIEEM	Chartered Institute of Ecology & Environmental Management
CWS	County Wildlife Site
DEFRA	Department for the Environment, Food and Rural Affairs
EPSL	European Protected Species Licence
EWT	Essex Wildlife Trust
MCIEEM	Full Member of Chartered Institute of Ecology & Environmental Management
PEA	Preliminary Ecological Appraisal
SAC	Special Area of Conservation
SSSI	Site(s) of Special Scientific Interest

1.0 Introduction

1.1 Background

WYG was commissioned by Greater Cambridgeshire Partnership on 18th July 2019 to complete bat activity surveys to inform the proposed Cambridgeshire South East Transport Strategy (CSET) (hereafter referred to as 'the site').

This report has been prepared by WYG Senior Ecologist Tim Lees MCIEEM and WYG Assistant Ecologist Jo Sykes and the conditions pertinent to it are provided in Appendix A.

1.2 Site Location

The site comprises a linear route which extends from the Cambridge Biomedical Campus in Cambridge, through to the A11 beyond the town of Babraham. The site is centred at TL 48499 51169. The most north-western point is TL 45829 55102. The most easterly point is TL 53005 49788.

The survey area generally falls across a predominately arable landscape, interspersed with residential and commercial land, with areas of semi-natural habitat including woodland and grassland. It also partially incorporates a total of five sites designated for nature conservation, comprising a single statutory site and four non-statutory sites. There were a total of 56 waterbodies within 500 m of the proposed development. The wider landscape consists of agricultural land and the villages of Stapleford, Sawston and Babraham.

1.3 Development Proposals

Phase 2 of CSET is a project to create a segregated public transport route from the A11 (near Babraham) to the Cambridge Biomedical Campus (CBC). There are three potential route corridors, but only one is being considered for additional surveys at present. This route corridor is called Strategy 1 and is largely across open arable land.

1.4 Previous Ecology Reports

A PEA was undertaken in 2018 (Plowman Craven, 2018) to provide baseline ecological information about the survey area and identify ecological constraints associated with the proposals and recommendations relating to further survey. The PEA assessed the site as providing high suitability for foraging and commuting bats.

1.5 Purpose of the Report

The purpose of this report is to complete:

- An assessment of bat activity to gain an understanding of usage of the site by bats; and
- An assessment of the potential ecological constraints to the proposed works at the site relating to bat species.

Note that scientific names are provided at the first mention of each species and common names (where appropriate) are then used throughout the rest of the report for ease of reading.

2.0 Methodology

2.1 Desk Study

2.1.1 Data Search

Extracts from the data search requested as part of the 2018 PEA from CPER and EWT are referred to in this report, Section 3.1 (Plowman Craven, 2018).

2.1.2 Online Resources

A search for relevant information was made on MAGIC www.magic.gov.uk - DEFRA's interactive, web-based database for information on any EPSL applications that have been granted for bats. Details of EPSLs granted within 2km of the red line boundary can be found in Table 8 in Section 3.1.

2.2 Field Surveys

All survey methods were carried out in-line with the Bat Conservation Trust (BCT) *Bat Surveys for Professional Ecologists: Good Practice Guidelines* (3rd ed, 2016) – hereafter referred to as the 'BCT Guidelines'.

2.2.1 Roosting Bats – Trees / Woodland

Within the red line boundary of the site individual trees (19 in total) and woodland blocks on site were assessed from the ground for their suitability to support breeding, resting and hibernating bats using survey methods based on the BCT Guidelines. Trees located outside of the red line boundary were not surveyed as the proposed routes are considered unlikely to impact upon these trees.

The woodland blocks were assessed as a group. Woodland blocks were categorised based on the highest bat roost suitability found for an individual tree within the block, where suitable features including the trees age, the condition of the tree i.e. sound or with broken limbs, cracks, rot holes etc., tree type e.g. broadleaved or coniferous.

The following system has therefore been used to categorise the bat roost suitability of any features found:

Table 1: Categories of bat roost suitability (BCT Guidelines)

Suitability	Typical Roosting Features
Negligible	Negligible habitat feature on site likely to be used by roosting bats.
Low	A structure 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, 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). A tree of sufficient size and age to contain potential roost features but with none seen from the ground or features seen with only very limited roosting potential.
Moderate	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 of high conservation status (with respect to roost type only – the

Suitability	Typical Roosting Features
	assessments in this table are made irrespective of species conservation status, which is established after presence is confirmed).
High	A structure or tree with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis & potentially for longer periods of time due to their size, shelter, protection, conditions and surrounding habitat.

2.2.2 Commuting / Foraging Bats

The site was assessed as providing high suitability for commuting and foraging bats (Plowman Craven, 2018).

Table 2: Categories of bat commuting and foraging habitat suitability (BCT Guidelines)

Suitability	Typical commuting and foraging habitat features
Negligible	Negligible habitat feature on site likely to be used by commuting and foraging bats.
Low	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	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.
High	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, streams, hedgerows, lines of trees and woodland edge. High-quality habitat that is well connected to the wider landscape that is likely to be used regularly by foraging bats such as broadleaved woodland, tree-lined watercourses and grazed parkland. Site is close to and connected to known roosts.

The proposed route was divided into seven individual transects due to the size of the site and to avoid surveys exceeding 3.5 hours. As per the BTC Guidelines, each transect route was to be undertaken every month (April - October) with one of these surveys comprising a dusk and dawn transect within the same 24 hour period. However, surveys only began in August; for further information see Section 2.4: Limitations.

The PEA recommended the deployment of three automated static detectors per transect route each month in line with BCT Guidelines for high suitability sites. However, so that data collected was proportionate to the expected impact, a single static was deployed in conjunction with each transect route, where the most likely point of impact would occur e.g. hedgerows that are likely to be severed by the proposed transport link, rather than deploying three static detectors per route. In this way the amount of data collected would be where the impacts are likely to occur and minimise data collection and analysis which would have limited bearing upon the proposed development The expected impact

on bats is low due to limited number of vehicles using the route during bat active hours, making the collision risk and potential light disturbance low. A total of seven routes were walked across the survey area each month. This was deemed sufficient given the linear nature of each transect and the proposed development.

2.2.3 Bat Activity – Walked Transects

In line with the BCT Guidelines, each walked transect surveys began at sunset and continued until at least two hours after sunset or began at least two hours prior to dawn and finished at sunrise in suitable weather conditions. Table 2 summarises the survey times and weather conditions of the walked transect surveys.

Surveys were undertaken by WYG ecologists with prior experience of undertaking similar surveys.

Table 2: Date, timings and weather conditions for walked transect surveys

Date of Survey	Transect number	Sunset/ Sunrise	Temp (°C)		Precipitation	Wind (Beaufort scale)	Cloud (%)
			Max	Min			
20/08/19	4, 7	20:14	21	16	None	1-1	20-10
25/09/19	1, 2, 3, 4, 7	18:52	18	18	None	1-2	50-75
16/10/19	2, 3, 4	18:04	14	12	None	2-1	40-15
28/10/19	1, 7	16:39	8	7	None	1-1	90-70

The survey routes (see Figure 1b) were designed to cover the suitable features for foraging and commuting bats, mainly comprising hedgerows and woodland (Figures 3a-6b). The surveyors walked at a steady pace and completed one lap of the transect on each survey. On the return journey of each transect, 10 minute listening points were completed at locations which will be directly impacted as a result of the development e.g. severance of hedgerows, with between 3 and 6 listening points per transect, totalling 25 listening points across the site. The transect routes were reversed upon each subsequent survey visit, with the listening points being completed prior to/after the walked element of the survey accordingly. This approach meant that the habitats within each transect route were sampled at different times following sunset.

The nature of any bat activity heard or seen was recorded along with the direction in which the bat was travelling if it was seen.

The bat calls were recorded on Elekon Batlogger M detectors and all calls were then analysed using 'Bat Explorer' version 2.0 software to allow identification to species or genus level.

2.2.4 Bat Activity – Static Detectors

On each of the site visits, Anabat Express static bat detectors were used to sample bat activity levels and bat species on the site. Anabat Express detectors have omni-directional microphones and record in zero crossing for later analysis using Analook W software to allow identification to genus or species level. The static detector(s) were placed at the location before dusk and retrieved during the daytime after at least five nights of consecutive recording in suitable weather conditions.

Prior to deploying the static detectors, a five day weather forecast was consulted to check that it would sample during suitable weather conditions. Table 3 presents the static detector survey details obtained, and locations are shown in Figures 3a-6b. The minimum overnight temperatures given in Table 3 are above the minimum 5 °C required.

Table 3: Summary of static bat detector survey deployment periods in 2019

Month	Transect number	Start date	End date	Overnight weather conditions
August	1, 2, 3, 4, 7	28/08/19	01/09/19	Mostly dry; minimum temps 8-13°C
September	1, 2, 3, 4, 7	12/09/19	16/09/19	Dry; minimum temps 5-11°C
October	1, 2, 3, 4, 7	09/10/19	13/10/19	Periods of rainfall on the final two nights; with minimum temps 8-14°C

2.3 Value of the Bat Populations on Site

The assessment of the value of the bat population on site is based on the article by Wray *et al.* (2010). Where bats (species and number) are found using certain habitats (to roost, commute or forage) their population is assigned a relative ecological value. The value to the species is partly based upon how well used a habitat is and also upon how rare the bat species is. In the case of commuting routes or foraging areas the number of roosts nearby is also a factor. Once the value of the bat population has been calculated, robust mitigation for any impact on the bats can be determined.

British bat species have been subdivided into groups, dependant on how common they are: common, rarer and rarest. These have been further subdivided based upon the location surveyed. Table 4 presents the rarity categorisation of bats in England. The tables in the following sections have been adapted from Wray *et al.* (2010).

Table 4: Categorising bats by distribution and rarity in England

Rarity	Species
Rarest	Greater horseshoe *Rhinolophus ferrumequinum* Bechstein's *Myotis bechsteinii* Alcathoe *Myotis alcathoe* Greater mouse-eared *Myotis myotis* Barbastelle *Barbastellus barbastella* Grey long-eared *Plecotus austriacus*
Rarer	Lesser horseshoe *Rhinolophus hipposideros* Whiskered *Myotis mystacinus* Brandt's *Myotis brandti* Daubenton's *Myotis daubentonii* Natterer's *Myotis nattereri* Leisler's *Nyctalus leisleri* Noctule *Nyctalus noctula* Nathusius' pipistrelle *Pipistrellus nathusii* Serotine *Eptesicus serotinus*

Rarity	Species
Common	Common pipistrelle *Pipistrellus pipistrellus* Soprano pipistrelle *Pipistrellus pygmaeus* Brown long-eared *Plecotus auritus*

To calculate the score for either commuting routes or foraging areas the numerical values from each column below are added together. These are detailed in Table 5 and Table 6.

Table 5: Valuing commuting routes

Species	No. of bats	Roosts/potential roosts nearby	Type and complexity of linear features
Common (2)	Individual bats (5)	None (1)	Absence of (other) linear features (1)
		Small number (3)	Unvegetated fences and large field sizes (2)
Rarer (5)	Small number of bats (10)	Moderate number/Not known (4)	Walls, gappy or flailed hedgerows, isolated well grown hedgerows, and moderate field sizes (3)
		Large number of roosts or close to a SSSI (5)	Well grown and well connected hedgerows, small field sizes (4)
Rarest (20)	Large number of bats (20)	Close to or within a SAC for the species (20)	Complex network of mature well-established hedgerows, small fields and rivers/streams (5)

Table 6: Valuing foraging areas

Species	Number of bats	Roosts/potential roosts nearby	Foraging habitat characteristics
Common (2)	Individual bats (5)	None (1)	Industrial or other site without established vegetation (1)
		Small number (3)	Suburban areas or intensive arable land (2)
Rarer (5)	Small number of bats (10)	Moderate number/Not known (4)	Isolated woodland patches less intensive arable and/or small towns and villages (3)
		Large number of roosts or close to a SSSI (5)	Larger or connected woodland blocks, mixed agriculture and small villages/hamlets (4)
Rarest (20)	Large number of bats (20)	Close to or within a SAC for the species (20)	Mosaic of pasture, woodlands and wetland areas (5)

For commuting routes and foraging areas, the ecological value of the site is based on the scoring system shown in Table 7.

Table 7: Scoring system for valuing commuting and foraging bats

Geographic frame of reference	Score
International	>50
National	41-50
Regional	31-40
County	21-30
District, local or parish	11-20
Not important	1-10

2.4 Limitations

The static bat detector provides no indication as to the number of bats present on a site as recorded bat calls could be from one bat making repeated passes or multiple bats making fewer passes. Therefore it can only be used as an indicative assessment of the bat species that are present on site, but gives a longer snapshot of time than the walked transect surveys.

Due to the timings of instruction, and access constraints, it was not possible to begin the surveys in April, as advised in the BCT Guidelines. Surveys were only undertaken in August, September and October, which does not give a full representation of activity on site for bats. However, further surveys will be undertaken between April and July 2020, including one dawn survey per transect, to complete the data set to input into the ecology chapter for this project. As such, this assessment is considered incomplete.

Woodland blocks W34 and W35 could not be accessed and assessed due to health and safety, as the woodland blocks were located within a very busy A11 roundabout. However, this is considered to be a minor limitation as the trees are of a relatively young age and thus are likely to have minimal bat roots features.

The October surveys at Transect 1 and Transect 7 were completed late in the month (28th October) and in temperatures below 10ºC at the start of the survey. This may have resulted in fewer bats being recorded, as higher levels of activity were recorded during the early October surveys (16th October). This has been taken into consideration when reviewing the data.

Transects 1, 2 and 3 did not have surveys completed in August due to access not being provided until September. Transects 5 and 6 did not have any surveys completed during the survey period as no access was available due to potential disturbance of game birds and shooting. It is considered that access to transect 5 and 6 areas during the rearing and shooting season will be the same as in 2019.

Any bats recorded were identified to species (where possible) and recorded on a field map. Many of the calls were heard without bats being seen due to the position of the bat and the lack of light.

Listening points and walked transect were alternated to allow for data to be collected at sunset for each survey type. However, this therefore does not allow for direct comparison of results between the months. This has been taken into consideration when interpreting the data.

During the August surveys the static detector on Transect 4 did not record any calls due, to a malfunction. This has been taken into consideration when interpreting the data.

The surveys were completed with the assistance of bat detectors. All survey techniques are subject to bias, and bat detector surveys may under-record species with weak echolocation calls, such as long-eared bats *Plecotus* spp. However, these biases were considered when interpreting the results (it is also of note that Batloggers are very effective at picking up quiet calls for brown long-eared bats). Therefore this is not considered to be a significant limitation. Some bat calls are variable and extremely similar between species. Where identification to species level was not possible (for example in the *Myotis* bat group), bats were identified to family level (e.g. *Myotis* sp.).

The details of this report are considered to remain valid for a period of **one survey season** (until April 2021, providing the remaining surveys are completed within the 2020 survey season and subject to no significant changes in the development proposals. Beyond this period, if works have not yet been undertaken, it is recommended that a review of the ecological conditions is undertaken.

Cambridgeshire South East Transport Strategy (CSET): Bat Activity Survey

3.0 Results

3.1 Desk Study

The data search returned a large number of records for bats within a 5km radius of the survey area. Species included barbastelle, serotine, noctule, Daubenton's bat, brown long-eared bat and soprano pipistrelle. The closest known roost was for an unidentified bat species, from a residential dwelling in Sawston, approximately 850m south-west of the survey area in 2009. The most recent record was of a brown long-eared bat and *Pipistrellus* species roost recorded approximately 1.5km north-east of the survey area at Wandlebury CWS in 2015 (Plowman Craven 2018).

There were seven EPSLs returned for bats within 2km of the site boundary (Table 8).

Table 8: Summary of granted EPSLs for bats within 2km of the site

Species	Year Granted	Distance & Direction	Reason Granted
Common pipistrelle	2015	1.3km N	Destruction of a breeding site
Common pipistrelle	2016	1.5km E	Destruction of a resting place
Common pipistrelle, serotine, brown long-eared	n/a	1.6km W	Destruction of a resting place
Common pipistrelle, brown long-eared	2015	1.7km W	Destruction of a resting place
Common pipistrelle, soprano pipistrelle, brown long-eared	2015	1.7km W	Destruction of a resting place and breeding site
Barbastelle, brown long-eared, common pipistrelle, Natterers', serotine, soprano pipistrelle	2014	1.8km SW	Damage and destruction of a resting place
Brown long-eared, common pipistrelle, Natterers', soprano pipistrelle	2016	1.8km SW	Damage to a resting place and breeding site

3.2 Ground-Level Roost Assessment

The site consists of multiple areas of scattered trees or small woodland blocks with potential to support roosting bats. Two trees were assessed as providing high suitability, three as moderate suitability, one as low suitability and 13 as negligible suitability to support roosting bats. Seven woodland blocks were assessed as providing high suitability, five as moderate suitability, one as low suitability and 13 as negligible suitability.

Table 9 and Figures 2a-2f show the locations of trees/woodland and levels of suitability for roosting bats.

Table 9: Summary of bat roosting suitability for trees and woodland

Tree / Woodland Reference	Grid Reference	Level of Bat Roost Suitability	Tree / Woodland Reference	Grid Reference	Level of Suitability
T1	TL4593754535	Negligible	W9	TL4882950686	Moderate
T2	TL4594254538	Negligible	W10	TL5055749362	High
T3	TL4594554541	Negligible	W11	TL5090249263	High
T4	TL4596454548	Negligible	W12	TL5133149767	High
T5	TL4597054549	Negligible	W13	TL5158449599	High
T6	TL4598154551	Negligible	W14	TL5149948825	Low
T7	TL4719953240	Low	W15	TL5154548946	Negligible
T8	TL4859951087	Negligible	W16	TL5167749038	Negligible
T9	TL4857351112	Negligible	W17	TL5177549046	Negligible
T10	TL4855951143	Negligible	W18	TL5179748973	Negligible
T11	TL4861251252	Negligible	W19	TL5184848976	Negligible
T12	TL4852251183	Negligible	W20	TL5190648931	Negligible
T13	TL4826851207	Negligible	W21	TL5164048791	Negligible
T14	TL4827851206	Negligible	W22	TL5178148792	Negligible
T15	TL4829651210	High	W23	TL5185648821	Negligible
T16	TL4830351217	High	W24	TL5190248774	Negligible
T17	TL4831051220	Moderate	W25	TL5206949120	Negligible
T18	TL4832851212	Moderate	W26	TL5191249877	Low
T19	TL4841751231	Moderate	W27	TL5198249522	High
W1	TL4655354700	Negligible	W28	TL5215949800	High
W2	TL4605754110	Moderate	W29	TL5213050152	Low
W3	TL4658353523	Low	W30	TL5211850283	Low
W4	TL4691753098	High	W31	TL5249149944	Low
W5	TL4704453276	Moderate	W32	TL5249649766	Moderate
W6	TL4725553108	Moderate	W33	TL5224250042	Negligible
W7	TL4769352793	Low	W34	TL5220150230	Not assessed
W8	TL4858350833	Low	W35	TL5225750198	Not assessed

3.3 Walked Transect Survey Results

Results of the walked transect surveys are detailed below and should be read with reference to Figures 3a-6b, which show the location of all recorded bat passes per transect.

3.3.1 Transect 1

25th September

Only common pipistrelle bats were recorded during the survey, with a total of 51 passes. Passes were predominantly recorded along the southern section of the transect, adjacent to Hinton Way, and along the central western boundary, a tree line bordering arable fields (Figure 4a), with occasional foraging and commuting passes recorded along the northern section of the transect. Activity was consistent between 20:27 (1 hour 35 minutes after sunset) and 20:50 (1 hour 58 minutes after sunset), with few calls recorded after 20:50.

28th October

No bats were recorded during the survey.

3.3.2 Transect 2

25th September

Four species of bat were recorded during the survey, common pipistrelle, soprano pipistrelle, serotine and brown long-eared bats, with common pipistrelle being the most frequently recorded species. Activity was spread across the transect, with a high number of common pipistrelle passes along the north-western transect boundary, adjacent to Hinton Way, and the junction of Haverhill Road and Gog Magog Way. The majority of the soprano pipistrelle passes were recorded on the south-eastern boundary between 20:02 (1 hour 10 minutes after sunset) and 20:12 (1 hour 20 minutes after sunset). A serotine was recorded in the same area at 20:09 (1 hour 17 minutes after sunset). A brown long-eared bat was recorded at 21:04 (2 hours 12 minutes after sunset) along a species-poor hedgerow on the northern boundary between an arable field and a residential estate (Figure 4b).

16th October

Two species of bat were recorded during the survey: common pipistrelle and soprano pipistrelle, with the most frequent species recorded being common pipistrelle with 63 passes. There was very low activity on the northern section of the transect; most activity was recorded on the western section, behind the residential buildings on Gog Magog Way, and southern transect boundary between two arable fields (Figure 5a).

3.3.3 Transect 3

25th September

Only common pipistrelle bats were recorded during the survey between 20:53 (2 hours 1 minute after sunset) and 21:06 (2 hours 14 minutes after sunset). These bats were only recorded along the north-west transect boundary which borders a small parcel of woodland (Figure 4c).

16th October

Two species of bat were recorded during the survey, common pipistrelle and soprano pipistrelle. Soprano pipistrelle were the most frequently recorded bat, with 14 passes; the first pass was recorded at 18:27 (23 minutes after sunset). Activity levels were low and scattered across the transect route (Figure 5b).

3.3.4 Transect 4

20th August

Two species were recorded during the survey, common pipistrelle and soprano pipistrelle. Activity was very low, with a total of six common pipistrelle passes being recorded between 20:37 (23 minutes after sunset) and 21:29 (1 hour 15 minutes after sunset) and one soprano pipistrelle pass. These passes were spread across the transect (Figure 3a), with more passes recorded at the north-western end of the route.

25th September

Only common pipistrelle bats were recorded during the survey. The passes were only recorded at two points of the transect, at the north-western end point, a fenced boundary with scattered trees, and along the hedgerow boundary of two arable fields south of Sawston Road (Figure 4d).

16th October

Three species of bat were recorded during the survey, common pipistrelle, soprano pipistrelle and *Nyctalus* species bat. The *Nyctalus* sp. bat was recorded at 18:49 (45 minutes after sunset) commuting along the tree lined, fenced boundary between an arable field and the industrial site north of Babraham Road. The common pipistrelle bats were all recorded along the same fenced boundary with scattered trees between 18:49 (45 minutes after sunset) and 18:56 (52 minutes after sunset). The single soprano pipistrelle was recorded along the boundary of two arable fields south of Sawston Road (Figure 5c).

3.3.5 Transect 7

20th August

At least three species of bat were recorded during the survey, common pipistrelle, soprano pipistrelle and *Myotis* species bats. Common pipistrelle was the most frequently recorded species, with 26 passes recorded in total. The majority of the common pipistrelle passes were recorded along the northern section of the transect between an arable field and a parcel of semi-natural broadleaved woodland (Figure 3b). A total of five passes were recorded for soprano pipistrelle between 20:45 (31 minutes after sunset) and 20:46 (32 minutes after sunset). The *Myotis* sp. were recorded along the western and southern sections of the transect; two passes were recorded along the broadleaved woodland plantation along the A1307 and a pass was recorded in the southern arable field at 21:38 (1 hour 24 minutes after sunset).

25th September

Only common pipistrelle bats were recorded during the survey, between 20:24 (1 hour 32 minutes after sunset) and 21:15 (2 hours 23 minutes after sunset). Activity was mostly recorded along the species rich hedgerow on the eastern boundary (Figure 4e).

28th October

Three species of bat were recorded during the survey, common pipistrelle, brown long-eared and barbastelle. All passes were recorded in the southern field, south of the A1307. The two common pipistrelle passes were recorded commuting at the boundary between the woodland and the A1307. The brown long-eared (recorded at 18:45) (2 hours 6 minutes after sunset) and barbastelle (recorded at 18:43) (2 hours 4 minutes after sunset) bats were both recorded on the boundary of the arable field and broadleaved woodland in the south-western section of the transect (Figure 6b).

3.3.6 Summary of Walked Transect Surveys

At least six species of bat were recorded across the proposed route during the walked transect surveys: common pipistrelle, soprano pipistrelle, *Nyctalus* sp., brown long-eared, *Myotis* species and serotine. The most frequently recorded species throughout the survey period was common pipistrelle. One barbastelle bat was recorded in October on Transect 7. See Figure 11 for an overarching heat map for all transects.

3.4 Listening Point Survey

Results of the listening point surveys are detailed below and should be read with reference to Figures 7a-10b, which show the location of all recorded bat passes.

3.4.1 Transect 1

25th September

Three species of bat were recorded during the survey, common pipistrelle, soprano pipistrelle and noctule with common pipistrelle being the most frequently recorded species with 29 passes in total. Two passes of noctule were recorded at Listening Point (LP) 2 at 19:09 (17 minutes after sunset) , one pass at LP 3 at 19:23 (31 minutes after sunset) and one pass at LP 5 at 20:02 (1 hour 10 minutes after sunset) (Figure 8a). Several soprano pipistrelles were recorded and observed foraging, with occasional social calling, at LP 3 between 19:20 (28 minutes after sunset) and 19:29 (37 minutes after sunset). LP 6 had the highest number of passes, with 24 in total. At least three bats were observed at any one time foraging along the hedgerow for the duration of the 10 minute stop.

28th October

Two species of bat were recorded during the survey, brown long-eared bat and a *Myotis* species bat. These were all recorded at LP 2 and 3 along the western boundary (Figure 10a).

3.4.2 Transect 2

25th September

Four species of bat were recorded during the survey, common pipistrelle, soprano pipistrelle, noctule and *Myotis* species. Common pipistrelle were the most frequently recorded species, with seven passes recorded at three different listening points. A commuting noctule was recorded at LP 8 at 19:24 (32 minutes after sunset). A *Myotis* sp. bat was recorded at LP 9 at 19:37 (45 minutes after sunset). No bats were recorded at LPs 6 or 7 (Figure 8b).

16th October

No bats were recorded during the survey.

3.4.3 Transect 3

25th September

No bats were recorded during the survey.

16th October

At least three species of bat were recorded during the survey, common pipistrelle, barbastelle and *Myotis* species bats. The *Myotis* sp. bats were recorded at LP 13b at 20:03 (1 hour 59 minutes after sunset). Two barbastelle passes were recorded at 20:30 (2 hours 26 minutes after sunset) at LP 11 (Figure 9b).

3.4.4 Transect 4

20th August

Four species of bat were recorded during the survey, common pipistrelle, soprano pipistrelle, barbastelle and serotine. Soprano pipistrelle were recorded at LP 16 between 21:31 (1 hour 17 minutes after sunset) and 21:38 (1 hour 24 minutes after sunset) (Figure 7a). The barbastelle bats were recorded at two locations, LP 14 and 16. The majority of the passes were recorded at LP 16 between 21:31 (1 hour 17 minutes after sunset) and 21:35 (1 hour 21 minutes after sunset) with a single recording at LP 14 at 22:06 (1 hour 52 minutes after sunset). The serotine was also recorded at LP 14, at 22:08 (1 hour 54 minutes after sunset).

25th September

No bats were recorded during the survey.

16th October

At least three species of bat were recorded during the survey; common pipistrelle, soprano pipistrelle and *Myotis* species. The *Myotis* sp. bats were recorded at LP 16 at 20:04 (2 hours after sunset), with two soprano pipistrelle bats recorded foraging, with intermittent social calling at 20:01 (1 hour 57 minutes after sunset) (Figure 9c). All other foraging and commuting passes, from common pipistrelle, were recorded at LP 14 between 19:00 (56 minutes after sunset) and 19:06 (1 hour 2 minutes after sunset).

3.4.5 Transect 7

20th August

Only common pipistrelles were recorded during this survey at LP 25 (Figure 7b). A single commuting pass was recorded at 22:16 (2 hours 2 minutes after sunset).

25th September

No bats were recording during the survey.

28th October

Two species of bat were recorded during the survey, *Myotis* species and barbastelle. The two barbastelle passes were heard at LP 24 at 19:00 (2 hours 21 minutes after sunset) and the two *Myotis* sp. passes were heard at LP 25 at 19:15 (2 hours 36 minutes after sunset) (Figure 10b).

3.4.6 Summary of Listening Point Surveys

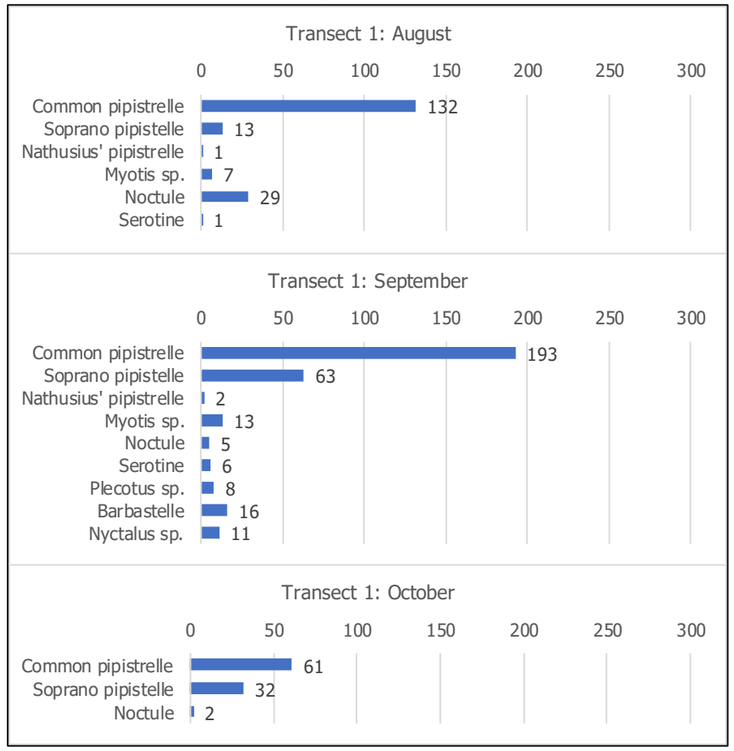
At least six species of bat were recorded across the proposed route during the listening point surveys: common pipistrelle, soprano pipistrelle, noctule, brown long-eared, *Myotis* species, and barbastelle. The barbastelle bats were recorded on 20th August on Transect 4, 16th October on Transect 3 and 28th October on Transect 7. The most frequently recorded species was common pipistrelle.

3.5 Static Detector Results

3.5.1 Static 1

Common pipistrelle was the most frequently recorded species during each survey occasion with a peak of 193 passes in September. September provided the greatest species diversity with at least eight species of bat recorded, albeit with only common pipistrelle and soprano pipistrelle registering 20 passes of more (Graph 1). October recorded lower levels of activity registering only 95 times compared with 183 and 317 in September.

Graph 1: Static 1 Detector Registrations

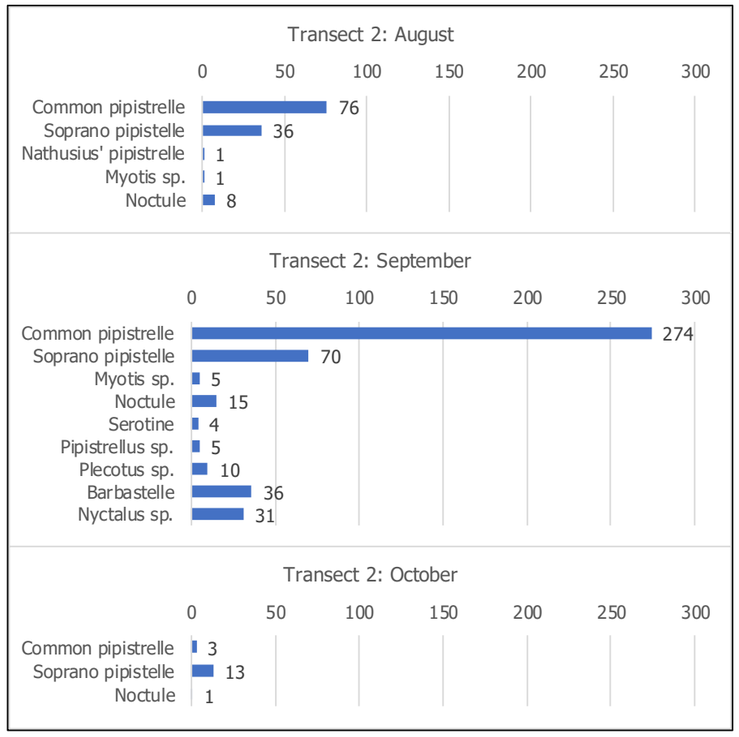


3.5.2 Static 2

Common pipistrelle was the most frequently recorded species during each survey occasion with a peak of 274 passes in September. September provided the greatest species diversity with at least seven species of bat recorded, with common pipistrelle, soprano pipistrelle, barbastelle and *Nyctalus*

sp. all registering more than 30 passes (Graph 2). September recorded significantly more activity than other months recording 450 registrations compared with 122 in August and 17 in October.

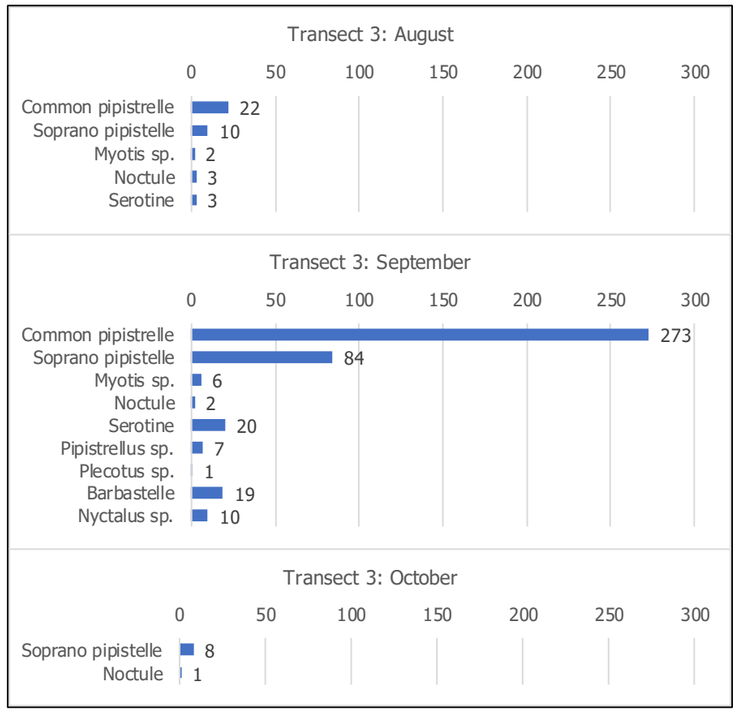
Graph 2: Static 2 Detector Registrations



3.5.3 Static 3

Common pipistrelle was the most frequently recorded species during each survey occasion with a peak of 273 passes in September. September provided the greatest species diversity with at least seven species of bat recorded, albeit with only common pipistrelle and soprano pipistrelle registering more than 20 passes (Graph 3). September recorded significantly more activity than other months registering 422 times compared with 40 in August and 9 in October.

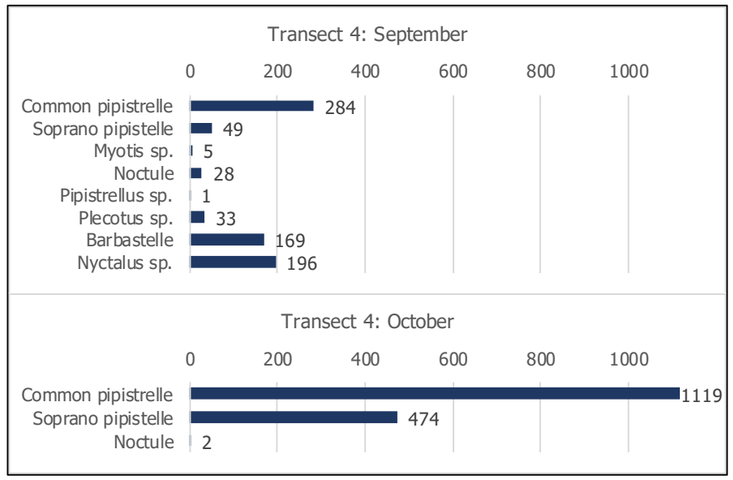
Graph 3: Static 3 Detector Registrations



3.5.4 Static 4

Common pipistrelle was most frequently recorded species during each survey occasion with a peak of 1,119 passes in October indicating a potential swarming location. September provided the greatest species diversity with at least six species of bat recorded, with three species registering more than 150 times: common pipistrelle, *Nyctalus* sp. and barbastelle (Graph 4). Despite the greater diversity, the September deployment recorded less than half (765) the number of registrations recorded during the October deployment (1,595). Due to a malfunction with the detector no recordings were gathered from the August deployment at Transect 4.

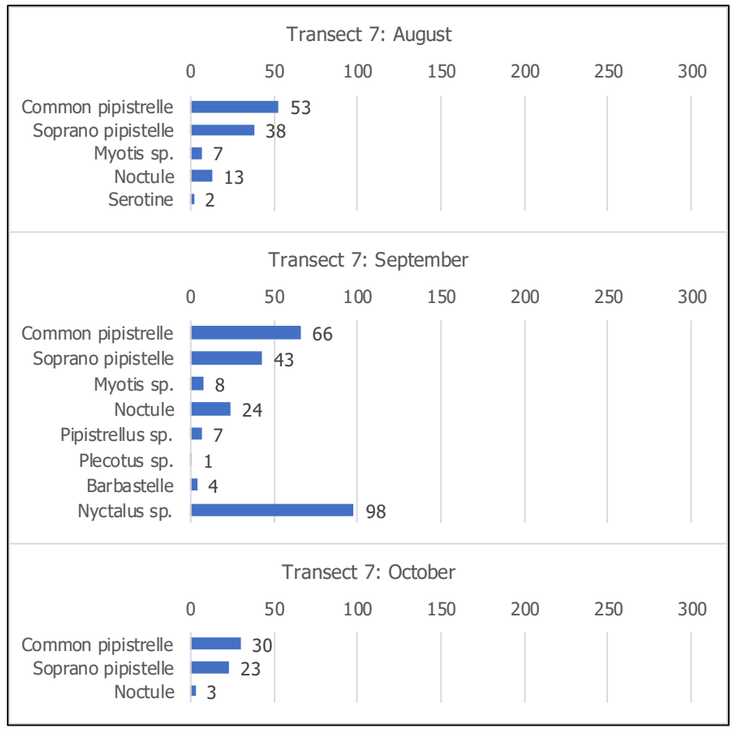
Graph 4: Static 4 Detector Registrations



3.5.5 Static 7

Common pipistrelle was the most frequently recorded species during the surveys; however, *Nyctalus* sp. recorded the peak count in September with 98 registrations. September provided the greatest species diversity with at least six species of bat recorded, with *Nyctalus* sp., common pipistrelle, soprano pipistrelle and noctule registering more than 20 times (Graph 5). The levels of activity were consistent with trends on Transects 1-3 whereby the most calls were recorded in September (251), followed by August (113) and then October (56).

Graph 5: Static 7 Detector Registrations



3.5.6 Summary of Static Detector Surveys

At least eight species of bat were recorded across the site during automated static detector surveys: common pipistrelle, soprano pipistrelle, barbastelle, noctule, *Plecotus* species, *Myotis* species, serotine and Nathusius' pipistrelle. Overall common pipistrelle was the most frequently recorded species during the surveys (2,592 registrations), followed by soprano pipistrelle (974 registrations) and *Nyctalus* sp. (346 registrations). Barbastelle was recorded within each transect surveyed with all registrations recorded in September. The peak count for barbastelle was 169 registrations on Transect 4. The closest known barbastelle roost is a maternity roost located in Eversden and Wimpole Woods, 18.5km west of the site (JNCC website), which could explain the high number of calls in September.

3.6 Value of Habitats

Each transect has been attributed a value based upon the scoring system in Wray *et al.* (2010). For the purposes of the assessment all static detector data has been assumed as commuting.

3.6.1 Transect 1

- The commuting value of the Transect is of **Regional** level.
  Rarest bats such as barbastelle (20) + Individual bats (5) + Moderate number/Not known (4) + Walls, gappy or flailed hedgerows, isolated well grown hedgerows, and moderate field sizes (3) = 32.

- The foraging value of the Transect is of **District** level (at most).
  Common bats such as common pipistrelle (2) + Small numbers of bats (10) + Moderate / unknown numbers of nearby roost sites (4) + Isolated woodland patches, less intensive arable and/or small towns and villages (3) = 19.

3.6.2 Transect 2

- The commuting value of the Transect is of **Regional** level.
  Rarest bats such as barbastelle (20) + Individual bats (5) + Moderate / unknown numbers of nearby roost sites (4) + Walls, gappy or flailed hedgerows, isolated well grown hedgerows, and moderate field sizes (3) = 32.
- The foraging value of the Transect is of **District** level (at most).
  Common bats such as common pipistrelle (2) + Small numbers of bats (10) + Moderate / unknown numbers of nearby roost sites (4) + Isolated woodland patches, less intensive arable and/or small towns and villages (3) = 19.

3.6.3 Transect 3

- The commuting value of the Transect is of **Regional** level.
  Rarest bats such as barbastelle (20) + Individual bats (5) + Moderate / unknown numbers of nearby roost sites (4) + Walls, gappy or flailed hedgerows, isolated well grown hedgerows, and moderate field sizes (3) = 32.
- The foraging value of the Transect is of **District** level (at most).
  Common bats such as common pipistrelle (2) + Small numbers of bats (10) + Moderate / unknown numbers of nearby roost sites (4) + Isolated woodland patches, less intensive arable and/or small towns and villages (3) = 19.

3.6.4 Transect 4

- The commuting value of the Transect is of **Regional** level.
  Rarest bats such as barbastelle (20) + Small number of bats (10) + Moderate / unknown numbers of nearby roost sites (4) + Walls, gappy or flailed hedgerows, isolated well grown hedgerows, and moderate field sizes (3) = 37.
- The foraging value of the Transect is of **Regional** level.
  Rarest bats such as barbastelle (20) + Small number of bats (10) + Moderate / unknown numbers of nearby roost sites (4) Larger or connected woodland blocks, mixed agriculture, and small villages/hamlets (4) = 38.

3.6.5 Transect 7

- The commuting value of the Transect is of **Regional** level.
  Rarest bats such as barbastelle (20) + Individual bats (5) + Moderate / unknown numbers of nearby roost sites (4) + Walls, gappy or flailed hedgerows, isolated well grown hedgerows, and moderate field sizes (3) = 32.
- The foraging value of the Transect is of **Regional** level.
  Rarest bats such as barbastelle (20) + Individual bats (5) + Moderate / unknown numbers of nearby roost sites (4) Larger or connected woodland blocks, mixed agriculture, and small villages/hamlets (4) = 33.

3.7 Results Summary

At least eight bat species were recorded on site and the survey are has been valued at **Regional** level for commuting bats. Transects 4 and 7 have been valued at **Regional** level for foraging bats and Transects 1, 2 and 3 at **District** level. Transects 4 and 7 have been valued at regional level due to the presence of barbastelle bats, with the highest number of foraging and commuting passes recorded in September on Transect 4.

The walked survey results indicated that bats are present across the site, with common pipistrelle being the most frequently recorded species to be commuting and foraging on this site. Soprano pipistrelle were the next most frequently recorded bat species, although the frequency was significantly lower than that of common pipistrelle. Other bat species were recorded fewer than ten times on each survey. Barbastelle bats were recorded on one occasion during the walked transects, in October on Transect 7, a single pass was recorded in the southern arable field.

The listening point surveys allowed for a broader data set to be collected at the pre-determined points. Common pipistrelle was the most frequently recorded species, however, more barbastelle bats were recorded during the listening point surveys. Four passes of barbastelle were recorded at Transect 4 in August, two passes were recorded at Transect 3 in October and two passes were recorded at Transect 7 in October. There were also a higher number of *Myotis* species recorded during at the listening points.

The static detector surveys also confirmed that common pipistrelle are present in the highest numbers, with this species being the most frequently recorded. September recorded the highest number of passes collectively across all transects, however, 1119 common pipistrelle passes recorded on Transect 4 in October. September also had the highest number of barbastelle passes recorded, with 169 passes recorded on Transect 4.

Data collected from each survey technique supports each other, identifying that common pipistrelle are the most frequently recorded species across on the site. High numbers of barbastelle bats were recorded over the three month period, 248 passes recorded in total, indicate the area is regularly used by foraging and commuting barbastelle bats. There is a key foraging and commuting hotspot for bats on the southern section of Transect 1, which is a species rich hedgerow between an arable field and semi-improved natural grassland. Overall, the areas with the highest levels of activity are the boundary features, such as hedgerows and boundaries of woodland parcels (Figure 11).

3.7.1 Further Survey Requirements

When the further surveys have been completed in 2020, a further understanding of the most important features and habitats can be inferred.

Transects 5 and 6 are considered likely to have bats along the River Granta and along the woodland block at the junction of Transect 4 with Transect 5. The River Granta and the woodland block offer suitable features along which bats would commute and forage. The neighbouring Transect 4 results show that bats are utilising the woodland block within that Transect and are thus considered likely to move into the connected woodland block within Transect 5. Also of note is that barbastelle bats have been recorded on Transects 4 and 7 which are located either side of Transects 5 and 6 thus indicating that they are potentially using the habitats within Transects 5 and 6.

Cheveley Park Farms Limited confirmed (Pers. Comm.) that the rearing and shooting of game birds is likely to take place from the end of August 2020 until February 2021 and thus similar site access restrictions are likely to be in place, therefore early communication with Mark is advised so that the appropriate level of survey data can be gathered to inform the proposed development.

Further surveys to be completed in 2020 include walked transects and static surveys of all transect routes between the months of April to July, while transects 5 and 6 will also be completed in August, September and October, if access can be arranged due to the rearing and shooting of game birds which is likely to be undertaken again in 2020.

As barbastelle bats have been recorded within transects 3, 4 and 7 it likely that additional information will need to be gathered for this species including the direction they are flying from and to within the site and at what height etc. so that the appropriate level mitigation can be provided.

Cambridgeshire South East Transport Strategy (CSET): Bat Activity Survey

4.0 References

- Collins, J. (ed.), (2016), *Bat Surveys for Professional Ecologists: Good Practice Guidelines*, 3rd Edition, The Bat Conservation Trust: London.
- JNCC, 1308 Barbastelle *Barbastella barbastellus*, [Online] https://sac.jncc.gov.uk/species/S1308/ - Accessed December 2019
- Plowman Craven, (2018), *Cambridge South East Transport Study*
- *Phase 2: Strategy 1: Preliminary Ecological Appraisal*.
- Wray. S, Wells. D, Long. E & Mitchell-Jones. T. (2010). *Valuing Bats in Ecological Impact Assessment*, In Practice Magazine December 2010, pp. 23-25.

FIGURES

Figure 1a – Site Location Plan
Figure 1b – Transect Routes
Figures 2a-2f – Bat Roost Potential Survey
Figures 3a-3b Bat Survey Results – Walked Transect 20/08/2019
Figures 4a-4e Bat Survey Results – Walked Transect 25/09/2019
Figures 5a-5c Bat Survey Results – Walked Transect 16/10/2019
Figures 6a-6b Bat Survey Results – Walked Transect 28/10/2019
Figures 7a-7b Bat Survey Results – Listening Points 20/08/2019
Figures 8a-8e Bat Survey Results – Listening Points 25/09/2019
Figures 9a-9c Bat Survey Results – Listening Points 16/10/2019
Figures 10a-10b Bat Survey Results – Listening Points 28/10/2019
Figure 11 – Bat Heat Map – Summary

Rev	Date	Notes
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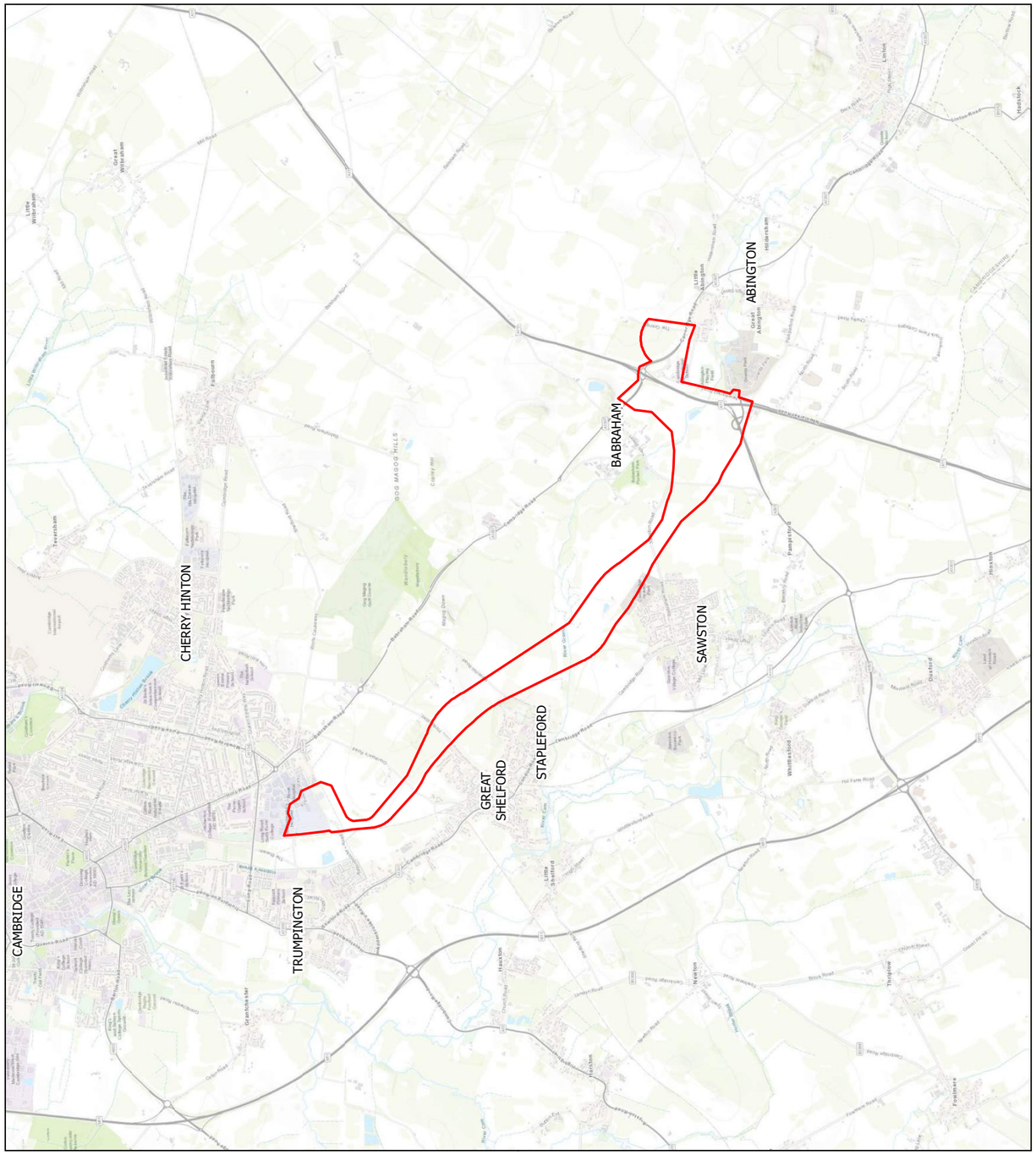
Site boundary

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Site Location Plan

CSET
Greater Cambridge Partnership

Scale at A3: 1:50,000	Project No: A113521	Drawing No: Figure 1a	Revision: A
Drawn by: Ben Blowers	Drawn date: 05/02/2020	Approved by: Rachel Sore	



Rev	Date	Notes
A	04/06/20	Initial map production

Legend

- Site boundary
- Transect route 1
- Transect route 2
- Transect route 3
- Transect route 4
- Transect route 5
- Transect route 6
- Transect route 7
- Static detector location

Static detectors 5 and 6 were not done due to access issues.

0 250 500 1,000 Metres

Transect Routes and Static Locations

CSET
Greater Cambridge Partnership

Scale at A3:	Project No:	Drawing No:	Revision:
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Drawn by:	**Drawn date:**	**Approved by:**	
Ben Blowers	04/06/2020	David Goddard	

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Rev	Date	Notes
A	06/11/19	Initial map production

Legend

- Site boundary

Woodland blocks bat roost potential

- Moderate bat roost potential
- Low bat roost potential
- Negligible bat roost potential

Scattered tree bat roost potential

- Negligible bat roost potential

0 62.5 125 250 Metres

Bat Roost Potential Survey Map

CSET
Greater Cambridge Partnership

Scale at A3:	Project No:	Drawing No:	Revision:
1:6,400	A113521	Figure 2a	A
Drawn by:	**Drawn date:**	**Approved by:**	
Ben Blowers	06/11/2019	Tim Lees	

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Rev	Date	Notes
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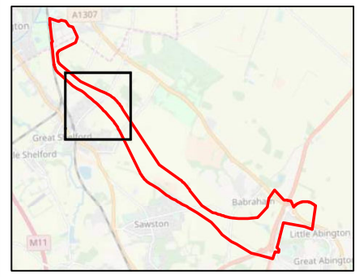
- Site boundary

Woodland blocks bat roost potential

- High bat roost potential
- Moderate bat roost potential
- Low bat roost potential

Scattered tree bat roost potential

- Low bat roost potential



0 62.5 125 250 Metres

Bat Roost Potential Survey Map

CSET
Greater Cambridge Partnership

Scale at A3:	Project No:	Drawing No:	Revision:
1:6,400	A113521	Figure 2b	A

Drawn by:	Drawn date:	Approved by:
Ben Blowers	06/11/2019	Tim Lees

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Rev	Date	Notes
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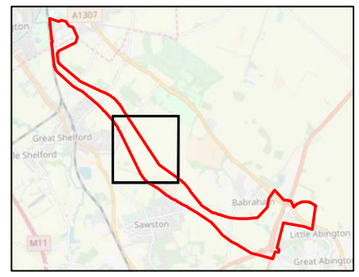
- Site boundary

Woodland blocks bat roost potential

- Moderate bat roost potential
- Low bat roost potential

Scattered tree bat roost potential

- High bat roost potential
- Moderate bat roost potential
- Negligible bat roost potential



0 62.5 125 250 Metres

Bat Roost Potential Survey Map

CSET
Greater Cambridge Partnership

Scale at A3:	Project No:	Drawing No:	Revision:
1:6,400	A113521	Figure 2c	A

Drawn by:	Drawn date:	Approved by:
Ben Blowers	06/11/2019	Tim Lees

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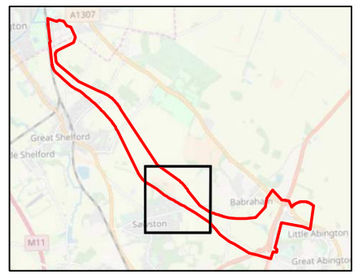
- Site boundary

Woodland blocks bat roost potential

- Moderate bat roost potential
- Low bat roost potential

Scattered tree bat roost potential

- Moderate bat roost potential
- Negligible bat roost potential



0 62.5 125 250 Metres

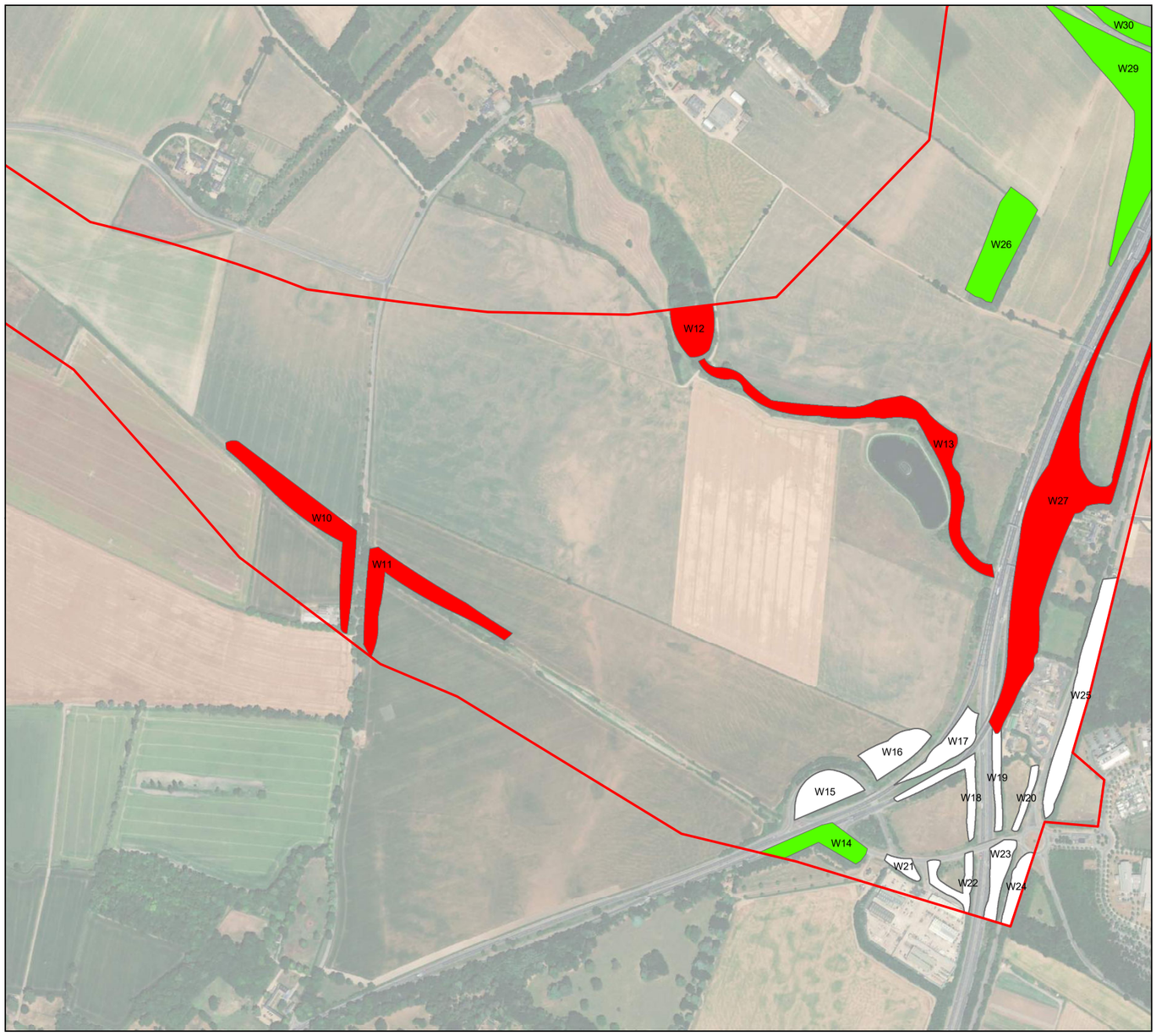
Bat Roost Potential Survey Map

CSET
Greater Cambridge Partnership

Scale at A3:	Project No:	Drawing No:	Revision:
1:6,400	A113521	Figure 2d	A

Drawn by:	Drawn date:	Approved by:
Ben Blowers	06/11/2019	Tim Lees

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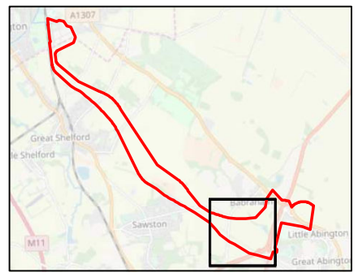
Rev	Date	Notes
A	06/11/19	Initial map production

Legend

- Site boundary

Woodland blocks bat roost potential

- High bat roost potential
- Low bat roost potential
- Negligible bat roost potential



0 62.5 125 250 Metres

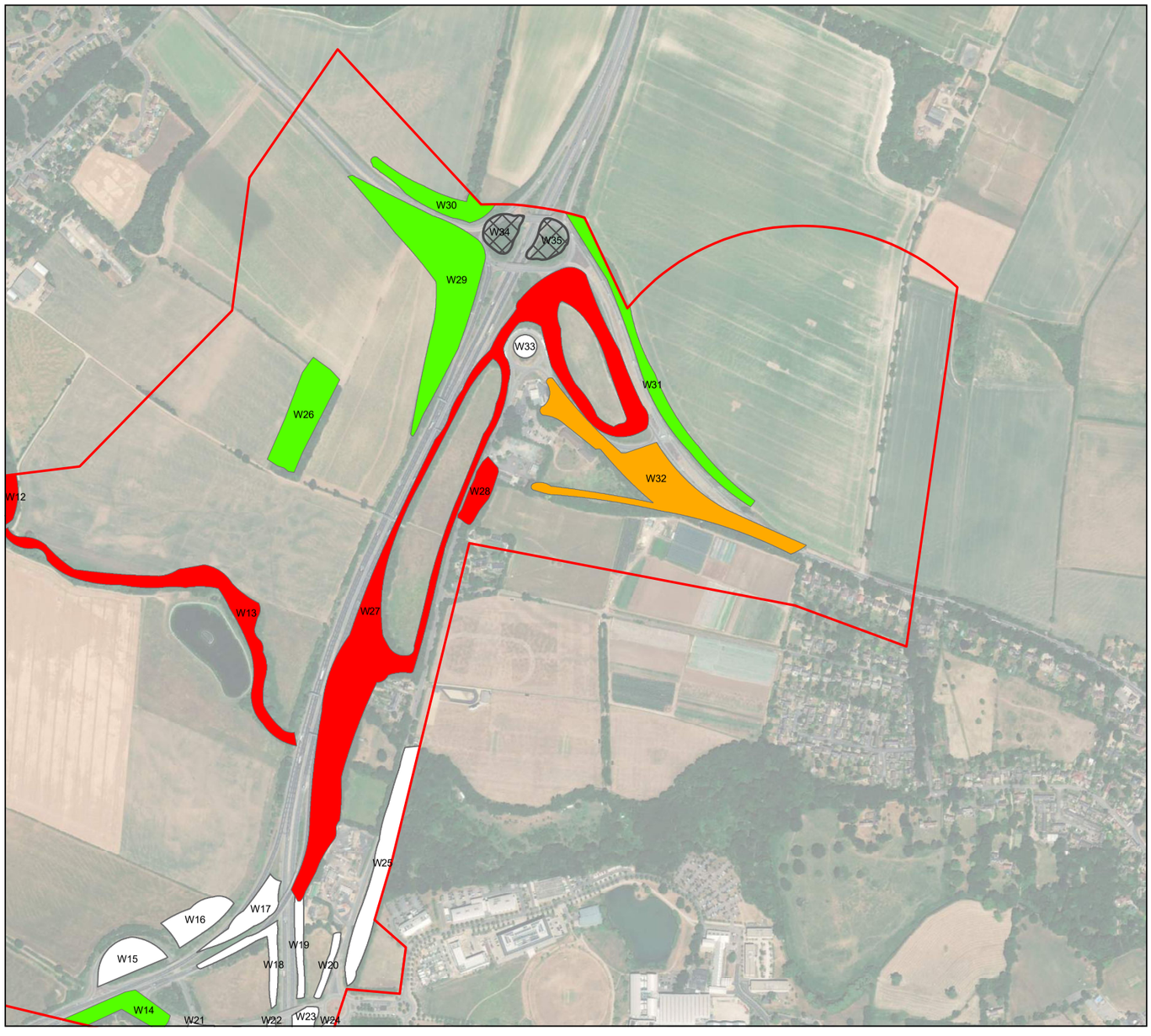
Bat Roost Potential Survey Map

CSET
Greater Cambridge Partnership

Scale at A3:	Project No:	Drawing No:	Revision:
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Drawn by:	Drawn date:	Approved by:
Ben Blowers	06/11/2019	Tim Lees

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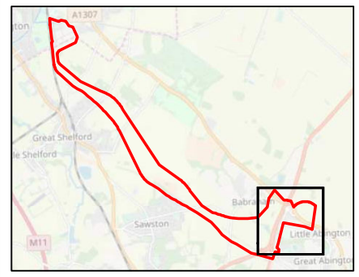
Rev	Date	Notes
A	06/11/19	Initial map production

Legend

- Site boundary

Woodland blocks bat roost potential

- High bat roost potential
- Moderate bat roost potential
- Low bat roost potential
- Negligible bat roost potential
- Not assessed for bat roost potential



0 62.5 125 250 Metres

Bat Roost Potential Survey Map

CSET
Greater Cambridge Partnership

Scale at A3:	Project No:	Drawing No:	Revision:
1:6,400	A113521	Figure 2f	A

Drawn by:	Drawn date:	Approved by:
Ben Blowers	06/11/2019	Tim Lees

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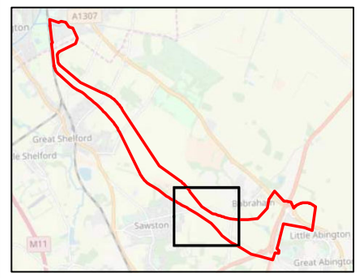
Rev	Date	Notes
A	29/11/19	Initial map production

Legend

- Site boundary
- Transect route 4
- Static detector location

Number of calls

- 0
- 1 - 35



0 62.5 125 250 Metres

Bat Survey Results - Walked Transect 4 20/08/2019

CSET
Greater Cambridge Partnership

Scale at A3:	Project No:	Drawing No:	Revision:
1:5,500	A113521	Figure 3a	A

Drawn by:	Drawn date:	Approved by:
Maddie Errington	29/11/2019	Jo Sykes

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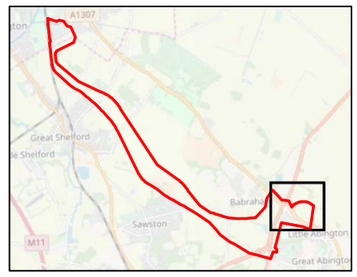
Rev	Date	Notes
A	29/11/19	Initial map production

Legend

- Site boundary
- Transect route 7
- Static detector location

Number of calls

- 0
- 1 - 35
- 36 - 85
- 86 - 135



0 50 100 200 Metres

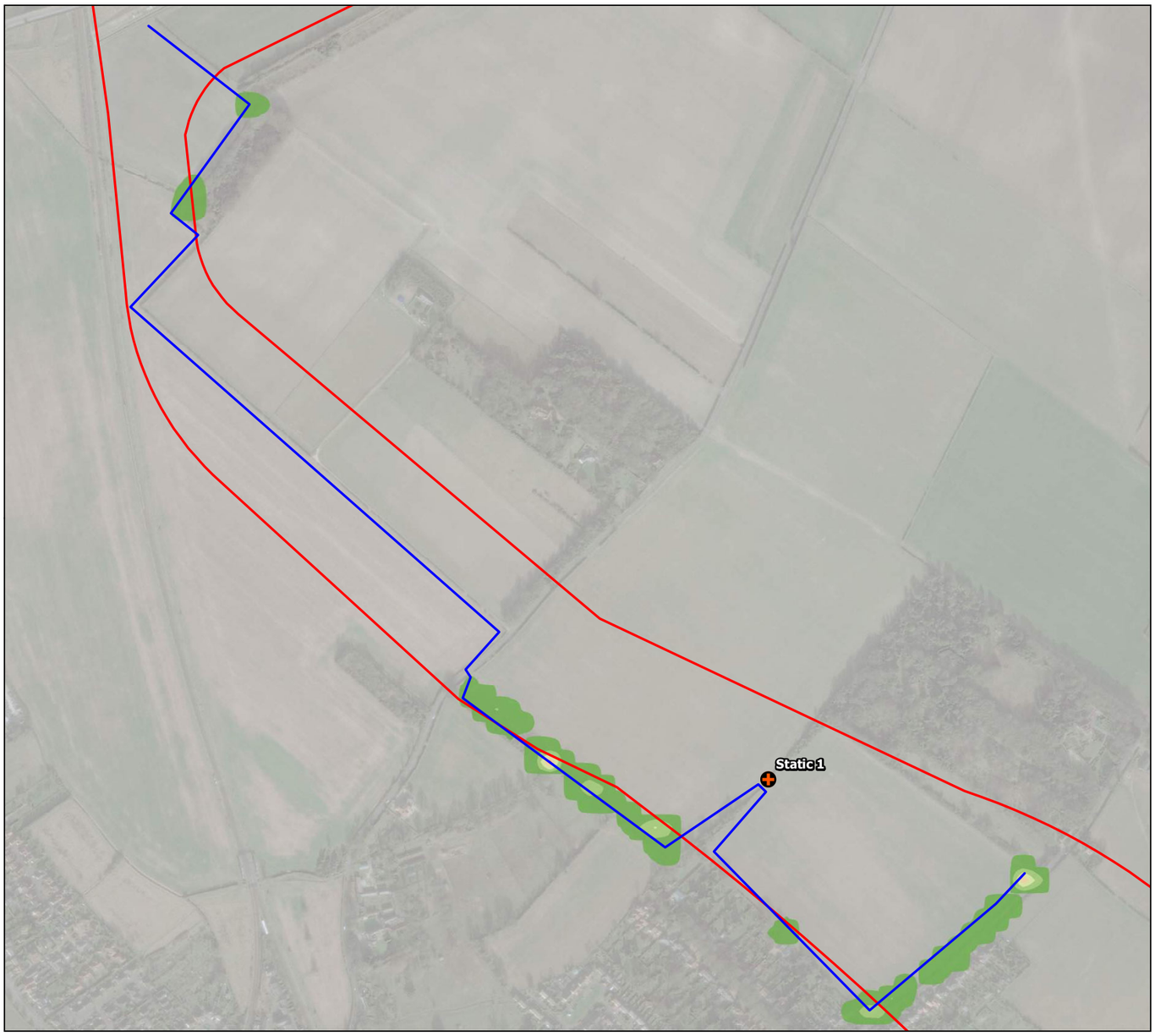
Bat Survey Results - Walked Transect 7 20/08/2019

CSET
Greater Cambridge Partnership

Scale at A3:	Project No:	Drawing No:	Revision:
1:4,500	A113521	Figure 3b	A

Drawn by:	Drawn date:	Approved by:
Maddie Errington	29/11/2019	Jo Sykes

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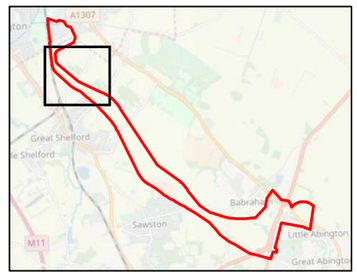
Rev	Date	Notes
A	29/11/19	Initial map production

Legend

- Site boundary
- Transect route 1
- Static detector location

Number of calls

- 0
- 1 - 35
- 36 - 85
- 86 - 135
- 136 - 185
- 186 - 235



0 62.5 125 250 Metres

Bat Survey Results - Walked Transect 1 25/09/2019

CSET
Greater Cambridge Partnership

Scale at A3:	Project No:	Drawing No:	Revision:
1:5,500	A113521	Figure 4a	A

Drawn by:	Drawn date:	Approved by:
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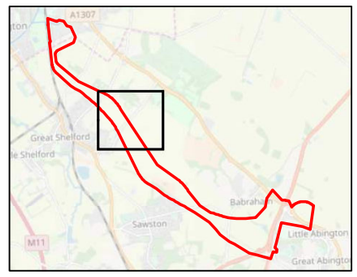
Rev	Date	Notes
A	29/11/19	Initial map production

Legend

- Site boundary
- Transect route 2
- Static detector location

Number of calls

- 0
- 1 - 35
- 36 - 85
- 86 - 135



0 62.5 125 250 Metres

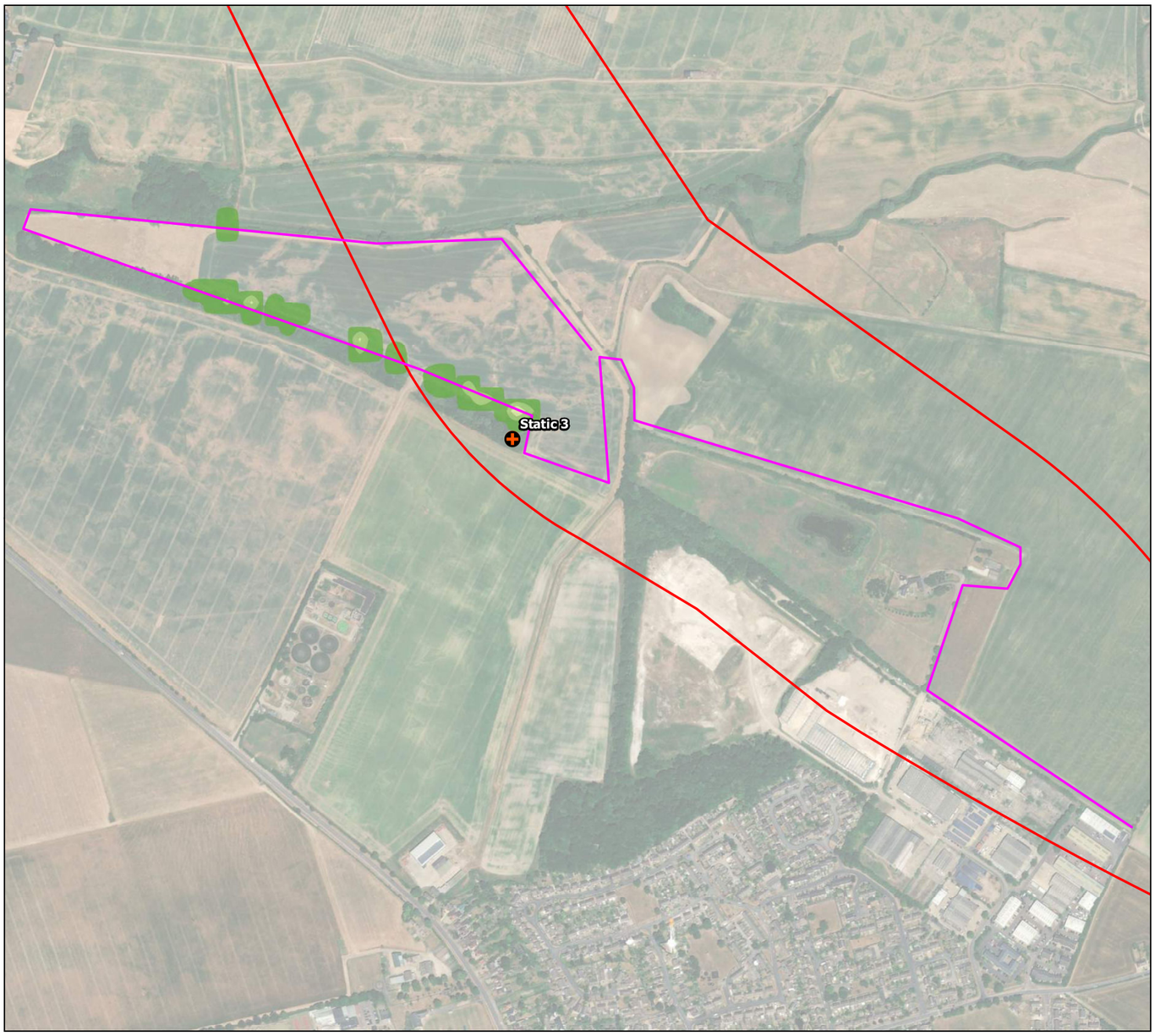
Bat Survey Results - Walked Transect 2 25/09/2019

CSET
Greater Cambridge Partnership

Scale at A3:	Project No:	Drawing No:	Revision:
1:5,500	A113521	Figure 4b	A

Drawn by:	Drawn date:	Approved by:
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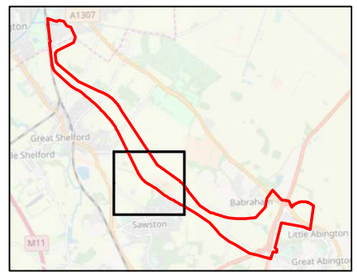
Rev	Date	Notes
A	29/11/19	Initial map production

Legend

- Site boundary
- Transect route 3
- Static detector location

Number of calls

- 0
- 1 - 35
- 36 - 85
- 86 - 135
- 136 - 185



0 62.5 125 250 Metres

Bat Survey Results - Walked Transect 3 25/09/2019

CSET
Greater Cambridge Partnership

Scale at A3:	Project No:	Drawing No:	Revision:
1:6,000	A113521	Figure 4c	A

Drawn by:	Drawn date:	Approved by:
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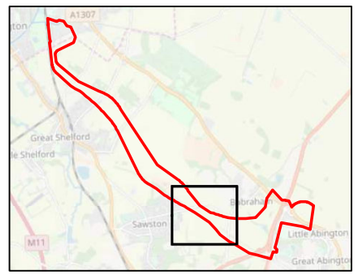
Rev	Date	Notes
A	29/11/19	Initial map production

Legend

- Site boundary
- Transect route 4
- Static detector location

Number of calls

- 0
- 1 - 35
- 36 - 85
- 86 - 135
- 136 - 185



0 62.5 125 250 Metres

Bat Survey Results - Walked Transect 4 25/09/2019

CSET
Greater Cambridge Partnership

Scale at A3:	Project No:	Drawing No:	Revision:
1:5,500	A113521	Figure 4d	A

Drawn by:	Drawn date:	Approved by:
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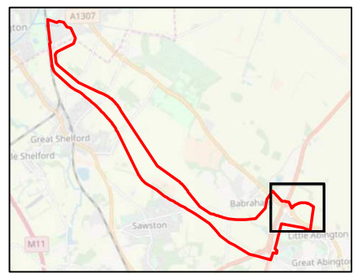
Rev	Date	Notes
A	29/11/19	Initial map production

Legend

- Site boundary
- Transect route 7
- Static detector location

Number of calls

- 0
- 1 - 35
- 36 - 85



0 50 100 200 Metres

Bat Survey Results - Walked Transect 7 25/09/2019

CSET
Greater Cambridge Partnership

Scale at A3:	Project No:	Drawing No:	Revision:
1:4,500	A113521	Figure 4e	A

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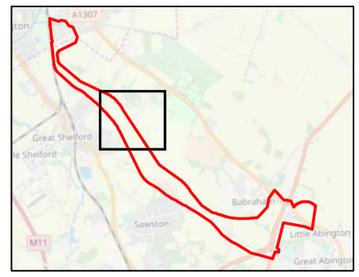
Rev	Date	Notes
A	29/11/19	Initial map production

Legend

- Site boundary
- Transect route 2
- Static detector location

Number of calls

- 0
- 1 - 35
- 36 - 85
- 86 - 135
- 136 - 185
- 186 - 235
- 236 - 285



0 62.5 125 250 Metres

Bat Survey Results - Walked Transect 2 16/10/2019

CSET
Greater Cambridge Partnership

Scale at A3:	Project No:	Drawing No:	Revision:
1:5,500	A113521	Figure 5a	A

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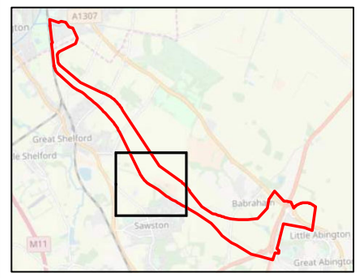
Rev	Date	Notes
A	29/11/19	Initial map production

Legend

- Site boundary
- Transect route 3
- Static detector location

Number of calls

- 0
- 1 - 35
- 36 - 85



0 62.5 125 250 Metres

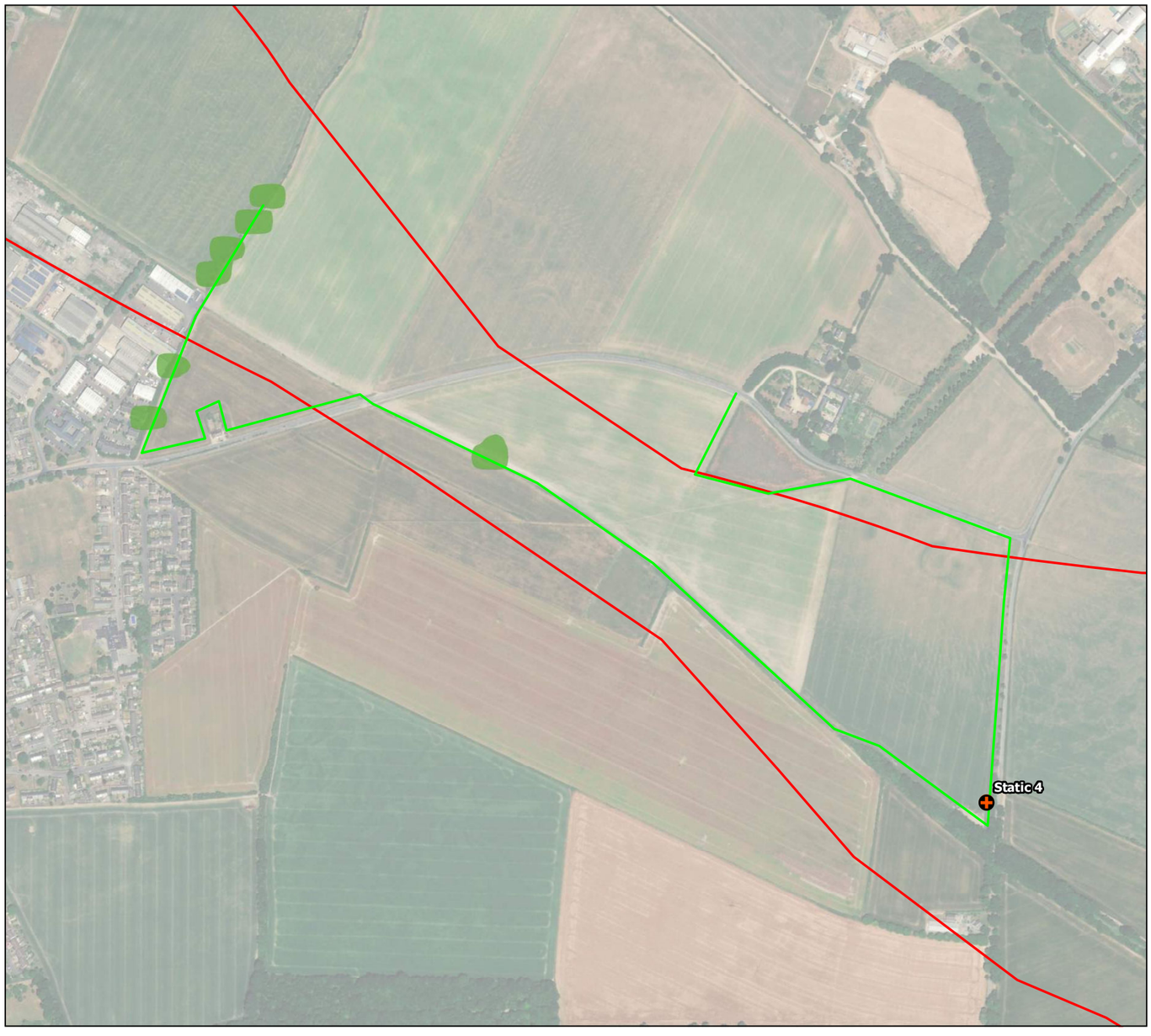
Bat Survey Results - Walked Transect 3 16/10/2019

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Greater Cambridge Partnership

Scale at A3:	Project No:	Drawing No:	Revision:
1:6,000	A113521	Figure 5b	A

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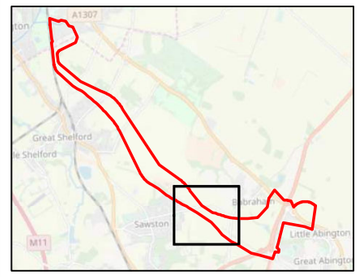
Rev	Date	Notes
A	29/11/19	Initial map production

Legend

- Site boundary
- Transect route 4
- Static detector location

Number of calls

- 0
- 1 - 35



0 62.5 125 250 Metres

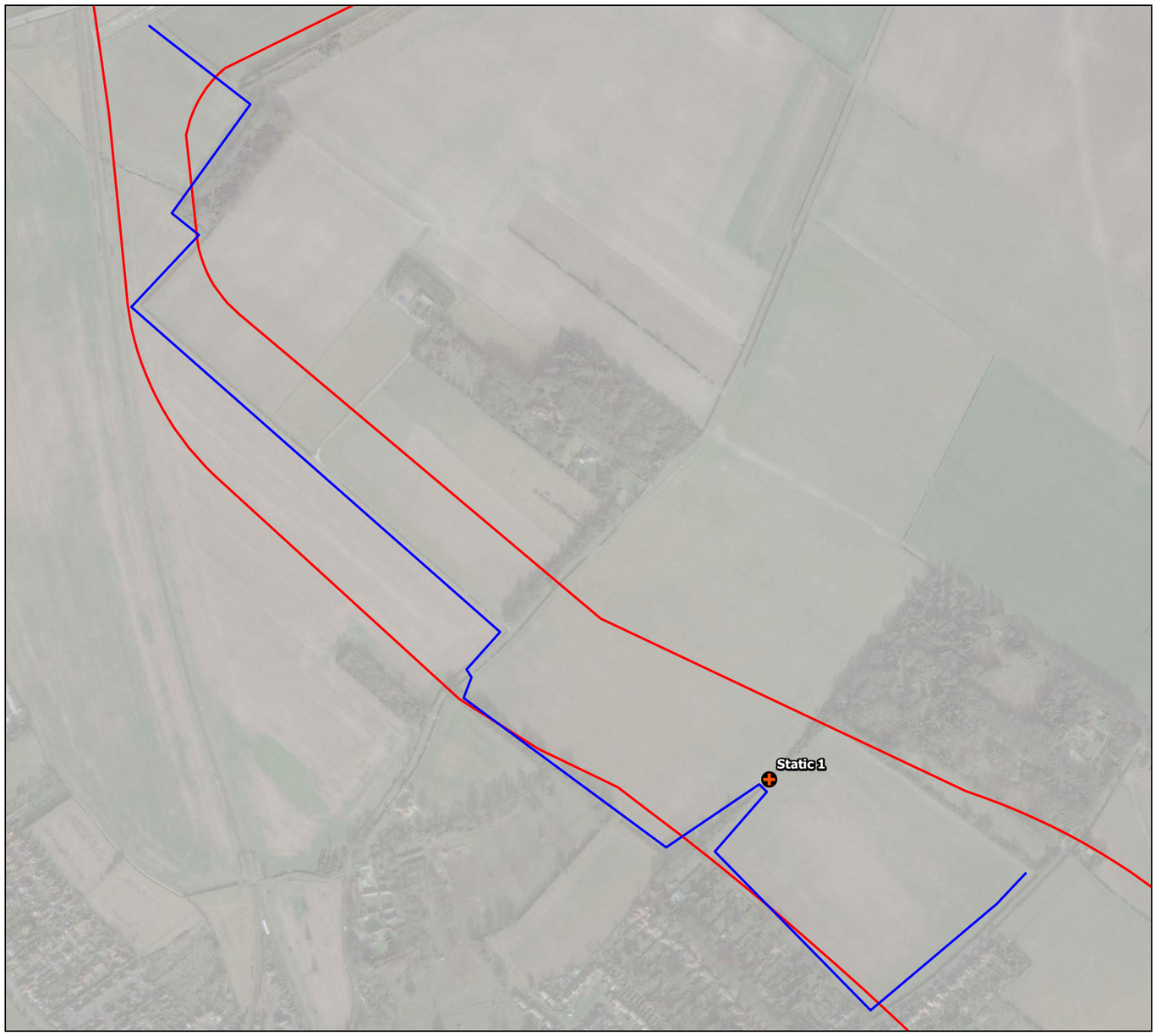
Bat Survey Results - Walked
Transect 4 16/10/2019

CSET
Greater Cambridge Partnership

Scale at A3:	Project No:	Drawing No:	Revision:
1:5,500	A113521	Figure 5c	A

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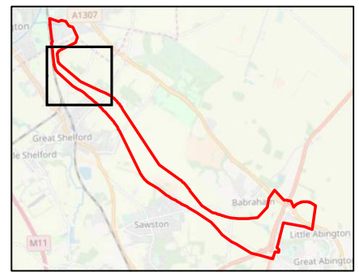


Rev	Date	Notes
A	29/11/19	Initial map production

Legend

- Site boundary
- Transect route 1
- Static detector location

No bat data was recorded
15:36 and before



0 62.5 125 250 Metres

Bat Survey Results - Walked
Transect 1 28/10/2019

CSET
Greater Cambridge Partnership

Scale at A3:	Project No:	Drawing No:	Revision:
1:5,500	A113521	Figure 6a	A

Drawn by:	Drawn date:	Approved by:
Maddie Errington	29/11/2019	Jo Sykes

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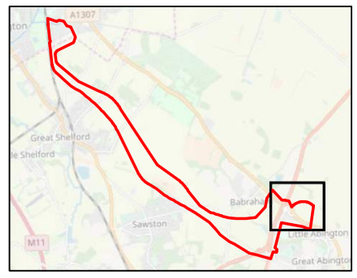
Rev	Date	Notes
A	29/11/19	Initial map production

Legend

- Site boundary
- Transect route 7
- Static detector location

Number of calls

- 0
- 1 - 35



0 50 100 200 Metres

Bat Survey Results - Walked Transect 7 28/10/2019

CSET
Greater Cambridge Partnership

Scale at A3:	Project No:	Drawing No:	Revision:
1:4,500	A113521	Figure 6b	A

Drawn by:	Drawn date:	Approved by:
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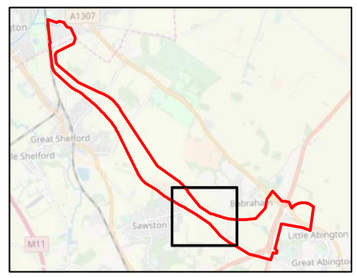
Rev	Date	Notes
A	29/11/19	Initial map production

Legend

- Site boundary
- Transect route 4
- Static detector location
- Listening points

Number of calls

- 0
- 1 - 35
- 36 - 85
- 86 - 135



0 62.5 125 250 Metres

Bat Survey Results - Listening Points Transect 4 20/08/2019

CSET
Greater Cambridge Partnership

Scale at A3:	Project No:	Drawing No:	Revision:
1:5,500	A113521	Figure 7a	A

Drawn by:	Drawn date:	Approved by:
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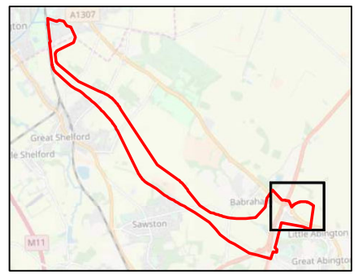
Rev	Date	Notes
A	29/11/19	Initial map production

Legend

- Site boundary
- Transect route 7
- Static detector location
- Listening points

Number of calls

- 0
- 1 - 35



0 50 100 200 Metres

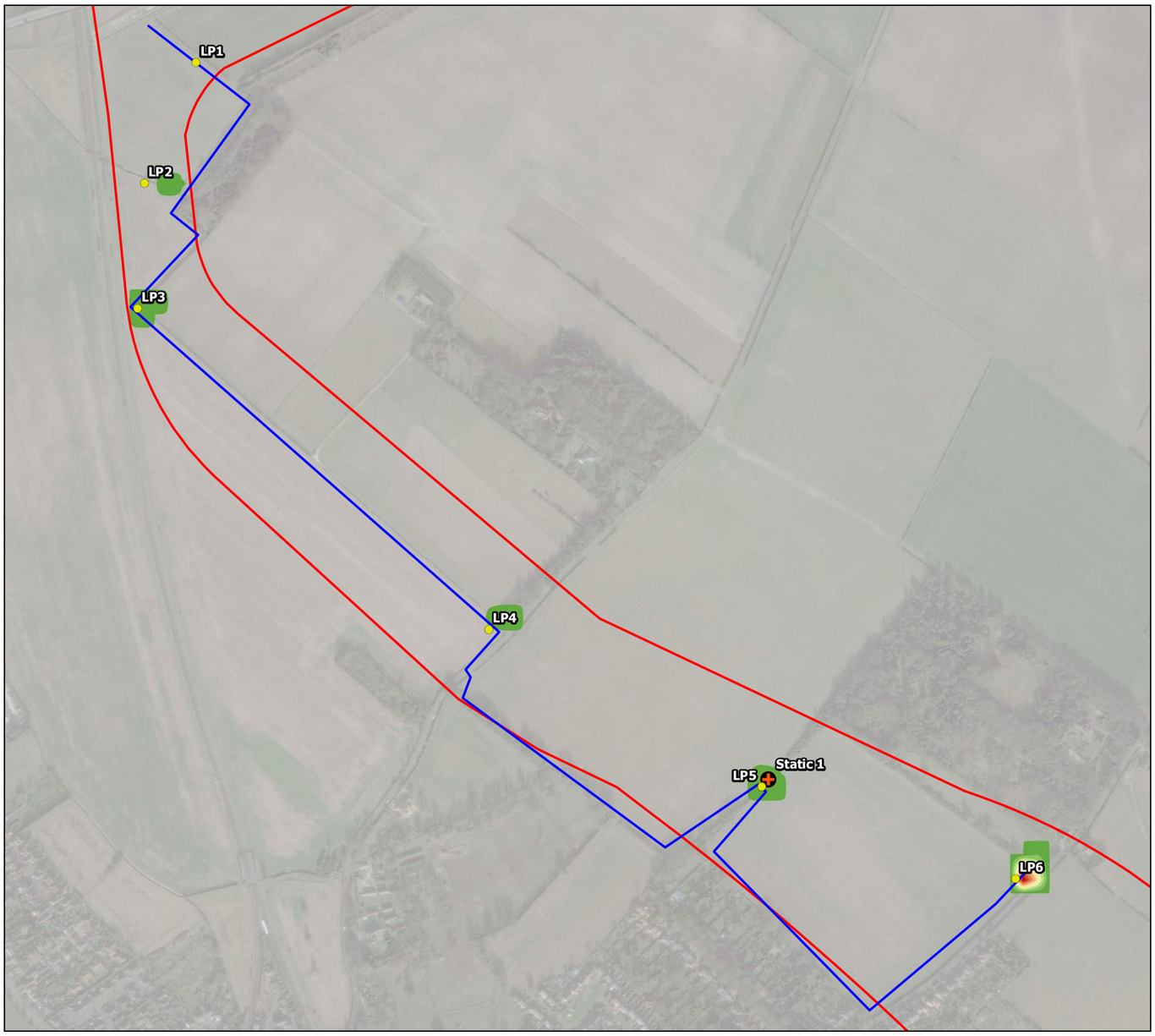
Bat Survey Results - Listening Points
Transect 7 20/08/2019

CSET
Greater Cambridge Partnership

Scale at A3:	Project No:	Drawing No:	Revision:
1:4,500	A113521	Figure 7b	A

Drawn by:	Drawn date:	Approved by:
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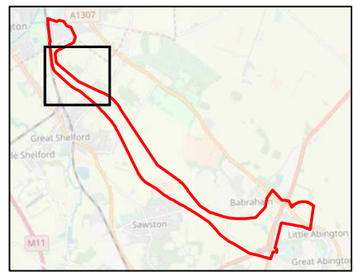
Rev	Date	Notes
A	29/11/19	Initial map production

Legend

- Site boundary
- Transect route 1
- Static detector location
- Listening points

Number of calls

- 0 - 1
- 1 - 179
- 180 - 357
- 358 - 536
- 537 - 714
- 715 - 893
- 894 - 1,071
- 1,072 - 1,250
- 1,251 - 1,428
- 1,429 - 1,607



0 62.5 125 250 Metres

Bat Survey Results - Listening Points
Transect 1 25/09/2019

CSET
Greater Cambridge Partnership

Scale at A3:	Project No:	Drawing No:	Revision:
1:5,500	A113521	Figure 8a	A

Drawn by:	Drawn date:	Approved by:
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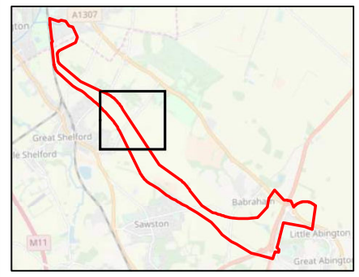
Rev	Date	Notes
A	29/11/19	Initial map production

Legend

- Site boundary
- Transect route 2
- Static detector location
- Listening points

Number of calls

- 0
- 1 - 35
- 36 - 85



0 62.5 125 250 Metres

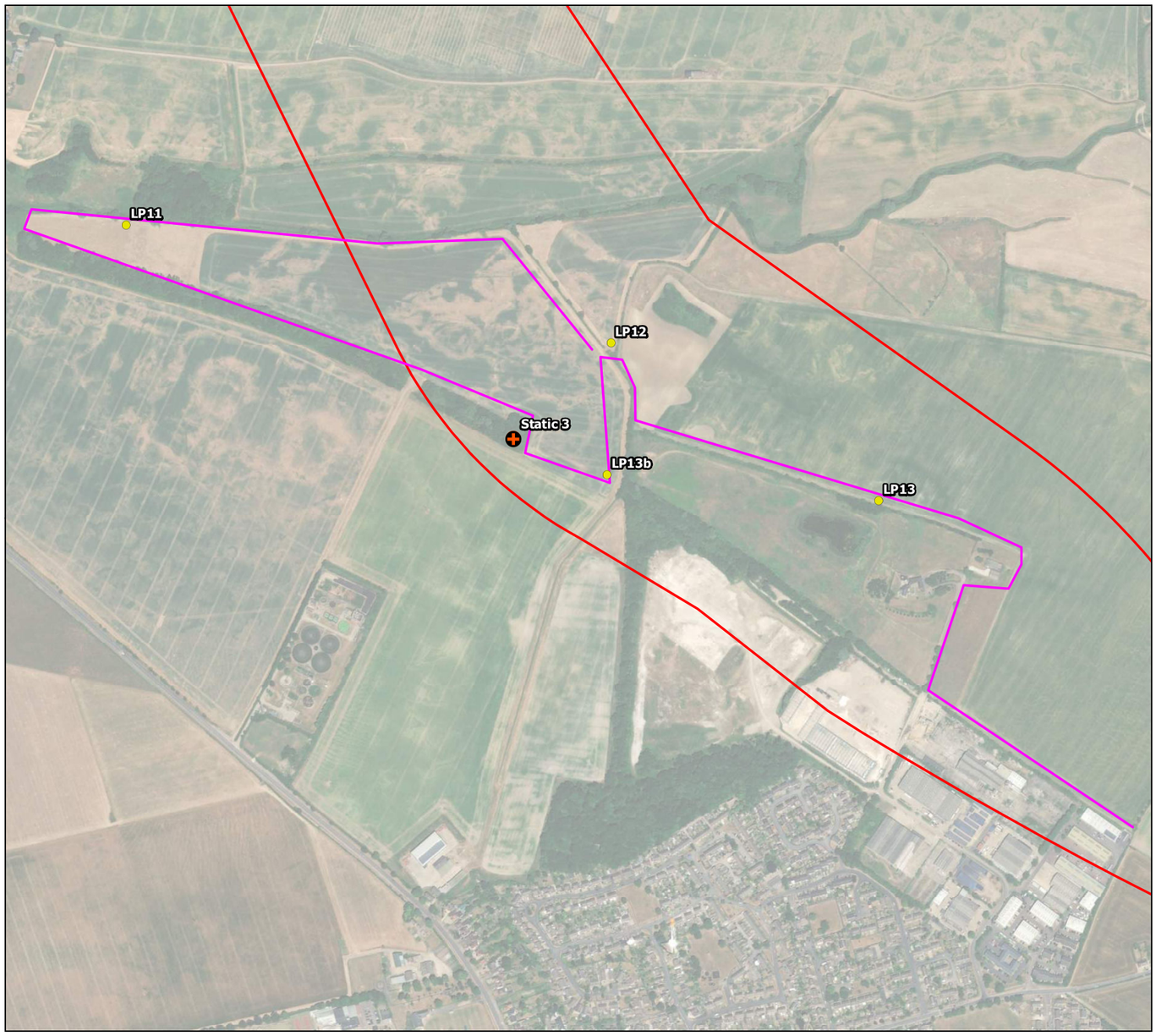
Bat Survey Results - Listening Points Transect 2 25/09/2019

CSET
Greater Cambridge Partnership

Scale at A3:	Project No:	Drawing No:	Revision:
1:5,500	A113521	Figure 8b	A

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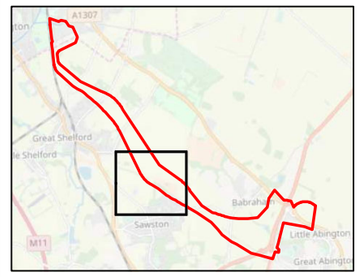


Rev	Date	Notes
A	29/11/19	Initial map production

Legend

- Site boundary
- Transect route 3
- Static detector location
- Listening points

No bat data was recorded
20:22 and before



0 62.5 125 250 Metres

Bat Survey Results - Listening Points Transect 3 25/09/2019

CSET
Greater Cambridge Partnership

Scale at A3:	Project No:	Drawing No:	Revision:
1:6,000	A113521	Figure 8c	A

Drawn by:	Drawn date:	Approved by:
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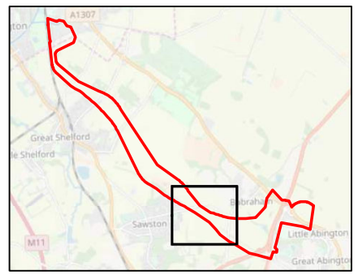


Rev	Date	Notes
A	29/11/19	Initial map production

Legend

- Site boundary
- Transect route 4
- Static detector location
- Listening points

No bat data was recorded
18:45 and before



0 62.5 125 250 Metres

Bat Survey Results - Listening Points
Transect 4 25/09/2019

CSET
Greater Cambridge Partnership

Scale at A3:	Project No:	Drawing No:	Revision:
1:5,500	A113521	Figure 8d	A

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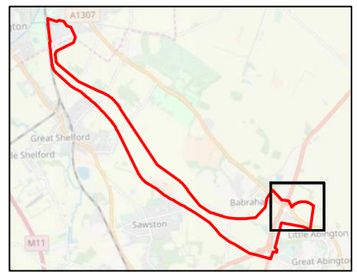


Rev	Date	Notes
A	29/11/19	Initial map production

Legend

- Site boundary
- Transect route 7
- Static detector location
- Listening points

No bat data was recorded
20:24 and before



0 50 100 200 Metres

Bat Survey Results - Listening Points
Transect 7 25/09/2019

CSET
Greater Cambridge Partnership

Scale at A3:	Project No:	Drawing No:	Revision:
1:4,500	A113521	Figure 8e	A

Drawn by:	Drawn date:	Approved by:
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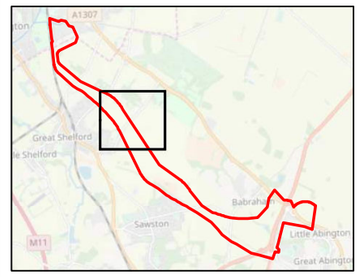


Rev	Date	Notes
A	29/11/19	Initial map production

Legend

- Site boundary
- Transect route 2
- Static detector location
- Listening points

No bat data was recorded
20:10 and after



0 62.5 125 250 Metres

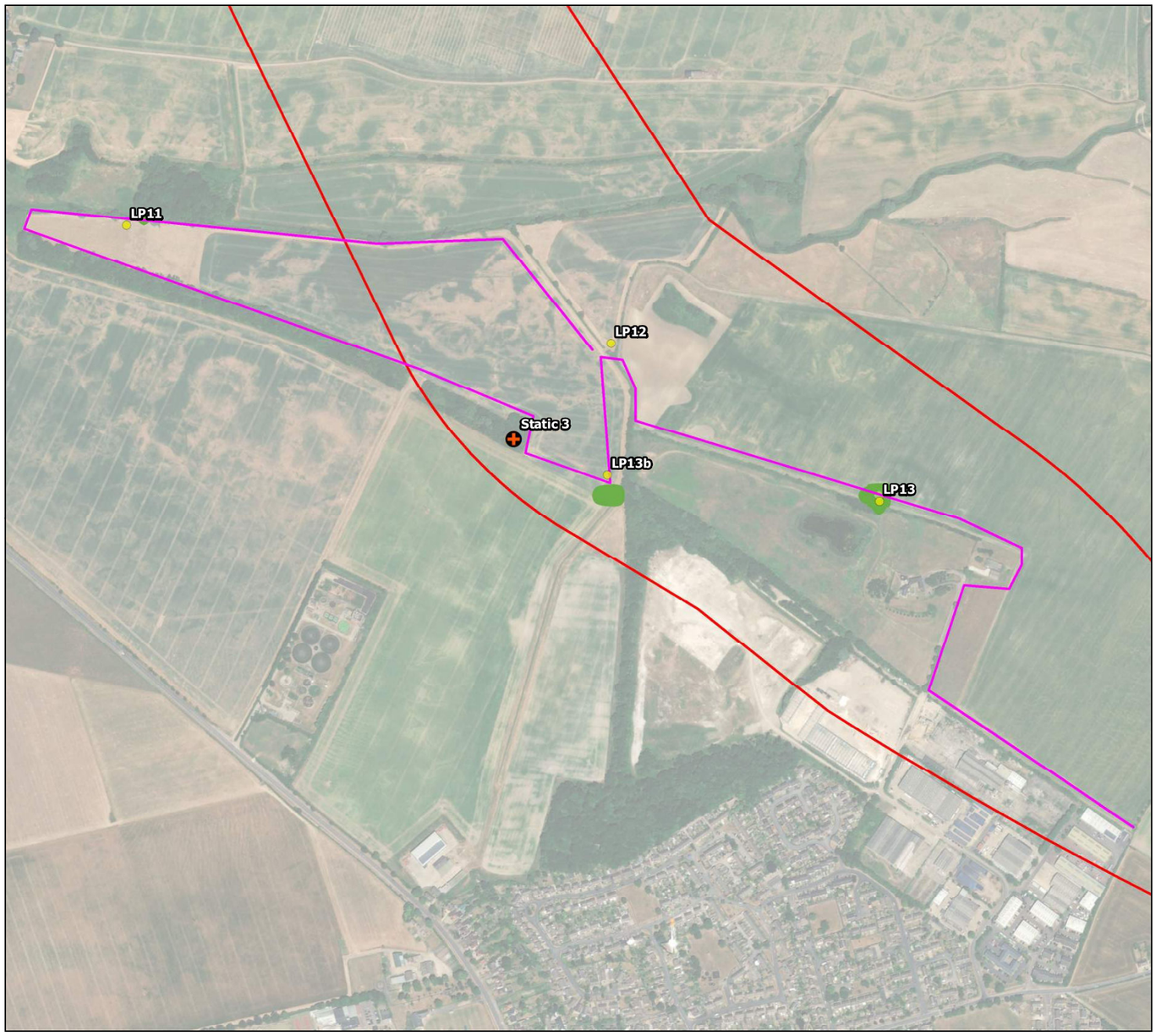
Bat Survey Results - Listening Points
Transect 2 16/10/2019

CSET
Greater Cambridge Partnership

Scale at A3:	Project No:	Drawing No:	Revision:
1:5,500	A113521	Figure 9a	A

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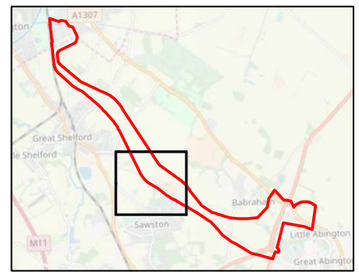
Rev	Date	Notes
A	29/11/19	Initial map production

Legend

- Site boundary
- Transect route 3
- Static detector location
- Listening points

Number of calls

- 0
- 1 - 35
- 36 - 85



0 62.5 125 250 Metres

Bat Survey Results - Listening Points
Transect 3 16/10/2019

CSET
Greater Cambridge Partnership

Scale at A3:	Project No:	Drawing No:	Revision:
1:6,000	A113521	Figure 9b	A

Drawn by:	Drawn date:	Approved by:
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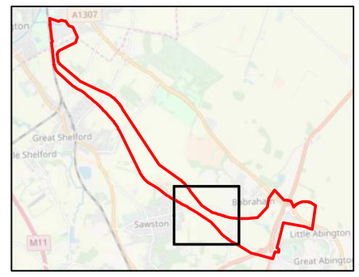
Rev	Date	Notes
A	09/12/19	Initial map production

Legend

- Site boundary
- Transect route 4
- Static detector location
- Listening points

Number of calls

- 0
- 1 - 35
- 36 - 85



0 62.5 125 250 Metres

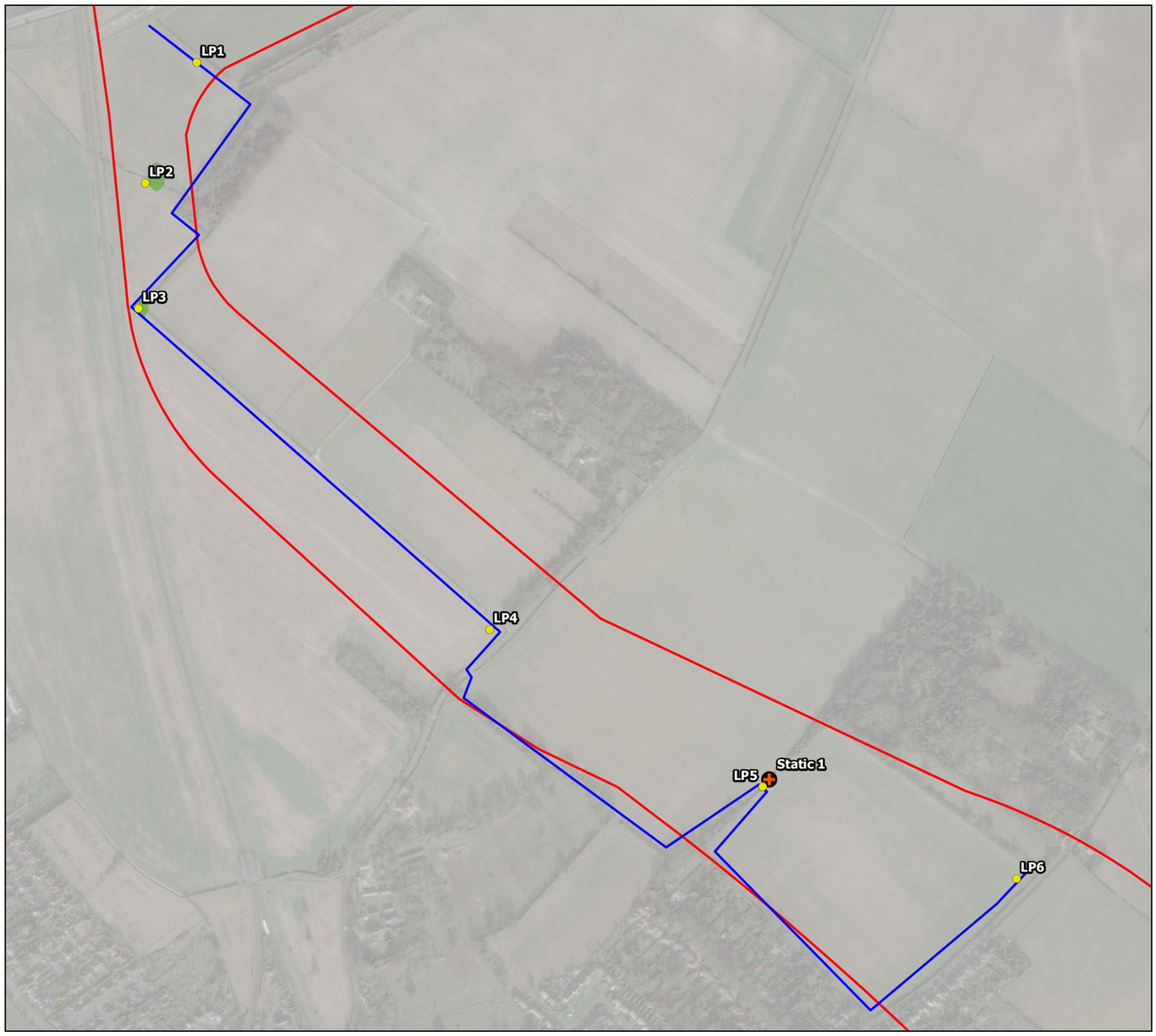
Bat Survey Results - Listening Points
Transect 4 16/10/2019

CSET
Greater Cambridge Partnership

Scale at A3:	Project No:	Drawing No:	Revision:
1:5,500	A113521	Figure 9c	A

Drawn by:	Drawn date:	Approved by:
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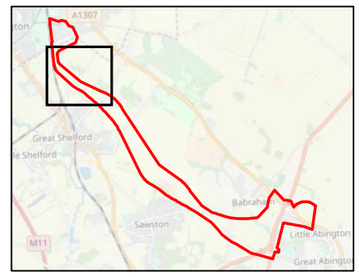
Rev	Date	Notes
A	29/11/19	Initial map production

Legend

- Site boundary
- Transect route 1
- Static detector location
- Listening points

Number of calls

- 0
- 1 - 35



0 62.5 125 250 Metres

Bat Survey Results - Listening Points
Transect 1 28/10/2019

CSET
Greater Cambridge Partnership

Scale at A3:	Project No:	Drawing No:	Revision:
1:5,500	A113521	Figure 10a	A

Drawn by:	Drawn date:	Approved by:
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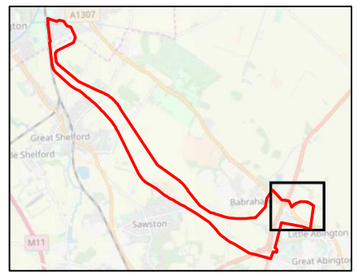
Rev	Date	Notes
A	29/11/19	Initial map production

Legend

- Site boundary
- Transect route 7
- Static detector location
- Listening points

Number of calls

- 0
- 1 - 35



0 50 100 200 Metres

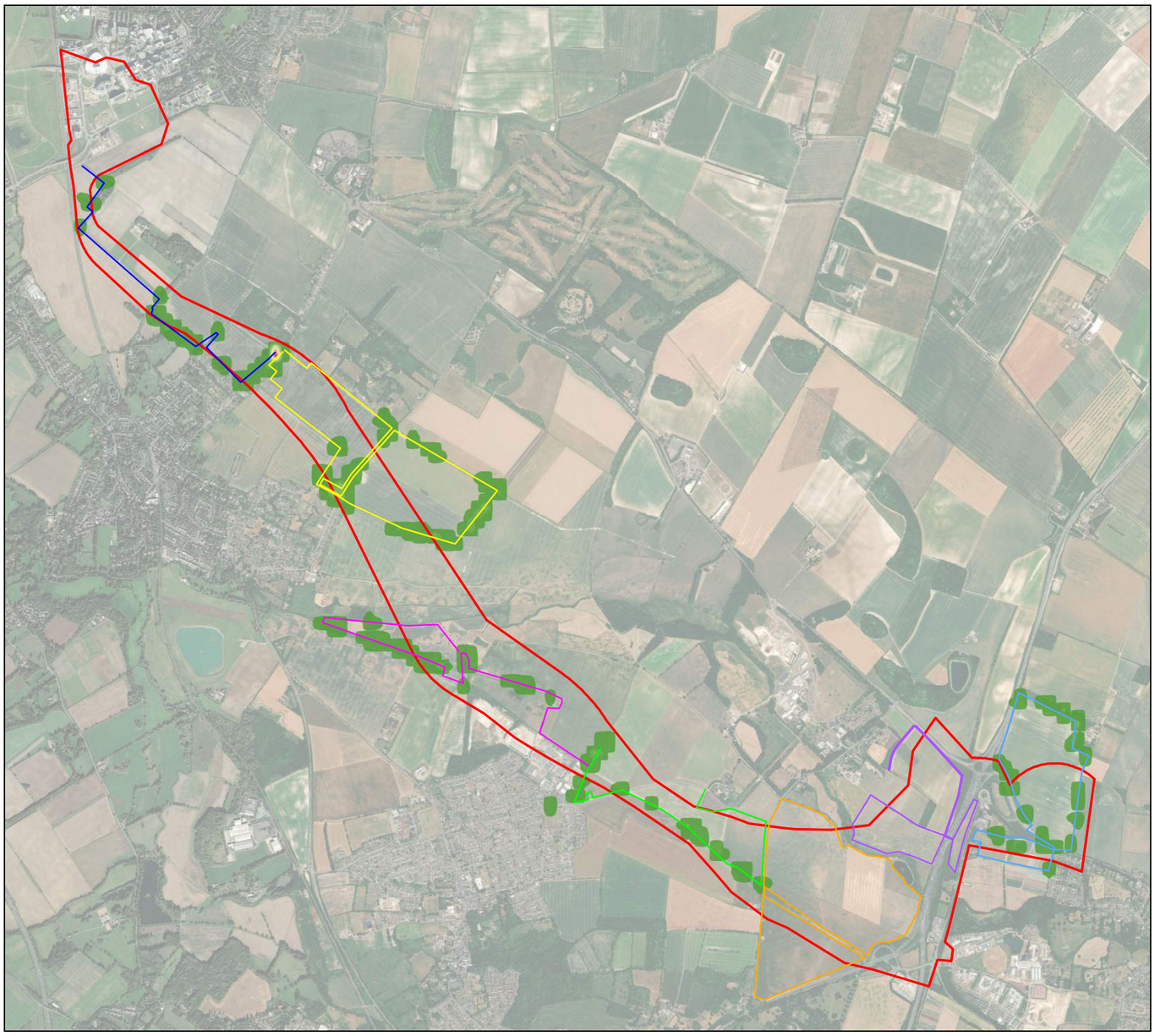
Bat Survey Results - Listening Points Transect 7 28/10/2019

CSET
Greater Cambridge Partnership

Scale at A3:	Project No:	Drawing No:	Revision:
1:4,500	A113521	Figure 10b	A

Drawn by:	Drawn date:	Approved by:
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Rev	Date	Notes
A	09/12/19	Initial map production
B	05/02/20	Added transects & no access

Legend

- Site boundary
- Transect route 1
- Transect route 2
- Transect route 3
- Transect route 4
- Transect route 5 (no access during survey)
- Transect route 6 (no access during survey)
- Transect route 7

Number of calls

- 0
- 1 - 99
- 100 - 199
- 200 - 299
- 300 - 399
- 400 - 499
- 500 - 599
- 600 - 699
- 700 - 799
- 800 - 899
- 900 - 999
- 1,000 - 1,099
- 1,100 - 1,199
- 1,200 - 1,299
- 1,300 - 1,399
- 1,400 - 1,499
- 1,500 - 1,599
- 1,600 - 1,671

0 250 500 1,000 Metres

Bat Heat Map - Summary

CSET
Greater Cambridge Partnership

Scale at A3:	Project No:	Drawing No:	Revision:
1:25,000	A113521	Figure 11	B

Drawn by:	Drawn date:	Approved by:
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Appendix A – Report Conditions

Cambridgeshire South East Transport Strategy (CSET): Bat Activity Survey

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The whole of the report must be read as other sections of the report may contain information which puts into context the findings in any executive summary.

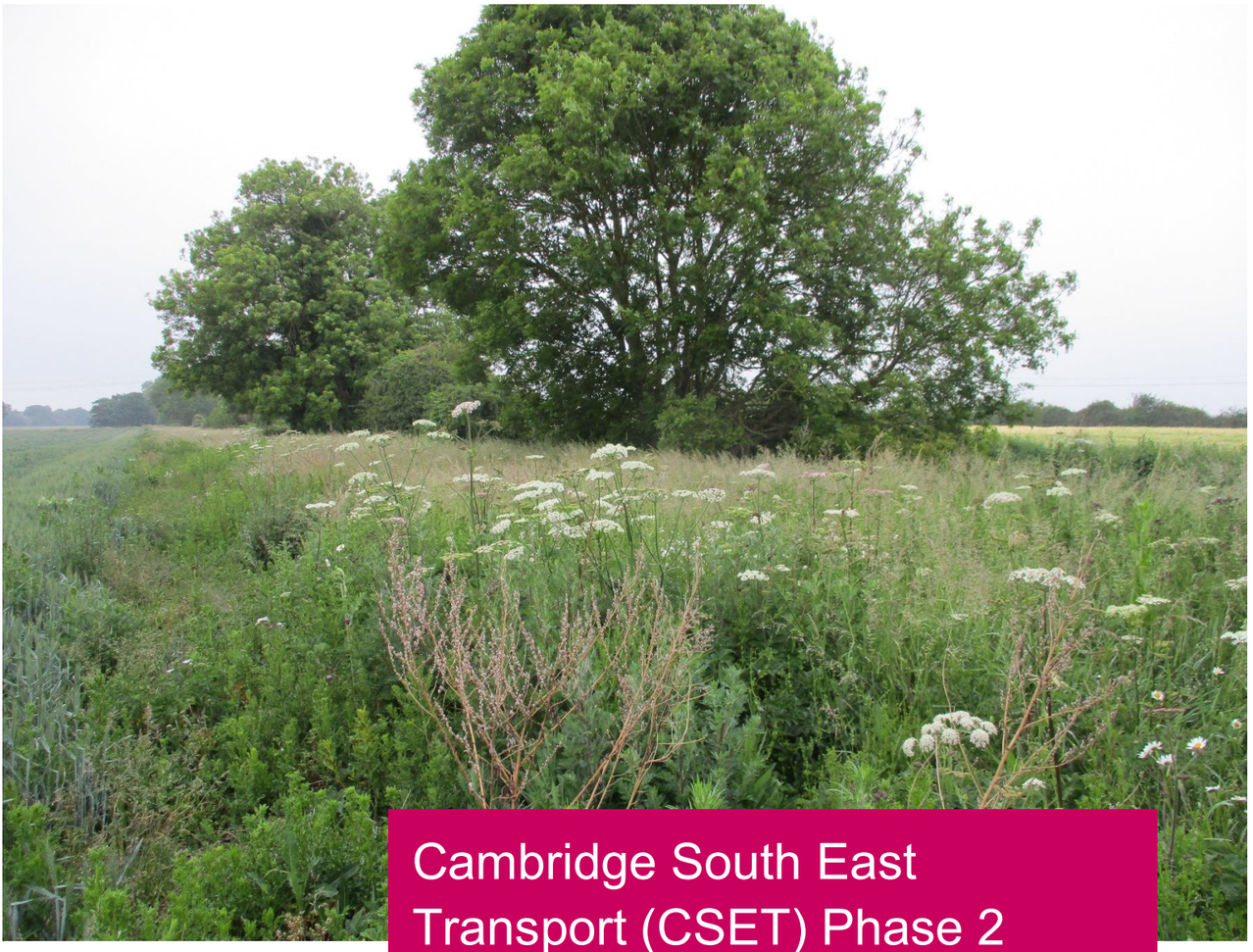
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Greater Cambridgeshire Partnership June 2020
A113521

ecology@wyg.com

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Cambridge South East Transport (CSET) Phase 2 Bat Survey Report

March 2021

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Quality Management

Job No	CS/099797-02		
Project	Cambridgeshire South East Transport (CSET) Phase 2		
Location	Trumpington to Babraham, Cambridgeshire		
Title	Cambridgeshire South East Transport (CSET) Phase 2 Bat Survey Report		
Document Ref	Bat Survey Report	**Issue / Revision**	04
File reference	https://teams.microsoft.com/l/file/232EF6A7-5309-4225-8358-718BAEF8D3D6?tenantId=1edaad83-b2ef-483d-81f1-2c48682f40ec&fileType=docx&objectUrl=https%3A%2F%2Fcapita.sharepoint.com%2Fsites%2FEcology%2FShared%20Documents%2FProjects%2FCSET%20CS099797%2FK.%20-%20Reports%2FA.%20-%20Draft%20Reports%2FBat%20Survey%20Report%2FCSET%20Bat%20Survey%20Report%20Draft.docx&baseUrl=https%3A%2F%2Fcapita.sharepoint.com%2Fsites%2FEcology&serviceName=teams&threadId=19:ef05f643715a4784abe3afa851a7c2bd@thread.skype&groupId=c8a829e7-5255-4d7f-9810-cacf613a46d7		
Date	March 2021		
Prepared by	Thomas Fawley Ecologist	Signature (for file)	
Reviewed by	James Johnston ACIEEM Principal Ecologist	Signature (for file)	
Authorised by	Tabatha Boniface CEnv MCIEEM Ecology Technical Lead	Signature (for file)	

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CAPITA

1. Summary

Capita Real Estate & Infrastructure's Ecologists was commissioned by the Greater Cambridgeshire Partnership to undertake a series of surveys for bats across the route of Phase 2 of the Cambridge South East Transport (CSET) Project between Great Shelford to Sawston and to Babraham, Cambridgeshire (henceforth referred to as the Site).

The surveys have been carried out to provide baseline ecological information for the CSET Phase 2 Project to inform the design and environmental assessment of the proposals

Surveys were carried out between April and October 2020, focussing on the proposed areas of land to be affected by the CSET Phase 2 scheme.

This report details the bat surveys which have been carried out to provide baseline ecological information to inform the impact avoidance and mitigation measures and ultimately the design of the scheme.

The results are summarised as follows. A total of:

- None of the buildings surveyed within close proximity to the scheme were suitable for roosting bats.
- Common pipistrelle, soprano pipistrelle, noctule/serotine/Leisler's (NSL[1]), brown long eared (BLE) bats and, *Myotis* species Bat species were recorded during the activity surveys.
- Five species of bat were recorded during the static detector deployment consisting of common pipistrelle, soprano pipistrelle, NSL, *Myotis* species and barbastelle.
- Daubenton's (TL 51313 49713) and brown long eared bats (TL 51594 49021) identified in the field.
- Two confirmed roosts were recorded in T18 and T23.
- Droppings found in T13 no emergence/re-re-entry recorded.

Transects were undertaken between May and October.

Static detectors were deployed over six months May to October.

[1] A widely used grouping of bat calls for large bats whose calls can overlap in sound analysis

The range of farmland, riparian, woodland, and suburban habitats across the survey area provides a range of foraging, commuting and roosting opportunities for bat species.

2. Introduction

2.1 Background

2.1.1. Capita Real Estate & Infrastructure's Ecologists were commissioned by the Greater Cambridgeshire Partnership (GCP) in March 2020 to undertake a series of bat surveys. These surveys were undertaken in relation to the development of Phase 2 of the Cambridge South East Transport (CSET) Project, (the 'Scheme').

2.1.2. The aim of the bat survey report is to summarise the results of the baseline surveys conducted between April and October 2020 to inform the design of the Scheme, and in conjunction with the Environmental Statement, provide sufficient information to allow the Local Planning Authority (LPA) when deciding whether to grant planning permission for the Scheme, to do so in full knowledge of the likely significant effects on bat species, and any avoidance or mitigation measures that will be required to address any likely significant effects.

2.1.3. It includes the results of all preliminary roost assessments, bat emergence/re-entry and bat activity surveys.

2.2 Project Description and Purpose of the Scheme

2.2.1. The Cambridge South East Transport (CSET) Phase 2 project aims to create a new public transport route which would link the Cambridge Biomedical Campus via Great Shelford, Stapleford and Sawston to a new travel hub near the A11/A1307 with connections to Babraham and Granta Park.

2.2.2. The route would be entirely off-road, only interacting with other traffic at junctions. Junctions between existing roads and the new public transport route would be controlled by traffic lights. Alongside this new public transport route would be a new path for active travel. The section between Babraham and Sawston has been reviewed in terms of its detailed alignment, to reduce the impact on farm operations and reduce impacts on landscape character in the area

2.3 Legislation and Policy

2.3.1. Bats receive protection in the UK as a result of both legislation and planning policies. This section outlines the primary legislation protecting bats. All the information below is relevant to this report and to the work proposed at the development site.

Legislation

2.3.2. Bats are protected under Annex II of the EC Council Directive 92/43/EEC 1992 “Conservation of Natural Habitats and Wild Fauna and Flora” (the Habitats Directive) as a European Protected Species (EPS). This legislation has been transposed into UK legislation through the Conservation of Habitats and Species Regulations 2018.

2.3.3. Regulation 41 of the Conservation of Habitats and Species Regulations 2018 makes it an offence to:

- Deliberately capture, injure, or kill bats
- Deliberately disturb bats, or
- Damage or destroy a breeding site or resting place of a bat; this applies whether bats are present or not. NB - breeding sites and resting places are generally referred to as roosts.

2.3.4. In addition to the above protection, all bat species in the UK are protected under Schedule 5 of the Wildlife & Countryside Act 1981 (as amended). In addition to the above, it lists the following as additional offences:

- Disturbance of an animal whilst it is occupying a place which it uses for shelter or protection. NB - places of shelter or protection are generally referred to as roosts
- Obstruct access to any structure or place which an animal uses for shelter or protection.

2.3.5. In order to permit a development where the above offences are likely to be committed a European Protected Species Licence can be obtained from Natural England where appropriate mitigation is offered to offset the negative impacts to local bat populations.

Natural Environment and Rural Communities (NERC) Act 2006

2.3.6. Section 40 of NERC Act 2006 places a statutory duty on public bodies, such as local authorities, that “every public body must, in exercising its functions have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity”.

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Purpose of the Legislation

2.3.7. The purpose of the legislation is to maintain and restore bat populations within their natural range. This implies that the habitats on which they rely, and the ecology of their life cycles should not be compromised by human activities. Where activities have the potential to compromise bat populations, measures are required to be put in place to avoid impacts or compensate and mitigate for those impacts.

Planning Policy

2.3.8. National Planning Policy is set out by the National Planning Policy Framework (NPPF February 2019) combined with the guidance document Planning for Biodiversity and Geological Conservation: A Guide to Good Practice” (ODPM 2005).

2.3.9. Biodiversity net gains are referenced strongly in terms of developing local planning policy and decision-making for development applications. The environmental test of sustainable development requires planning policy and planning decisions to help to ‘improve biodiversity’ (paragraph 8c).

2.3.10. References to biodiversity net gain elsewhere in the new NPPF (such as paragraph 175d) support the delivery of biodiversity net gain through sustainable development. Net gain for biodiversity is far more prominent than in the previous NPPF and considers a holistic landscape approach to protect, and enhance biodiversity promoting conservation, restoration and enhancement of Priority Habitats (also listed as Habitats of Principal Importance) identified under the NERC Act 2006), ecological networks and the protection and recovery of Priority Species (also listed as Species of Principal Importance) identified under the NERC Act 2006). The NPPF includes requirements for planning authorities to identifying and pursuing opportunities for securing measurable net gains for biodiversity (paragraph 174b).

2.3.11. Protected sites and species are a material consideration in determining planning applications and therefore all information relating to protected sites and species must be submitted with planning submissions for determination of the whole application. The NPPF (paragraph 175) which promotes Local Planning Authorities to assess if significant harm would occur to biodiversity and decide accordingly.

Biodiversity Policy

2.3.12. Section 41 of the NERC Act requires the Secretary of State to draw up a list of Habitats and Species of Principal Importance which should be used to guide decision-makers (which include local authorities) in implementing their duty under Section 40. Several species of bat (listed below) are considered Species of Principal Importance, an important factor when considering proposed developments, in accordance with the NERC Act 2006.

- Soprano pipistrelle *Pipistrellus pygmaeus*
- Brown long-eared *Plecotus auritus*
- Barbastelle *Barbastella barbastellus*
- Bechstein's *Myotis bechsteinii*
- Noctule *Nyctalus noctula*
- Greater horseshoe *Rhinolophus ferrumequinum*
- Lesser horseshoe *Rhinolophus hipposideros.*

2.3.13. Additionally, four species of bat are recognised as local Priority Species in the Cambridgeshire and Peterborough Biodiversity Group LBAP:

- Soprano pipistrelle
- Brown long-eared
- Barbastelle
- Noctule.

2.4 Personnel and Quality Assurance

2.4.1. The surveys were led by experienced ecologists and carried out in accordance with Bat Surveys for Professional Ecologists: Good Practice Guidelines, (3rd ed) (Collins, 2016). Surveys were carried out under the supervision of Capita senior staff and bat licensed ecologists Suzannah Spencer (Licence ref: 2015-15891-CLS-CLS), James Johnston (2017-30517-CLS-CLS).

2.4.2. Capita surveyors present for the surveys and referred by their initials in this report are: Suzannah Spencer ACIEEM, James Johnson ACIEEM, Andrea Sarkissian ACIEEM, Neil Page MCIEEM, Thomas Fawley GradCIEEM, Caroline Smallthwaite GradCIEEM, Ann Sherwood MCIEEM, Mark Johnson and Michael Underwood.

2.4.3. The surveyors present for the tree climbing inspection surveys were Jon Durward (2015-11967-CLS-CLS) and William O'Connor. All are fully trained in tree climbing and aerial rescue.

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3. Methods

3.1 Survey and Report Objectives

3.1.1. The surveys and report were carried out to fulfil the following objectives.

1. To identify any features on site with the potential to support bats
2. To identify any evidence of usage of the site by bats
3. To provide data to inform an assessment of the importance of the site for bats and bat conservation

3.2 Desk-Based Study

3.2.1. Local ecological records were obtained from Cambridgeshire and Peterborough Environmental Records Centre in July 2020 from within 2km of the scheme.

3.3 Field Survey

Building Preliminary Roost Assessment Surveys

3.3.1. The Preliminary Roost Assessment (PRA) for buildings was undertaken during August 2020.

3.3.2. Buildings within a 50m buffer of the scheme requiring PRA were provided by Mott Macdonald and locations detailed in **Appendix H.**

3.3.3. The buildings were inspected to enable an assessment of their suitability to support roosting bats and to search for evidence indicating the current or historical use of the structure by bats.

3.3.4. Buildings which were accessible were inspected externally. External observations we made from ground level. No internal inspections were to be undertaken in-line with Covid-19 risk assessments.

3.3.5. Following an initial preliminary roost assessment, the buildings in **Table 6** were excluded from further assessment due to the lack of suitable roosting features within the structures.

3.3.6. Three buildings couldn't be accessed. These buildings are approx. 50m from the scheme boundary but are separated by an existing highway and it is considered unlikely that any roosting bats in these structures would be affected by the proposed scheme.

Tree Preliminary Roost Assessment Surveys

3.3.7. The Preliminary Roost Assessment for trees was undertaken during May - August 2020.

3.3.8. All accessible trees within 80m meter buffer from the scheme boundary were subject to a preliminary roost assessment.

3.3.9. Tree assessments were undertaken from ground level, using a high-powered torches and binoculars, where necessary for the inspection of any Potential Roost Features (PRFs), an endoscope was on hand for use by Ecologists with a Level 2 bat licence.

3.3.10. Trees were assessed for the presence of suitable roosting features including holes in the trunk and lifted bark and signs of bat presence including droppings, staining and scratch marks. All trees with low, moderate, or high potential were number tagged with a small metal disc where landowner permission allowed, and their location and species detail recorded to inform further surveys.

3.3.11. Trees that were scoped in for further assessment were those assessed as having moderate or high potential for roosting features based on the Bat Conservation Trust (BCT) guidance outlined in **Table 1**.

Tree Climbing Inspection Surveys

3.3.12. Trees that were assessed as having moderate or high suitability to support bat roosts and were likely to be affected by the scheme (within 80m of the scheme footprint) through loss damage or other direct impacts, were subject to a tree climbing inspection survey.

3.3.13. The tree climbing inspections were carried out on the 31st July and 14th August 2020.

3.3.14. The survey consisted of each tree being climbed using a harness, ropes, and ladder, where appropriate. The PRFs identified during the ground level assessment were inspected using torches and/or an endoscope to look for evidence of use by bats and collect information on the PRF. Whilst in the tree, climbers checked for additional features not visible from the ground and inspected using the endoscope and torch. The size, both internal and external, of the PRF was noted, as well as the condition within the PRF. The potential for each PRF to host bats was graded either high, moderate, low, or negligible. PRFs were either downgraded where no feature with the potential for roosting was found, retained at original assessed potential, upgraded to high potential or a confirmed roost if a bat or evidence of bats (droppings, scratch marks) were found.

3.3.15. The overall assessment of roosting suitability of each tree was updated based on the highest potential feature identified during the aerial inspections.

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Table 1: Bat Roost Potential Categories

Roost Potential Category	Description of Roosting Habitat	Commuting and Foraging Habitats
Negligible	Negligible habitat features on site unlikely to be used by roosting bats.	Negligible habitat features on site likely to be used by commuting or foraging bats only.
Low	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, shelter, appropriate conditions and / or suitable surrounding habitat to be used on a regular basis.	Habitat that could be used by small numbers of commuting bats such as gappy hedgerows or a vegetated stream, but isolated, e.g. not very connected habitat to the surrounding landscape by other habitats such as trees, hedges, or water courses. 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	A structure or tree with one or more potential roost features that could be used by bats due to their size, shelter, protection, conditions and surrounding habitat but unlikely to support a roost of high conservation status (with respect to roost type only- the assessments in this table are made irrespective of species conservation status, which is established after presence is confirmed).	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.
High	A structure or tree with one or more potential roost feature that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions, and surrounding habitat.	Continuous, high quality habitat that is well connected to the wider landscape that it is likely to be used regularly by commuting bats such as river valleys, streams, hedgerows, lines or trees and woodland edge. High quality habitat that is well connected to the wider landscape that is likely to be used regularly by foraging bats such as broadleaved woodland, tree-lined water courses and grazed parkland. Site is close to and connected to known roosts.

Bat Activity Transect Surveys

3.3.16. Seven transect routes were selected based on habitat types, quality, likely impacts and known species records, and to give good coverage of bat activity across the scheme. A description of the transects and associated habitats can be found in **Table 2**.

Table 2: Transect route descriptions

Transect Route ID	Transect Description
Transect 1	The transect covers the hedgerows bordering arable fields to the north and south of Granham's Road. To the north of Granham's road the transect follows a public right of way, adjacent to a farmhouse track with a hedgerow to the south-west and grassland fields to the east, the farmhouse is set back to the north-east. at the northern most end of this transect the route crosses over a large pond and enters part of Nine Wells Nature reserve. To the south of Granham's Road the transect follows the tree lined hedgerow which is adjacent to residential housing to the south-west. There is a woodland strip/hedgerow that bisects the two arable fields along the route. The southernmost section runs along Hinton Way with a mature hedgerow bordering the road.
Transect 2	The transect is located within agricultural surroundings consisting of two large arable land parcels surrounded by hedgerows and bisected by Haverhill Road.
Transect 3	Transect covers the land lying to the north of Dales Manor Business Park, Grove Road, Sawston as well as that lying west at Deal Farm, south of the River Granta. Habitats are generally agricultural with two woodland blocks on the south side and the River Granta to the north.
Transect 4	The transect covers the tree lined PRoW to the east of the Cambridge Science Park, to the north of Babraham Road. However, the area is now under construction for a housing estate which may reduce the suitability for bats. Part of the transect is unable to be accessed due to the construction site and the transect must be walked at the south of Brabham Road/Sawston Road, along the cycleway. Sawston Road is a minor, relatively quiet road that is unlit with the exception of illuminated 'cats eyes' along the cycle path. The transect follows the mature hedgerow through agricultural fields at the south of Sawston Road until the hedgerow meets a small woodland patch towards High Street. The transect continues along High Street following a gappy hedgerow and scattered trees until it meets back with the cycle path on Sawston Road.
Transect 5	Transect covers the land in Babraham at Cheveley Park Farms, lying south of the River Granta. Habitat is mostly agricultural with a reservoir on the north-east edge and the A505/ A11 roads running along the eastern and southern boundaries.
Transect 6	Transect covers the land in Babraham at Cheveley Park Farms, lying north of the River Granta. The transect consists of arable fields surrounded by hedgerows with woodlands located to the east and south. The River Granta and a pond is located within the southern aspect of the transect.
Transect 7	This transect includes the agricultural fields and greenhouses to the north of Bourn Bridge Road, crossing Cambridge Road and up towards The Grange farmhouse. The habitats are generally agricultural with woodland pockets, particularly to the north of The Grange. Cambridge Road is a main road and is a duel carriageway for part of the section close to the transect.

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3.3.17. The transects were carried out once per month and undertaken from May[2] - October 2020. **Table 3** below details the dates the transects were undertaken.

Table 3: Transect survey dates

Transect ID	May	June	July	August	September	October
1	01/06/2020	16/06/2020	21/07/2020	18/08/2020	25/09/2019	28/10/2019
2	21/05/2020	15/06/2020	14/07/2020	19/08/2020	25/09/2019	16/10/2019
3	19/05/2020	16/06/2020	15/07/2020	20/08/2020	25/09/2019	16/10/2019
4	18/05/2020	25/06/2020	16/07/2020	20/8/2019	25/09/2019	16/10/2019
5	18/05/2020	18/06/2020	16/07/2020	18/08/2020	15/09/2020	01/10/2020
6	20/05/2020	18/06/2020	15/07/2020	17/08/2020	16/09/2020	06/10/2020
7	19/05/2020	23/06/2020	14/07/2020	20/8/2019	25/09/2019	28/10/2019

3.3.18. Transect routes were walked at a slow, consistent pace by two surveyors carrying Anabat Walkabout bat detectors. Any bat activity was recorded with time, species of bat and type of activity (commuting, foraging, emerging). Each transect had at least five listening stops where surveyors remained stationary and recorded activity in that area for three to five minutes (dependant on route length). The transects were walked once in each direction on each evening to detect early and late emerging bats along the transect, the transects were then reversed the following month (e.g. Month one X-Y-X, Month two Y-X-Y and month three X-Y-X and so on). The transects began at sunset and continued for at least two hours after sunset.

[2] See Limitations section for constraints to the start of surveys in 2020

3.3.19. Surveys were undertaken in accordance to BCT guidelines and a low/moderate suitability for bat activity. April surveys were missed due to the pandemic and its restrictions at the time. No dawn surveys were conducted due to unsuitable weather on the planned survey days.

3.3.20. **Appendix D** provides heat maps from the data produced during the transect surveys. Bat data points, defined as bats seen or heard during transects, were used to generate heatmaps, which illustrate the intensity of bat activity. The kernel density algorithm in QGIS 3.16.3 was used to generate the heatmaps, with the number of bat data points (kernels) within a 50m radius defining the intensity of bat activity. This was illustrated using 9 colour categories, ranging from red (most intense) to green (least intense).

Static Detector Surveys

3.3.21. Static bat detectors (Anabat swift) were deployed in May- October 2020 in the locations associated with the transect routes. Seven detectors were deployed over five consecutive nights each month from May to July 2020. Following the identification of barbastelle bats, a total of 17 detectors were deployed in August - September 2020 and 15 in October 2020 due to landowner permissions. The number of detectors deployed was increased due to the recording of barbastelle bats and a subsequent request by Natural England to gain information relating to the distribution of barbastelle across the route. Static detector deployment dates are detailed in **Appendix B**.

3.3.22. As with the transect surveys, the statics were not deployed until May due to the pandemic.

3.3.23. Winter static surveys are being undertaken from November to March 2021.

3.3.24. Detectors were placed in locations in order to provide additional data to support the information collected during transect surveys. Data was recorded from half an hour before sunset to half an hour after sunrise. The detector sound files were then analysed using Anabat Insight software to assess the level of bat activity within each location.

3.3.25. The detector sound files were analysed in Anabat Insight using the Bat-Classify Auto ID program. 10% of data was manually checked, including noise files, with 100% of files identified through auto-ID as noctule/serotine/Leisler's and brown long-eared bat manually checked. Species from the *Myotis* genus of bats produce frequency modulated calls with overlapping call parameters and cannot be reliably distinguished to species level alone on call alone. As such, *Myotis* calls are identified as *Myotis* sp. Bats of the *Nyctalus* genus produce calls with overlapping call parameters, except in open environments. The two *Nyctalus* species found in this region, noctule and Leisler's, were therefore grouped together, with most bats being noted as noctule and a small number with overlapping parameters.

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Validating the data through manual checks follows the BCT best practice guidelines (2016). Bat calls was averaged over seven nights to provide a bat call/hour index, with night length calculated as sunset to sunrise. The exception for this was Static A in August, where only two nights data was recorded, due to the SD cards being full within this time; in this instance, the data was averaged over two nights.

3.3.26. All barbastelle calls were manually checked.

3.3.27. The locations of these static detectors shown is in **Appendix A** and a description in **Table 4**.

Table 4: Static detector locations

Static detector ID	Static Detector Description	Approximate Grid Reference
Transect 1 - static 1	Narrow hedge line with mature trees heading south west to north east. between two arable fields. Static detector pointing north westerly.	TL 46924 53227
Transect 1 - static 2	Narrow hedge line with trees heading south west to north east between two arable fields adjacent to nine wells nature reserve, within 50m of a ditch feed by a spring within nine wells woodland. Static detector pointing north westerly.	TL 46092 54075
Transect 1 - static 3	Narrow hedge line with mature trees heading North west to south east between two arable fields. Static detector pointing north easterly.	TL 46515 53347
Transect 2 - static 1	Attached to a tree within a line of trees heading north east to south west beside a B road in between two arable fields with a hedge line on the opposite side of the road. Static detector points easterly.	TL 48049 52433
Transect 2 - static 2	Positioned to the bottom of a hedge line north west to south east dissecting two arable fields. Detector point westerly	TL 47449 53095
Transect 2 - static 3	Positioned to the bottom of a hedge line north west to south east dissecting two arable fields. Detector points easterly.	TL 47999 51972
Transect 3 - static 1	Positioned within a small section of unmanaged arable land, bordered by woodland and open arable fields with a ditch running north to south. Static detector points south easterly.	TL 48660 50798
Transect 3 - static 2	Positioned on the edge of as strip of woodland heading east to west bordering an arable field. Static facing northerly.	TL 47994 51132
Transect 3 - static 3	Positioned on the edge of a narrow strip of hedge line with trees heading east to west bordering an arable field to the north. A Medium sized waterbody is in the adjacent land parcel to the south. Detector facing north.	TL 49074 50790
Transect 4 - static 1	Within the corner of a field, with tree lines heading south to north, and west to east. Detector facing north easterly.	TL 50708 49418

Transect 4 - static 2	Unable to deploy securely due to high use public footpath. Alternative locations too close to existing detectors or unsecure.	TL 49429 49951
Transect 4 - static 3	Unable to deploy securely due to high use public footpath. Alternative locations too close to existing detectors or unsecure.	TL 50406 49996
Transect 5 - static 1	Positioned on an ash tree on a tree line heading east to west. Bordered to the south by arable fields, with a ford and river adjacent to the north of the woodland strip. A mature ash and pine woodland are immediately to the north west. Detector pointing south.	TL 51318 49707
Transect 5 - static 2	Unable to deploy securely	TL 50757 49840
Transect 5 - static 3	Positioned on a tree within a small section of young plantation trees. Detector facing south with a small man-made reservoir to the north west and arable fields to the south.	TL 51759 49400
Transect 6 - static 1	Positioned on a beech tree, in a short line of 4 trees within a hedge line heading east to west. Arable fields border the hedge line to the north and south. Detector pointing north.	TL 51852 49807
Transect 6 - static 2	Unable to deploy securely	TL 52039 50232
Transect 6 - static 3	Positioned on a tree within a hedge line with trees heading north east to south west. An arable field is to the east and west with a farm track running adjacent to the east. Detector facing east.	TL 51453 50017
Transect 7 - static 1	Positioned on a tree within a woodland strip heading south east to north west, between an arable field and an A Road. Detector facing north easterly	TL 52570 49824
Transect 7 - static 2	Positioned on a tree beside a farm track. Farm track heading north to south. Arable fields are adjacent to the east and west. Detector facing west.	TL 52899 50014
Transect 7 - static 3	Positioned on a tree on the edge of a woodland beside a farm track. Farm track heading east to west. An arable field is adjacent to the south. Detector facing south.	TL 52787 50613

Emergence and Re-Entry Surveys

3.3.28. Trees were selected for emergence/re-entry surveys based on their suitability assessed during the Preliminary Roost Assessment and tree climbing surveys, the location of the tree in relation to the scheme and if they had been identified as being affected directly or indirectly by the proposed scheme. Trees with low potential were not surveyed further except T8 as this was visible close to another tree so was monitored during a survey. Trees with moderate potential required two surveys (dusk and a dawn), unless a roost was confirmed then a third survey was undertaken. Trees with high potential had three surveys (at least one dusk and one dawn).

3.3.29. T18 was identified as being of high potential but due to access issues, it was only surveyed once.

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3.3.30. Emergence and re-entry surveys were undertaken within the months of July, August, and September 2020. Dates are shown in **Table 5.**

Table 5: Tree emergence/re-entry survey dates

Tree Reference - potential	Survey 1	Survey 2	Survey 3
T8 – Low	12/08/2020 – Dusk	N/A	N/A
T9 - Moderate	12/08/2020 – Dusk	04/09/2020 - Dawn	N/A
T10 - Moderate	12/08/2020 – Dusk	04/09/2020 - Dawn	N/A
T11 - Moderate	12/08/2020 – Dusk	04/09/2020 - Dawn	N/A
T12 - Moderate	12/08/2020 – Dusk	04/09/2020 - Dawn	N/A
T13- High	11/08/2020 – Dusk	18/08/2020 – Dusk	01/09/2020 - Dawn
T14 - Moderate	18/08/2020 – Dusk	04/09/2020 - Dawn	N/A
T15 - Moderate	17/08/2020 – Dusk	04/09/2020 - Dawn	N/A
T18 - High	10/09/2020 – Dusk	N/A	N/A
T21 - Moderate	26/08/2020 – Dusk	09/09/2020 - Dawn	N/A
T22 - Moderate	26/08/2020 – Dusk	09/09/2020 – Dawn	N/A
T23 - Moderate	17/08/2020 – Dusk	19/09/2020 - Dawn	29/09/2020 - Dawn
T24 - Moderate	20/08/2020 – Dusk	23/09/2020 - Dawn	N/A
T25 - Moderate	20/08/2020 – Dusk	30/09/2020 - Dawn	N/A
Line 1 - Moderate	10/08/2020 – Dusk	24/09/2020 - Dusk	N/A
Line 2 - Moderate	10/08/2020 – Dusk	29/09/2020 - Dusk	N/A
Line 3 - Moderate	20/08/2020 – Dusk	29/09/2020 - Dusk	N/A

3.3.31. The number of surveys required on each tree were determined by the suitability of the tree. Those with moderate suitability were subject to an emergence and a re-entry survey and those with high suitability had three surveys consisting of both an emergence and a re-entry survey. Where roosts were identified, three surveys were carried out (T13 and T23) except T18 where only one was undertaken due to access constraints.

3.3.32. Surveyors were strategically positioned around the tree focusing on areas where potential access points had been identified during the Preliminary Roost Assessment, to be able to observe any bats leaving or entering roosts.

3.3.33. All observed bat passes were recorded on a plan, noting the time, the location and, where possible, the direction of flight, species, and behaviour of the bat (i.e. commuting, foraging, social calling). Importance was placed on noting the location of any points where bats were observed leaving or entering the tree. The weather details were also noted.

3.3.34. Capita Surveyors were equipped with Anabat Walkabout detectors.

3.3.35. After completion of each survey session, digital bat recordings were analysed using Anabat Insight analysis software to confirm species identification.

3.3.36. The emergence surveys commenced 15 minutes prior to sunset and continued for 1.5-2 hours after sunset.

3.3.37. The re-entry surveys commenced 1.5 hours before sunrise and continued for 15 minutes past sunrise.

3.4 Limitations and Assumptions

3.4.1. At the point of commencement of the surveys in April 2020 measures relating to the management of the coronavirus pandemic came into force which caused a delay to the start of surveys. This occurred as it was determined between the client and Capita how work could be carried out safely. This led to a delay in starting the surveys until May 2020 and the usual methodology of conducting bat surveys from April not being achieved. However, surveys were carried out from April 2020 and this constraint is not considered to have affected the reliability of the results outlined in this report.

Transects

3.4.2. Access to some land was restricted by the landowner due to farming practices, causing some deviation to the guidelines to allow landowners to continue as normal.

3.4.3. The routes of transect 5 and 6 had to be modified during September and October to accommodate specific landowner's restrictions. The transect 5 alteration was to walk the central section in a northerly direction against the old rail line at TL 51161 49109, due to game bird pens within the centre. This meant during the return walk of the transect we were not going in an opposite direction. The alteration on Transect 6 was to avoid the river due to game birds being released, a stretch of 300m was to be avoided. The alterations are unlikely to negatively impact the results due to the data available from previous surveys, substantial data from trees and static detectors located close to the transects providing sufficient evidence on the use of the areas by bats. The alterations account for <10% of transect 5 and 6.

3.4.4. The transect 5 October survey was undertaken on the 30 September due to landowner permissions. However, enough time had passed between the September survey and the October survey to provide a good range of data. This does not affect the validity of this report.

3.4.5. April surveys were missed due to the pandemic and the delays this caused in commencing field survey work. No dawn surveys were conducted due to unsuitable weather on the planned survey days.

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Static detectors

3.4.6. Due to the presence of barbastelles during August and September the surveys were split into two groups. Transect 1, 2, 3 were deployed together, followed by Transects 4, 5, 6 and 7 deployed the following week. As five nights deployment would cause them to fall on a weekend, it was determined to deploy for seven nights to ensure consistency.

3.4.7. A static detector was not deployed on Transect 1 in May as landowner permission had not yet been granted.

3.4.8. Transect 5 static detectors were not deployed in October due to landowner permissions being restricted in relation to the location of their game birds and possible disturbance.

3.4.9. It was not possible to deploy four static detectors due to security and lack of suitable locations as described in **Table 4.** Due to the number and distribution of the remaining static detectors the impact of this is negligible and the validity and assumptions of this report are not negatively impacted.

3.4.10. The number of detectors deployed was increased in August due to the recording of barbastelle bats and a subsequent request by Natural England to gain information relating to the distribution of barbastelle across the route.

3.4.11. The following static deviations occurred:

- May Static 6 - no recordings of bat species occurred– no obvious device malfunction
- June Static 2 - recorded for the first four nights only due to noise files filling the memory cards
- July Static 2 - recorded for the first four nights only due to noise files filling the memory cards
- August Transect 1 Static 3 - recorded for the first three nights only due to noise files filling the memory cards
- August Transect 2 Static 1 - recorded for the first two nights only due to noise files filling the memory cards
- August Transect 6 Static 1 - recorded for the first five nights only due to noise files filling the memory cards
- August Transect 6 Static 3 - recorded for the first five nights only due to noise files filling the memory cards

- September Transect 1 Static 3 - recorded for the first three nights only due to noise files filling the memory cards
- September Transect 2 Static 3 - recorded for the first three nights only due to noise files filling the memory cards
- September Transect 3 Static 3 - recorded for the first three nights only due to noise files filling the memory cards
- September Transect 6 Static 3 - recorded for the first four nights only due to noise files filling the memory cards

3.4.12. These deviations whilst not providing fully comparative data, do not impact the validity and accuracy of the data. Sufficient data has been collected to provide a sufficient bat assessment of the site. A cause for excess noise files is possibly increased by wind and rain during the dates of deployment. Analysis of some of the noise files indicate rainfall. However, this possible unsuitable weather does not appear to have affected the number of bat calls recorded during these months when compared to other months. The site is very open and even light breeze through vegetation may increase the noise files significantly. Reducing the sensitivity of the detectors was discussed but this may have led to a decrease in bat calls being recording.

Trees

3.4.13. Access to T18 was subject to landowner changes after the first survey, which restricted confirmed access to one survey initially despite it being a high potential tree. When access was permitted weather impacted further surveys. However, the first survey provided positive roost data, so the impact of the limited survey effort does not impact the validity of this report.

3.4.14. Lines 1-3 of trees had the PRA undertaken at inopportune timing and the full extent of the tree wasn't visible due to canopy and leaf cover and negligible to low suitability was assessed to be present, however as a precaution it was decided to survey them as a whole to provide further data to back-up the low suitability for roosting bats. This limitation does not impact the validity and assumptions of this report.

3.4.15. T23 was initially surveyed in the core season, however weather constraints caused the second and third survey to be delayed resulting in them being outside of core season and only 10 days apart. However, a roost was confirmed in the initial survey, so this limitation will not negatively impact the results for T23.

Buildings

3.4.16. No access was possible to the internal of buildings and external assessments were made only.

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3.4.17. Three buildings (9,10,11) had no access due to timing and being unable to contact owners due to COVID-19 restrictions. Limited external survey was undertaken, and they are not to be directly affected by the proposals.

4. Results

4.1 Desk Study

4.1.1 The 2km local ecological records search included the following notable bat records.

1. Brown Long-eared Bat *Plecotus auritus*
2. Common Pipistrelle *Pipistrellus*
3. Daubenton's Bat *Myotis daubentonii*
4. Nathusius's Pipistrelle *Pipistrellus nathusii*
5. Natterer's Bat *Myotis nattereri*
6. Noctule Bat *Nyctalus noctula*
7. Serotine *Eptesicus serotinus*
8. Soprano Pipistrelle *Pipistrellus pygmaeus*
9. Western Barbastelle *Barbastella barbastellus*

4.2 Building Preliminary Roost Assessment Survey

4.2.1. **Table 6** details the results of the preliminary roost assessment of all buildings surveyed. The suitability and photos of the structures is also shown on the plan at **Appendix I**.

4.2.2. None of the buildings surveyed have any suitability for roosting bats.

4.2.3. Access to Buildings 9, 10 and 11 was not possible. However, the buildings are 50m distance from the current proposed scheme and separated by an existing road. Therefore, no further surveys are required on these buildings with the current design.

Table 6: Preliminary roost assessment building survey results.

Building Number	Grid Reference	Building Type and description	Roosting Potential (Negligible, Low, Moderate, High, or confirmed)
1	TL 46144 54556	Brand new scientific/office building. No access to internals,	Negligible

Building Number	Grid Reference	Building Type and description	Roosting Potential (Negligible, Low, Moderate, High, or confirmed)
		external done from public highway. New modern building built recently. Well-sealed and of metal/glass construction.	
2	TL 49167 50418	Cement factory – made of steel structure, very dusty, well used, and dangerous to inspect or approach.	Negligible
3	TL 49282 50329	Demolished	N/A
4	TL 49283 50358	Demolished	N/A
5	TL 49318 50311	Demolished	N/A
6	TL 49318 50311	Demolished	N/A
7	TL 49448 50253	Steel structure commercial units, external is well maintained, some shutters were open and internally the roof was a single sheet with sections of clear plastic. Building appeared to be single sheet steel structure.	Negligible
8	TL 49432 50226	Steel structure commercial units, external is well maintained, some shutters were open and internally the roof was a single sheet with sections of clear plastic. Building appeared to be single sheet steel structure.	Negligible
9	TL 50397 50062	Residential dwelling – No access and covered from public view by tall trees and fences/gates.	N/A
10	TL 50421 50050	Residential dwelling – No access and covered from public	N/A

Building Number	Grid Reference	Building Type and description	Roosting Potential (Negligible, Low, Moderate, High, or confirmed)
		view by tall trees and fences/gates.	
11	TL 50460 50032	Residential dwelling – No access and covered from public view by tall trees and fences/gates.	N/A
12	TL 51346 49707	Wooden Shed/pump house. Felt covered roof, internals housed pumping machinery. No suitable spots for bats to roost	Negligible

4.3 Tree Roost Assessment Survey

Results

4.3.1. Thirteen woodland locations were surveyed from ground-level in order to assess the individual trees suitability to support roosting bats. Of this, 25 trees were identified as having moderate to high suitability to support roosting bats. The location of trees with low to high suitability are shown in **Appendix E**; these trees were then climbed, where safe to do so, to determine the category of the tree. Photographs of these trees are shown in **Appendix F.**

4.3.2. Tree climbing was undertaken in July and August 2020. Pipistrelle droppings were found in T13 increasing the assessment to high/confirmed roost. T18 was also increased to high after a tree climbing exercise. No other trees requiring further survey had the assessment criteria increased. **Appendix G.** provides full survey results.

4.3.3. **Table 7** details the results of the preliminary roost assessment of all trees surveyed with moderate or above suitability.

Table 7: Preliminary roost assessment tree survey results (subsequently confirmed roosts in bold)

Tree ID	Grid Reference	Tree species and condition	Assessment prior to tree climb	Tree climb assessment	Overall assessment of roosting potential
1	TL 46865 53157	Ash	Not Climbed	N/A	Low
2	TL 46865 53158	Oak	Not Climbed	N/A	Low
3	TL 50715 49352	*Sycamore*	Not Climbed	N/A	Low
4	TL 50714 49351	Ash	Not Climbed	N/A	Low
5	TL 50715 49294	Ash	Not Climbed	N/A	Low
6	TL 50714 49252	Ash	Not Climbed	N/A	Low
7	TL 51308 49848	Oak	Not Climbed	N/A	Low
8	TL 51300 49847	Standing dead	Not Climbed	N/A	Low
9	TL 51279 49775	Ash	Moderate	Moderate	Moderate
10	TL 51310 49844	Ash	Moderate	Moderate	Moderate
11	TL 51332 49818	Ash	Moderate	N/A	Moderate
12	TL 51333 49812	Ash	Moderate	Moderate	Moderate
13	TL 51333 49809	Pine	Moderate	**High**	High
14	TL 51334 49807	Ash	Moderate	Moderate	Moderate
15	TL 51439 49662	*Crack willow*	Moderate	Moderate	Moderate
16	TL 51482 49642	*Sycamore*	Low	Low	Low
17	TL 51509 49633	*Crack willow*	Low	Low	Low
18	TL 52154 49788	*Oak*	Moderate	**High**	High
19	TL 52146 49763	*Oak*	Low	Low	Low
20	TL 52679 49695	*Ash*	Low	Low	Low
21	TL 48413 50933	*Willow*	Moderate	Moderate	Moderate
22	TL 48429 50918	*Willow*	Moderate	Moderate	Moderate
23	TL 51861 49806	*Oak*	Moderate	**Low**	Low
24	TL 51906 49786	*Oak*	Moderate	Moderate	Moderate
25	TL 51953 49769	*Oak*	Moderate	Moderate	Moderate

Line 1	TL 50566 49990	*Lyme*	Not Climbed	N/A	Low
Line 2	TL 50533 49999	*Lyme*	Not Climbed	N/A	Low
Line 3	TL 46515 53347	*Mixed*	Not Climbed	N/A	Low

4.4 Tree Emergence/Re-entry Survey Results

4.4.1. During the emergence/re-entry surveys, roosts were recorded in T18 and T23. The species of bat in T23 was unknown as no sound was recorded, but two separate bats were seen to emerge during the survey. The behaviour of the bats emerging were similar to a single common pipistrelle and a single noctule. Inspection of the tree during daylight indicated the bats may have emerged from a hidden feature at the upper extremities of the tree. T18 roost was of a three soprano pipistrelle bats which emerged from the upper canopy from dead dieback on the main stem.

4.4.2. No other recordings of importance were made during the tree surveys.

4.4.3. Daubenton's were found to be foraging over the stream located at TL 51313 49713. Common and soprano pipistrelle were recorded foraging and commuting during emergencies and re-entry surveys in areas similar to those picked up during the transects. Noctules were occasionally recorded but not seen, commuting high above the survey site.

4.5 Bat Activity Transect Survey Results

4.5.1. Table 8 details bat activity transect survey timings and weather, and Table 9 summarises bat activity recorded along each route per month. Transect plans displaying bat activity are shown in **Appendix C.**

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Table 8: Bat Activity Transect Survey Timings and Weather Conditions

Transect ID	Sunset	Date	Start/End Time	Temperature (°C)	Rain	Cloud Cover (%)	Wind Speed (m/s)	Humidity (RH)
	May							
1	21:11	01/06/2020	21:11	17	0	10	1	91
			23:11	16	0	10	1	91
2	20:56	21/05/2020	20:56	20	0	0	1	44
			23:00	16	0	0	0	60
3	20:49	19/05/2020	20:49	22	0	10	1	62
			22:49	19	0	0	0	60
4	20:52	18/05/2020	20:52	18	0	10	2	52
			22:52	18	0	0	0	52
5	20:52	18/05/2020	20:52	18	0	20	1	58
			22:52	15	0	0	1	57
6	20:55	20/05/2020	20:55	23	0	0	2	44
			22:55	21	0	0	1	43
7	20:49	19/05/2020	20:49	21	0	0	0	62
			22:53	19	0	0	0	59
	June							
1	21:22	16/06/2020	21:22	16c	0	50	0	80
			23:22	14c	0	0	0	79
2	21:21	15/06/2020	21:21	19c	0	60	0	55
			23:21	16c	0	100	0	55
3	21:22	16/06/2020	21:22	20	0	10	0	60
			23:22	16	0	0	0	51
4	21:24	25/06/2020	21:24	24	0	10	1	36
			23:24	20	0	10	2	68
5	21:24	18/06/2020	21:23	17	0	10	1	69
			23:23	14	0	0	2	84
6	21:23	24/06/2020	21:20	26	0	10	1	47
			23:20	22	0	10	1	40
7	21:22	23/06/2020	21:24	20	0	25	4	55
			23:24	18	0	0	3	50
	July							
1a	21:14	13/07/2020	21:14	14	0	40	0	60
			22:30	13	0	90	0	72
1b	21:05	21/07/2020	21:05	17	0	90	0	45
			23:05	15	0	20	0	41
2	21:13	14/07/2020	21:14	16	0	90	3	66
			23:14	14	0	100	1	55
3	21:12	15/07/2020	21:12	21	0	100	0	60
			23:12	18	0	100	1	72
4	21:11	16/07/2020	21:11	21	0	100	0	52
			23:11	19	0	100	0	60
5	21:11	16/07/2020	*21:11*	18	0	95	1	57
			23:11	17	0	95	1	57

6	21:12	15/07/2020	*21:12*	16	0	100	1	58
			23:12	15	0	100	1	65
7	21:13	14/07/2020	*21:13*	18	0	95	2	58
			23:13	15	0	20	3	66
	August							
1	20:16	18/08/2020	20:16	20	0	70	2	61
			22:16	17	0	80	3	68
2	20:14	19/08/2020	20:14	18	0	100	7	81
			22:14	18	0	100	7	81
3	20:12	20/08/2020	20:12	18	0	30	4	62
			22:12	15	0	50	1	70
4	*N/A*	*N/A*	N/A	N/A	N/A	N/A	N/A	N/A
			N/A	N/A	N/A	N/A	N/A	N/A
5	20:16	18/08/2020	20:16	19	0	75	3	82
			22:16	17	0	20	3	88
6	20:18	17/08/2020	20:18	18	0	30	3	75
			22:18	16	0	30	4	72
7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			N/A	N/A	N/A	N/A	N/A	N/A
	September							
1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			N/A	N/A	N/A	N/A	N/A	N/A
2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			N/A	N/A	N/A	N/A	N/A	N/A
3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			N/A	N/A	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			N/A	N/A	N/A	N/A	N/A	N/A
5	19:13	15/09/2020	19:13	23	0	10	2	75
			21:13	21	0	10	2	80
6	19:10	16/09/2020	19:10	16	0	100	6	55
			21:10	15	0	90	5	63
7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			N/A	N/A	N/A	N/A	N/A	N/A
	October							
1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			N/A	N/A	N/A	N/A	N/A	N/A
2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			N/A	N/A	N/A	N/A	N/A	N/A
3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			N/A	N/A	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			N/A	N/A	N/A	N/A	N/A	N/A
5	18:36	01/10/2020	18:36	11	0	10	2	75
			20:36	9	0	60	2	74
6	18:24	06/10/2020	18:24	12	0	100	5	85
			20:24	11	0	80	5	85
7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			N/A	N/A	N/A	N/A	N/A	N/A

Note – N/A is due to the results of these surveys being completed in 2019 (WYG Dec 2019)

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Table 9: Activity Survey Results Summary

Transect ID	May	June
1	Undertaken on the 1st June, this transect started from the centre point, heading south initially, reaching the end point, returning on the same route, and completing the northern section, before looping back and returning to the centre point. Activity was low-moderate, with a common noctule foraging at the southernmost point, common pipistrelles heard but not seen along linear features, and a single common pipistrelle seen commuting on the northern point. A single serotine was heard not seen along a linear feature on the southern section, consisting of a trees and hedge line. Weather was mild at 17°C. First bat recorded was a common pipistrelle at 21:42 and last bat recorded was a serotine at 22:56.	Common pipistrelles and noctules were recorded during this survey, with bats recorded along all areas of the transects. Noctules were recorded at the northern end of the transect. Passes followed the hedgerows bordering arable fields. Passes were noted around the waterbody to the north of the transect. The first bat was a noctule recorded at 21:42 commuting over the arable fields at the north of the transect. The last bat was a common pipistrelle recorded at 23:45, commuting along the tree line adjacent to the residential houses at the south of Granham's Road.
	July	**August**
	This transect was undertaken twice, initially on the 13th and started from the centre point, heading south initially, reaching the end point, returning on the same route. Halfway through the survey heavy rain started and the survey was aborted. However low to moderate levels of bat activity had been recorded on the southern section. Common pipistrelles were recorded foraging and commuting along the linear features. The first bat was recorded a 21:40 and the final recorded at 22:20 with the survey aborted at 22:30 after 20 minutes of persistent moderate increasing to heavy rain. It was then undertaken again on the 21st in suitable weather conditions, repeating the direction above. The first bat detected was a common pipistrelle at 22:13 and the final bat was a common pipistrelle at 22:41. Low to moderate levels of bat activity was detected.	Moderate levels of foraging and commuting bat activity along the hedgerow and woodland. A total of 13 common pipistrelle registrations and four soprano pipistrelle registrations, foraging and commuting were recorded (but often multiple passes/continuous foraging activity associated with each registration), with nine noctule and one NSL[3] registration and two *Myotis* species bat commuting passes towards the end of the survey. Most bats seen at one time was two. First bat heard was a soprano pipistrelle at 20:41 and the last was a noctule at 22:21.
	September	**October**
	N/A	N/A

[3] A grouping of large bats (noctule/serotine/Leisler's) where calls can overlap and be difficult to separate

2	**May**	**June**
	The transect started from a central point circling clockwise on the northern section, before crossing the main road, circling the southern section anti-clockwise. Low activity was recorded around the field margins, species present were foraging common pipistrelle, soprano pipistrelle and *Myotis* species. A noctule and common pipistrelle were also heard but not seen. The first bat was recorded at 21:37 a common pipistrelle and the last bat at 22:53 a noctule.	This transect started from a central point, circling anti-clockwise on the southern section, before anti-clockwise on the northern section. No bats were recorded on the southern section of the transect. Common pipistrelle, soprano pipistrelle and noctule bats were recorded on the northern section foraging and commuting. Overall activity was low. The first recording was at 22:06 2 x common pipistrelle and the last recording at 23:10 a single common pipistrelle.
	July	**August**
	The transect started from a central point circling clockwise on the northern section, before crossing the main road, circling the southern section clockwise. A single foraging noctule and a single common pipistrelle pass was recorded on the southern section. Two noctules and a single common pipistrelle recorded on the northern section. Activity was low. The first recording was at 21:19 a foraging noctule and the last recording at 23:00 a common pipistrelle.	Light rain between 21:00 and 21:20, bats still present considering the weather and largely open arable landscape. Three noctule commuting passes overhead, one NSL (most likely Leisler's/Serotine 21:19:19), with eight common pipistrelles commuting and foraging, multiple registrations where foraging. Total of six soprano pipistrelle registrations, again largely along hedgerows, commuting and foraging. One BLE commuting pass at the northern end of the route near an area of dense tree over/hedgerow/scattered parkland trees. The first recording was a noctule at 20:41 and the last recording a common pipistrelle at 22:10.
	September	**October**
	N/A	N/A
3	**May**	**June**
	Low level of activity of which most was recorded in north-western corner of transect, adjacent to River Granta. A noctule was the first bat recorded at 21:26 and the last bat a soprano pipistrelle recorded at 22:54. Suspected serotines were evidenced but noted as NSL. A total of 6 bats were recorded.	The transect was run east to west. No bats were recorded on the eastern section with common pipistrelle, soprano pipistrelle and noctules recorded near the wooded western end, close to the river. Activity levels were low with foraging and commuting activity witnessed. The first bat was noctule recorded at 21:53 and the last recorded at pipistrelle 22.24.
	July	**August**
	Transect walked clockwise. Only two noctules were recorded during the survey. One was continuously foraging at 21:36 and another was heard not seen at 21:51.	No bats recorded. Weather was suitable for the survey and no obvious reasons for not recordings or sightings. Device checked and confirmed to be working fine. No bats recorded.
	September	**October**
	N/A	N/A

4	**May**	**June**
	Only common pipistrelles were recorded during this survey. Most bat activity was recorded at the south eastern section of the transect and along High Street and south of Sawston Road. The first bat was a common pipistrelle recorded at 21:25 along the hedgerow that bisects the arable fields to the south of Sawston Road. The last bat was a common pipistrelle recorded at 22:28, which was not seen but recorded in the same location. Constant foraging pipistrelle passes were recorded along High Street throughout the survey. Overall, a low level of bat activity was recorded during this survey.	Only pipistrelles were recorded during this survey. No bats were recorded at the south east section of this transect. Most bat activity was recorded at the south eastern section of the transect and along High Street and south of Sawston Road. Constant foraging pipistrelle passes were recorded along the public footpath, a low level of bat activity was recorded during this survey. The first bat was recorded at 22:20 and the final at 23:04. Only common pipistrelle were recorded.
	July	**August**
	Transect walked anti-clockwise, then again clockwise. No bats recorded in north-western section of transect. *P.pip* was seen commuting at 21:55 south along tree line next to High Street at listening stop 16. Another was also recorded foraging north-west along woodland edge/hedgerow at 22:36. Soprano pipistrelle heard not seen along Sawston Road at 22:07. Low levels of activity recorded during survey.	N/A
	September	**October**
	N/A	N/A
5	**May**	**June**
	Moderate levels of activity concentrated along the hedgerows where the A505 merges to the A11. Constant foraging by two soprano pipistrelles in this area. The first bat was a common pipistrelle recorded at 21:21 and the last a common pipistrelle at 22:56. The majority of recordings were made up of pipistrelle species with a suspected serotine, which is noted as an NSL.	Only pipistrelles were recorded during this survey. Most bat activity was recorded at the north of the Transect along Babraham Road section of the transect. Constant foraging pipistrelle passes were recorded along this section, a low level of bat activity was recorded during this survey. The first bat was a common pipistrelle recorded at 22:10 and the last a myotis sp. at 23:12. Pipistrelle species, *Myotis* species, noctules and a suspected serotine were recorded during this transect,
	July	**August**
	Only common pipistrelle foraging and commuting. Five commuting passes and one registration of foraging activity, all along the western boundary of the transect along the tree lined High Street that leads into Babraham. Low levels of activity overall. The first recording was at 21:43 and the final at 22:45.	The transect had low activity levels, common pipistrelles were witnessed foraging and commuting along linear features, and a myotis species detected close to a wooded section on the eastern boundary. The detection was quiet and not picked up by the recording device and it's suspected they are brown long eared bat. The first recording of a bat was at 21:31 a common pipistrelle and the last a common pipistrelle at 22:10.

	September	**October**
	This survey was extremely low activity. Only two bats were registered at the centre of the transect. A single noctule was registered at 19:21 then another at the same point on the return journey at 20:11. No obvious reasons for low bat activity. Weather suitable and device working.	Extremely low level of bat activity recorded here. Only a single common pipistrelle was recorded foraging along the field margin at 19:39. Weather was suitable for bat activity but did drop to 9 °C by survey conclusion.
6	**May**	**June**
	Low levels of activity concentrated along the hedgerows where the A505 merges to the A11. Occasional pipistrelle passes. The first recording was a soprano pipistrelle at 21:31 and the last at a common pipistrelle at 22:51. In total four recordings of soprano pipistrelle and 2 common pipistrelles.	Low levels of bat activity were registered, 4 separate registrations of Common pipistrelle were registered one heard not seen, 3 foraging along a linear hedgerow. First recording at 22:24 and the last at 22:45. Weather was suitable for bat activity.
	July	**August**
	Mild, still night after rain earlier in the day. Moderate - high levels for first 60-90 minutes in particular - regular foraging and commuting activity, particularly by common and soprano pipistrelles along hedgerow and woodland edges with some activity from noctule and occasionally serotine and one Myotis (possible natterer's) species. A total of 15 common pipistrelle and 10 soprano pipistrelle registrations (but often multiple passes/continuous foraging activity associated with each registration), five noctule and two NSL, with three serotine passes along hedgerow and woodland edge habitat and one *Myotis* pass along the River Granta corridor. The highest number of bats seen at any one time was four, comprising common and soprano pipistrelle foraging along the hedgerows. The first bat heard was a soprano pipistrelle, 10 minutes after sunset at 21:23, with the last also being a soprano pipistrelle at 23:13.	Moderate levels of foraging from 20:48 until the end of the survey, largely associated with dense hedgerows and mature tree lined hedgerows with some noctules flying high overhead across open arable land. A total of 12 common pipistrelle and 11 soprano pipistrelle registrations (but often multiple passes/continuous foraging activity associated with each registration) and two noctule passes. The greatest number of bats seen at any one time was four, comprising common and soprano pipistrelle foraging along the hedgerows. The first bat heard was a soprano pipistrelle at 20:48, 30 minutes after sunset. The last bat was a soprano pipistrelle at 22:12.
	September	**October**
	Breezy night with occasional gusts of wind, with some sheltered and stiller areas. Transect route altered due to game keeper request to keep away from woodland around the Ford. See survey map for route. Very little activity (may be in part due to windy conditions). Three bats in total - two soprano pipistrelle (one heard, not seen, the other foraging along the tree line - see map)	Low level of bat activity recorded. Transect route again altered at game keeper's request. Four bats recorded in total. Two common pipistrelles heard, not seen and, two soprano pipistrelle – one heard, not seen, the other continuously foraging along woodland edge at 19:00. Breezy conditions may have contributed to low activity levels. the first recording was a soprano

	and one common pipistrelle foraging. The first recording was a soprano pipistrelle at 19:35 and the last a common pipistrelle at 20:20	pipistrelle at 19:00 and the last recording a soprano pipistrelle at 19:58.
7	**May**	**June**
	Common pipistrelle, soprano pipistrelle, *Myotis sp*. and barbastelle were recorded during this survey, with a total of 40 bat passes recorded. All activity was recorded in the northern section of the transect surrounding The Grange farmhouse, woodlands, and arable field with a mixture of foraging and commuting passes. A total of 19 barbastelle passes were recorded. The barbastelle and pipistrelle passes were concentrated around The Grange Road, following the hedgerow and mature trees to the east of the road. Activity was recorded consistently through throughout the transect but limited to the northern areas. The first bats recorded was three common pipistrelles at 21:31 foraging along the hedgerow and mature trees towards the southern end of The Grange Road. The last bat pass recorded at 22:51 was also a common pipistrelle, heard at the western area of the larger northern agricultural field, along Cambridge Road. Overall a moderate level of bat activity was recorded for this survey.	This transect was relatively quiet. Low numbers of bat recorded in suitable conditions. The first bat recorded was a common pipistrelle heard not seen at 22:24 and the final at 22:45 foraging along a hedge. A total of 4 detections of common pipistrelles were made between 22:24 and 22:45.
	July	**August**
	Moderate levels of activity, largely from common and soprano pipistrelle (commuting and some foraging, 20 registrations), with two noctule and two serotines overall. Activity was clustered at the woodland edge north of Bourn Bridge Road near the start of the survey - with noctule, soprano pipistrelle and serotine recorded in quick succession commuting along the woodland edge. Frequent activity was thereafter recorded in the northern and western edges of the large tree lined arable field to the north of the A1307, with noctule, soprano and common pipistrelle and serotine species present. The first recording of a bat was at 21:53 a noctule and the last at 22:40 of a common pipistrelle	N/A
	September	**October**
	N/A	N/A

4.6 Static detector survey results

4.6.1. Static detector maps showing the locations of the static detectors are provided in **Appendix A** and are described in **Table 4**. The results of the data collected from the static detectors is detailed in the sections below with percentage of bat sound recordings per species noted in brackets and illustrated in table 10, results are also illustrated in **Appendix J**.

May

4.6.2. **Transect 1 Static 1** was not deployed during May, so no species data is available.

4.6.3. **Transect 2 Static 1** - A total of four species was detected with the following number of sound recordings: 99 common pipistrelle (70.5%), 24 soprano pipistrelle (17%), 16 (11.5%) *Myotis* species and 1 (1%) barbastelle out of a total of 193 recordings; the remainder were noise.

4.6.4. **Transect 3 Static 1** - A total of four species was detected with the following number of sound recordings: 479 (64%) common pipistrelle, 255 (34%) soprano pipistrelle, 16 (1%) *Myotis* species and 1 (>1%)barbastelle out of a total of 1398 recordings; the remainder were noise.

4.6.5. **Transect 4 Static 1** - A total of two species was detected with the following number of sound recordings: 812 (82.5%) common pipistrelle and 174 (17.5%) soprano pipistrelle out of a total of 4499 recordings; the remainder were noise.

4.6.6. **Transect 5 Static 1** - A total of five species was detected with the following number of sound recordings: 285 (76%) common pipistrelle, 63 (17%) soprano pipistrelle, 19 (5%) *Myotis* species, 7 (2%) NSL (noctule/serotine/leisler's) species and 4 (1%) barbastelle out of a total of 421 recordings; the remainder were noise.

4.6.7. **Transect 6 Static 1** - No recordings were made during its deployment and no equipment malfunction was apparent.

4.6.8. **Transect 7 Static 1** - A total of four species was detected with the following number of sound recordings: 188 (41%) common pipistrelle, 104 (22.5%) soprano pipistrelle, 148 (32%) *Myotis* species and 19 (4.5%) barbastelle out of a total of 1240 recordings; the remainder were noise.

June

4.6.9. **Transect 1 Static 1** - A total of four species was detected with the following number of sound recordings: 749 (68.5%) common pipistrelle, 198 (18%) soprano pipistrelle, 75 (9%) *Myotis* species and 72 (6.5%) barbastelle out of a total of 3786 recordings; the remainder were noise.

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4.6.10. **Transect 2 Static 1** - A total of four species was detected with the following number of sound recordings: 255 (82%) common pipistrelle, 19 (6%) soprano pipistrelle, 35 (11%) *Myotis* species and 2 (1%) barbastelle out of a total of 688 recordings; the remainder were noise.

4.6.11. **Transect 3 Static 1** - A total of three species was detected with the following number of sound recordings: 330 (92%) common pipistrelle, 23 (6%) soprano pipistrelle and 7 (2%) *Myotis* species out of a total of 432 recordings; the remainder were noise.

4.6.12. **Transect 4 Static 1** - A total of five species was detected with the following number of sound recordings: 2178 (96%) common pipistrelle, 57 (2.5%) soprano pipistrelle, 24 (1%) *Myotis*, 1 (>1%) NSL and 3 (>1%) barbastelle species out of a total of 5167 recordings; the remainder were noise.

4.6.13. **Transect 5 Static 1** - A total of four species was detected with the following number of sound recordings: 196 (75%) common pipistrelle, 33 (12%) soprano pipistrelle, 29 (11%) *Myotis* and 3 (1%) barbastelle species out of a total of 518 recordings; the remainder were noise.

4.6.14. **Transect 6 Static 1** - A total of four species was detected with the following number of sound recordings: 1392 (95.2%) common pipistrelle, 52 (1.5%) soprano pipistrelle, 17 (1.1%) *Myotis* and 1 (>1%) barbastelle species out of a total of 3828 recordings; the remainder were noise.

4.6.15. **Transect 7 Static 1** - A total of four species was detected with the following number of sound recordings: 130 (46.5%) common pipistrelle, 101 (36%) soprano pipistrelle, 42 (15%) *Myotis* and 6 (2.5%) barbastelle species out of a total of 4163 recordings; the remainder were noise.

July

4.6.16. **Transect 1 Static 1** - A total of five species was detected with the following number of sound recordings: 730 (80%) common pipistrelle, 91 (11%) soprano pipistrelle, 20 (2%) *Myotis* species, 40 (4.5%) NSL and 28 (2.5%) barbastelle out of a total of 2658 recordings; the remainder were noise.

4.6.17. **Transect 2 Static1** - A total of four species was detected with the following number of sound recordings: 152 (64.5%) common pipistrelle, 55 (23.5%) soprano pipistrelle, 26 (11%) NSL and 3 (1.5%) barbastelle out of a total of 8389 recordings; the remainder were noise.

4.6.18. **Transect 3 Static 1** - A total of three species was detected with the following number of sound recordings: 158 (58.5%) common pipistrelle, 87 (32.5%) soprano pipistrelle and 24 (9%) NSL out of a total of 2670 recordings; the remainder were noise.

4.6.19. **Transect 4 Static 1** -. A total of five species was detected with the following number of sound recordings: 925 (87%) common pipistrelle, 88 (8.5%) soprano pipistrelle, 7 (>1%) *Myotis* species, 25 (2.5%) NSL and 9 (>1%) barbastelles out of a total of 3786 recordings; the remainder were noise.

4.6.20. **Transect 5 Static 1** - A total of five species was detected with the following number of sound recordings: 168 (60%) common pipistrelle, 46 (16.5%) soprano pipistrelle, 31 (11%) *Myotis* species, 27 (9.5%) NSL and 7 (3%) barbastelles out of a total of 312 recordings; the remainder were noise.

4.6.21. **Transect 6 Static 1** - A total of five species was detected with the following number of sound recordings: 171 (66.5%) common pipistrelle, 68 (26.5%) soprano pipistrelle, 3 (1%) *Myotis* species, 13 (5%) NSL and 1 (>1%) barbastelle out of a total of 603 recordings; the remainder were noise.

4.6.22. **Transect 7 Static 1** - A total of five species was detected with the following number of sound recordings: 160 (31.5%) common pipistrelle, 267 (52.5%) soprano pipistrelle, 13 (2.5%) Myotis species, 63 (12.5%) NSL and 3 (>1%) barbastelles out of a total of 3888 recordings; the remainder were noise.

August

Transect 1

4.6.23. **Static 1** - A total of five species was detected with the following number of sound recordings: 628 (76%) common pipistrelle, 88 (10%) soprano pipistrelle, 13 (1.5%) *Myotis* species, 92 (11%) NSL and 7 (0.5%) barbastelles out of a total of 4086; recordings the remainder were noise.

4.6.24. **Static 2** - A total of five species was detected with the following number of sound recordings: 538 (75%) common pipistrelle, 58 (8%) soprano pipistrelle, 2 (>1%) *Myotis* species, 106 (14.5%) NSL and 13 (1.5%) barbastelles out of a total of 13392 recordings; the remainder were noise.

4.6.25. **Static 3** - A total of four species was detected with the following number of sound recordings: 95 (25%) common pipistrelle, 165 (43%) soprano pipistrelle, 2 (>1%) *Myotis* species and 116 (30%) NSL out of a total of 11852 recordings; the remainder were noise.

Transect 2

4.6.26. **Static 1** - No obvious signs of equipment malfunction, but no bat calls were recorded from a total of 3,315. All were noise files.

4.6.27. **Static 2** - A total of five species was detected with the following number of sound recordings: 442 (76%) common pipistrelle, 69 (12%) soprano pipistrelle, 6 (1%) *Myotis* species, 108 (19%) NSL and 10 (2%) barbastelles out of a total of 12446 recordings; the remainder were noise.

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4.6.28. **Static 3** - A total of five species was detected with the following number of sound recordings: 187 (70%) common pipistrelle, 74 (28%) soprano pipistrelle, 1 (>1%) *Myotis* species, 2 (>1%) NSL and 1 (>1%) barbastelle out of a total of 2773 recordings; the remainder were noise.

Transect 3

4.6.29. **Static 1** - A total of five species was detected with the following number of sound recordings: 150 (69%) common pipistrelle, 31 (14%) soprano pipistrelle, 1 (>1%) *Myotis* species, 8 (3.5%) NSL and 28 (12.5%) barbastelles out of a total of 9086 recordings; the remainder were noise.

4.6.30. **Static 2** - A total of five species was detected with the following number of sound recordings: 716 (69%) common pipistrelle, 176 (17%) soprano pipistrelle, 14 (1.5%) *Myotis* species, 126 (12%) NSL and 9 (>1%) barbastelles out of a total of 10204 recordings; the remainder were noise.

4.6.31. **Static 3** - A total of five species was detected with the following number of sound recordings: 62 (38%) common pipistrelle, 35 (21%) soprano pipistrelle, 9 (5%) *Myotis* species and 56 (34%) NSL out of a total of 8157 recordings; the remainder were noise.

Transect 4

4.6.32. **Static 1** - A total of five species was detected with the following number of sound recordings: 488 (68%) common pipistrelle, 103 (14.5%) soprano pipistrelle, 11 (1.5%) *Myotis* species, 71 (10%) NSL and 38 (5.5%) barbastelles out of a total of 14556 recordings; the remainder were noise.

Transect 5

4.6.33. **Static 1** - A total of five species was detected with the following number of sound recordings 220 (63%) common pipistrelle, 93 (26.5%) soprano pipistrelle, 22 (6%) *Myotis* species, 11 (3%) NSL and 4 (1%) barbastelles out of a total of 19249 recordings the remainder were noise.

4.6.34. **Static 3** - A total of five species was detected with the following number of sound recordings: 26 (19.5%) common pipistrelle, 58 (43%) soprano pipistrelle, 14 (10%) *Myotis* species, 34 (25%) NSL and 2 (1.5%) barbastelles out of a total of 7423 recordings; the remainder were noise.

Transect 6

4.6.35. **Static 1** - A total of five species was detected with the following number of sound recordings: 1280 (80%) common pipistrelle, 129 (8%) soprano pipistrelle, 7 (0.5%) *Myotis* species, 167 (10%) NSL and 25 (1.5%)barbastelles out of a total of 14459 recordings; the remainder were noise.

4.6.36. **Static 3** - A total of five species was detected with the following number of sound recordings: 671 (92%) common pipistrelle, 37 (5%) soprano pipistrelle, 12 (1.5%) *Myotis* species, 4 (>1%) NSL and 12 (1.5%) barbastelles out of a total of 12743 recordings; the remainder were noise.

Transect 7

4.6.37. **Static 1** - A total of five species was detected with the following number of sound recordings: 34 (30%) common pipistrelle, 44 (38%) soprano pipistrelle, 7 (6.5%) *Myotis* species, 24 (21%) NSL and 4 (3.5%) barbastelles out of a total of 6952 recordings; the remainder were noise.

4.6.38. **Static 2** - A total of five species was detected with the following number of sound recordings: 241 (64%) common pipistrelle, 51 (13.5%) soprano pipistrelle, 6 (1.5%) *Myotis* species, 3 (>1%) NSL and 74 (19.5%) barbastelles out of a total of 19366 recordings; the remainder were noise.

4.6.39. **Static 3** - A total of three species was detected with the following number of sound recordings 33 (59%) common pipistrelle, 21 (37.5%) soprano pipistrelle and 2 (3.5%) NSL out of a total of 16701 recordings the remainder were noise.

September

Transect 1

4.6.40. **Static 1** - A total of five species was detected with the following number of sound recordings 272 (59%) common pipistrelle, 120 (26%) soprano pipistrelle, 23 (5%) *Myotis* species, 21 (4.5%) NSL and 27 (5%) barbastelles out of a total of 525 recordings the remainder were noise.

4.6.41. **Static 2** - A total of five species was detected with the following number of sound recordings 1159 (85.5%) common pipistrelle, 107 (8%) soprano pipistrelle, 8 (>1%) *Myotis* species, 74 (5.5%) NSL and 3 (>1%) barbastelles out of a total of 2429 recordings the remainder were noise.

4.6.42. **Static 3** - A total of five species was detected with the following number of sound recordings 159 (46.5%) common pipistrelle, 70 (20.5%) soprano pipistrelle, 8 (2.5%) *Myotis* species, 78 (22.5%) NSL and 27 (8%) barbastelle bats out of a total of 1858 recordings the remainder were noise.

Transect 2

4.6.43. **Static 1** - A total of five species was detected with the following number of sound recordings 139 (50%) common pipistrelle, 58 (21%) soprano pipistrelle, 21 (7.5%) *Myotis* species, 21 (7.5%) NSL and 37 (13%) barbastelles out of a total of 1584 recordings; the remainder were noise.

4.6.44. **Static 2** - A total of five species was detected with the following number of sound recordings 374 (64%) common pipistrelle, 73 (12.5%) soprano pipistrelle, 29 (5%) *Myotis* species, 45 (8%) NSL and 57 (10%) barbastelles out of a total of 5179 recordings; the remainder were noise.

4.6.45. **Static 3** - A total of three species was detected with the following number of sound recordings 62 (53%) common pipistrelle, 44 (37%) soprano pipistrelle, and 11 (9.5%) NSL out of a total of 620 recordings the remainder were noise.

Transect 3

4.6.46. **Static 1** - A total of five species was detected with the following number of sound recordings 1067 (65%) Common pipistrelle, 375 (22%) Soprano pipistrelle, 45 (2.5%) Myotis species, 93 (5.5%) NSL and 52 (3%) barbastelles out of a total of 21459 recordings the remainder were noise.

4.6.47. **Static 2** - A total of five species was detected with the following number of sound recordings 51 (36%) common pipistrelle, 46 (33%) soprano pipistrelle, 7 (5%) Myotis species, 29 (20%) NSL and 6 (4%) barbastelles out of a total of 569 recordings the remainder were noise.

4.6.48. **Static 3** - A total of five species was detected with the following number of sound recordings 23 (38%) common pipistrelle, 14 (23%) soprano pipistrelle, 9 (14.5%) Myotis species, 11 (18%) NSL and 4 (6.5%) barbastelle bats out of a total of 688 recordings the remainder were noise.

Transect 4

4.6.49. **Static 1** - A total of two species was detected with the following number of sound recordings 59 (81%) common pipistrelle and 14 (19%) soprano pipistrelles out of a total of 3925 recordings; the remainder were noise.

Transect 5

4.6.50. **Static 1** - A total of five species was detected with the following number of sound recordings 83 (40%) common pipistrelle, 81 (40%) soprano pipistrelle, 25 (12%) *Myotis* species, 4 (2%) NSL and 13 (6%) barbastelles out of a total of 1601 recordings; the remainder were noise.

4.6.51. **Static 3** - A total of four species was detected with the following number of sound recordings 4 (3.5%) common pipistrelle, 64 (59%) soprano pipistrelle, 6 (5.5%) *Myotis* species and 35 (32%) NSL out of a total of 330 recordings; the remainder were noise.

Transect 6

4.6.52. **Static 1** -. A total of five species was detected with the following number of sound recordings: 107 (25.5%) common pipistrelle, 203 (48.5%) soprano pipistrelle, 15

(3.5%) *Myotis* species, 21 (5%) NSL and 73 (17.5%) barbastelles out of a total of 4866 recordings; the remainder were noise.

4.6.53. **Static 3** - A total of five species was detected with the following number of sound recordings: 78 (79%) common pipistrelle, 12 (12%) soprano pipistrelle, 3 (3%) *Myotis* species, 2 (2%) NSL and 4 (4%) barbastelles out of a total of 9832 recordings; the remainder were noise.

Transect 7

4.6.54. **Static 1** - A total of four species was detected with the following number of sound recordings: 5 (22%) common pipistrelle, 4 (18%) soprano pipistrelle, 1 (4.5%) *Myotis* species and 12 (54.5%)NSL out of a total of 2106 recordings; the remainder were noise.

4.6.55. **Static 2** - A total of five species was detected with the following number of sound recordings 41 (19%) common pipistrelle, 55 (26.5%) soprano pipistrelle, 3 (1.5%) *Myotis* species, 1 (0.5%) NSL and 107 (51%) barbastelles out of a total of 5108 recordings; the remainder were noise.

4.6.56. **Static 3** - A total of three species was detected with the following number of sound recordings 706 (56%) common pipistrelle, 392 (31%) soprano pipistrelle, 4 (>1%) *Myotis* species, 6 (>1%) NSL and 147 (11.5%) barbastelle bats out of a total of 12351 recordings; the remainder were noise.

October

Transect 1

4.6.57. **Static 1** - A total of four species was detected with the following number of sound recordings 219 (55%) common pipistrelle, 136 (34%) soprano pipistrelle, 13 (3.5%) *Myotis* species and 25 (6.5%) barbastelles out of a total of 574 recordings the remainder were noise.

4.6.58. **Static 2** - A total of four species was detected with the following number of sound recordings 1854 (97%) common pipistrelle, 51 (2%) soprano pipistrelle, 1 (>1%) *Myotis* species and 3 (>1%) barbastelles out of a total of 3530 recordings the remainder were noise.

4.6.59. **Static 3** - A total of five species was detected with the following number of sound recordings 1771 (77.5%) common pipistrelle, 446 (19.5%) soprano pipistrelle, 5 (0.2%) *Myotis* species, 27 (1.5%) NSL and 28 (1.5%) barbastelle bats out of a total of 3052 recordings the remainder were noise.

Transect 2

4.6.60. **Static 1** - A total of four species was detected with the following number of sound recordings 28 (46.5%) common pipistrelle, 24 (40%) soprano pipistrelle, 3 (5%) NSL and 5 (8.5%) barbastelles out of a total of 894 recordings; the remainder were noise.

4.6.61. **Static 2** - A total of five species was detected with the following number of sound recordings 127 (76%) common pipistrelle, 34 (20%) soprano pipistrelle, 3 (2%) *Myotis* species, 1 (>1%) NSL and 2 (1%) barbastelles out of a total of 9807 recordings; the remainder were noise.

4.6.62. **Static 3** - A total of five species was detected with the following number of sound recordings 105 (88%) common pipistrelle, 11 (9%) soprano pipistrelle, 1 (>1%) *Myotis* species, 1 (>1%) NSL and 1 (>1%) barbastelles out of a total of 316 recordings; the remainder were noise.

Transect 3

4.6.63. **Static 1** - A total of three species was detected with the following number of sound recordings 47 (69%) Common pipistrelle, 20 (30%) Soprano pipistrelle and 1 (1%) NSL out of a total of 3828 recordings the remainder were noise.

4.6.64. **Static 2** - A total of five species was detected with the following number of sound recordings 1497 (60.5%) common pipistrelle, 878 (35.5%) soprano pipistrelle, 63 (2.5%) Myotis species, 23 (>1%) NSL and 20 (>1%) barbastelles out of a total of 3766 recordings the remainder were noise.

4.6.65. **Static 3** - A total of five species was detected with the following number of sound recordings 226 (49%) common pipistrelle, 205 (44%) soprano pipistrelle, 15 (3.5%) Myotis species, 2 (>1%) NSL and 11 (2%) barbastelle bats out of a total of 1795 recordings the remainder were noise.

Transect 4

4.6.66. **Static 1** - A total of three species was detected with the following number of sound recordings 298 (82%) common pipistrelle, 62 (17%) soprano pipistrelles and 3 (>1%) myotis species out of a total of 1775 recordings; the remainder were noise.

Transect 6

4.6.67. **Static 1** -. A total of five species was detected with the following number of sound recordings: 191 (58.5%) common pipistrelle, 121 (37%) soprano pipistrelle, 6 (1.5%) *Myotis* species, 1 (>1%) NSL and 7 (1.5%) barbastelles out of a total of 2587 recordings; the remainder were noise.

4.6.68. **Static 3** - A total of five species was detected with the following number of sound recordings: 90 (27%) common pipistrelle, 207 (65%) soprano pipistrelle, 7 (2.5%) *Myotis* species, 4 (1%) NSL and 14 (4.5%) barbastelles out of a total of 4936 recordings; the remainder were noise.

Transect 7

4.6.69. **Static 1** - A total of five species was detected with the following number of sound recordings: 9 (47%) common pipistrelle, 4 (21.5%) soprano pipistrelle, 2 (10.5%) *Myotis* species, 2 (10.5%) NSL and 2 (10.5%) barbastelles out of a total of 3439 recordings; the remainder were noise.

4.6.70. **Static 2** - A total of four species was detected with the following number of sound recordings 80 (51%) common pipistrelle, 53 (34%) soprano pipistrelle, 3 (1.5%) *Myotis* species and 22 (13.5%) barbastelles out of a total of 320 recordings; the remainder were noise.

4.6.71. **Static 3** - A total of three species was detected with the following number of sound recordings 583 (56%) common pipistrelle, 433 (41.5%) soprano pipistrelle, 8 (>1%) *Myotis* species, 3 (>1%) NSL and 18 (1.5%) barbastelle bats out of a total of 1168 recordings; the remainder were noise.

Table 10 - Percentage of total bat sound recordings per species (not including noise)

Static ID	Ppip	Ppyg	Myotis Sp.	NSL	Barbastelle
Transect 1 Static 1	70%	17%	4%	4%	4%
Transect 1 Static 2	89%	5%	0%	5%	0%
Transect 1 Static 3	68%	23%	1%	7%	2%
Transect 2 Static 1	66%	18%	7%	5%	5%
Transect 2 Static 2	68%	13%	3%	11%	5%
Transect 2 Static 3	71%	26%	0%	3%	0%
Transect 3 Static 1	68%	24%	2%	4%	2%
Transect 3 Static 2	62%	30%	2%	5%	1%
Transect 3 Static 3	46%	37%	5%	10%	2%
Transect 4 Static 1	87%	9%	1%	2%	1%
Transect 5 Static 1	58%	19%	18%	3%	2%
Transect 5 Static 3	12%	50%	8%	28%	1%
Transect 6 Static 1	73%	22%	2%	1%	3%

Transect 6 Static 3	38%	37%	15%	7%	2%
Transect 7 Static 1	49%	21%	2%	1%	27%
Transect 7 Static 2	56%	36%	1%	0%	7%
Transect 7 Static 3	73%	22%	2%	1%	3%
Total across all statics	70%	19%	3%	4%	3%

5. Summary

Evidence of at least five species of bats: common and soprano pipistrelle, *Myotis* species, noctule/serotine/Leisler's and barbastelle bats were recorded during the surveys and found to be present across the seven transect locations through recordings from the static detectors.

Brown long eared bats were also detected during Transect 5 making the total species recorded at least six.

Field surveys have provided confidence that noctule and serotine have both been recorded on transects which would take the total species of bats to seven.

The presence of barbastelle bats is of particular note being an Annex II species and one of the rarer species recorded in the UK, and with Eversden and Wimpole Woods SAC (barbastelle one of the qualifying features) lying approximately over 10 km west of the route. Barbastelle bats were recorded at all static locations except for Transect 1 Static 2, and Transect 2 Static 3, and that the highest number of barbastelle passes were recorded at T1 S1 in June (72), T7 S2 in August (74), T6 S1 in September (73), T7 S2 in September (107), and T7 S3 in September (147).

A soprano pipistrelle day roost was recorded in T18 and a bat roost of a currently unidentified species recorded in T23.

A pipistrelle roost has been confirmed in T13 through the findings of droppings during the tree climbing surveys, however no emergence or re-entry of bats was recorded during surveys.

Building surveys found none of the buildings surveyed provided any suitable roosting potential.

Sufficient survey effort consisting of building and tree PRAs, walked transects, static detector deployment, emergence/re-entry surveys of buildings and trees have been undertaken during 2020 to provide a comprehensive survey data throughout the scheme.

The total number of recordings, species found and roosts confirmed, combined with the presence of habitats suitable of supporting bats including woodlands, open fields, waterbodies and linear habitat features such as rivers, streams and hedge lines show that the survey route provides suitable habitats for roosting, foraging and commuting bats.

Winter static surveys are also being undertaken in 2020-2021 to inform barbastelle activity levels.

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6. References

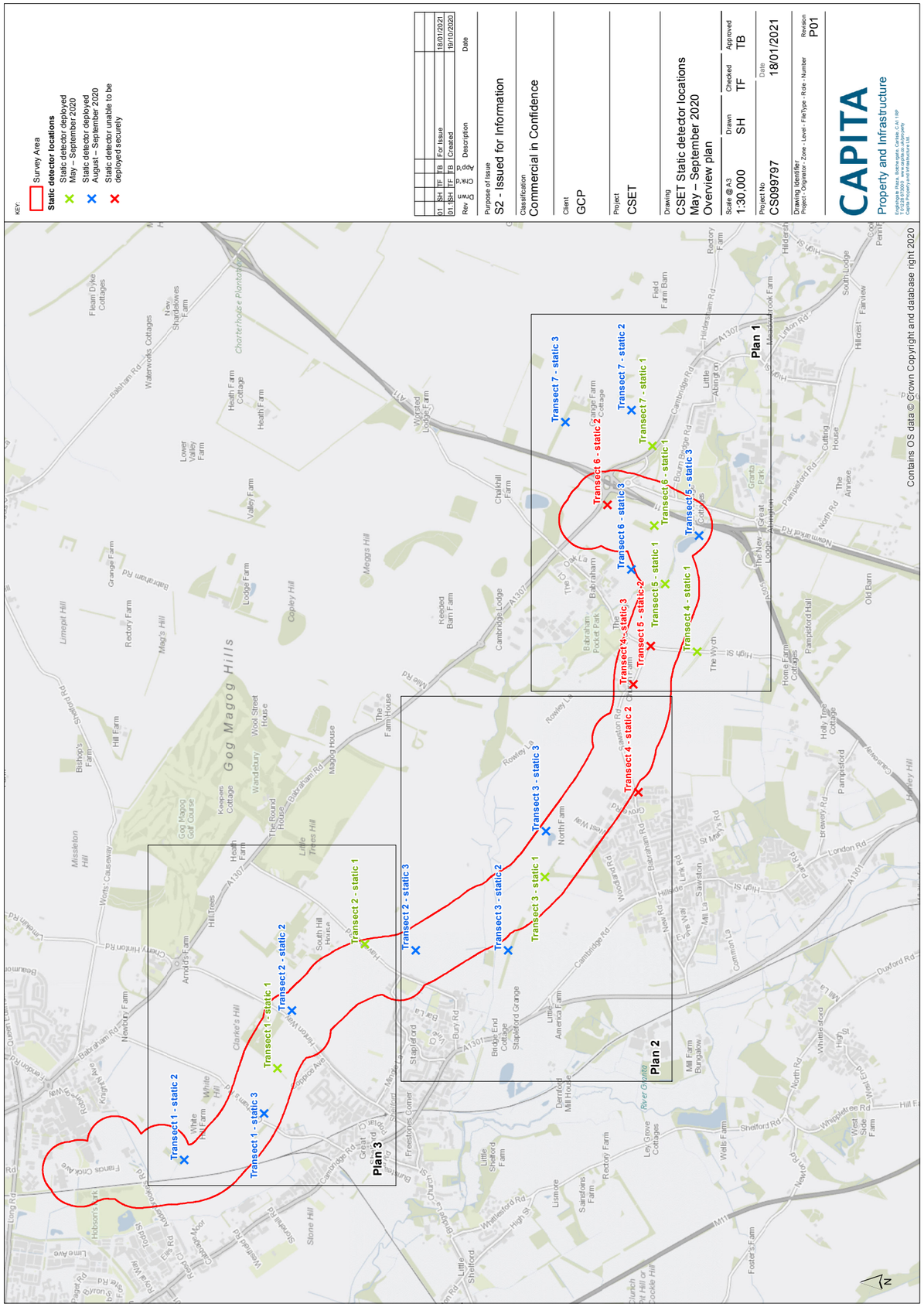
Collins, J. (ed. (2016). Bat Surveys for Professional Ecologists —Good Practice Guidelines, 3rd edition, Bat Conservation Trust, London.

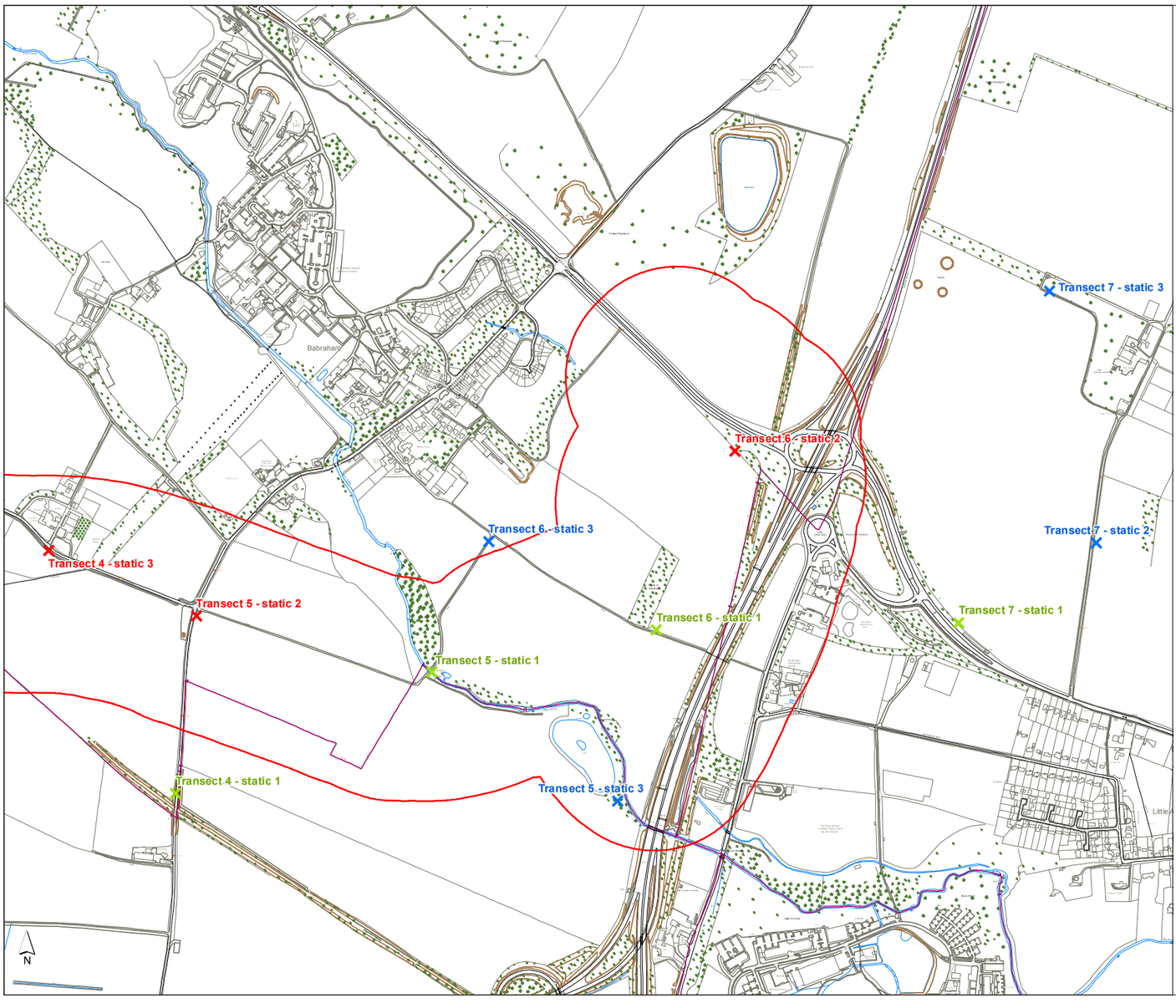
WYG. (Dec 2019). Cambridge South East Transport Strategy (CSET). Bat Activity Report

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Appendices

Appendix A – Static Detector location map





KEY:

Survey Area

Static detector locations

- Static detector deployed May – September 2020
- Static detector deployed August – September 2020
- Static detector unable to be deployed securely

Rev.	Drwn	Chk'd	App'd	Description	Date
01	SH	TF	TB	For Issue	18/01/2021
01.1	SH	TF	TB	Created	19/10/2020

Purpose of Issue
S2 - Issued for Information

Classification
Commercial in Confidence

Client
GCP

Project
CSET

Drawing
CSET Static detector locations
May – September 2020
Plan 1

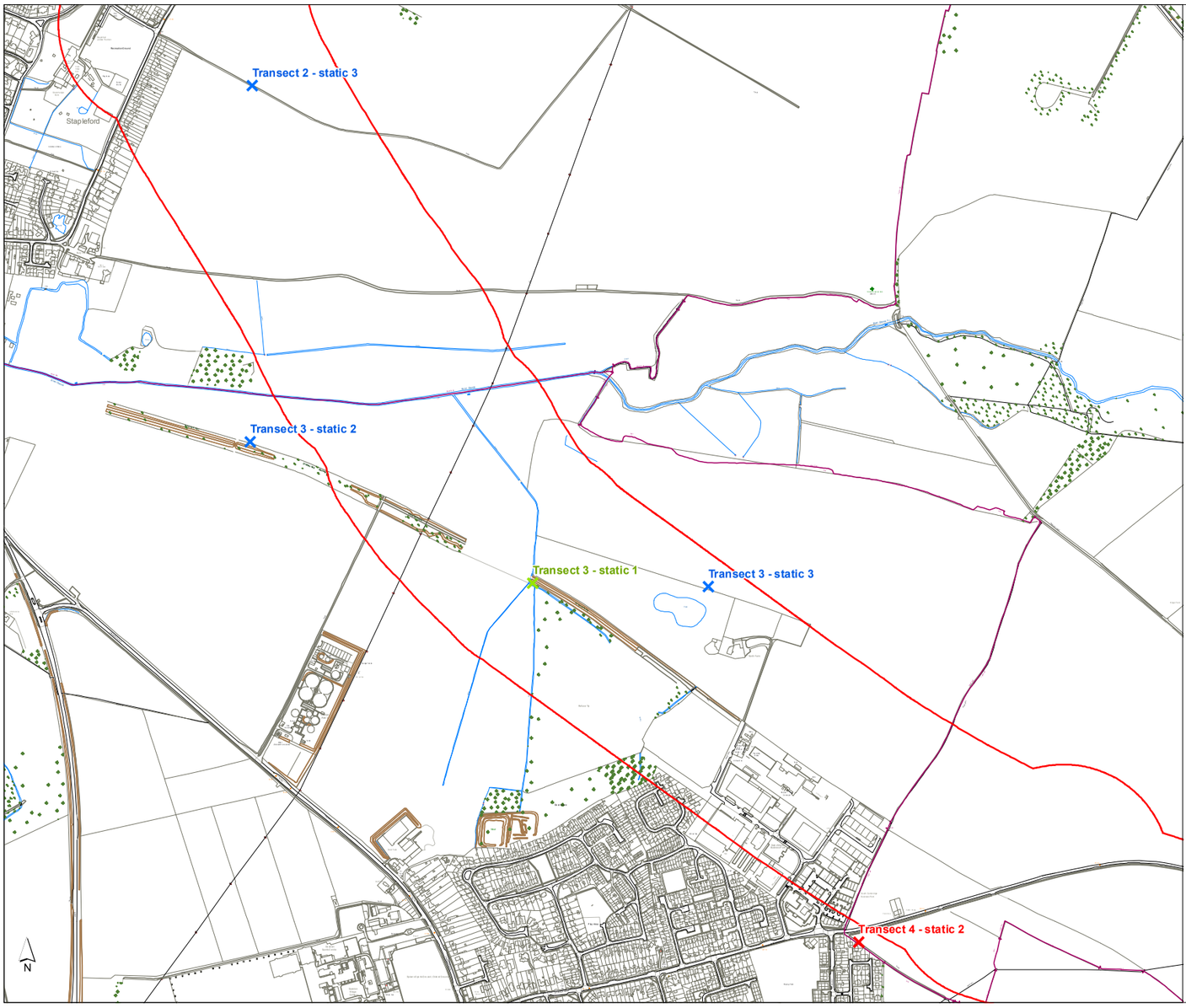
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Date: 18/01/2021

Drawing Identifier
Project - Originator - Zone - Level - FileType - Role - Number
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KEY:

Survey Area

Static detector locations

- Static detector deployed May – September 2020
- Static detector deployed August – September 2020
- Static detector unable to be deployed securely

Rev.	Drwn	Chk'd	App'd	Description	Date
01	SH	TF	TB	For Issue	18/01/2021
01.1	SH	TF	TB	Created	19/10/2020

Purpose of Issue
S2 - Issued for Information

Classification
Commercial in Confidence

Client
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Project
CSET

Drawing
CSET Static detector locations
May – September 2020
Plan 2

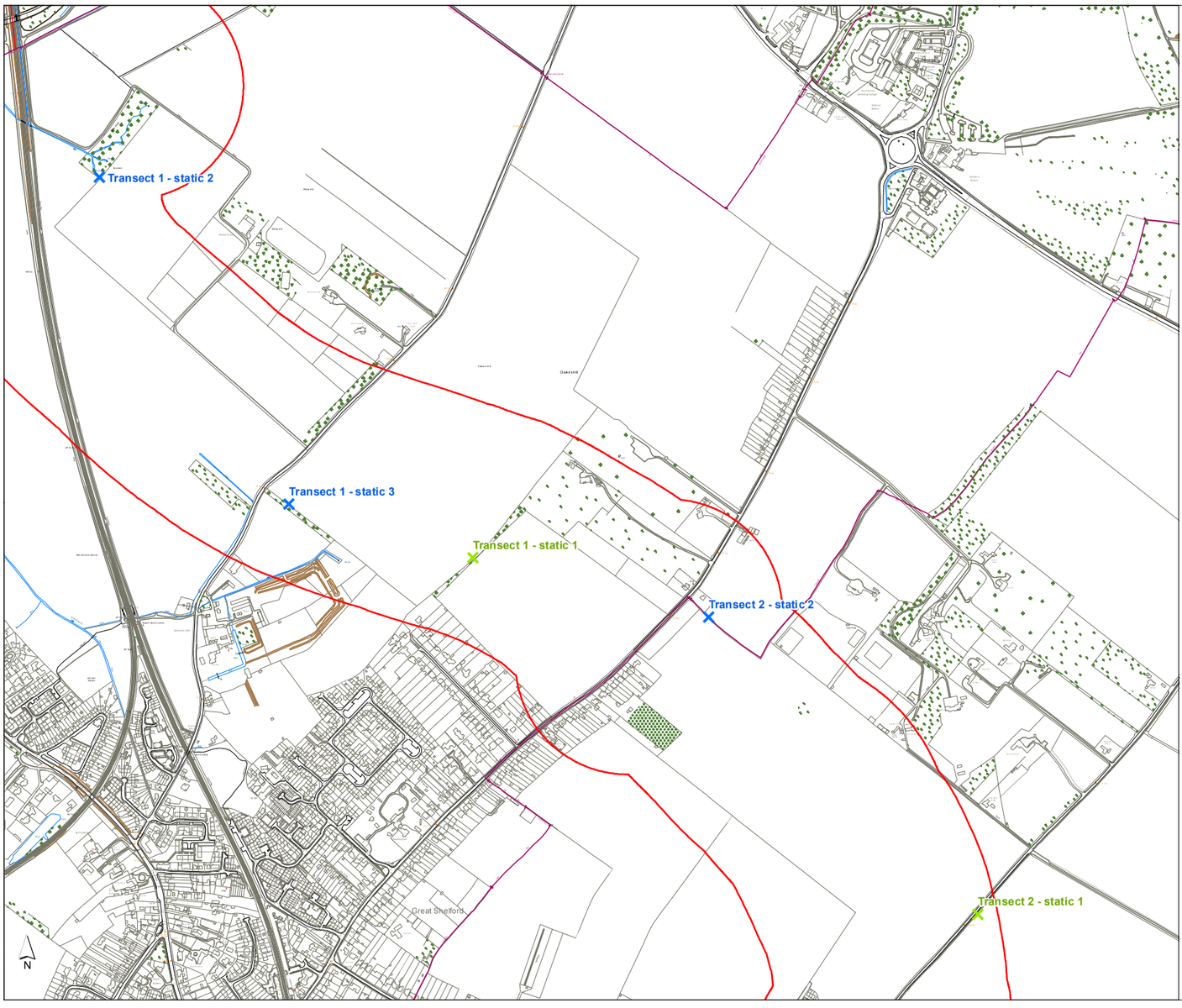
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Project No: CS099797
Date: 18/01/2021

Drawing Identifier
Project - Originator - Zone - Level - FileType - Role - Number
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KEY:

Survey Area

Static detector locations

Static detector deployed May – September 2020

Static detector deployed August – September 2020

Static detector unable to be deployed securely

Rev.	Drwn	Chk'd	App'd	Description	Date
01	SH	TF	TB	For Issue	18/01/2021
01.1	SH	TF	TB	Created	19/10/2020

Purpose of Issue
S2 - Issued for Information

Classification
Commercial in Confidence

Client
GCP

Project
CSET

Drawing
CSET Static detector locations
May – September 2020
Plan 3

Scale @ A3	Drawn	Checked	Approved
1:8,000	SH	TF	TB

Project No: CS099797

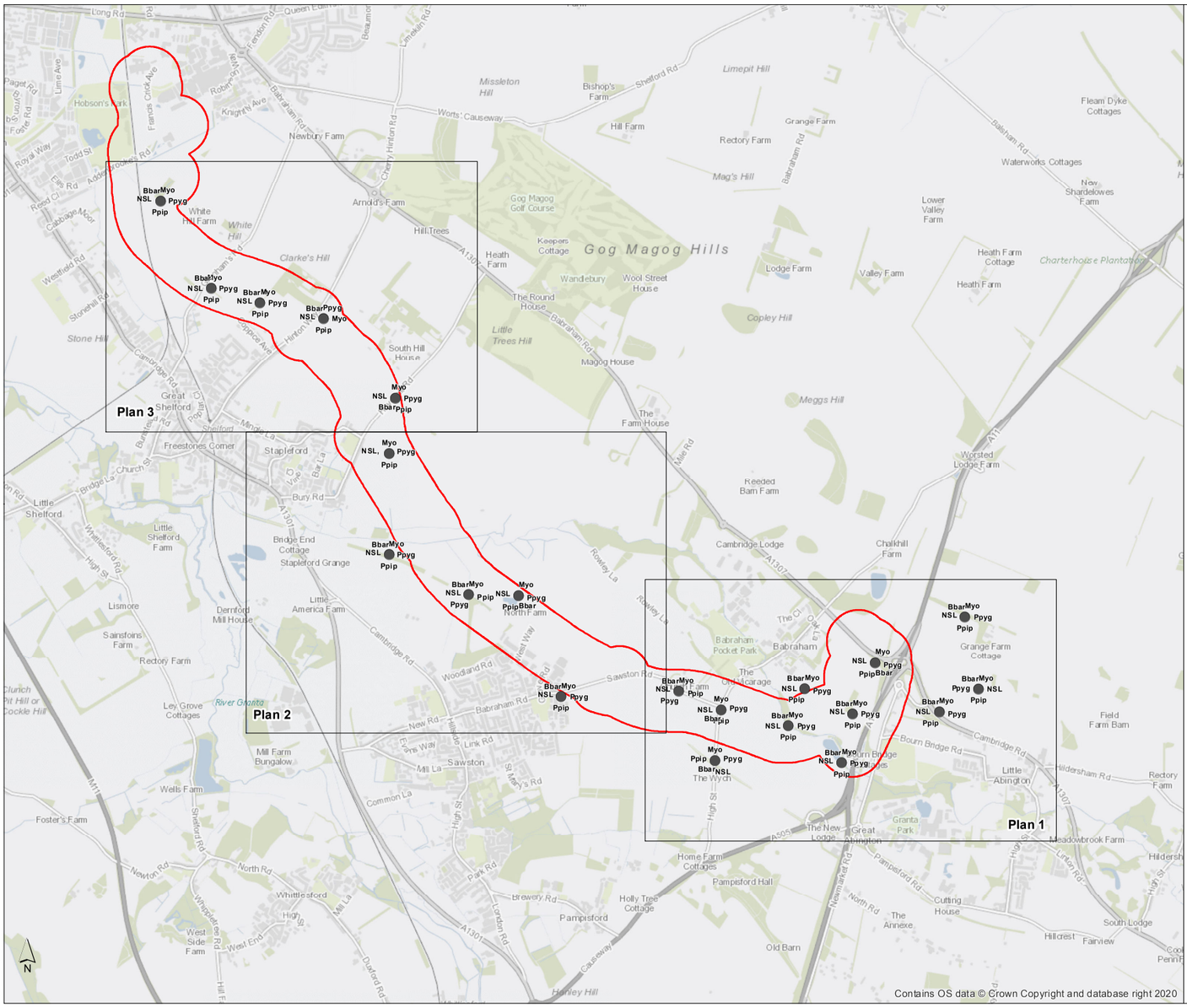
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Drawing Identifier
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KEY:

Survey Area

Static Detector locations

SPECIES
Ppip – Common pipistrelle
Ppyg – Soprano pipistrelle
NSL – Noctule/Serotine/Leislers
Bbar – Barbastelle
Myo – Myotis species

Rev.	Drwn	Chk'd	App'd	Description	Date
01	SH	TF	TB	For Issue	18/01/2021
01.1	SH	TF	TB	Created	19/10/2020

Purpose of Issue
S2 - Issued for Information

Classification
Commercial in Confidence

Client
GCP

Project
CSET

Drawing
CSET Static detector locations
May – September 2020
Overview plan

Scale @ A3	Drawn	Checked	Approved
1:30,000	SH	TF	TB

Project No: CS099797

Date: 18/01/2021

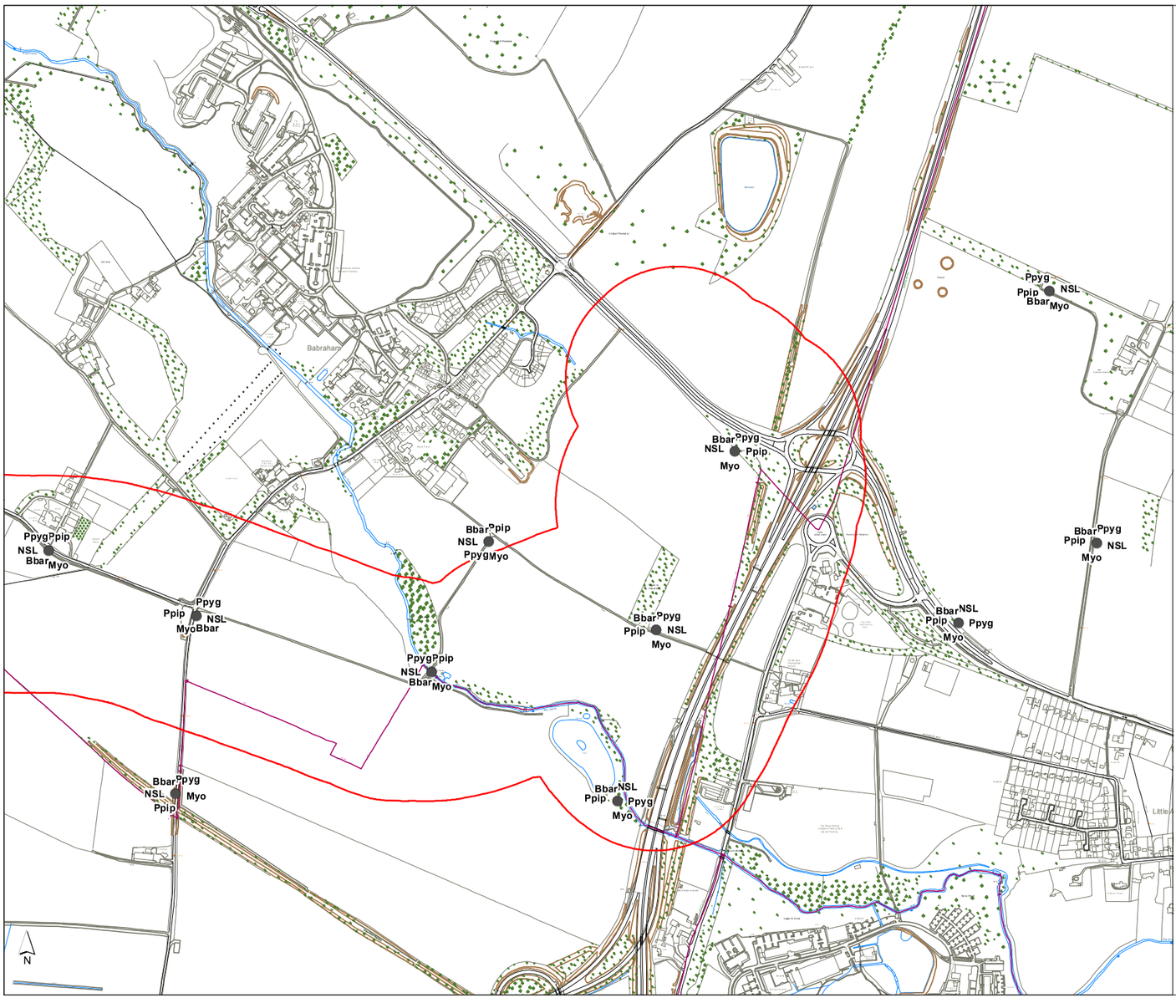
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Project - Originator - Zone - Level - FileType - Role - Number

Revision: P01

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KEY:

Survey Area

Static Detector locations

SPECIES
Ppip – Common pipistrelle
Ppyg – Soprano pipistrelle
NSL – Noctule/Serotine/Leislers
Bbar – Barbastelle
Myo – Myotis species

Rev.	Drawn	Checked	Appd	Description	Date
01	SH	TF	TB	For Issue	18/01/2021
01.1	SH	TF	TB	Created	23/10/2020

Purpose of Issue
S2 - Issued for Information

Classification
Commercial in Confidence

Client
GCP

Project
CSET

Drawing
CSET Static detector locations - Species
Plan 1 of 3

Scale @ A3	Drawn	Checked	Approved
1:8,500	SH	TF	TB

Project No
CS099797

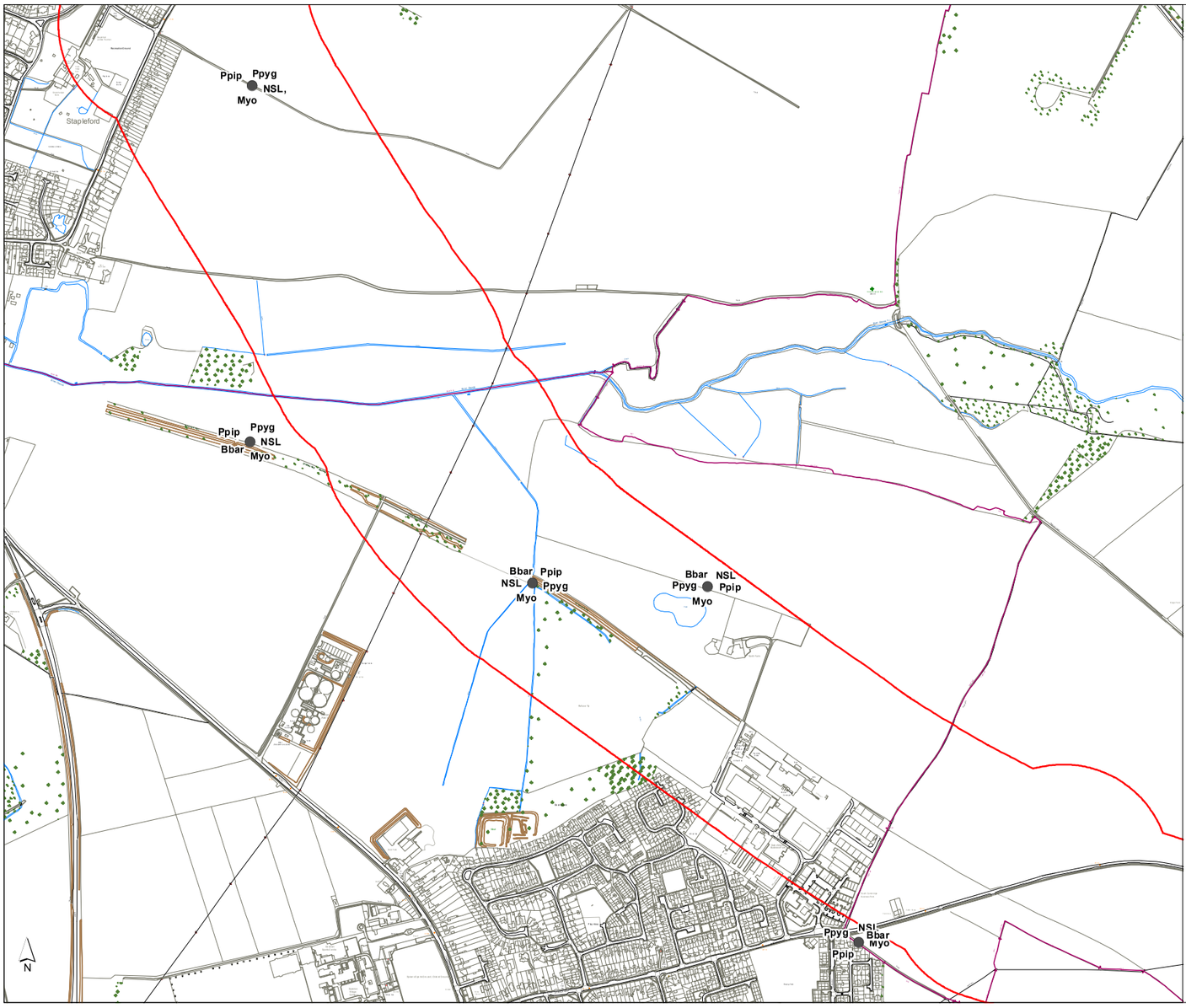
Date
18/01/2021

Drawing Identifier
Project - Originator - Zone - Level - FileType - Role - Number

Revision
P01

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Plot date: 18/01/2021



KEY:

Survey Area

Static Detector locations

SPECIES
Ppip – Common pipistrelle
Ppyg – Soprano pipistrelle
NSL – Noctule/Serotine/Leislers
Bbar – Barbastelle
Myo – Myotis species

Rev.	Drawn	Checked	Appd	Description	Date
01	SH	TF	TB	For Issue	18/01/2021
01.1	SH	TF	TB	Created	23/10/2020

Purpose of Issue
S2 - Issued for Information

Classification
Commercial in Confidence

Client
GCP

Project
CSET

Drawing
CSET Static detector locations - Species
Plan 2 of 3

Scale @ A3	Drawn	Checked	Approved
1:8,500	SH	TF	TB

Project No
CS099797

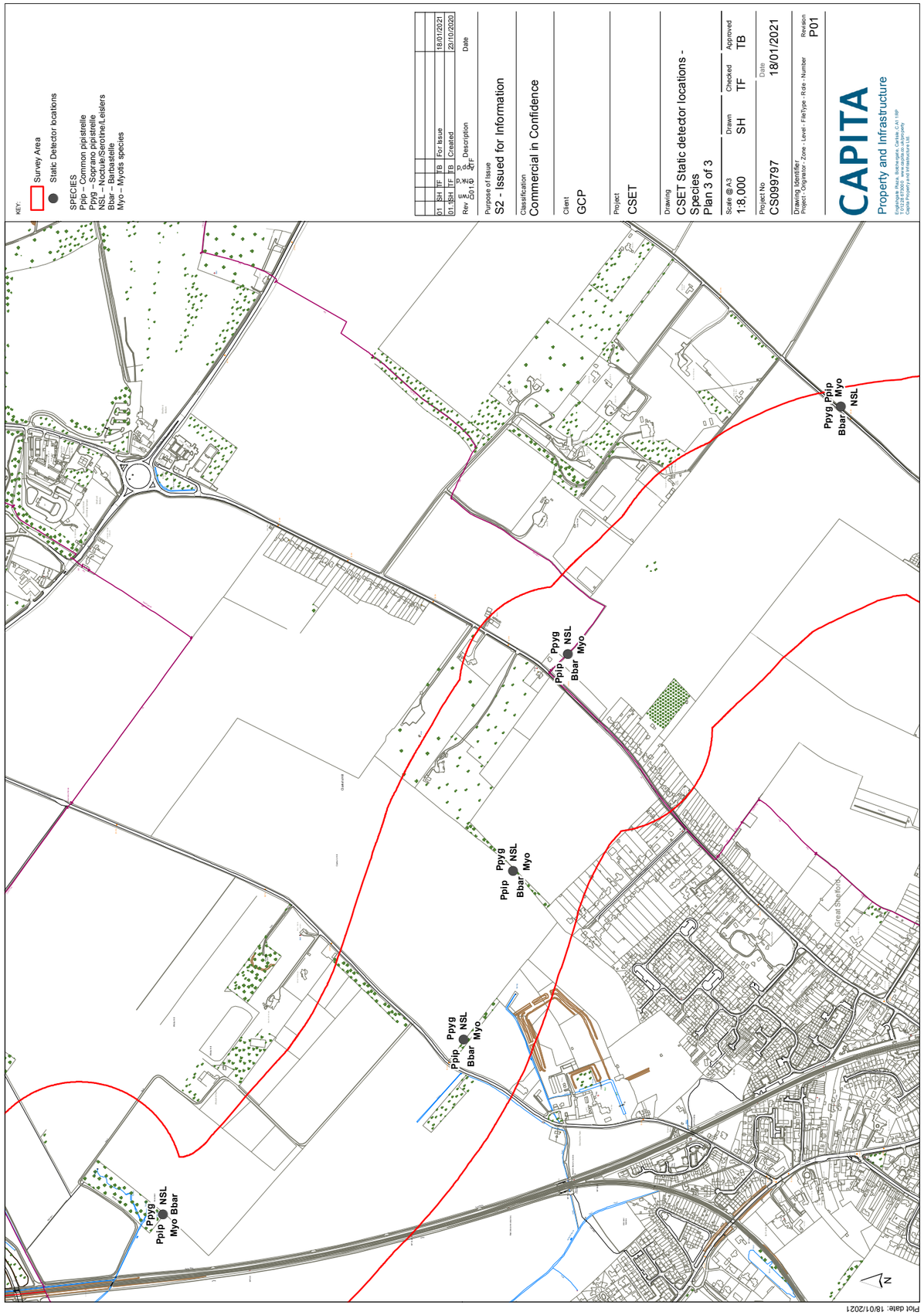
Date
18/01/2021

Drawing Identifier
Project - Originator - Zone - Level - FileType - Role - Number

Revision
P01

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Plot date: 18/01/2021



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Appendix B – Static Deployment Dates

Table 11: May static dates

Static detector ID	Date of deployment	Date of collection
Transect 1 - static 1	Not deployed – no access	Not deployed – no access
Transect 2 - static 1	19/05/2020	04/06/2020
Transect 3 - static 1	19/05/2020	04/06/2020
Transect 4 - static 1	19/05/2020	04/06/2020
Transect 5 - static 1	28/04/2020	19/05/2020
Transect 6 - static 1	19/05/2020	04/06/2020
Transect 7 - static 1	19/05/2020	04/06/2020

Table 12: June static dates

Static detector ID	Date of deployment	Date of collection
Transect 1 - static 1	17/06/2020	30/06/2020
Transect 2 - static 1	17/06/2020	30/06/2020
Transect 3 - static 1	17/06/2020	30/06/2020
Transect 4 - static 1	17/06/2020	30/06/2020
Transect 5 - static 1	17/06/2020	30/06/2020
Transect 6 - static 1	17/06/2020	30/06/2020
Transect 7 - static 1	17/06/2020	30/06/2020

Table 13: July static dates

Static detector ID	Date of deployment	Date of collection
Transect 1 - static 1	14/07/2020	23/07/2020
Transect 2 - static 1	14/07/2020	23/07/2020
Transect 3 - static 1	14/07/2020	23/07/2020
Transect 4 - static 1	14/07/2020	23/07/2020
Transect 5 - static 1	14/07/2020	23/07/2020
Transect 6 - static 1	14/07/2020	23/07/2020
Transect 7 - static 1	14/07/2020	23/07/2020

Table 14: August static dates

Static detector ID	Date of deployment	Date of collection
Transect 1 - static 1	11/08/2020	18/08/2020
Transect 1 - static 2	11/08/2020	18/08/2020
Transect 1 - static 3	11/08/2020	18/08/2020
Transect 2 - static 1	11/08/2020	18/08/2020
Transect 2 - static 2	11/08/2020	18/08/2020
Transect 2 - static 3	11/08/2020	18/08/2020
Transect 3 - static 1	11/08/2020	18/08/2020
Transect 3 - static 2	11/08/2020	18/08/2020
Transect 3 - static 3	11/08/2020	18/08/2020
Transect 4 - static 1	19/08/2020	26/08/2020
Transect 4 - static 2	Not deployed	Not deployed
Transect 4 - static 3	Not deployed	Not deployed
Transect 5 - static 1	19/08/2020	26/08/2020
Transect 5 - static 2	Not deployed	Not deployed
Transect 5 - static 3	19/08/2020	26/08/2020
Transect 6 - static 1	19/08/2020	26/08/2020
Transect 6 - static 2	Not deployed	Not deployed
Transect 6 - static 3	19/08/2020	26/08/2020
Transect 7 - static 1	19/08/2020	26/08/2020
Transect 7 - static 2	19/08/2020	26/08/2020
Transect 7 - static 3	19/08/2020	26/08/2020

Table 15: September static dates

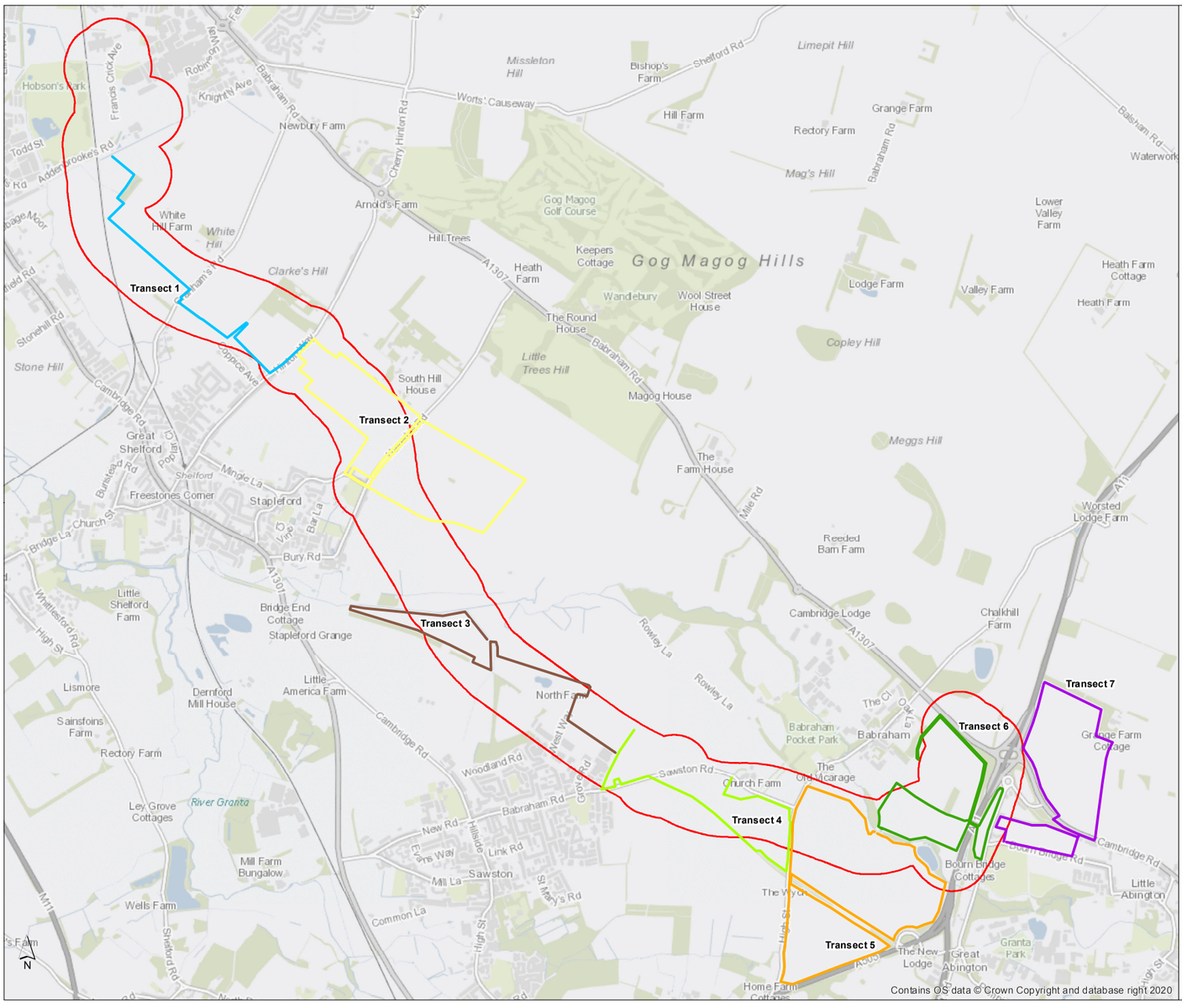
Static detector ID	Date of deployment	Date of collection
Transect 1 - static 1	15/09/2020	22/09/2020
Transect 1 - static 2	15/09/2020	22/09/2020
Transect 1 - static 3	15/09/2020	22/09/2020
Transect 2 - static 1	15/09/2020	22/09/2020
Transect 2 - static 2	15/09/2020	22/09/2020
Transect 2 - static 3	15/09/2020	22/09/2020
Transect 3 - static 1	15/09/2020	22/09/2020
Transect 3 - static 2	15/09/2020	22/09/2020
Transect 3 - static 3	15/09/2020	22/09/2020
Transect 4 - static 1	23/09/2020	30/09/2020
Transect 4 - static 2	Not deployed	Not deployed
Transect 4 - static 3	Not deployed	Not deployed
Transect 5 - static 1	23/09/2020	30/09/2020
Transect 5 - static 2	Not deployed	Not deployed
Transect 5 - static 3	23/09/2020	30/09/2020
Transect 6 - static 1	23/09/2020	30/09/2020
Transect 6 - static 2	Not deployed	Not deployed
Transect 6 - static 3	23/09/2020	30/09/2020
Transect 7 - static 1	23/09/2020	30/09/2020
Transect 7 - static 2	23/09/2020	30/09/2020
Transect 7 - static 3	23/09/2020	30/09/2020

Table 16 - October static dates

Static detector ID	Date of deployment	Date of collection
Transect 1 - static 1	06/10/2020	13/10/2020
Transect 1 - static 2	06/10/2020	13/10/2020
Transect 1 - static 3	06/10/2020	13/10/2020
Transect 2 - static 1	06/10/2020	13/10/2020
Transect 2 - static 2	06/10/2020	13/10/2020
Transect 2 - static 3	13/10/2020	20/10/2020
Transect 3 - static 1	06/10/2020	13/10/2020
Transect 3 - static 2	06/10/2020	13/10/2020
Transect 3 - static 3	06/10/2020	13/10/2020
Transect 4 - static 1	13/10/2020	20/10/2020
Transect 4 - static 2	Not deployed	Not deployed
Transect 4 - static 3	Not deployed	Not deployed
Transect 5 - static 1	Not deployed	Not deployed
Transect 5 - static 2	Not deployed	Not deployed
Transect 5 - static 3	Not deployed	Not deployed
Transect 6 - static 1	13/10/2020	20/10/2020
Transect 6 - static 2	Not deployed	Not deployed
Transect 6 - static 3	13/10/2020	20/10/2020
Transect 7 - static 1	13/10/2020	20/10/2020
Transect 7 - static 2	13/10/2020	20/10/2020
Transect 7 - static 3	13/10/2020	20/10/2020

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Appendix C – Transect route maps



KEY:

- Survey Area
- Transect 1
- Transect 2
- Transect 3
- Transect 4
- Transect 5
- Transect 6
- Transect 7

Rev.	Drwn	Chkd	Appd	Description	Date
01	SH	MJ	TB	Created	18/02/2021

Purpose of Issue: S2 - Issued for Information

Classification: Commercial in Confidence

Client: GCP

Project: CSET

Drawing: CSET Bat Transects - Overview Plan

Scale @ A3	Drawn	Checked	Approved
1:25,000	SH	MJ	TB

Project No: CS099797

Date: 18/02/2021

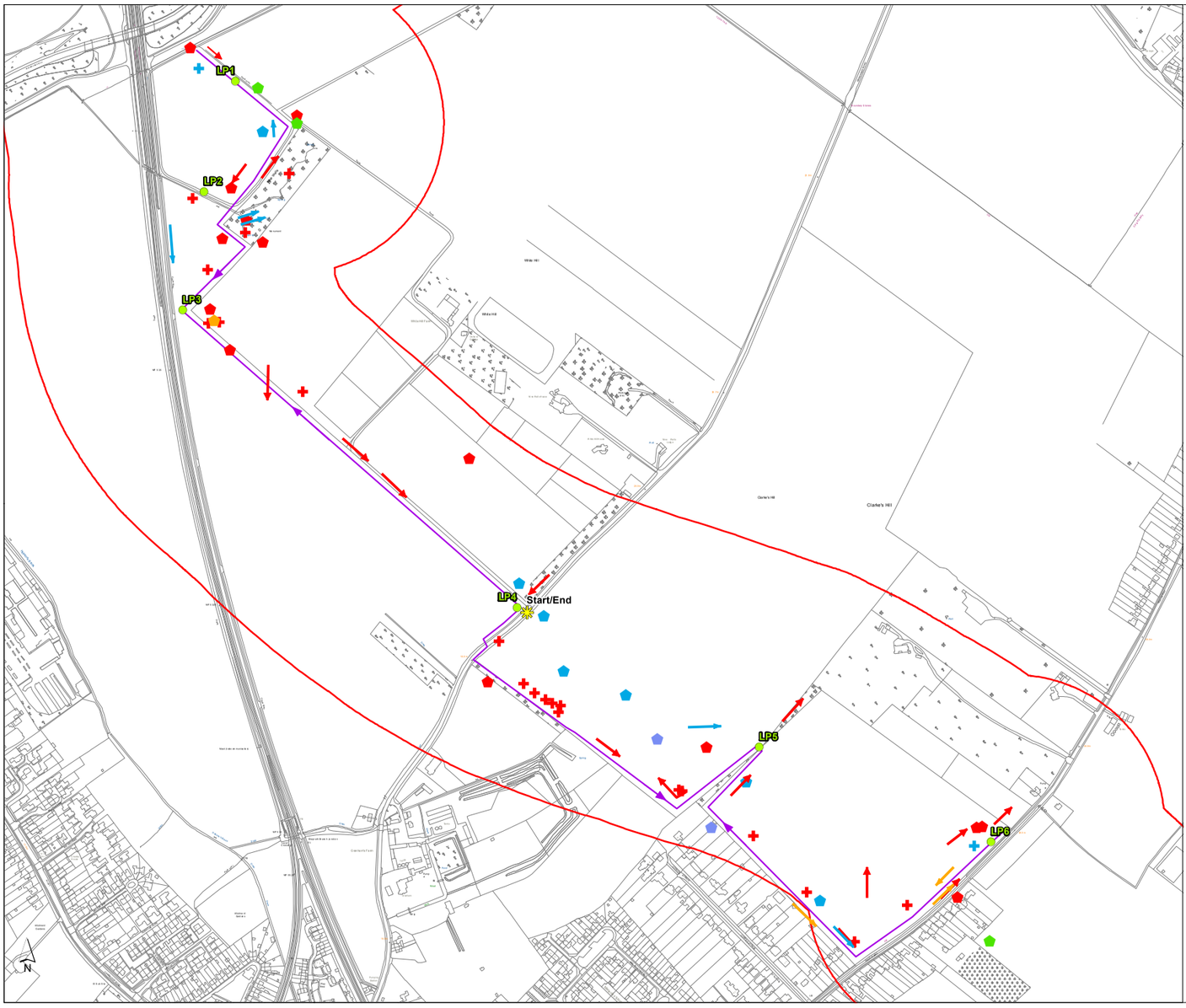
Drawing Identifier: Project - Originator - Zone - Level - FileType - Role - Number

Revision: P01

CAPITA
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Capita Property and Infrastructure Ltd.

Plot date: 18/02/2021



KEY:

- Survey Area

Species, Activity

- Common Noctule, Commuting
- Common Noctule, Foraging
- Common Noctule, Pass
- Common Pipistrelle, Commuting
- Common Pipistrelle, Foraging
- Common Pipistrelle, Pass
- Myotis species, Pass
- Serotine, Pass
- Soprano Pipistrelle, Commuting
- Soprano Pipistrelle, Pass
- Transects
- Listening points
- Start/End

Rev.	Drwn	Chkd	Appd	Description	Date
01	SH	MJ	TB	Created	22/02/2021

Purpose of Issue: S2 - Issued for Information

Classification: Commercial in Confidence

Client: GCP

Project: CSET

Drawing: CSET Bat Transects - Transect 1 - Summary Plan (May, June, July & August 2020)

Scale @ A3	Drawn	Checked	Approved
1:6,000	SH	MJ	TB

Project No: CS099797

Date: 22/02/2021

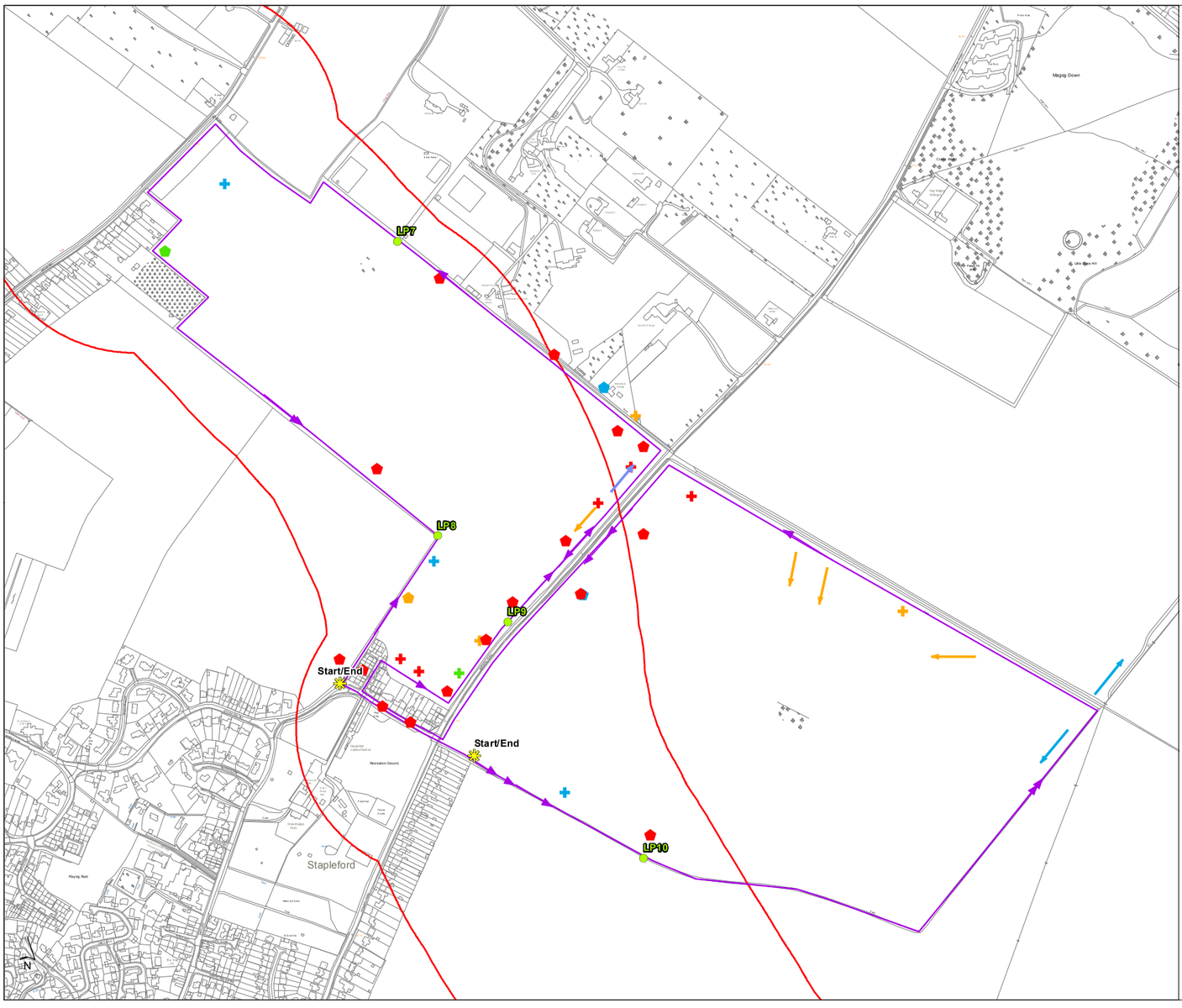
Drawing Identifier: Project - Originator - Zone - Level - FileType - Role - Number

Revision: P01

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Capita Property and Infrastructure Ltd.

Plot date: 22/02/2021



KEY:

Survey Area

Species, Activity

- Common Noctule, Commuting
- Common Noctule, Foraging
- Common Noctule, Heard not seen
- Common Pipistrelle, Commuting
- Common Pipistrelle, Foraging
- Common Pipistrelle, Pass
- Myotis species, Foraging
- Myotis species, Pass
- Serotine, Commuting
- Soprano Pipistrelle, Commuting
- Soprano Pipistrelle, Foraging
- Soprano Pipistrelle, Pass

Transects

Listening points

Start/End

Rev	Drwn	Chk'd	App'd	Description	Date
01	SH	MJ	TB	Created	22/02/2021

Purpose of Issue
S2 - Issued for Information

Classification
Commercial in Confidence

Client
GCP

Project
CSET

Drawing
CSET Bat Transects -
Transect 2 - Summary Plan
(May, June, July & August 2020)

Scale @ A3	Drawn	Checked	Approved
1:6,000	SH	MJ	TB

Project No
CS099797

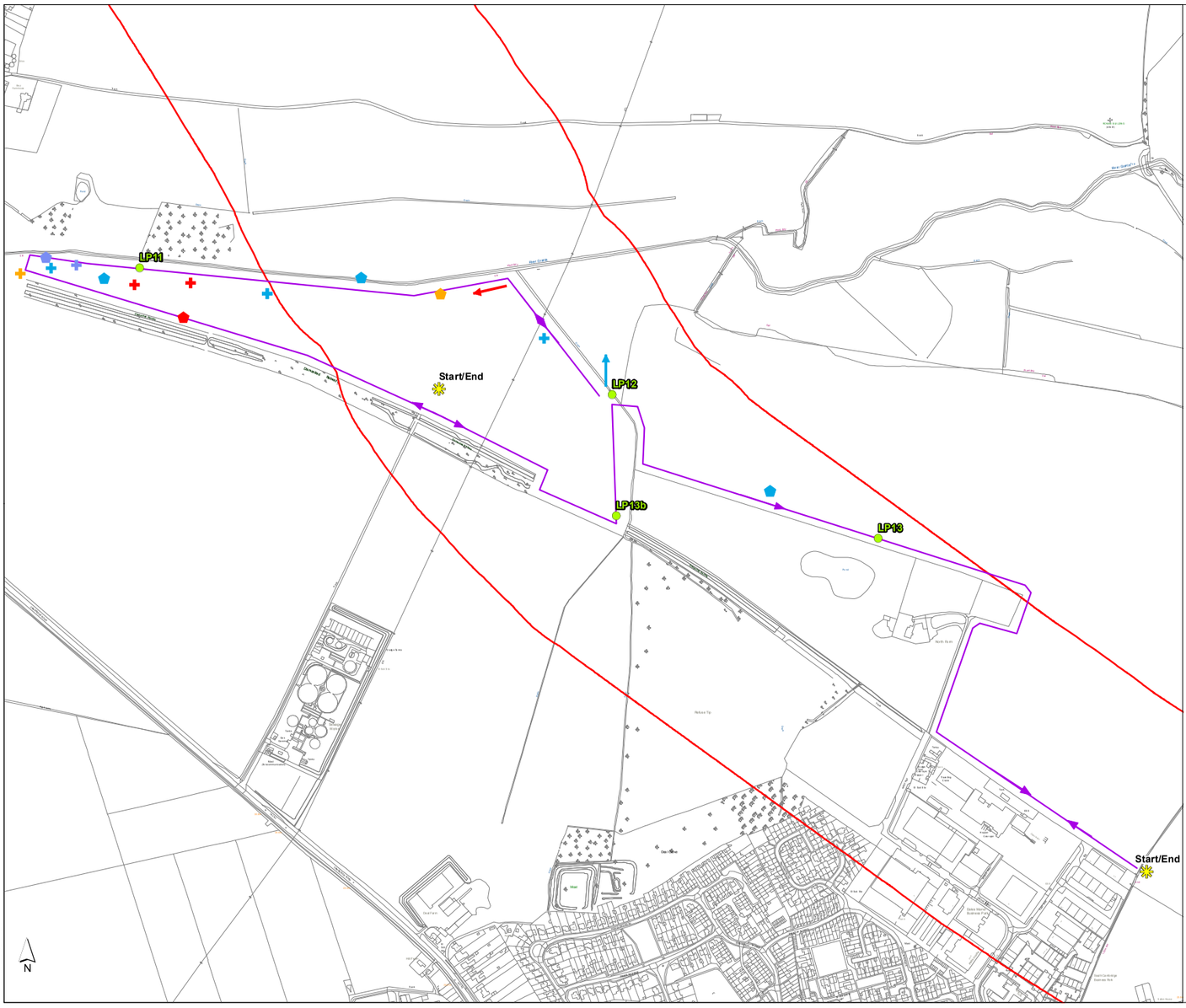
Date
22/02/2021

Drawing Identifier
Project - Originator - Zone - Level - FileType - Role - Number

Revision
P01

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Plot date: 22/02/2021



KEY:

Survey Area

Species, Activity

- Common Noctule, Commuting
- Common Noctule, Foraging
- Common Noctule, Pass
- Common Pipistrelle, Commuting
- Common Pipistrelle, Foraging
- Common Pipistrelle, Pass
- Serotine, Foraging
- Serotine, Heard not seen
- Soprano Pipistrelle, Foraging
- Soprano Pipistrelle, Pass

Transects

Listening points

Start/End

Rev	Drwn	Chk'd	App'd	Description	Date
01	SH	MJ	TB	Created	22/02/2021

Purpose of Issue
S2 - Issued for Information

Classification
Commercial in Confidence

Client
GCP

Project
CSET

Drawing
CSET Bat Transects -
Transect 3 - Summary Plan
(May, June, July & August 2020)

Scale @ A3	Drawn	Checked	Approved
1:6,000	SH	MJ	TB

Project No
CS099797

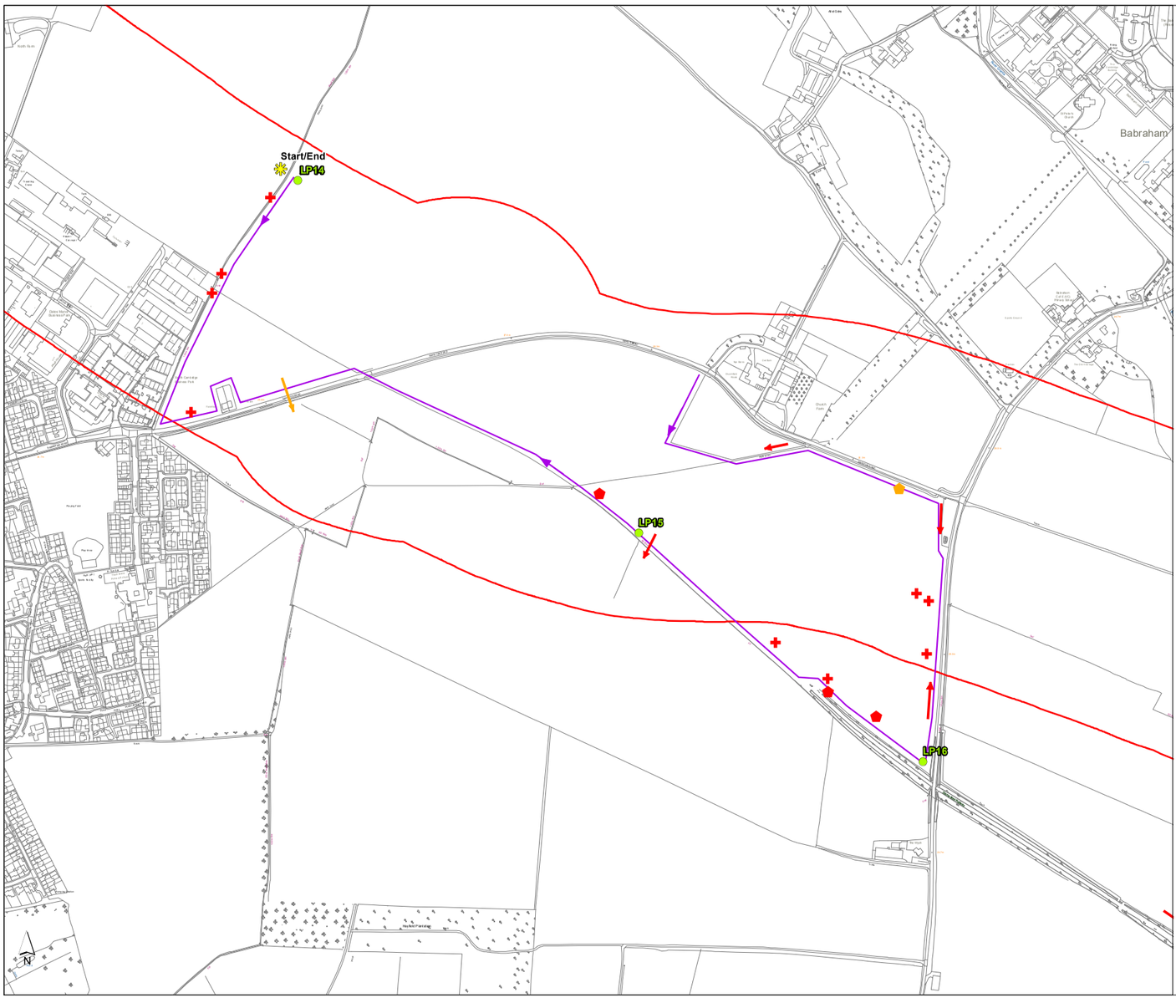
Date
22/02/2021

Drawing Identifier
Project - Originator - Zone - Level - FileType - Role - Number

Revision
P01

CAPITA
Property and Infrastructure
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Capita Property and Infrastructure Ltd.

Plot date: 22/02/2021



KEY:

Survey Area

Species, Activity

- Common Pipistrelle, Commuting
- Common Pipistrelle, Foraging
- Common Pipistrelle, Pass
- Soprano Pipistrelle, Commuting
- Soprano Pipistrelle, Pass

Transects

Listening points

Start/End

Rev	Drwn	Chk'd	App'd	Description	Date
01	SH	MJ	TB	Created	22/02/2021

Purpose of Issue
S2 - Issued for Information

Classification
Commercial in Confidence

Client
GCP

Project
CSET

Drawing
CSET Bat Transects -
Transect 4 - Summary Plan
(May, June & July 2020)

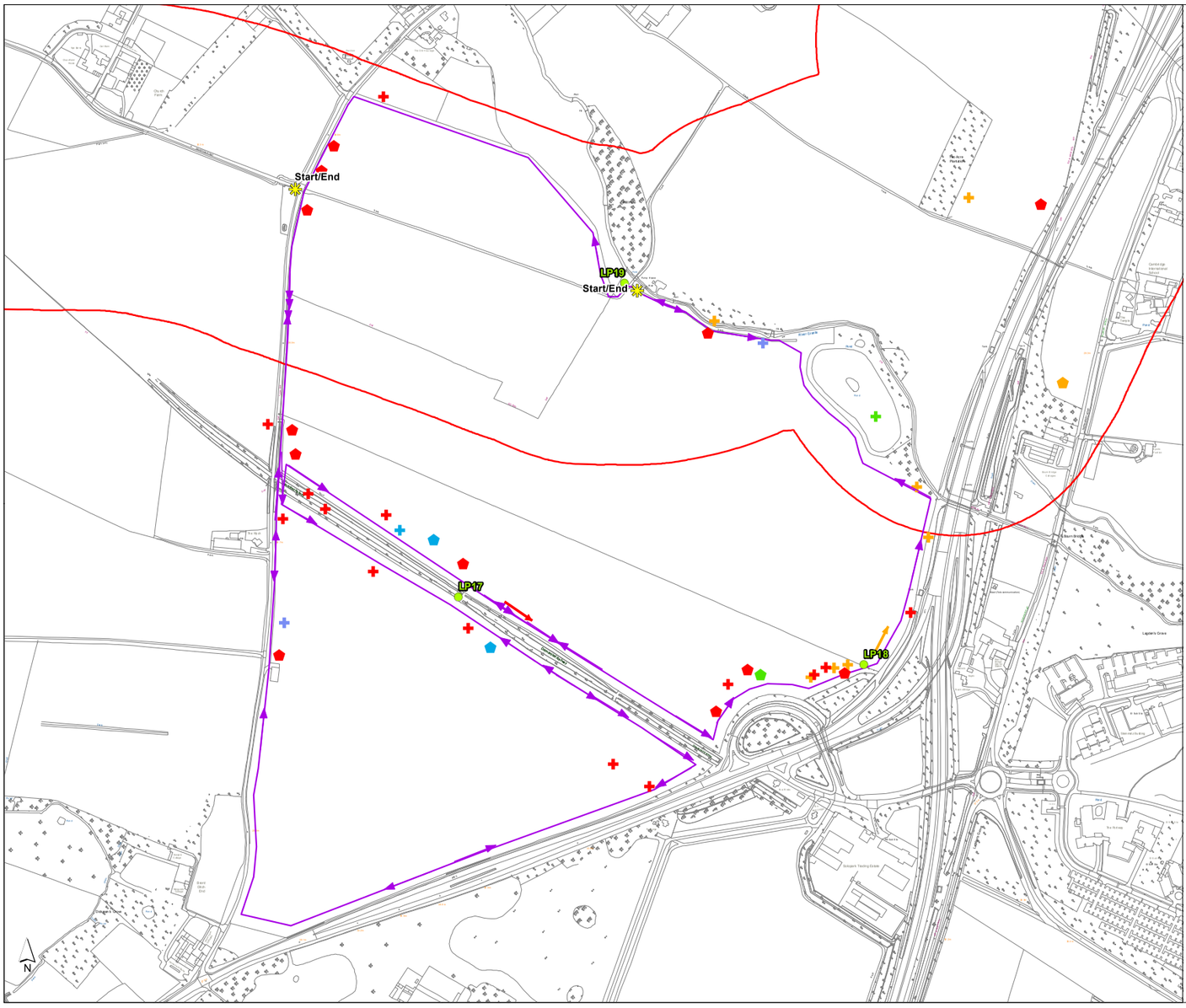
Scale @ A3	Drawn	Checked	Approved
1:6,000	SH	MJ	TB

Project No: CS099797
Date: 22/02/2021

Drawing Identifier
Project - Originator - Zone - Level - FileType - Role - Number
Revision: P01

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Capita Property and Infrastructure Ltd.

Plot date: 22/02/2021



KEY:

Survey Area

Species, Activity

- Common Noctule, Foraging
- Common Noctule, Heard not seen
- Common Pipistrelle, Commuting
- Common Pipistrelle, Foraging
- Common Pipistrelle, Heard not seen
- Myotis species, Foraging
- Myotis species, Heard not seen
- Serotine, Foraging
- Soprano Pipistrelle, Commuting
- Soprano Pipistrelle, Foraging

Transects

Listening points

Start/End

Rev	Drwn	Chk'd	App'd	Description	Date
01	SH	MJ	TB	Created	22/02/2021

Purpose of Issue
S2 - Issued for Information

Classification
Commercial in Confidence

Client
GCP

Project
CSET

Drawing
CSET Bat Transects -
Transect 5- Summary Plan
(May, June, July, August, September & October 2020)

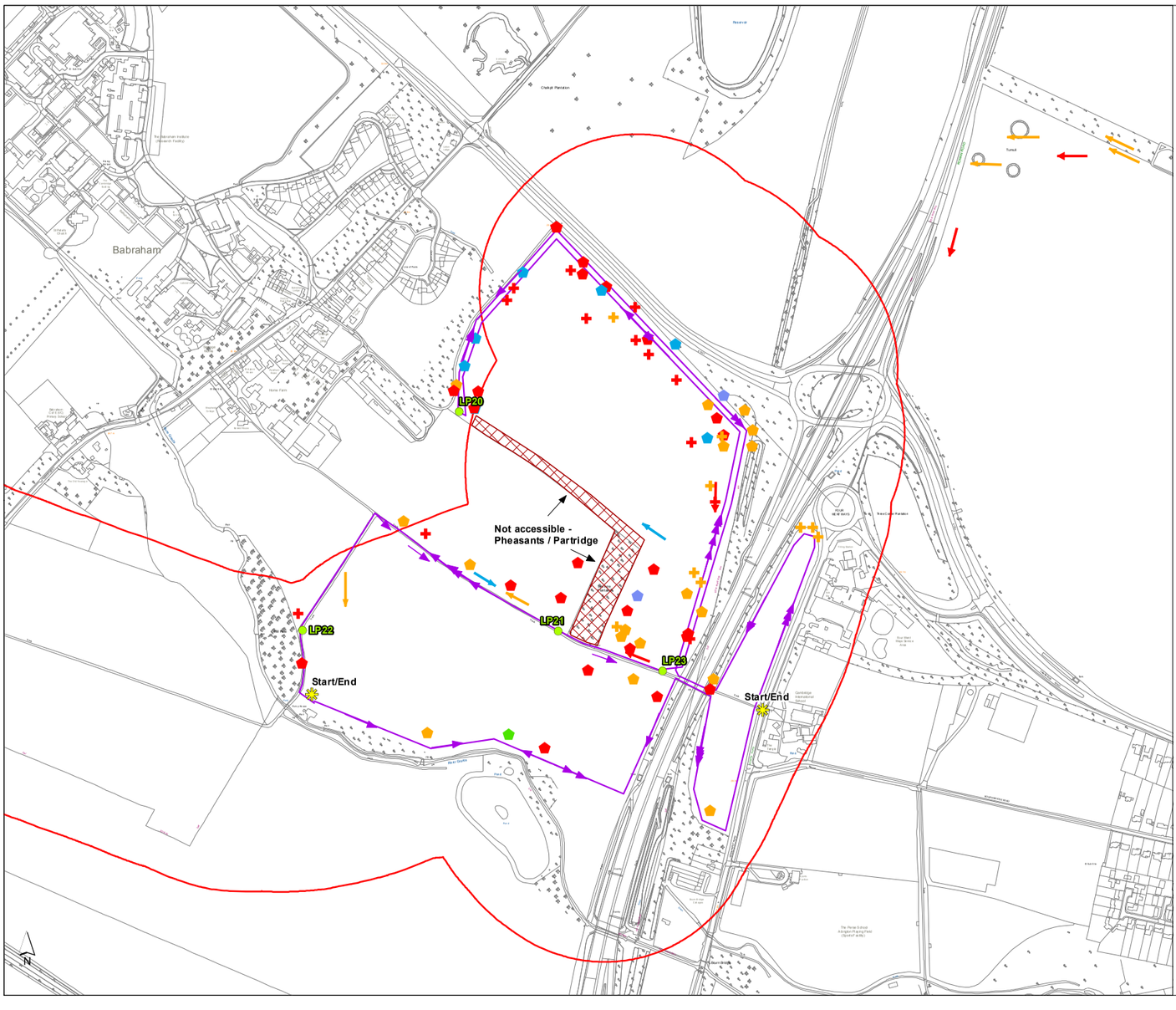
Scale @ A3	Drawn	Checked	Approved
1:6,000	SH	MJ	TB

Project No: CS099797
Date: 22/02/2021

Drawing Identifier
Project - Originator - Zone - Level - FileType - Role - Number
Revision: P01

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Plot date: 22/02/2021



KEY:

Survey Area

Species, Activity

- Common Noctule, Commuting
- Common Noctule, Pass
- Common Pipistrelle, Commuting
- Common Pipistrelle, Foraging
- Common Pipistrelle, Pass
- Myotis species, Pass
- Serotine, Pass
- Soprano Pipistrelle, Commuting
- Soprano Pipistrelle, Foraging
- Soprano Pipistrelle, Pass

Transects

Listening points

Start/End

Not accessible

Rev	Dwn	Chk'd	App'd	Description	Date
01	SH	MJ	TB	Created	22/02/2021

Purpose of Issue
S2 - Issued for Information

Classification
Commercial in Confidence

Client
GCP

Project
CSET

Drawing
CSET Bat Transects -
Transect 6 - Summary Plan
(May, June, July, August, September & October 2020)

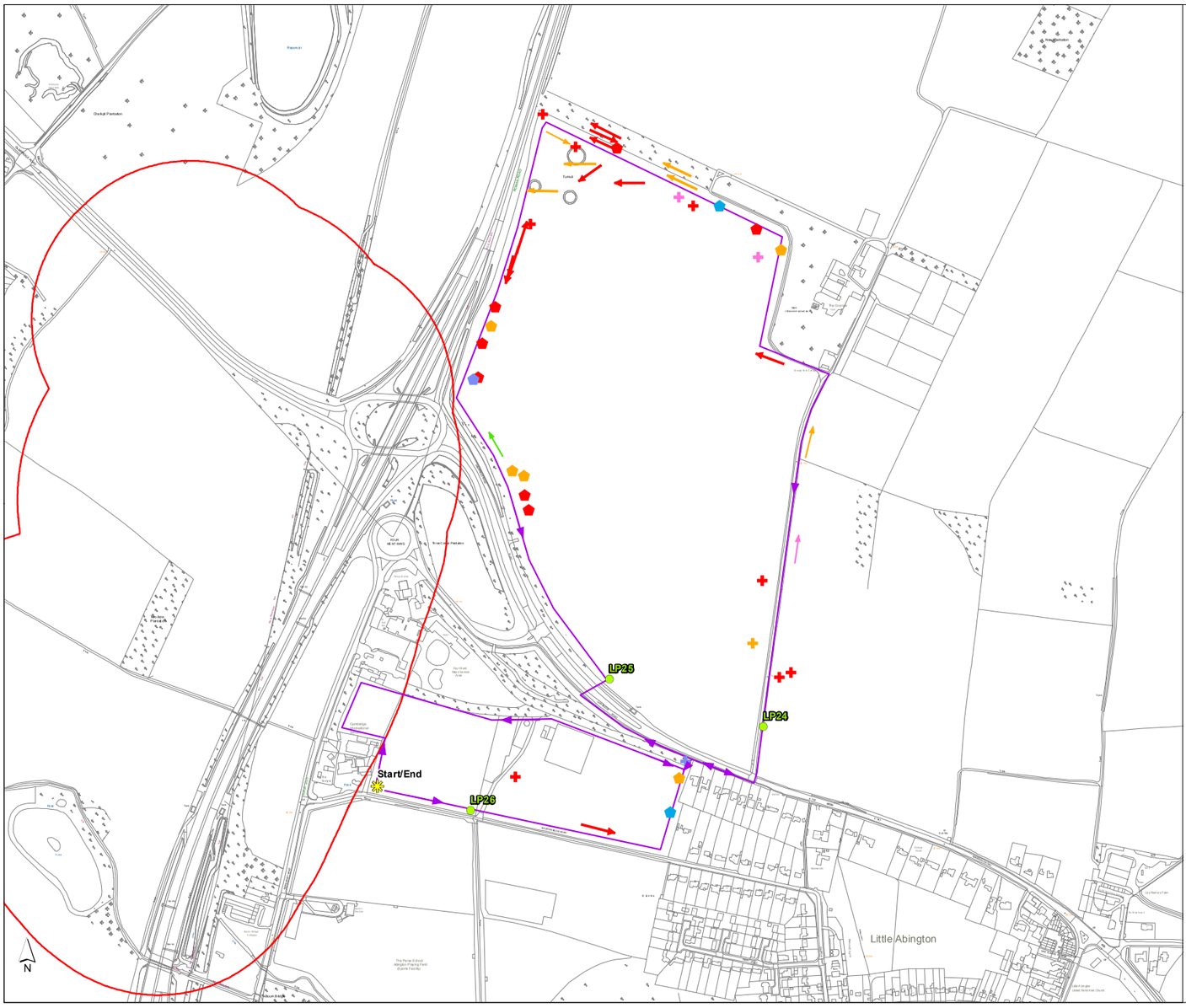
Scale @ A3	Drawn	Checked	Approved
1:6,000	SH	MJ	TB

Project No: CS099797
Date: 22/02/2021

Drawing Identifier
Project - Originator - Zone - Level - FileType - Role - Number
Revision: P01

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Capita Property and Infrastructure Ltd.

Plot date: 22/02/2021



KEY:

Survey Area

Species, Activity

- Barbastelle, Commuting
- Barbastelle, Foraging
- Common Noctule, Pass
- Common Pipistrelle, Commuting
- Common Pipistrelle, Foraging
- Common Pipistrelle, Heard not seen
- Myotis species, Commuting
- Serotine, Foraging
- Serotine, Pass
- Soprano Pipistrelle, Commuting
- Soprano Pipistrelle, Foraging
- Soprano Pipistrelle, Pass

Transects

Listening points

Start/End

Rev	Dwn	Chk'd	App'd	Description	Date
01	SH	MJ	TB	Created	22/02/2021

Purpose of Issue
S2 - Issued for Information

Classification
Commercial in Confidence

Client
GCP

Project
CSET

Drawing
CSET Bat Transects -
Transect 7 - Summary Plan
(May, June & July 2020)

Scale @ A3	Drawn	Checked	Approved
1:6,000	SH	MJ	TB

Project No: CS099797
Date: 22/02/2021

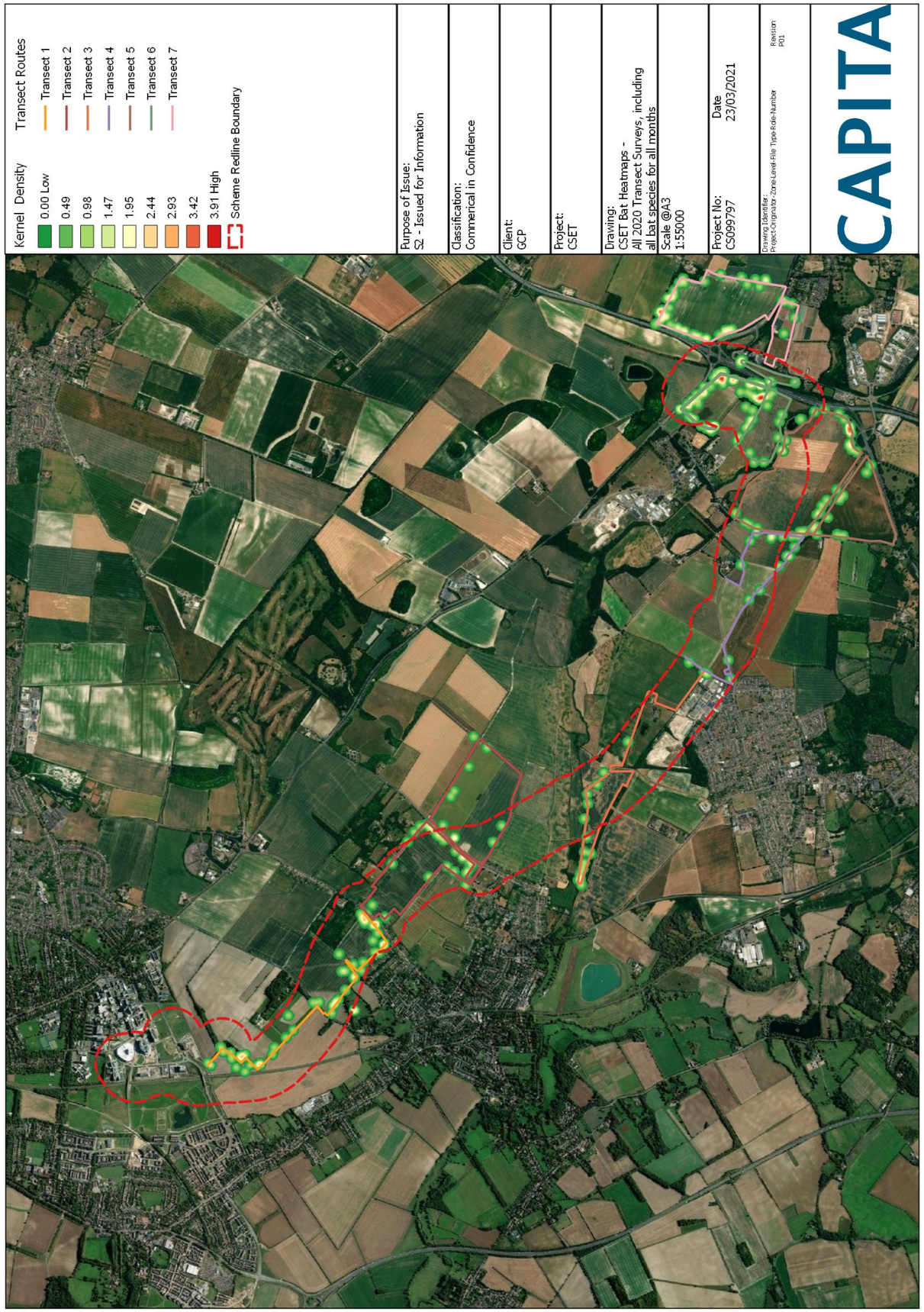
Drawing Identifier
Project - Originator - Zone - Level - FileType - Role - Number
Revision: P01

CAPITA
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Plot date: 22/02/2021

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Appendix D – Transect Heat Maps





Purpose of Issue:
S2 - Issued for Information

Classification:
Commerical in Confidence

Client:
GCP

Project:
CSET

Drawing:
CSET Bat Heatmaps -
Transect 1 2020 Surveys, including all bat species and all months

Scale @A3
1:12000

Project No: CS099797
Date 23/03/2021

Drawing Identifier:
Project-Originator-Zone-Level-File Type-Role-Number
Revision P01

CAPITA



Purpose of Issue:
S2 - Issued for Information

Classification:
Commerical in Confidence

Client:
GCP

Project:
CSET

Drawing:
CSET Bat Heatmaps -
Transect 2 2020 Surveys, including all bat species and all months

Scale @A3
1:12000

Project No: CS099797
Date 23/03/2021

Drawing Identifier:
Project-Originator-Zone-Level-File Type-Role-Number
Revision P01

CAPITA



Purpose of Issue:
S2 - Issued for Information

Classification:
Commerical in Confidence

Client:
GCP

Project:
CSET

Drawing:
CSET Bat Heatmaps -
Transect 3 2020 Surveys, including
all bat species and all months

Scale @A3
1:12000

Project No: CS099797
Date 23/03/2021

Drawing Identifier:
Project-Originator-Zone-Level-File Type-Role-Number
Revision P01

CAPITA



Purpose of Issue:
S2 - Issued for Information

Classification:
Commerical in Confidence

Client:
GCP

Project:
CSET

Drawing:
CSET Bat Heatmaps -
Transect 4 2020 Surveys, including
all bat species and all months

Scale @A3
1:12000

Project No: CS099797
Date 23/03/2021

Drawing Identifier:
Project-Originator-Zone-Level-File Type-Role-Number
Revision P01

CAPITA



Purpose of Issue:
S2 - Issued for Information

Classification:
Commerical in Confidence

Client:
GCP

Project:
CSET

Drawing:
CSET Bat Heatmaps -
Transect 5 2020 Surveys, including
all bat species and all months

Scale @A3
1:12000

Project No: CS099797

Date 23/03/2021

Drawing Identifier:
Project-Originator-Zone-Level-File Type-Role-Number

Revision P01

CAPITA



Purpose of Issue:
S2 - Issued for Information

Classification:
Commerical in Confidence

Client:
GCP

Project:
CSET

Drawing:
CSET Bat Heatmaps -
Transect 6 2020 Surveys, including
all bats species and all months

Scale @A3
1:12000

Project No: CS099797

Date 23/03/2021

Drawing Identifier:
Project-Originator-Zone-Level-File Type-Role-Number

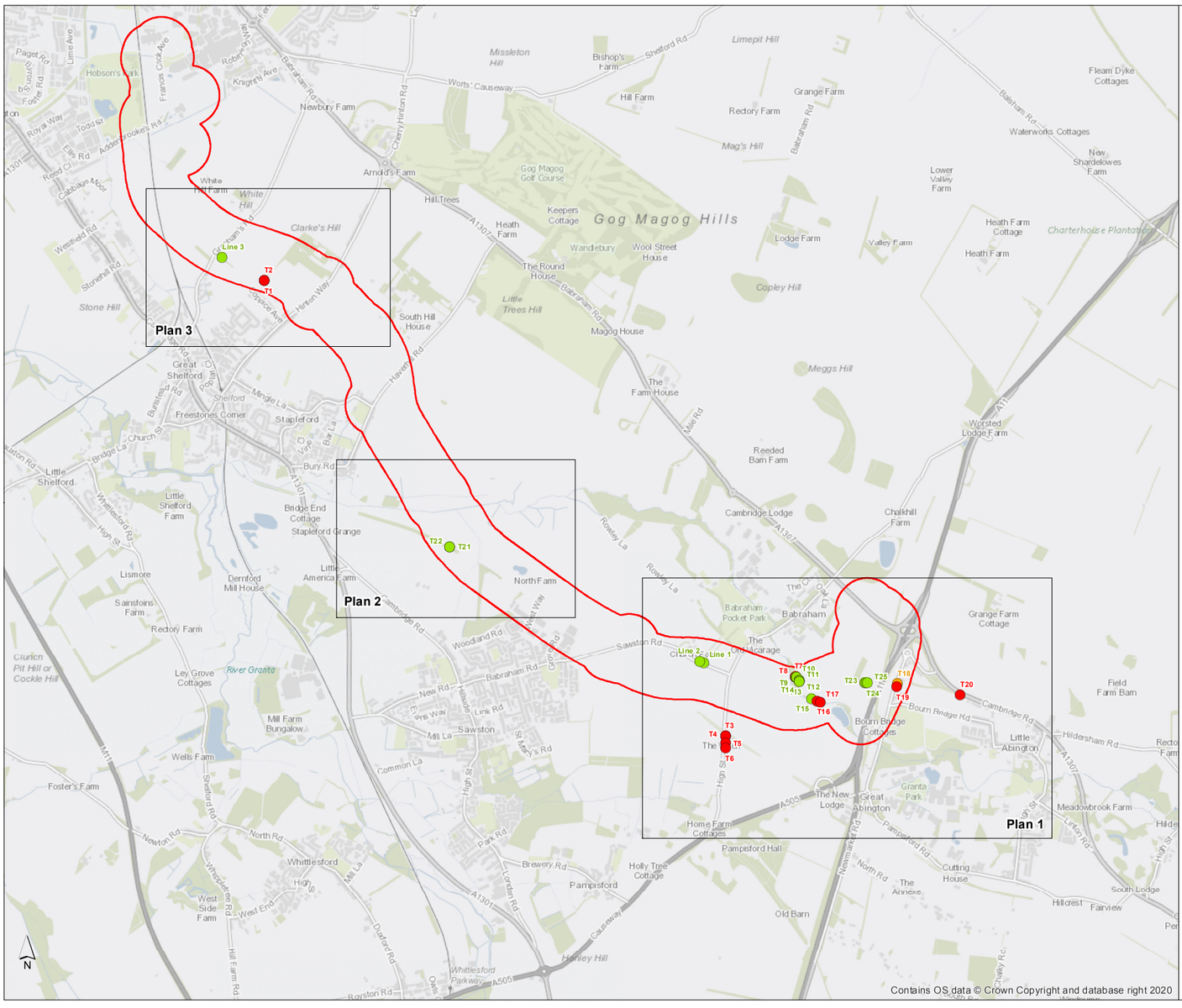
Revision P01

CAPITA



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Appendix E - Tree Location Map



KEY:

- Survey Area

Bat Roost Potential

- High potential
- Moderate potential
- Negligible potential

Rev	Drwn	Chkd	Appd	Description	Date
01	SH	TF	TB	For Issue	18/01/2021
01.1	SH	TF	TB	Created	23/10/2020

Purpose of Issue
S2 - Issued for Information

Classification
Commercial in Confidence

Client
GCP

Project
CSET

Drawing
CSET Bat Roost Potential - Trees
Overview plan

Scale @ A3	Drawn	Checked	Approved
1:30,000	SH	TF	TB

Project No
CS099797

Date
18/01/2021

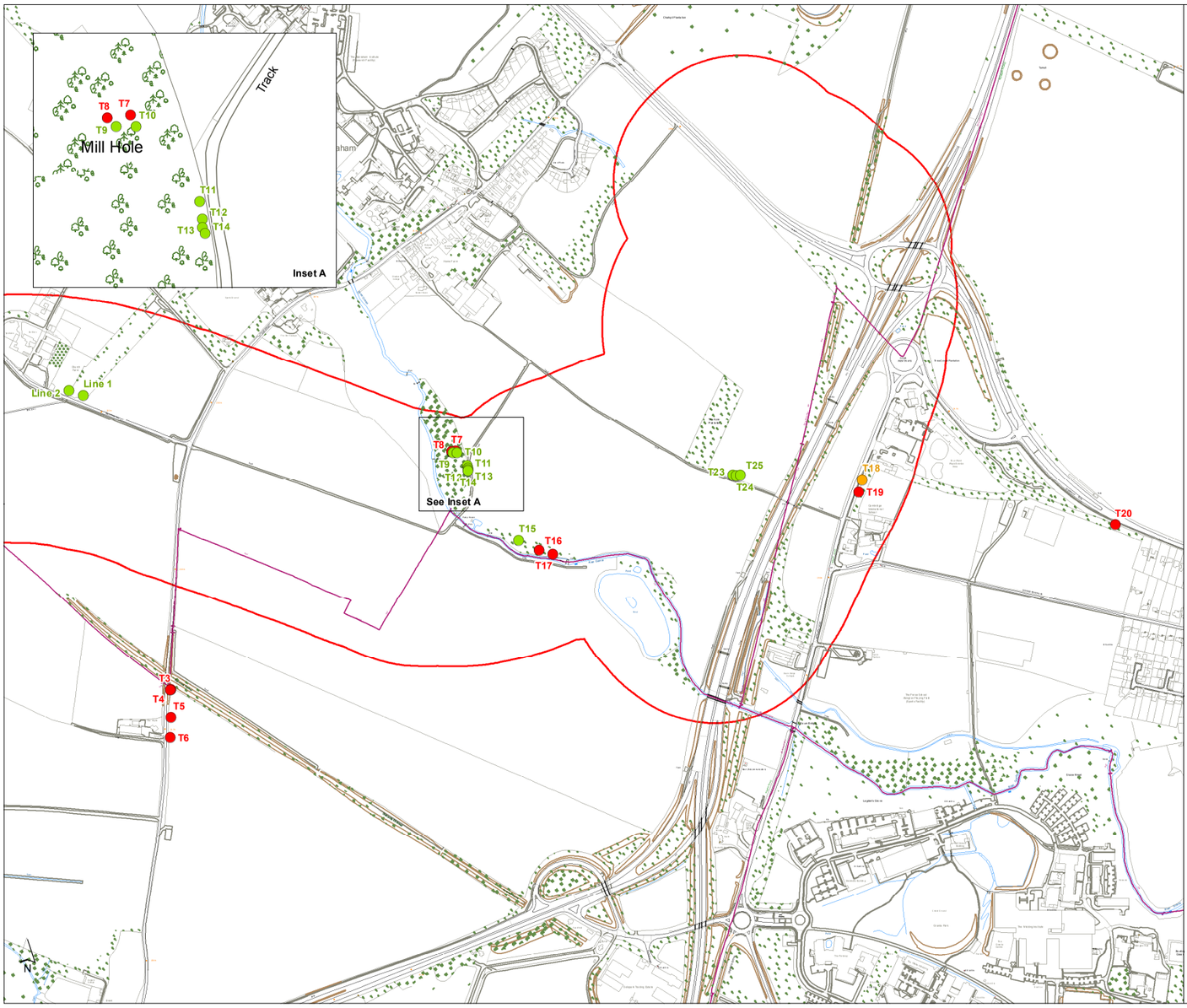
Drawing Identifier
Project - Originator - Zone - Level - FileType - Role - Number

Revision
P01

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Property and Infrastructure

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T 01228 673000 www.capita.co.uk/property
Capita Property and Infrastructure Ltd.

Plot date: 18/01/2021



KEY:

- Survey Area

Bat Roost Potential

- High potential
- Moderate potential
- Negligible potential

Rev	Drwn	Chkd	Appd	Description	Date
01	SH	TF	TB	For Issue	18/01/2021
01.1	SH	TF	TB	Created	23/10/2020

Purpose of Issue
S2 - Issued for Information

Classification
Commercial in Confidence

Client
GCP

Project
CSET

Drawing
CSET Bat Roost Potential - Trees
Plan 1 of 3

Scale @ A3	Drawn	Checked	Approved
1:7,500	SH	TF	TB

Project No
CS099797

Date
18/01/2021

Drawing Identifier
Project - Originator - Zone - Level - FileType - Role - Number

Revision
P01

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Plan 2 of 3

Scale @ A3	Drawn	Checked	Approved
1:1,250	SH	TF	TB

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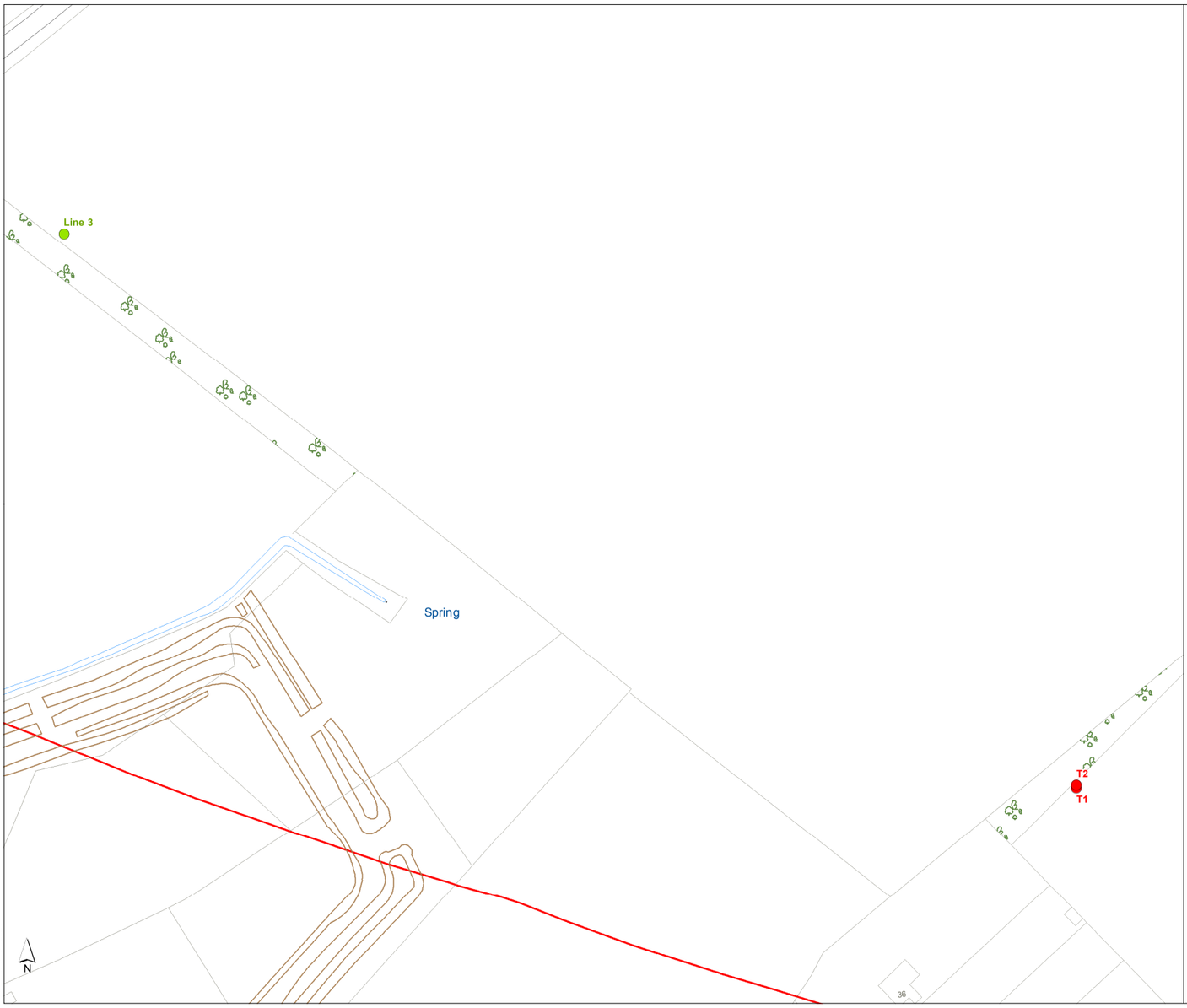
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Plan 3 of 3

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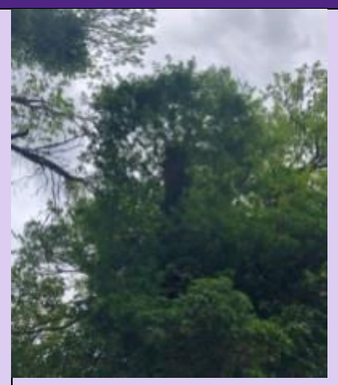
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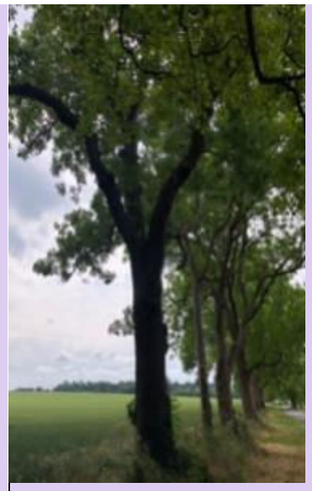
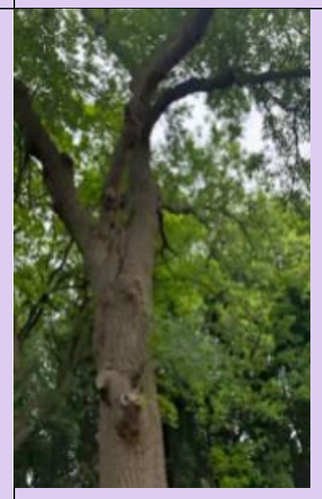
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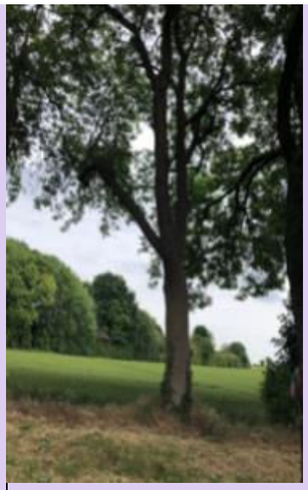
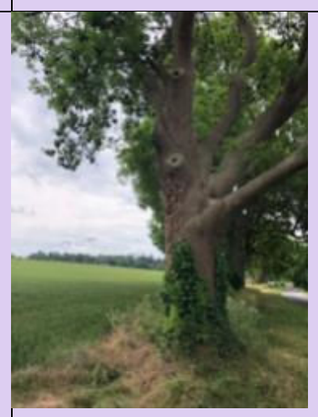
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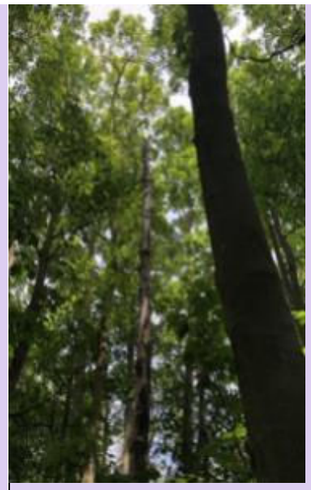
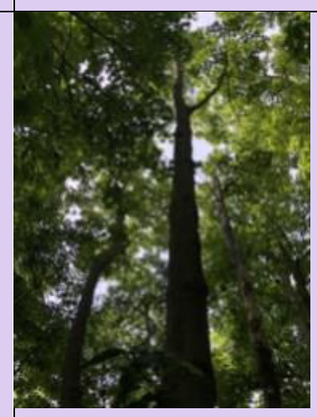
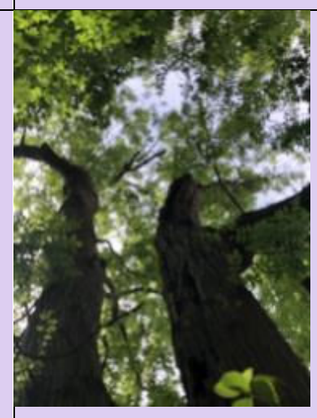
Appendix F - Tree Reference Photos

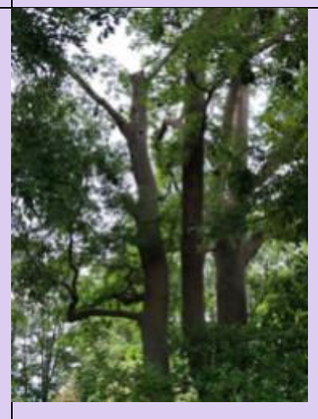
Tree ID	Grid Reference	Tree species and condition	Overall assessment of roosting potential	Photo
1	TL 46865 53157	Ash	Low	
2	TL 46865 53158	Oak	Low	

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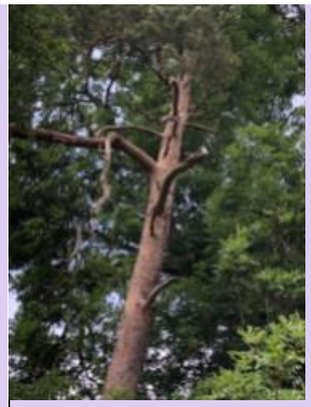
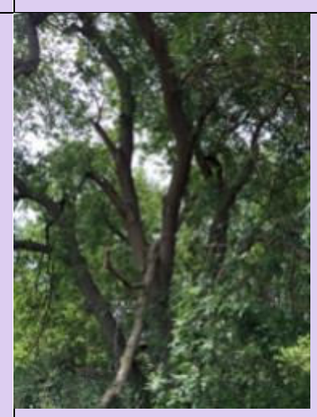
3	TL 50715 49352	*Sycamore*	Low	
4	TL 50714 49351	Ash	Low	

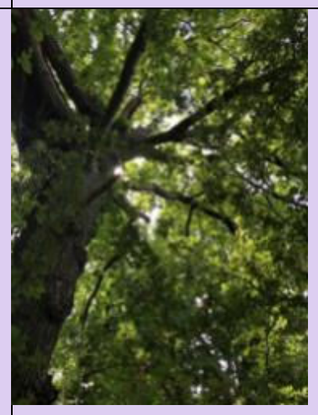
5	TL 50715 49294	Ash	Low	
6	TL 50714 49252	Ash	Low	

7	TL 51308 49848	Oak	Low	
8	TL 51300 49847	Standing dead	Low	
9	TL 51279 49775	Ash	Moderate	

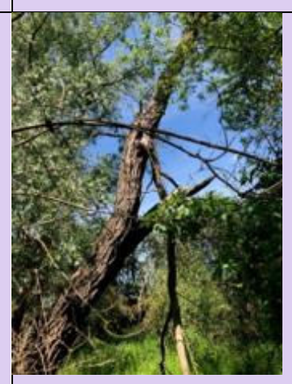
10	TL 51310 49844	Ash	Moderate	
11	TL 51332 49818	Ash	Moderate	
12	TL 51333 49812	Ash	Moderate	

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13	TL 51333 49809	Pine	High	
14	TL 51334 49807	Ash	Moderate	
15	TL 51439 49662	*Crack willow*	Moderate	

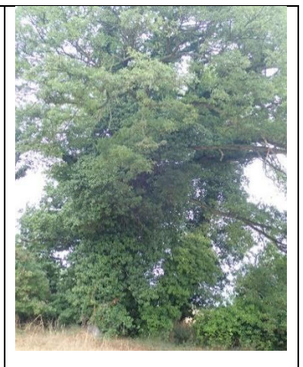
16	TL 51482 49642	*Sycamore*	Low	
17	TL 51509 49633	*Crack willow*	Low	
18	TL 52154 49788	*Oak*	High	No image
19	TL 52146 49763	*Oak*	Low	

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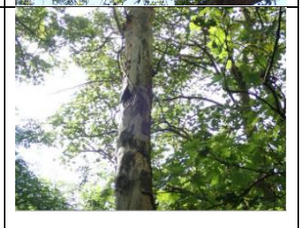
20	TL 52679 49695	*Ash*	Low	
21	TL 48413 50933	*Willow*	Moderate	
22	TL 48429 50918	*Willow*	Moderate	
23	TL 51861 49806	*Oak*	Moderate	No image
24	TL 51906 49786	*Oak*	Moderate	No image
25	TL 51953 49769	*Oak*	Moderate	No image
Line 1	TL 50566 49990	*Lyme*	Moderate	No image

Line 2	TL 50533 49999	*Lyme*	Moderate	No image
Line 3	TL 46515 53347	*Mixed*	Moderate	

Appendix G – Tree Climbing Results

Tree Survey Roost Report Form			Date: 21/07/2020							
Site Name: **CSET – Cheveley Park Farms**			Surveyor: J. Durward / W. O'Connor				Weather: **20 degrees Celsius, sunny, 60% cloud cover.**			
Grid Reference	Tree Species & Tag/Map no.	Potential Roost Features	Camera Image No.	Height from bas of tree	Distance out from stem	PRF on N, E, S, W side of tree	PRF N, E, S, W	Category of PRF	Notes of PRF	Photograph
TL 46852 53159	European Ash T01	Ivy	P8140697	0 – 14M	-	ALL	ALL	Low	Too dangerous to climb tree. Ivy covered the tree with limited potential for the presence of cavities	
TL 46857 53 157	Peduncu late Oak T02	Ivy	P8140696	0 – 14M	-	ALL	ALL	Low	Ivy covered the tree with some potential for the presence of cavities	
		Tear-out / ivy	P8140695	5 – 7M	0 – 3M	S	S	Low	3m long limb that has torn out below the limb and left the heartwood exposed. Limited lifted bark overlapping the sides of the feature amongst the ivy.	
TL 50714 49356	Sycamor e T3	Wound		5M	1.5M	SE	SE	Neg	Exposed inward facing wound goes back 6cm towards tree and narrows to 2cm. Full of woodlice.	N/A

TL 50715 49351	Ash T4	Wound	P666	6M	-	S	S	Neg	4 x 2cm entrance goes in 2cm.	
		Wound	P670	4M	1M	S	S	Mod	4 x 3cm entrance goes in 5cm and up for 30cm. Dry and messy inside cavity.	
		Wound	P670	5M	2M	S	S	Low	6 x 3cm entrance goes in 5cm and up for 10cm. Dry and messy inside cavity.	As above
		Wound	P670	6M	3M	S	SE	Mod	6 x 6cm entrance goes in 8cm and back towards the tree for 25cm. Wren inside cavity.	As above
		Split	P670	6.5M	0.3M	SSE	S	Low	Downward facing split 40cm long. Cavity goes in on the end of the feature and outwards for 2cm.	As above

		2 x knotholes	P671	5M 5.5M	-	NW	NW	Neg	First knothole with exposed downward facing cavity on secondary stem overhanging road. Feature goes down for 10cm.	
TL 51282 49808	Dead Tree T08 P619	Woodpecker hole	P617	10M	-	E	E	Low	Feature could not be inspected properly as too dangerous to climb.	
TL 51274 49809	Twin stemmed European Ash T09	Woodpecker hole / knothole	P620	6M	-	S	S	Mod	5 x 5cm diameter entrance goes into a bowl. The cavity extends into the stem beyond the bowl for 40cm. The heartwood has been removed.	
TL 51274 49809	Twin stemmed European Ash T09	Lighting strike / lifted bark	-	1 – 8M	-	SE	SE	Mod	Feature starts at the union. The split is 10 x 40cm wide up the stem for 8m. Feature could not be inspected properly as too dangerous to climb.	N/A
		Woodpecker hole	P622 P623 P624	12M	2M	S	S	High	Large hole with approx. Diameter of 10x8cm on underside	

									of secondary stem. The hole faces downwards. Feature could not be inspected properly as too dangerous to climb.	
		Woodpecker hole	P621	9M	-	W	W	Low – mod	Hole with approx. Diameter of 7 x 7cm extends into the tree. Feature could not be inspected properly as too dangerous to climb.	
TL 51309 49819	European Ash T10								Tree next to powerlines so not climbed. Grid reference is approximate as not taken in the field.	N/A

TL 51332 49810	European Ash T11	Woodpecker hole	P602	7M	-	S	S	Mod	In secondary stem. 5 x 5cm diameter entrance goes into a depth of 10cm and up 20cm. Old bird's nest at base. Cavity dirty and heartwood present.	
		Wound	P603	6M	-	NE	SE	Low	In secondary stem. Cavity 2 x 2cm at entrance, goes in 9cm behind heartwood.	
		Torn out dead branch with modified woodpecker hole present	P604	7M	0.5M	SE	E	Mod	5 x 5cm diameter entrance goes into a depth of 5cm and up 20cm. Inside there is a 2cm diameter gap behind the exterior bark so cavity inside is 20 x 2cm in dimensions.	

TL 51336 49772	European Ash T12 P593	Weld between dead tree and ash.	P588 / P592	12M	-	SW/NE	SW/NE	Low	3cm gap at base of wedged extending upwards 20cm to a point.	
		Helical split + woodpecker holes on dead tree (+14m)	P589	5M – top of tree	-	All sides	All sides	Low	Open split that varies in width between 3-5cm and a depth of 8cm. Evidence where woodpeckers have caused superficial damage near top of tree. Could not be fully inspected as too dangerous to climb.	
		Woodpecker hole	P591	10M	-	NW	NW	Low	Feeding hole. 5 x 5cm diameter entrance goes into a depth of 8cm.	

										
		Woodpecker hole	P591	10.5M	-	NW	NW	Low	Feeding hole. 5 x 5cm diameter entrance goes into a depth of 10cm.	As above
		Woodpecker hole	P591	9M	-	SE	SE	Low	5 x 5cm diameter entrance goes into a depth of 10cm and down to a nest at 20cm.	As above
		Woodpecker hole	-	8.5M	-	S	S	Low	Feeding hole. 5 x 5cm diameter entrance goes into a depth of 9cm.	As above
TL 51339 49753	Scot's Pine T13 P594	Woodpecker hole	-	8M	-	SE	SE	Neg	Feeding hole. 4 x 4cm diameter entrance goes into a depth of 6cm.	N/A

		Split	P599 P600 P601	8M	-	S	S	Day roost	40 x 5cm vertical split with dead branch at top. Dry inside with old bird's nest at base. Cavity goes up 50cm from base of deadwood and is rough and dry inside. 3 pipistrelle droppings seen on cobwebs and 3 inside the cavity, likely from a single bat.	  

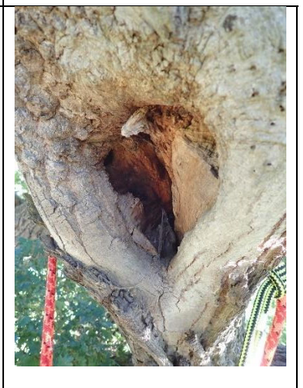
TL 51336 49763	European Ash T14 P595	Woodpecker hole	P596	6M	-	SE	SE	Mod	5 x 5cm diameter entrance goes into a depth of 30cm and down 40cm. Feature is stuffed full of cobwebs and very dry inside. Old heartwood removed from cavity.	
		Wound	P597	7M	1M	SE	E	Mod	On secondary stem. 40cm long open split. 5 x 5cm entrance goes into a dry cavity for 30cm away from the tree. Old bird's nest present.	
		Knothole / tear-out	-	7M	-	N	N	Neg	7 x 7cm entrance goes into an open cavity approx. 10cm deep.	As above
		Woodpecker hole						Low	7 x 7cm diameter entrance goes into a depth of 30cm and down to a nest at 20cm. Cavity is quite cluttered.	As above

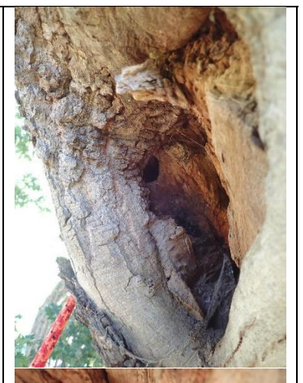
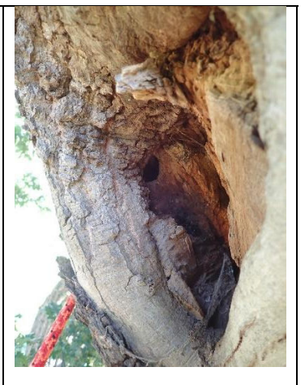
TL 51861 49 806	Peduncul ate Oak T23	Wound	P614	9M	-	N	S	Mod	4 x 5cm opening at top of secondary stem 2m above the union. Cavity goes into deadwood for 5ocm away from the tree. Dry inside.	
		Helical split	P612 P613	9M	-	W	E – N	Mod	Approx. 10cm wide by 1m long crack. First 80cm is exposed and the last 20cm goes underneath the bark near the top of the tear out.	
										
TL 51861 49806	Peduncul ate Oak T23	Branch collar	-	9M	1M	S	S	Low	Upwards facing collar of bark around deadwood goes down 5cm and is 3cm wide.	N/A
		Large knothole		5M	-	S	S	Low	40 x 20cm cavity goes in and down 40cm to a stock dove's nest. 4 chicks present.	N/A
		Knothole		5M	-	N	N	Neg	Approx. 10 x 10cm cavity goes in 5cm.	N/A

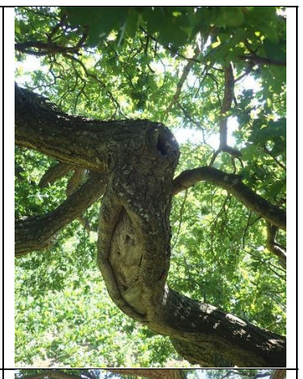
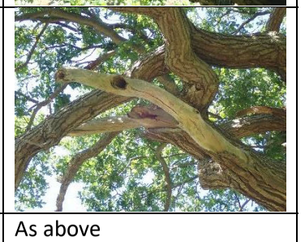
Tree Survey Roost Report Form			**Date: 31/07/2020**							
Site Name: CSET – Cheveley Park Farms			Surveyor: J. Durward / W. O'Connor				Weather: 20 degrees Celsius, sunny, 60% cloud cover.			
Grid Reference	Tree Species & Tag/Map no.	Potential Roost Features	Camera Image No.	Height from bas of tree	Distance out from stem	PRF on N, E, S, W side of tree	PRF N, E, S, W	Category of PRF	Notes of PRF	Photograph
TL 51439 49662	Crack Willow T15	Large tear-out	P660	5M	-	NE	NE	Low	7cm diameter entrance goes down 8cm to an old bird's	

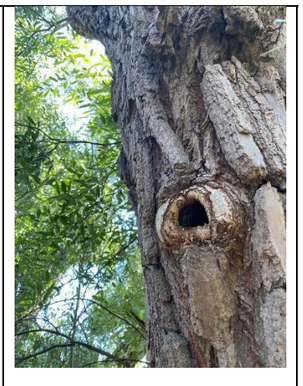
		(3m – 8m) Hole in heartwood							nest. Cavity goes up 50cm but was very dirty and dusty inside.
		Knothole	4797.jpeg	7M	-	N	N	Mod	4 x 4cm opening goes in horizontally for 35cm.
		Large hole in heartwood facing over field	P661	6M	2M	NE	NE	Low	20cm diameter hole goes down 10cm but is exposed.
		Upward facing hole		5M	1.5M	NE	NE	Low	30 x 10cm opening goes in 10cm. Likely used by birds.
TL 51439 49662	Crack Willow T15	Tear out	P662	4M	5M	NE	NE	Mod	Could not inspect. Potential crevice goes into the stem.
		Tear out (above larger tear out)	P663	6M	1M	N	N	Low	Could not inspect. Some lifted bark around deadwood.
TL 51482 49642	Sycamore T16	Large tear out + dead stem + ivy	P664 P665	0-3M	-	W	W	Low	Dense ivy and a series of exposed cracks in the dead stem amongst the ivy.
		Dead stem	P665	3M+	-	W	W	Low	3 exposed cracks in dead stem. The top of the tree has torn out and is covered in ivy.
TL 51509 49633	Crack Willow T17	Large wound/split		2.5M	-	E	E	Low	80 x 30cm entrance. First cavity goes upwards away from the tree for 1m+. Very

									dirty and dusty inside. Second cavity goes downwards away from the tree for 1m+ towards a torn off limb. Third cavity goes in towards tree for 1m+. Fourth cavity goes downwards for 50cm+.
TL 51906 49786	Peduncula te Oak T24	Wound in secondary stem	P643 P644 P646	7M	-	S	S	Mod	Triangular shaped wound 30cm x 40cm x 40cm. There is a cavity inside behind the heartwood, which is 3cm diameter at the entrance, going in 15cm but narrowing to a point. A second cavity 2 x 5cm wide at the base of the feature goes down 15cm.



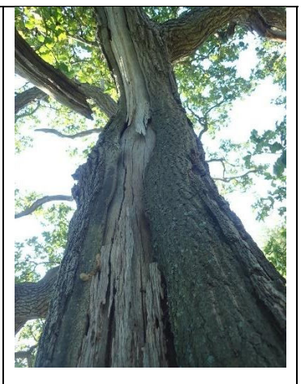
										 
		Branch collar in secondary stem	P647	7.5M	-	E	E	Mod	A 1.5m dead limb goes up from the base of the branch collar. Cavity opening 2cm in diameter goes down 30cm to an old bird's nest. A split at the top of the deadwood is open for 25cm and narrows to a point.	
		Cavity in tear out in branch off main stem	P649 P650	8.5M	-	SE	N	Mod	30cm long and 5cm wide opening behind deadwood, narrows then twists round 7cm and goes up for 20cm.	 

TL 51906 49786	Peduncula te Oak T24	Wound	P651	8M	-	SE	SE	Low	3 x 2cm opening goes into branch away from the tree for 30cm.	
		Wound in dead branch	P659	6M	1M	E	E	Mod	4cm diameter cavity at the end of the deadwood goes into the branch for 40cm. Dry inside	
		Wound in dead branch	P659	6M	0.5M	E	SE	Mod	7 x 7cm cavity in centre of deadwood, which is slightly upwards facing at the entrance. Cavity goes back 30cm towards the main stem. Old bird's nest inside.	As above
		Wound on undersid e of branch	P652 P653 P654	6M	3M	NE	NE	Mod	Wound with dead heartwood inside. Small hole at top of wound 3cm in diameter goes into a long cavity for 50cm.	
										 
		Knothole	P655	7M	-	NE	NE	Mod	7cm diameter opening goes in and down 30cm to an old bird's nest.	
		Lifted bark on dead branch	P656	6M	1M	E	E	Mod	Horizontal strip of lifted bark 40cm long and 15cm deep.	

TL 51906 49786	Peduncula te Oak T24	Knothole	P657	6.5M	-	NW	NW	Mod	3cm diameter opening goes down 20cm to an old bird's nest.	
		Branch collar	P658	6.5M	1M	N	N	Low	8cm diameter entrance goes in 20cm to an old bird's nest.	
										
										
										
										N/A

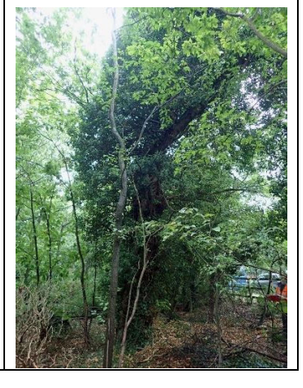
	

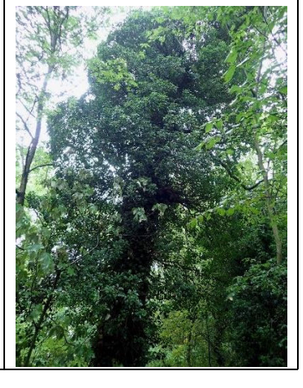
	

TL 51953 49769	Peduncula te Oak T25	Helical split and deadwoo d	P642	6-8M	-	NW	NW	Mod	5-10cm deep and 2-3cm wide gap underneath live tissue for 1m. At the top where the limb changes direction the gap goes up for a further 50cm underneath deadwood.	
		Lifted bark at base of helical split		6M	-	E	E	Low	Approx. 30cm wide piece of lifted bark comes out 5-10cm from the deadwood.	N/A
		Knothole		3M	-	S	S	Low	3 x 4cm opening goes in and down 10cm.	N/A

Tree Survey Roost Report Form			Date: 14/08/2020							
Site Name: CSET			Surveyor: J. Durward / W. O'Connor				Weather: 18 degrees Celsius, northerly wind 1-2, 100% cloud cover, hazy.			
Grid Reference	Tree Species & Tag/Map no.	Potential Roost Features	Camera Image No.	Height from bas of tree	Distance out from stem	PRF on N, E, S, W side of tree	PRF N, E, S, W	Category of PRF	Notes of PRF	Photograph

TL 52154 49788	Peduncula te Oak T18	Split and ivy on a dead stem	P814068 0 P814068 2	5 – 10M	0 – 4M	N	NW/NE	High	Ivy covering the stem from the union of the main stem and the dead stem. The dead stem has split running along its length, and on the north east side there is gap between the lifted bark and ivy of approximately 30 x 4cm.	
		Lifted bark and ivy on a dead stem	P814068 4 P814068 5	8-9M	3 -4M	NW	NW	High	On the underside of the dead stem is an opening between the ivy and the lifted bark that is approximately 1m in length by 20 – 30cm in width. The airspace underneath the stem is uncluttered.	 

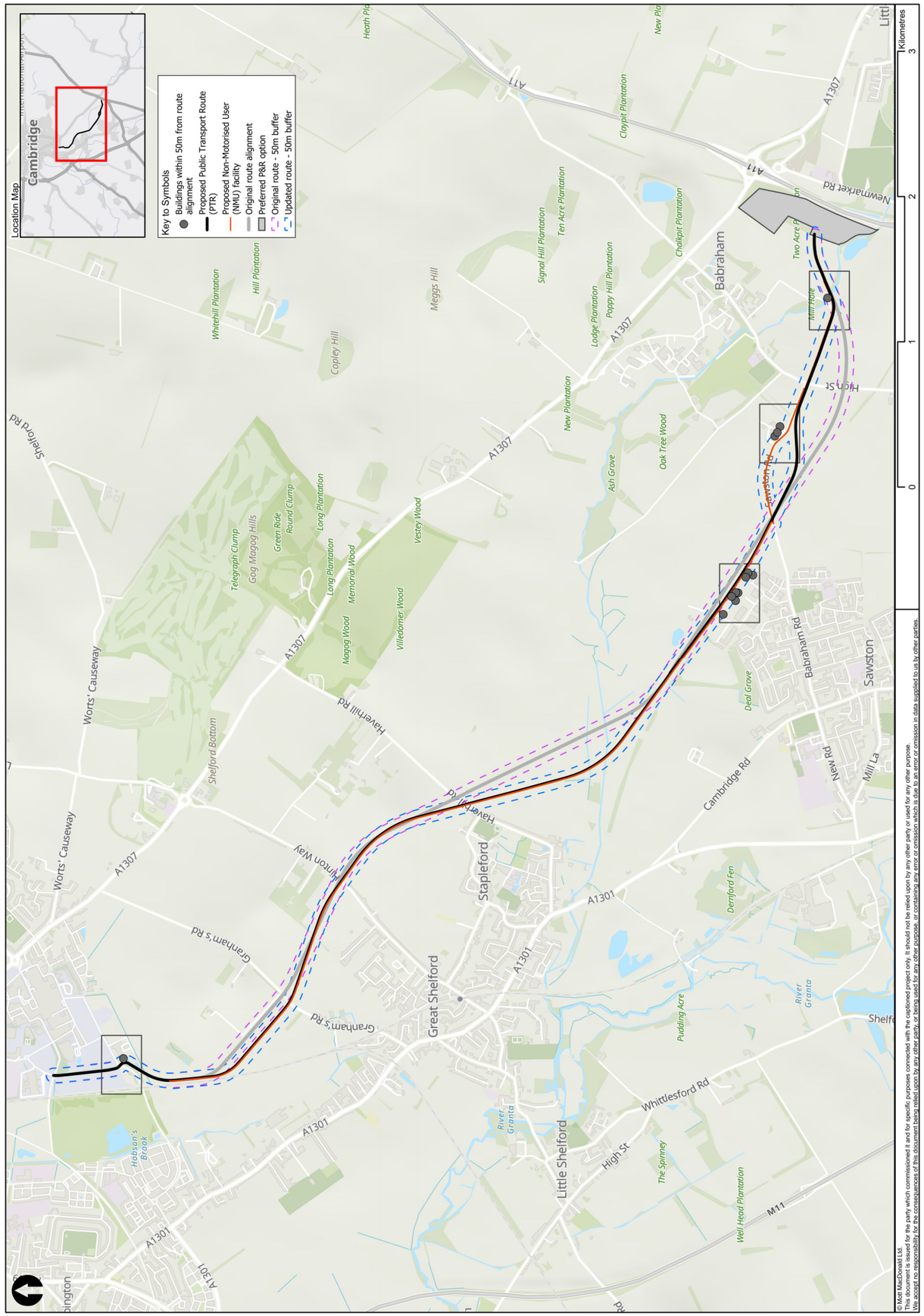
		Ivy	P8140688 P8140689	0 – 12M	-	ALL	ALL	Low	Ivy around the main stem of the tree has some small cavities present that may be used by bats.	 

TL 52146 49783	Peduncula te Oak T19	Ivy	P8140686 P8140687	0 – 10M	-	ALL	ALL	Neg	Ivy around the main stem of the tree is very tight and does not have any cavities present behind it. Old pigeon's nest at 5m on NW side.	 

TL 48434 50919	Crack Willow T22	Woodpecker hole above union on main stem	P8140690	6M	-	S	S	Mod	8x8cm opening into a cavity that goes up 30cm to an open wound (neg) above. Cavity goes down approximately 20cm to an old bird's nest.	
		Woodpecker hole above union on main stem	P8140691	5M	-	ESE	ESE	Mod	6x5cm opening into a cavity that goes up 8cm into deadwood, which is fractured internally and there are series of very small splits. Cavity goes down 5cm to an old bird's nest	
TL 48434 50919	Crack Willow T22	Woodpecker hole above union on dead stem	P8140692	4.8M	-	E	E	Mod	6x5cm opening into a cavity that goes up 1m to an open split (tear out) at the end of the limb. Nesting material is present above the opening. Cavity does not go down.	
		Woodpecker hole below union on dead stem	P8140693	3.7M	-	E	E	Mod	7x7cm opening into a cavity that goes up 10cm into debris. The cavity goes down 1m to the next woodpecker hole (below). The cavity is stuffed full of nesting material.	
		Woodpecker hole below union on dead stem	P8140694	2.7M	-	E	E	Low	6x6cm opening into a cavity that goes up 20cm but is full of nesting material the cavity going down is stuffed full of nesting material.	
		Woodpecker hole below union on dead stem	P8140694	2M	-	E	E	Low	6x6cm opening into a cavity that is stuffed full of nesting material	As above
TL 48413 50933	Crack Willow T23	-	-	-	-	-	-	Neg	No features were present on this tree.	N/A

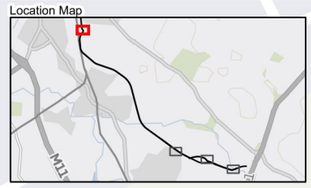
CAPITA

Appendix H – Building Location map



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Location Map



Key to Symbols

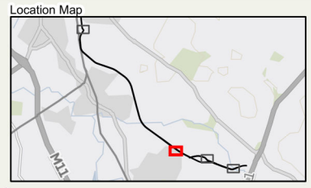
- Proposed Public Transport Route (PTR)
- Proposed Non-Motorised User (NMU) facility
- Original route alignment
- Buildings within 50m from route alignment
- Original route - 50m buffer
- Updated route - 50m buffer

1

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0 50 100 150 Metres

Location Map



Key to Symbols

- Proposed Public Transport Route (PTR)
- Proposed Non-Motorised User (NMU) facility
- Original route alignment
- Buildings within 50m from route alignment
- Original route - 50m buffer
- Updated route - 50m buffer

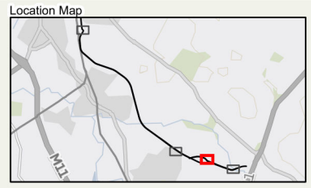
2 3 4 5 6 7 8

West Way
Grove Rd
Grove Rd
Middle Way
Middle Way
East Way
East Way
Grove Rd

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0 50 100 150 Metres

Location Map



Key to Symbols

- Proposed Public Transport Route (PTR)
- Proposed Non-Motorised User (NMU) facility
- Original route alignment
- Buildings within 50m from route alignment
- Original route - 50m buffer
- Updated route - 50m buffer

Sawston Rd

Sawston Rd

Sawston Rd

9

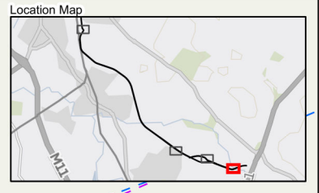
10

11

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0 50 100 150 Metres

Location Map



Key to Symbols

- Proposed Public Transport Route (PTR)
- Proposed Non-Motorised User (NMU) facility
- Original route alignment
- Buildings within 50m from route alignment
- Original route - 50m buffer
- Updated route - 50m buffer

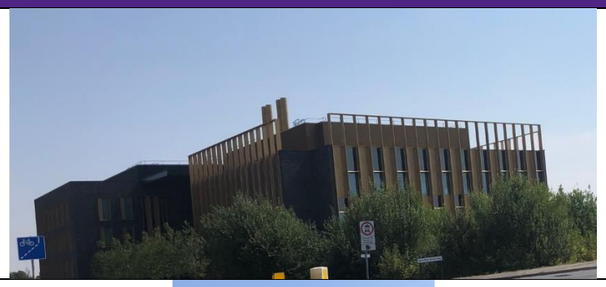
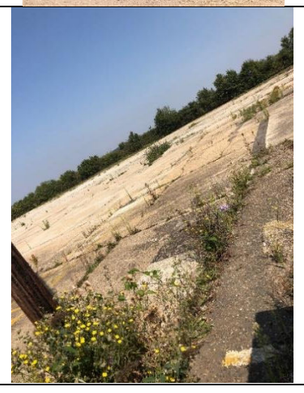
Mill Hole

12

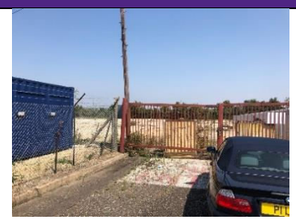
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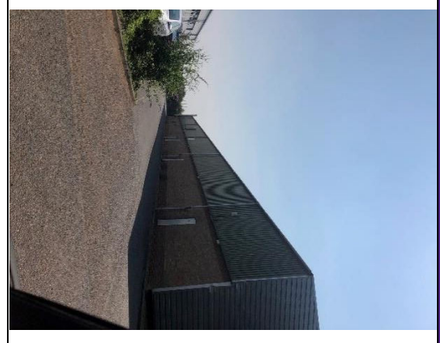
0 50 100 150 Metres

Appendix I – Building Photographs

Building Reference	Photo
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2	
3	

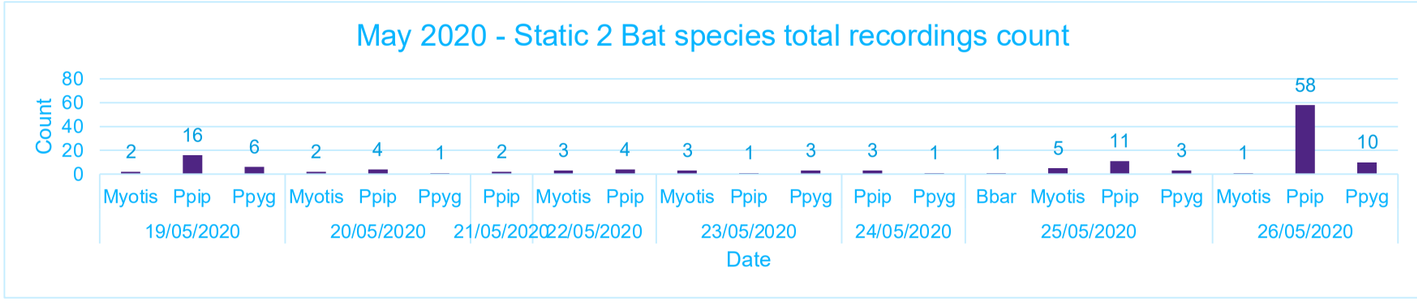
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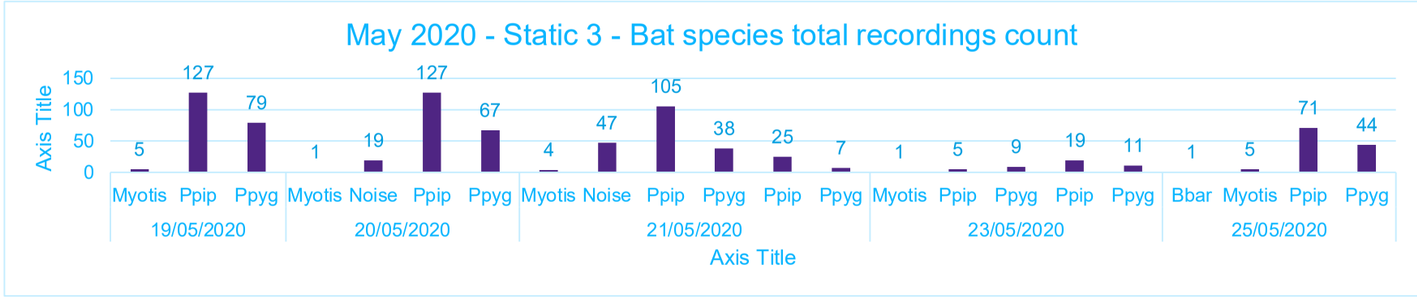
Building Reference	Photo
4	
5	
6	 
7	

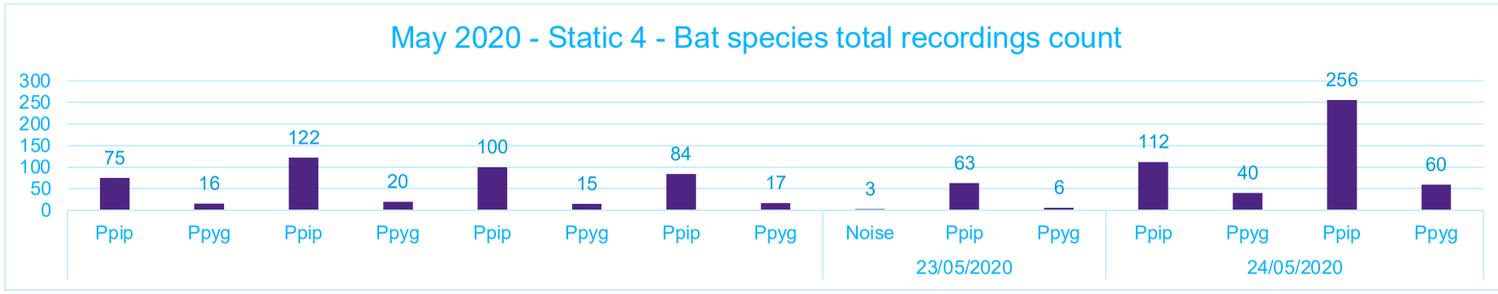
Building Reference	Photo
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9	No access
10	No access
11	No access
12	

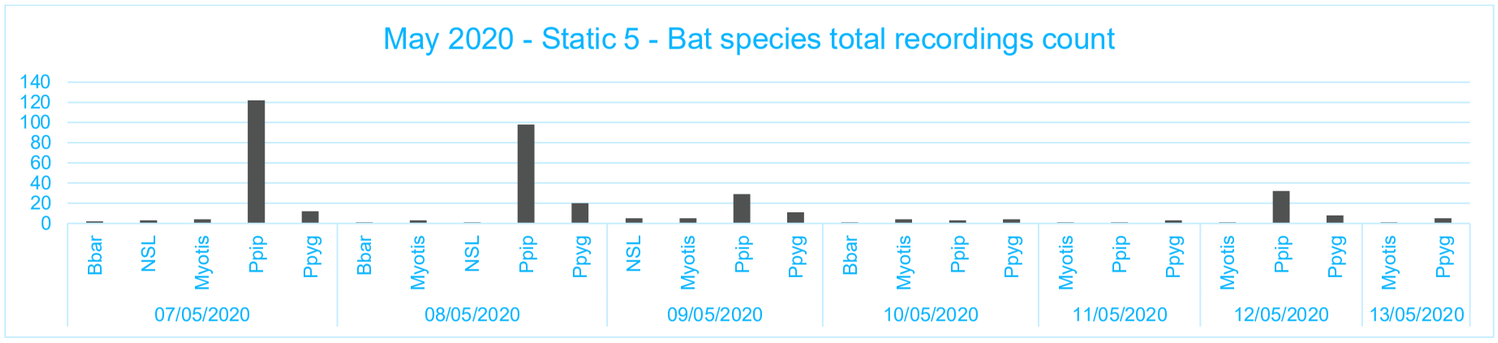
Appendix J – Static detector results graphs

May 2020

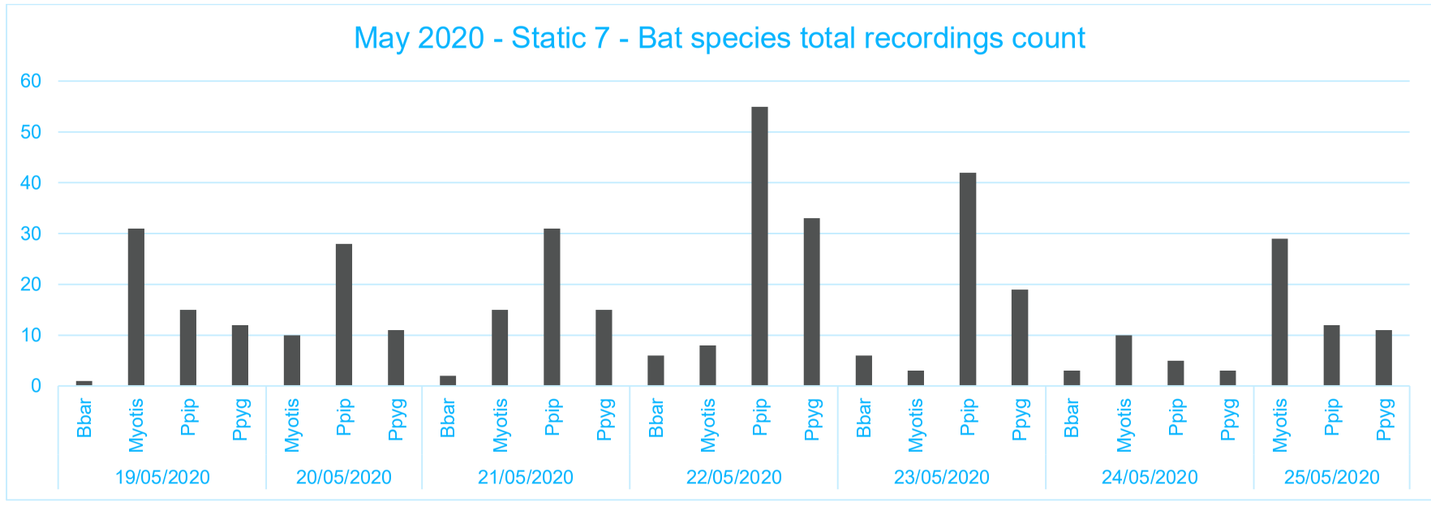






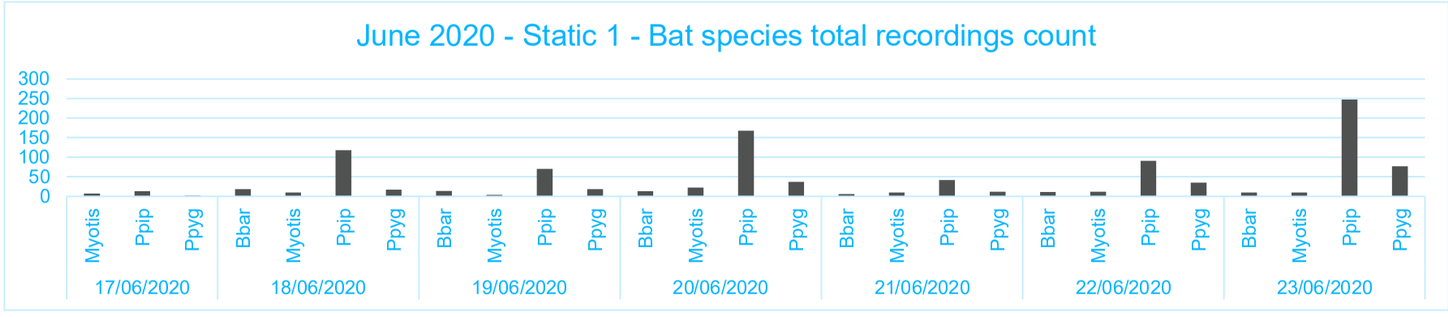


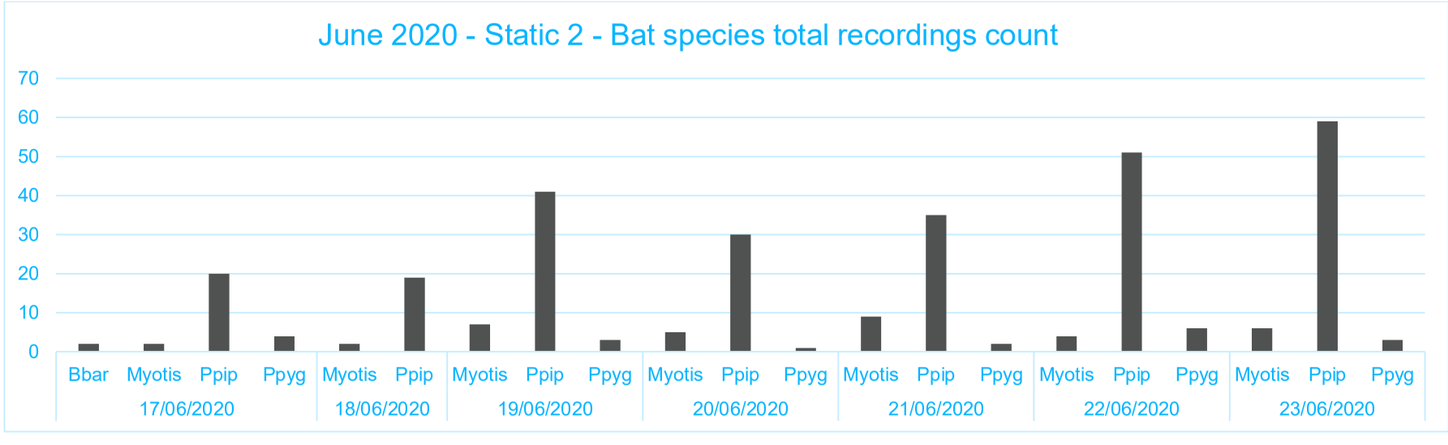
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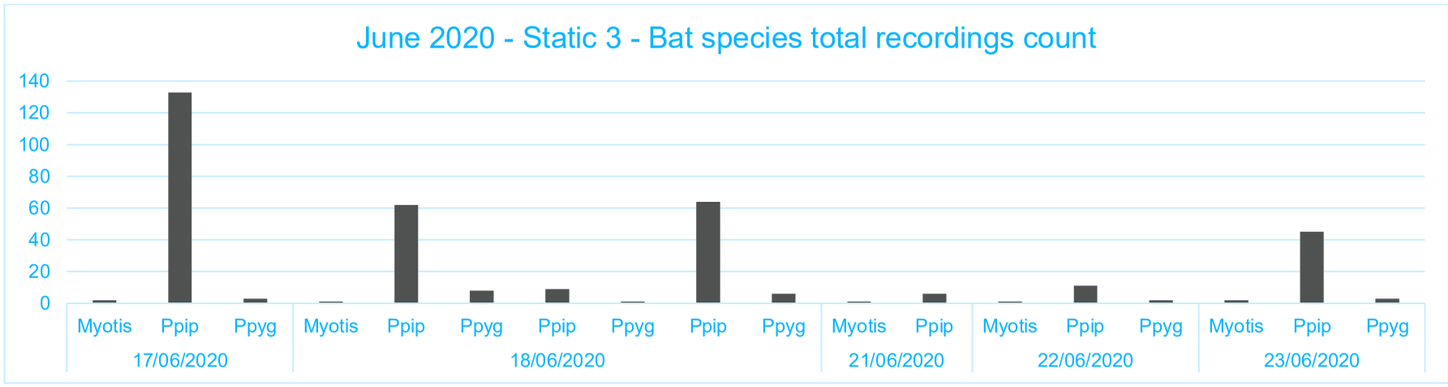


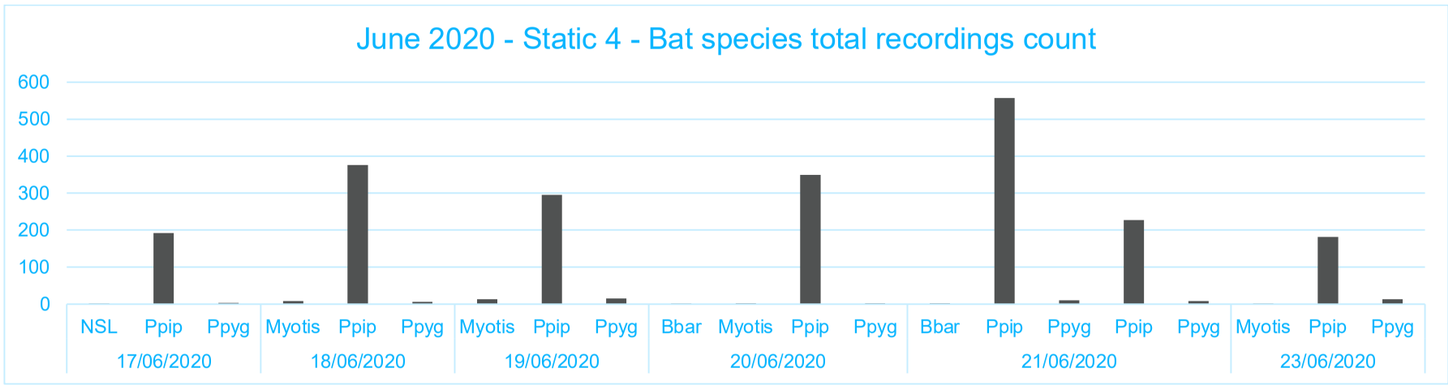
capitaproperty.co.uk

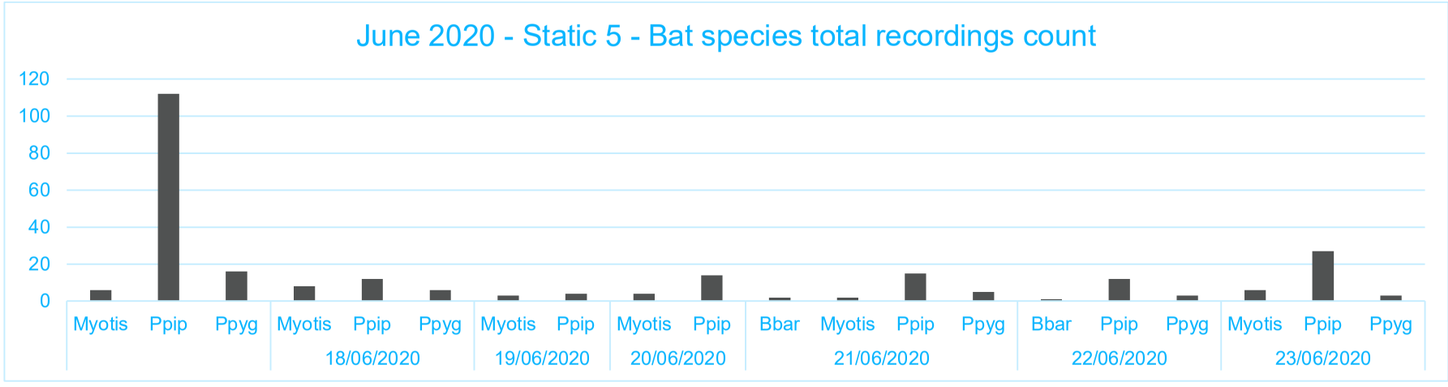
June 2020

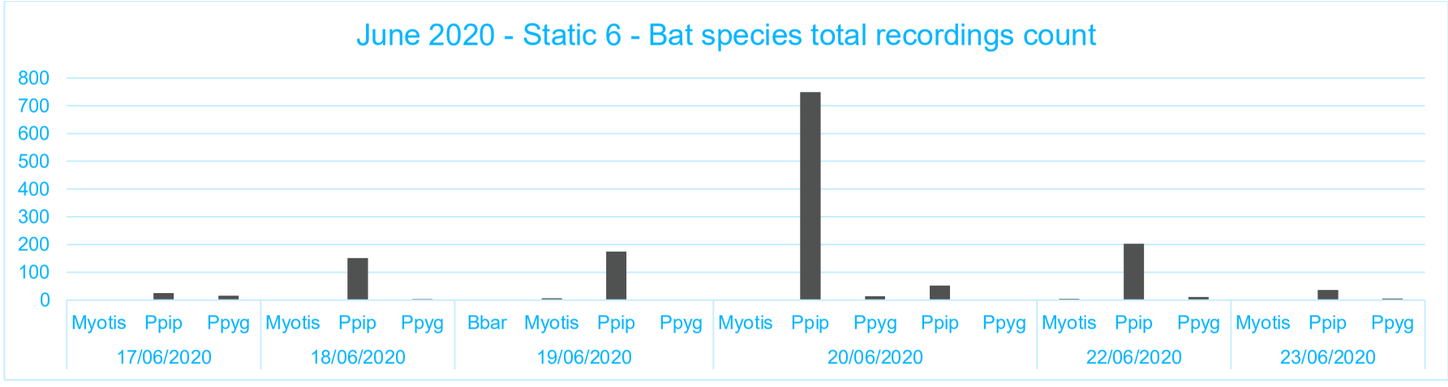

June 2020 - Static 1 - Bat species total recordings count
300
250
200
150
100
50
0
Myotis Ppip Ppyg Bbar Myotis Ppip Ppyg Bbar Myotis Ppip Ppyg Bbar Myotis Ppip Ppyg Bbar Myotis Ppip Ppyg Bbar Myotis Ppip Ppyg Bbar Myotis Ppip Ppyg
17/06/2020
18/06/2020
19/06/2020
20/06/2020
21/06/2020
22/06/2020
23/06/2020

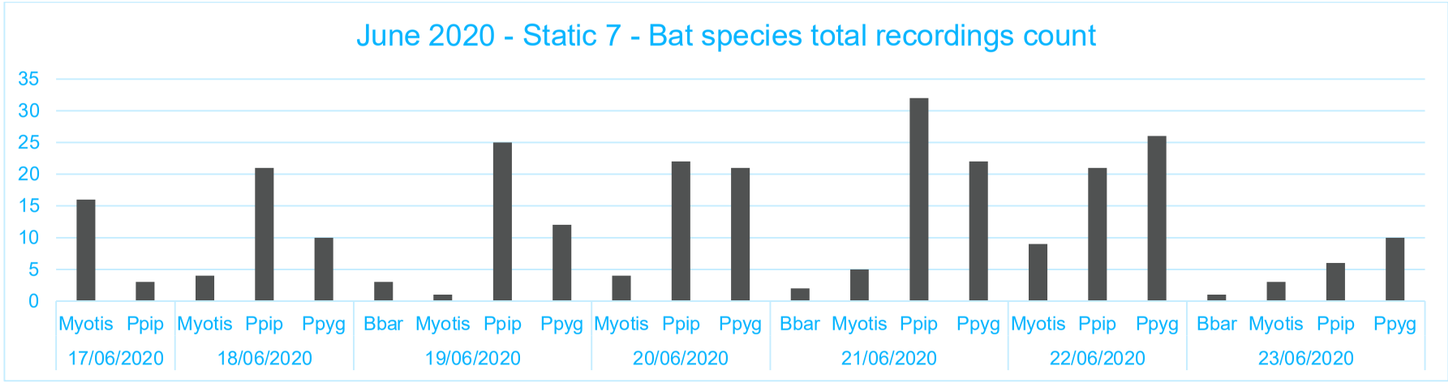

June 2020 - Static 2 - Bat species total recordings count
70
60
50
40
30
20
10
0
Bbar Myotis Ppip Ppyg Myotis Ppip Myotis Ppip Ppyg Myotis Ppip Ppyg Myotis Ppip Ppyg Myotis Ppip Ppyg Myotis Ppip Ppyg
17/06/2020
18/06/2020
19/06/2020
20/06/2020
21/06/2020
22/06/2020
23/06/2020


June 2020 - Static 3 - Bat species total recordings count
140
120
100
80
60
40
20
0
Myotis Ppip Ppyg Myotis Ppip Ppyg Ppip Ppyg Ppip Ppyg Myotis Ppip Myotis Ppip Ppyg Myotis Ppip Ppyg
17/06/2020
18/06/2020
21/06/2020
22/06/2020
23/06/2020

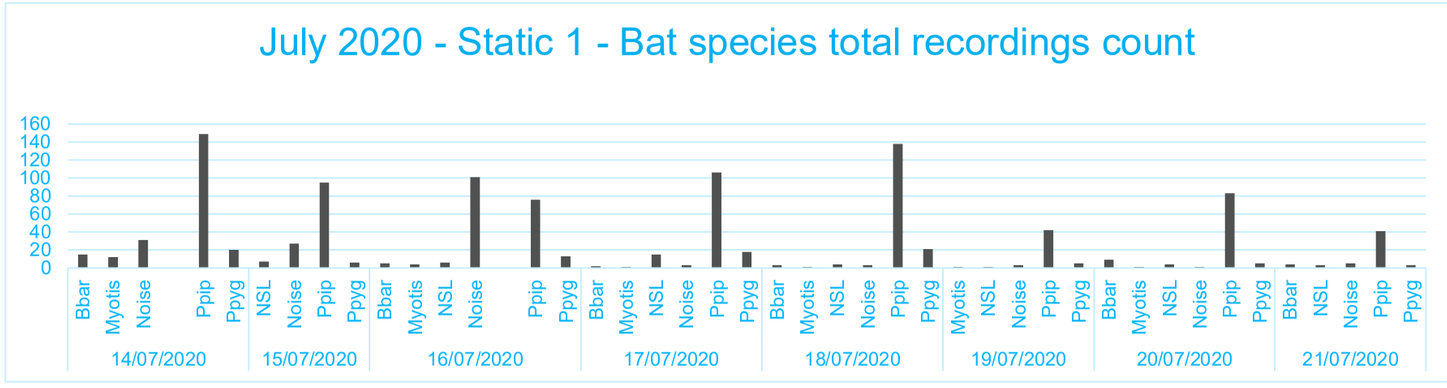

June 2020 - Static 4 - Bat species total recordings count
600
500
400
300
200
100
0
NSL Ppip Ppyg Myotis Ppip Ppyg Myotis Ppip Ppyg Bbar Myotis Ppip Ppyg Bbar Ppip Ppyg Ppip Ppyg Myotis Ppip Ppyg
17/06/2020
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21/06/2020
23/06/2020

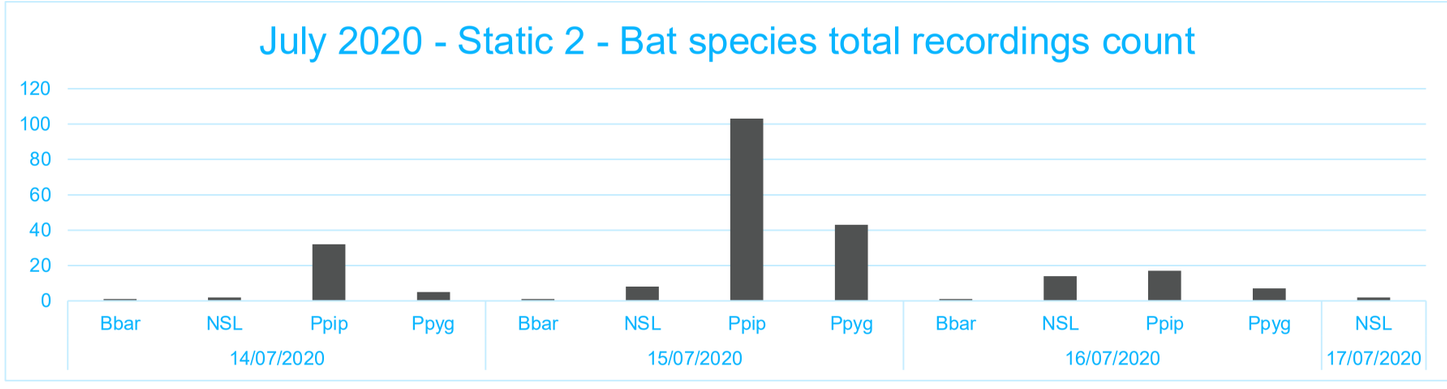

June 2020 - Static 5 - Bat species total recordings count
120
100
80
60
40
20
0
Myotis Ppip Ppyg Myotis Ppip Ppyg Myotis Ppip Myotis Ppip Bbar Myotis Ppip Ppyg Bbar Ppip Ppyg Myotis Ppip Ppyg
18/06/2020
19/06/2020
20/06/2020
21/06/2020
22/06/2020
23/06/2020


June 2020 - Static 6 - Bat species total recordings count
800
700
600
500
400
300
200
100
0
Myotis Ppip Ppyg Myotis Ppip Ppyg Bbar Myotis Ppip Ppyg Myotis Ppip Ppyg Ppip Ppyg Myotis Ppip Ppyg Myotis Ppip Ppyg
17/06/2020
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22/06/2020
23/06/2020

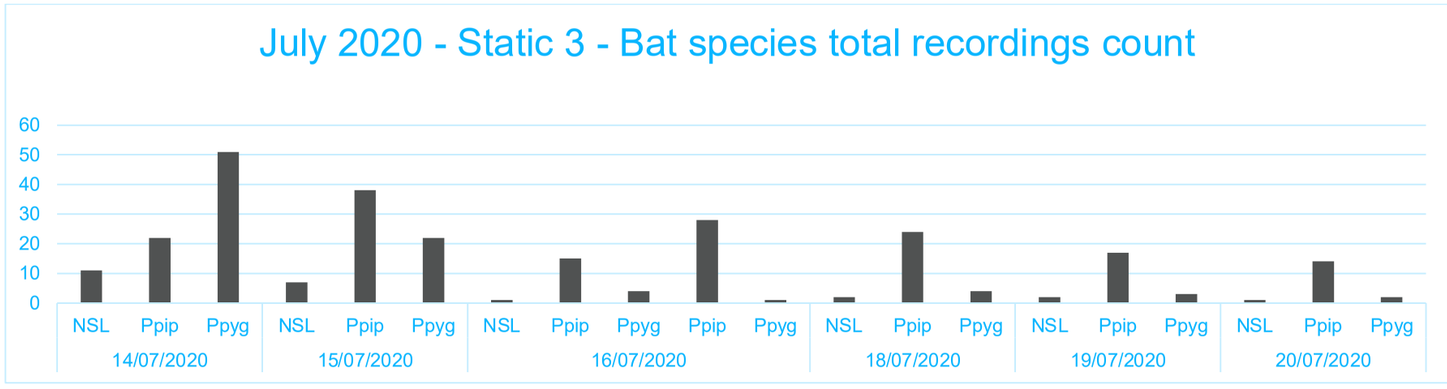

June 2020 - Static 7 - Bat species total recordings count
35
30
25
20
15
10
5
0
Myotis Ppip Myotis Ppip Ppyg Bbar Myotis Ppip Ppyg Myotis Ppip Ppyg Bbar Myotis Ppip Ppyg Myotis Ppip Ppyg Bbar Myotis Ppip Ppyg
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18/06/2020
19/06/2020
20/06/2020
21/06/2020
22/06/2020
23/06/2020

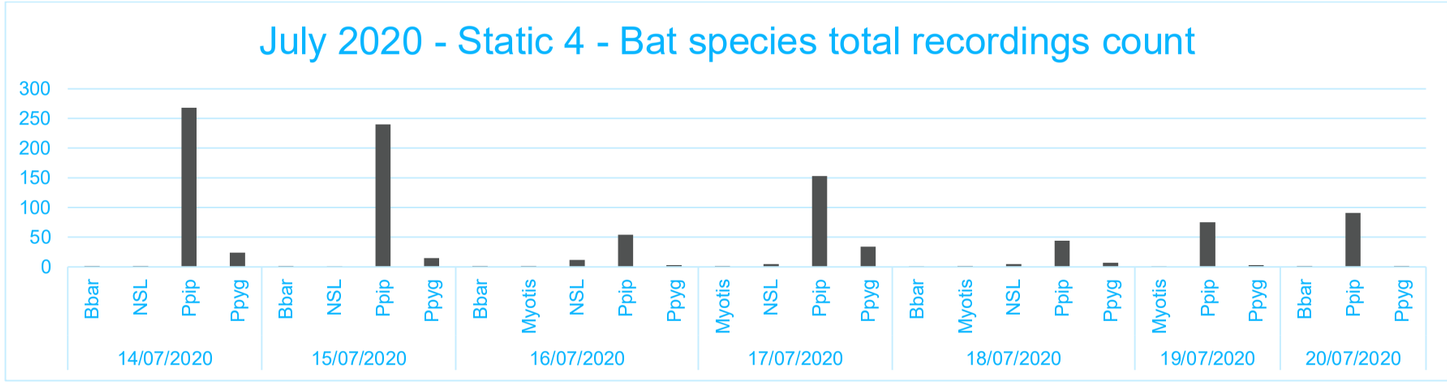
July 2020

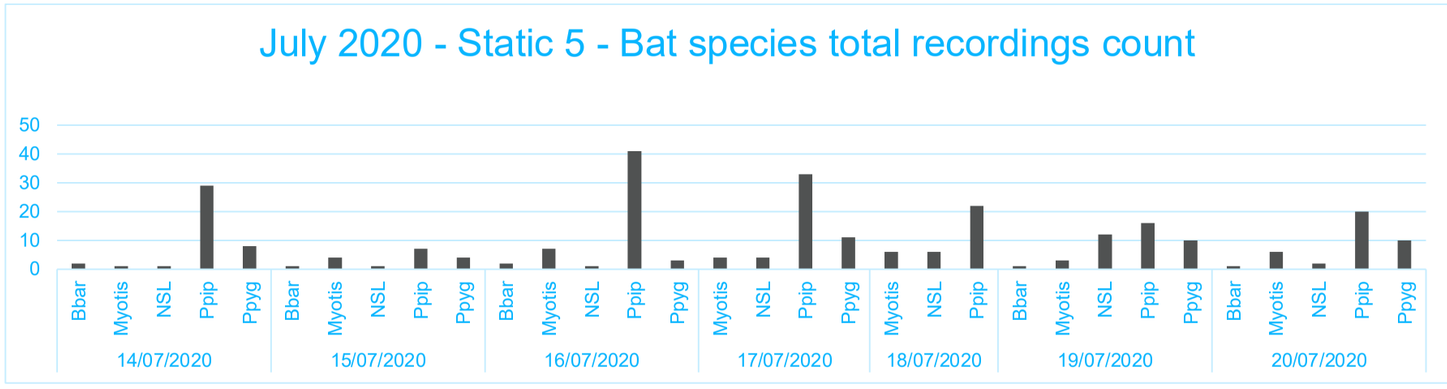


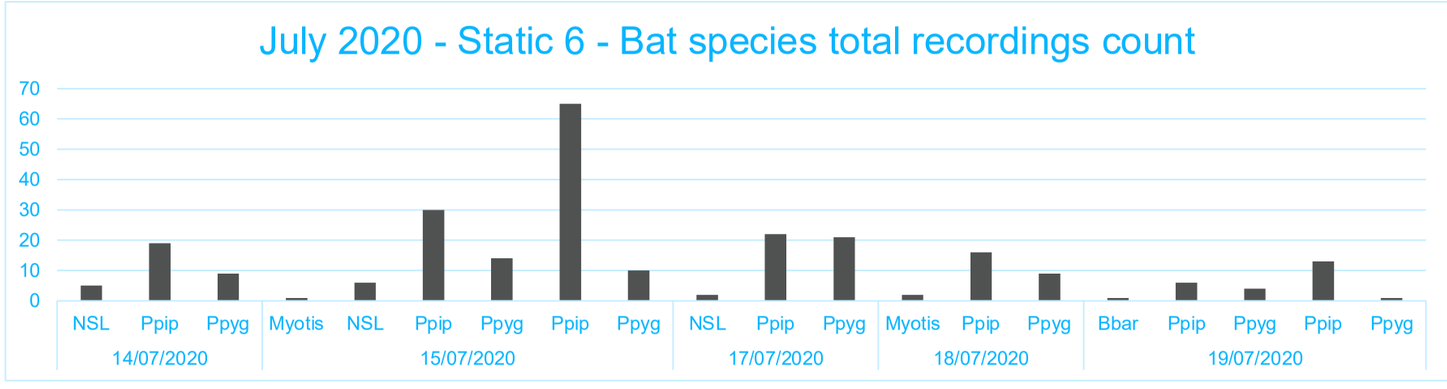


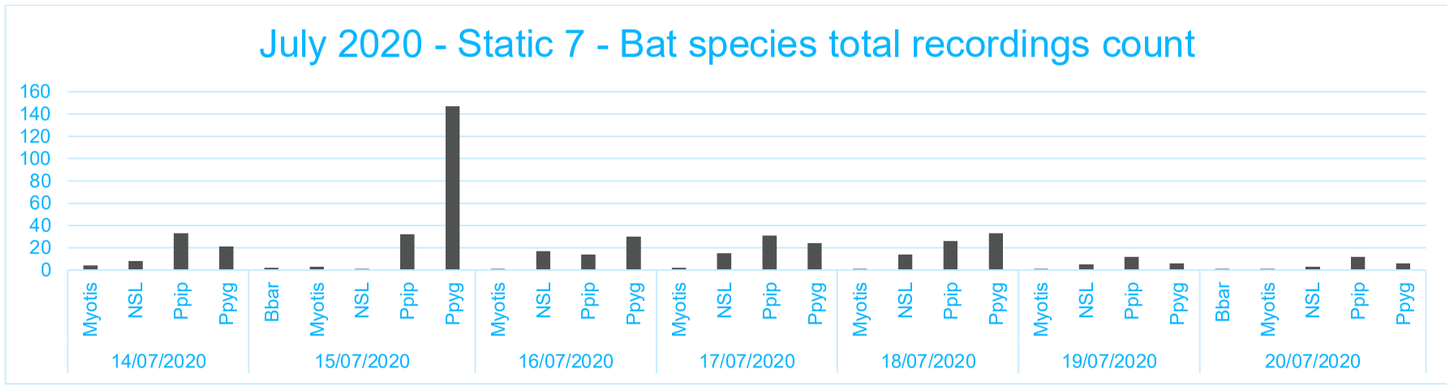
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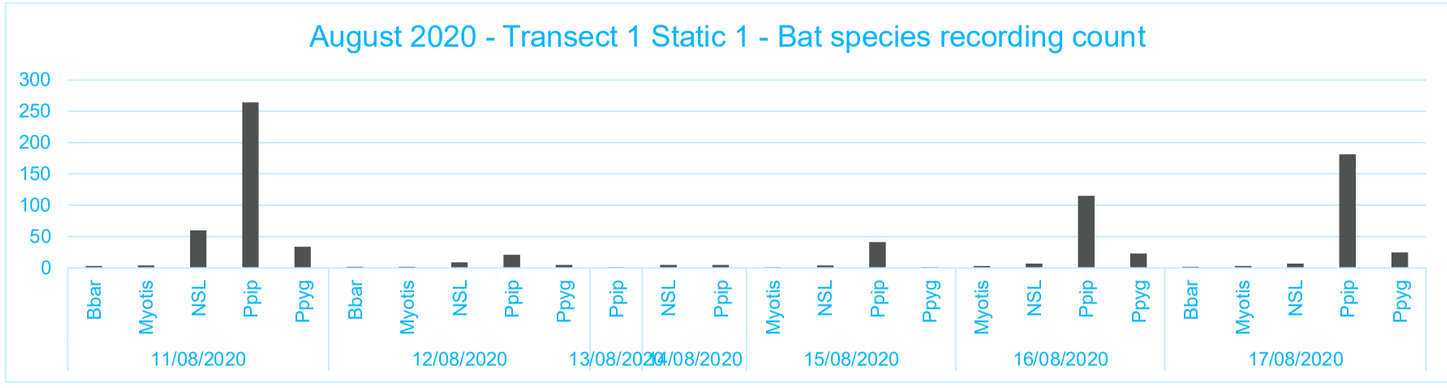


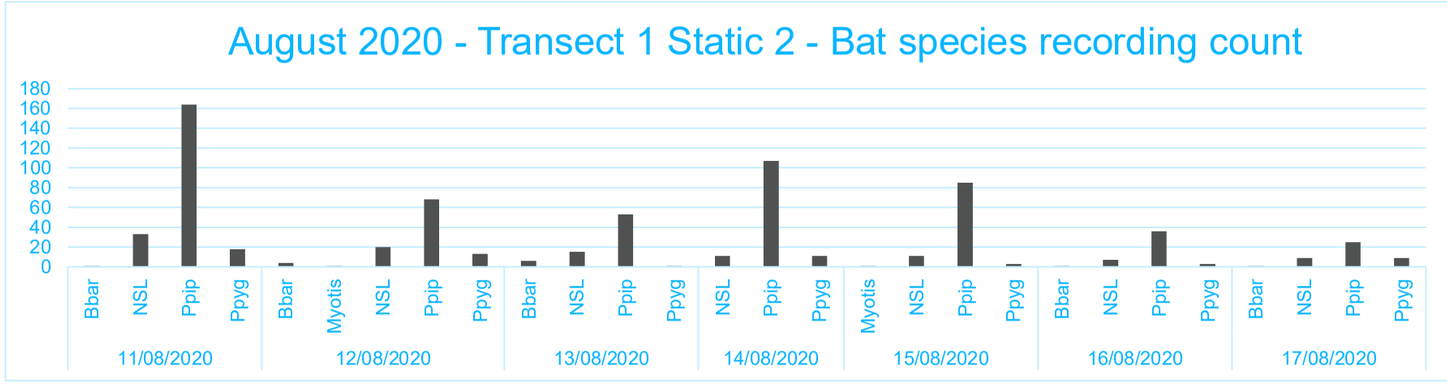

July 2020 - Static 5 - Bat species total recordings count
50
40
30
20
10
0
Bbar Myotis NSL Ppip Ppyg Bbar Myotis NSL Ppip Ppyg Bbar Myotis NSL Ppip Ppyg Myotis NSL Ppip Ppyg Myotis NSL Ppip Bbar Myotis NSL Ppip Ppyg Bbar Myotis NSL Ppip Ppyg
14/07/2020
15/07/2020
16/07/2020
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19/07/2020
20/07/2020

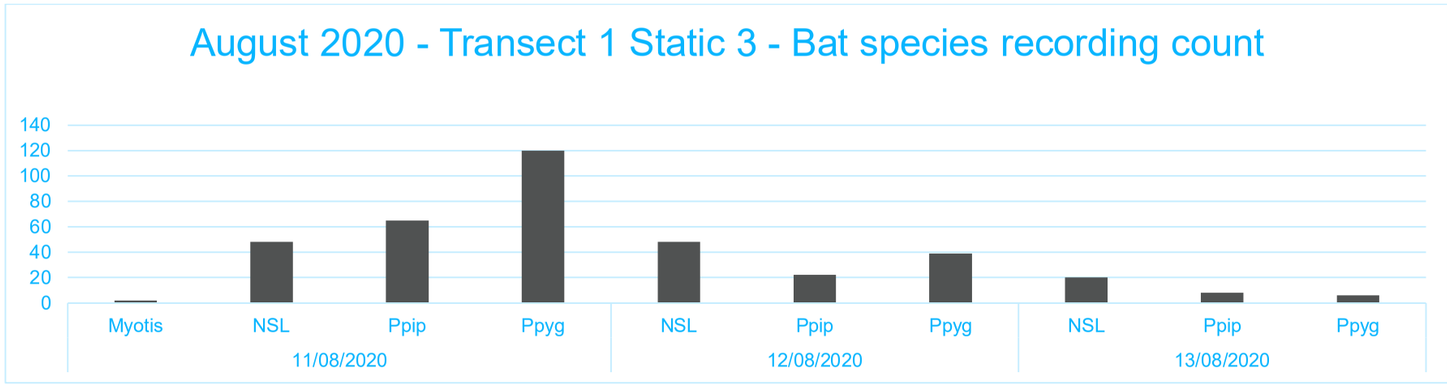

July 2020 - Static 6 - Bat species total recordings count
70
60
50
40
30
20
10
0
NSL Ppip Ppyg Myotis NSL Ppip Ppyg Ppip Ppyg NSL Ppip Ppyg Myotis Ppip Ppyg Bbar Ppip Ppyg Ppip Ppyg
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18/07/2020
19/07/2020

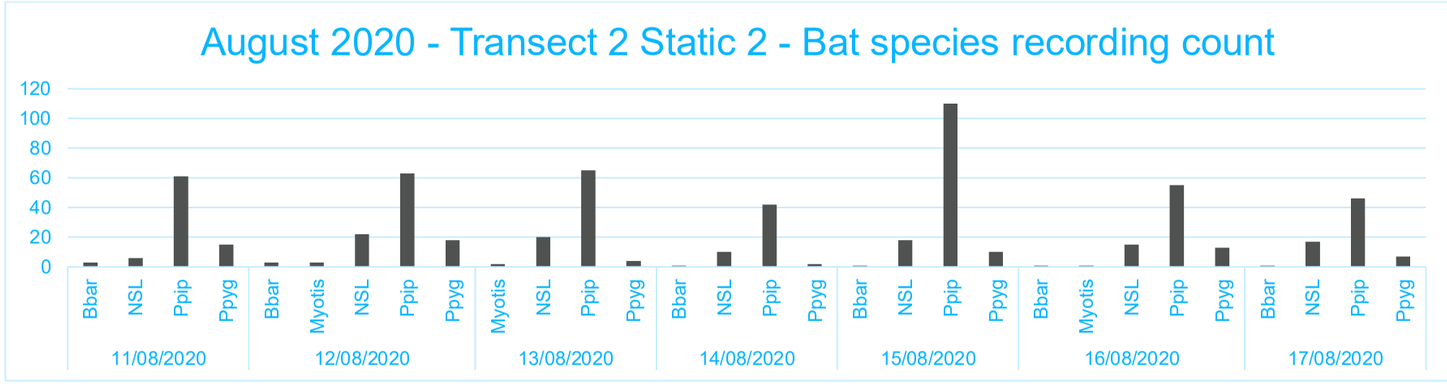

July 2020 - Static 7 - Bat species total recordings count
160
140
120
100
80
60
40
20
0
Myotis NSL Ppip Ppyg Bbar Myotis NSL Ppip Ppyg Myotis NSL Ppip Ppyg Myotis NSL Ppip Ppyg Myotis NSL Ppip Ppyg Myotis NSL Ppip Ppyg Bbar Myotis NSL Ppip Ppyg
14/07/2020
15/07/2020
16/07/2020
17/07/2020
18/07/2020
19/07/2020
20/07/2020

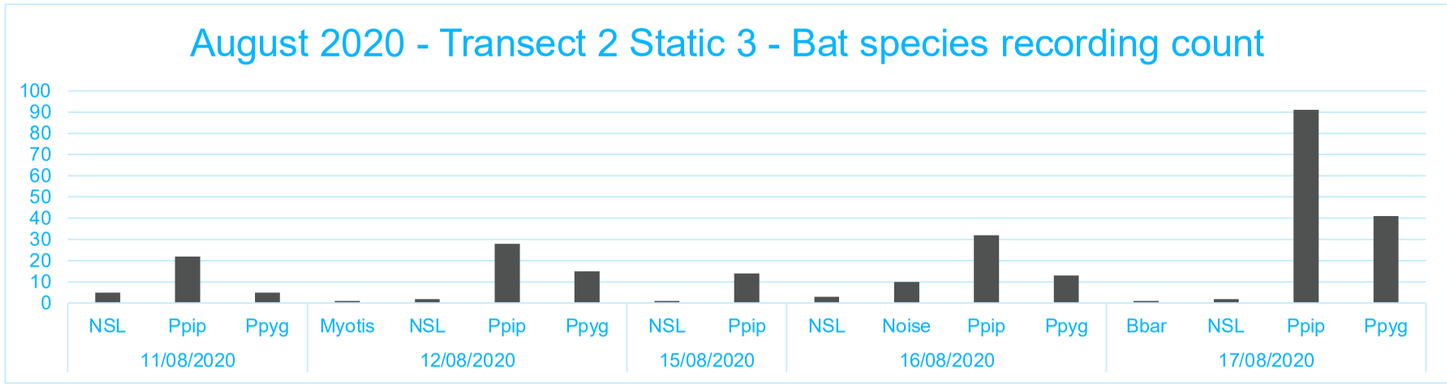
August 2020

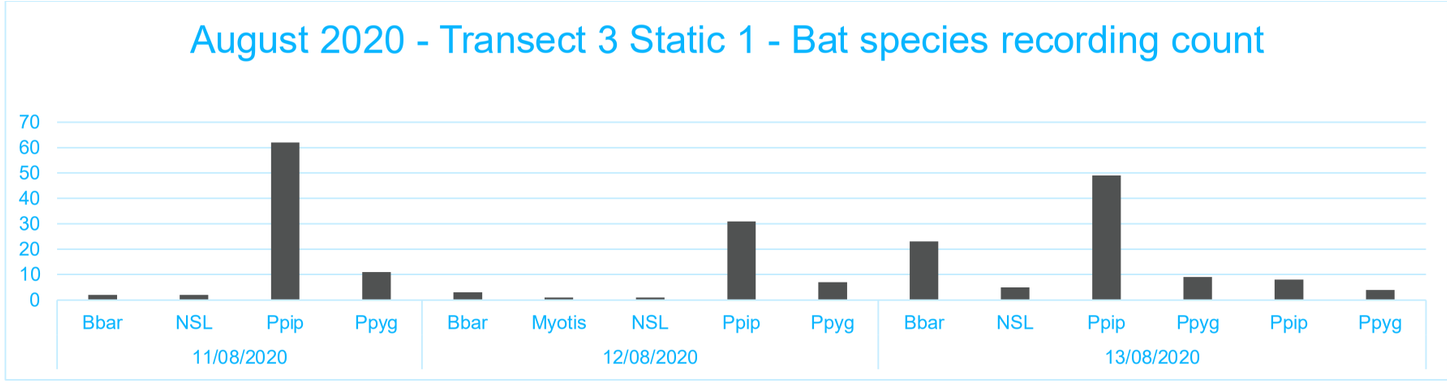

August 2020 - Transect 1 Static 1 - Bat species recording count
300
250
200
150
100
50
0
Bbar
Myotis
NSL
Ppip
Ppyg
11/08/2020
12/08/2020
13/08/2020
14/08/2020
15/08/2020
16/08/2020
17/08/2020

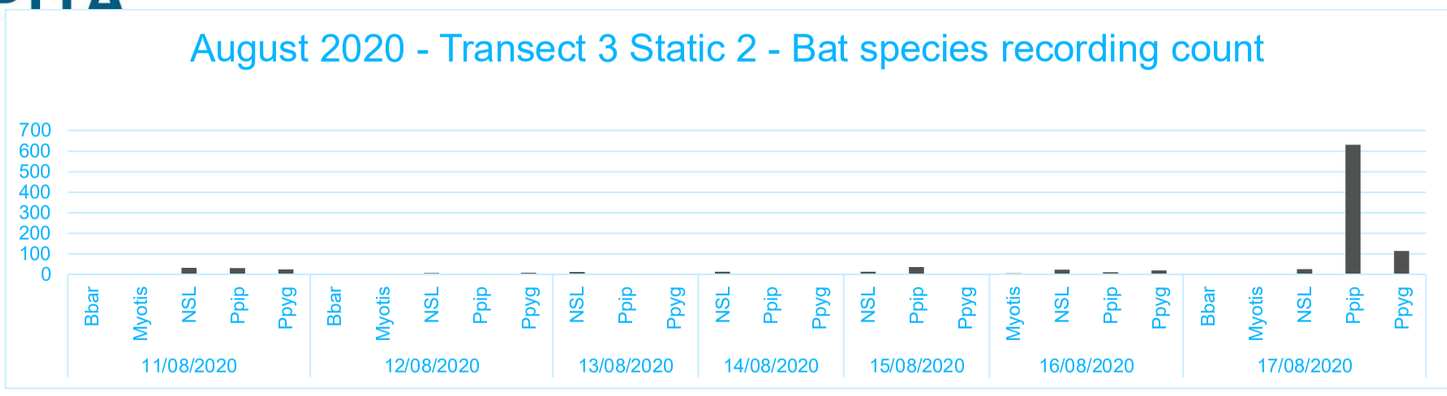

August 2020 - Transect 1 Static 2 - Bat species recording count
180
160
140
120
100
80
60
40
20
0
Bbar
NSL
Ppip
Ppyg
Myotis
11/08/2020
12/08/2020
13/08/2020
14/08/2020
15/08/2020
16/08/2020
17/08/2020

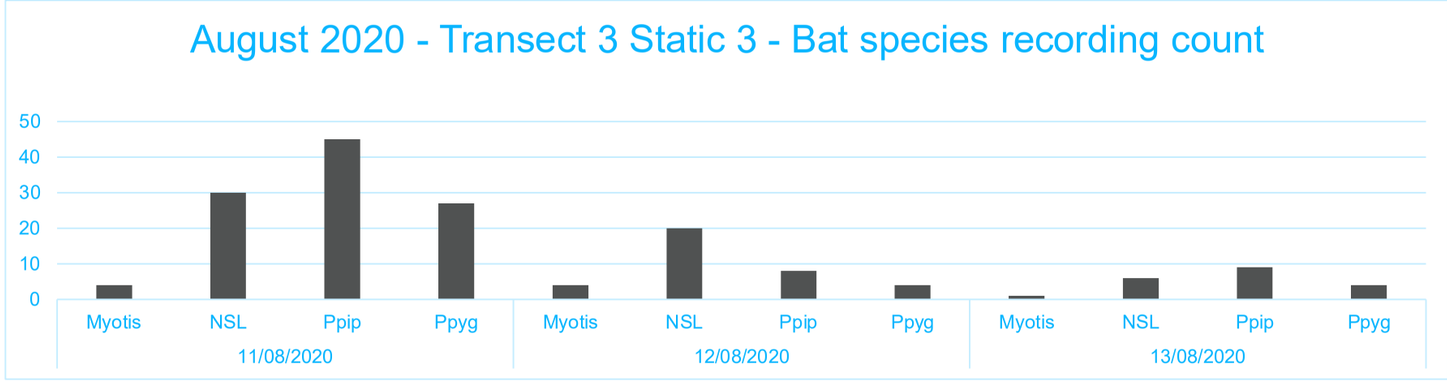

August 2020 - Transect 1 Static 3 - Bat species recording count
140
120
100
80
60
40
20
0
Myotis
NSL
Ppip
Ppyg
11/08/2020
12/08/2020
13/08/2020

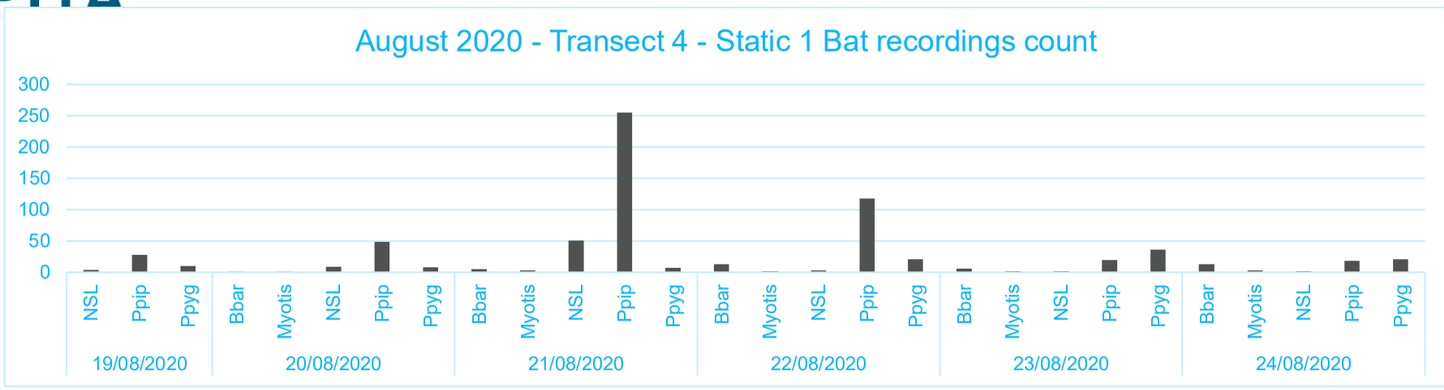

August 2020 - Transect 2 Static 2 - Bat species recording count
120
100
80
60
40
20
0
Bbar
NSL
Ppip
Ppyg
Myotis
11/08/2020
12/08/2020
13/08/2020
14/08/2020
15/08/2020
16/08/2020
17/08/2020

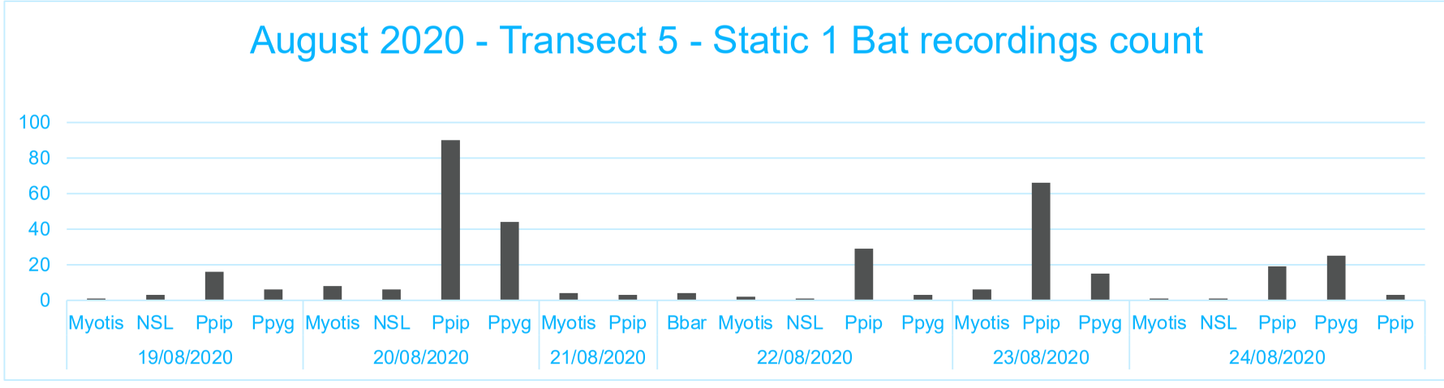

August 2020 - Transect 2 Static 3 - Bat species recording count
100
90
80
70
60
50
40
30
20
10
0
NSL
Ppip
Ppyg
Myotis
NSL
Ppip
Ppyg
NSL
Ppip
NSL
Noise
Ppip
Ppyg
Bbar
NSL
Ppip
Ppyg
11/08/2020
12/08/2020
15/08/2020
16/08/2020
17/08/2020

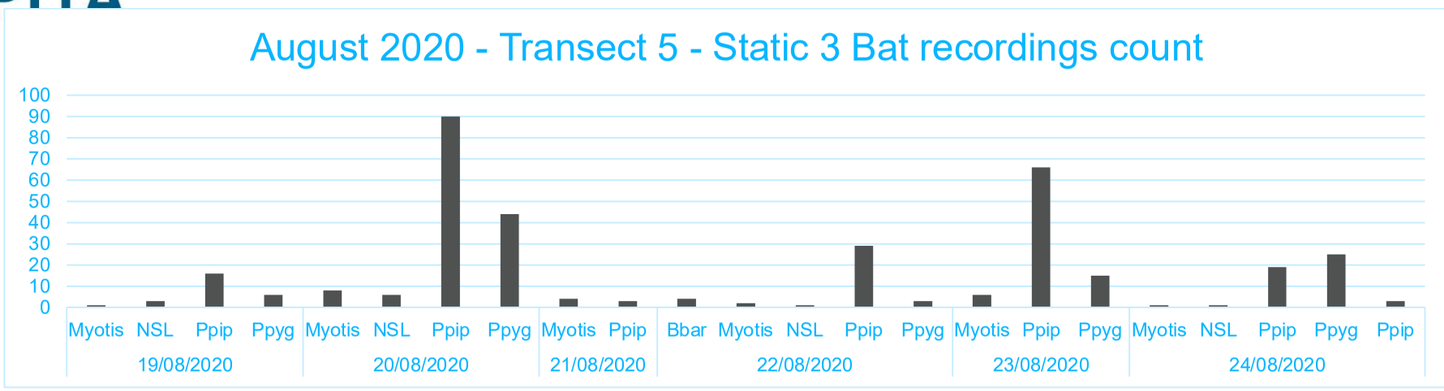

August 2020 - Transect 3 Static 1 - Bat species recording count
70
60
50
40
30
20
10
0
Bbar
NSL
Ppip
Ppyg
Bbar
Myotis
NSL
Ppip
Ppyg
Bbar
NSL
Ppip
Ppyg
Ppip
Ppyg
11/08/2020
12/08/2020
13/08/2020

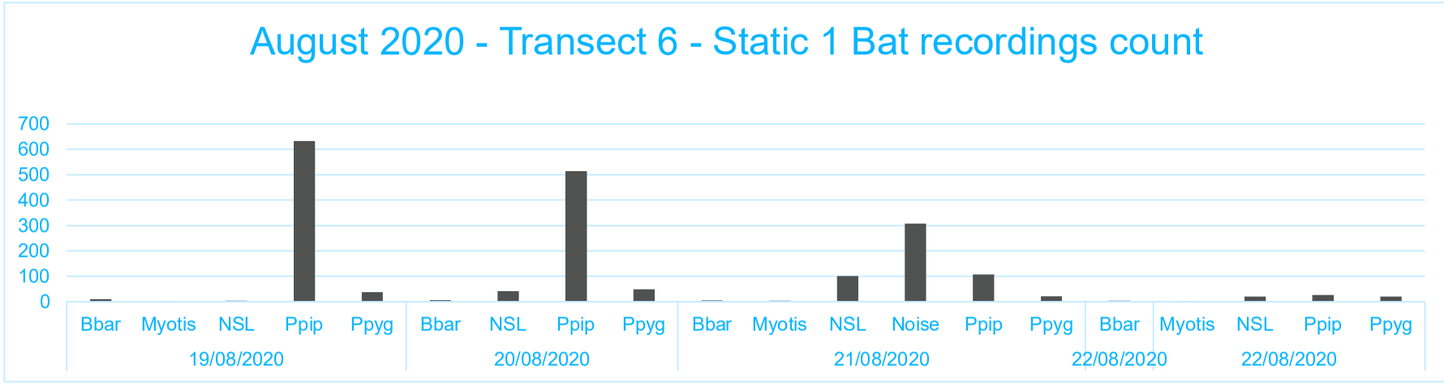

August 2020 - Transect 3 Static 2 - Bat species recording count
700
600
500
400
300
200
100
0
Bbar
Myotis
NSL
Ppip
Ppyg
Bbar
Myotis
NSL
Ppip
Ppyg
NSL
Ppip
Ppyg
NSL
Ppip
Ppyg
NSL
Ppip
Ppyg
Myotis
NSL
Ppip
Ppyg
Bbar
Myotis
NSL
Ppip
Ppyg
11/08/2020
12/08/2020
13/08/2020
14/08/2020
15/08/2020
16/08/2020
17/08/2020

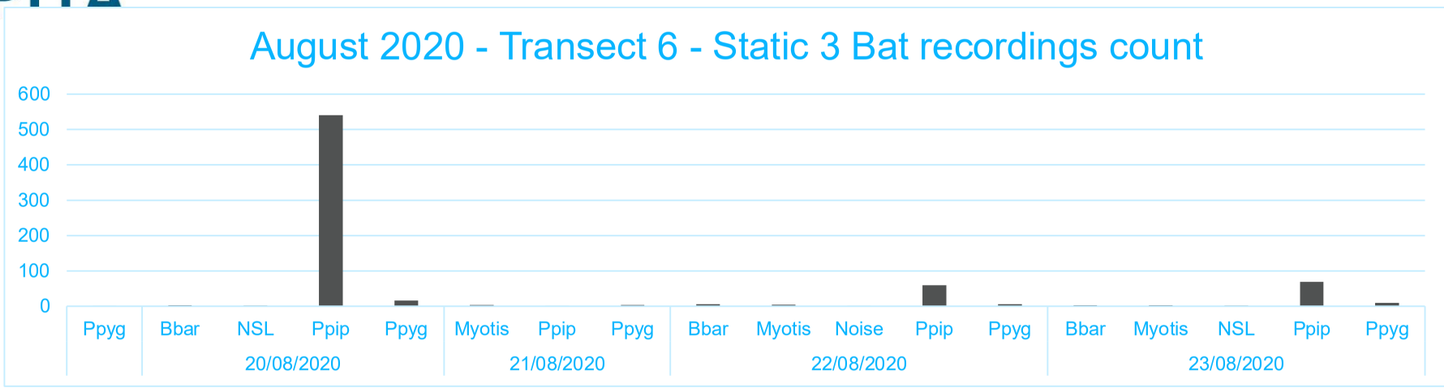

August 2020 - Transect 3 Static 3 - Bat species recording count
50
40
30
20
10
0
Myotis
NSL
Ppip
Ppyg
Myotis
NSL
Ppip
Ppyg
Myotis
NSL
Ppip
Ppyg
11/08/2020
12/08/2020
13/08/2020

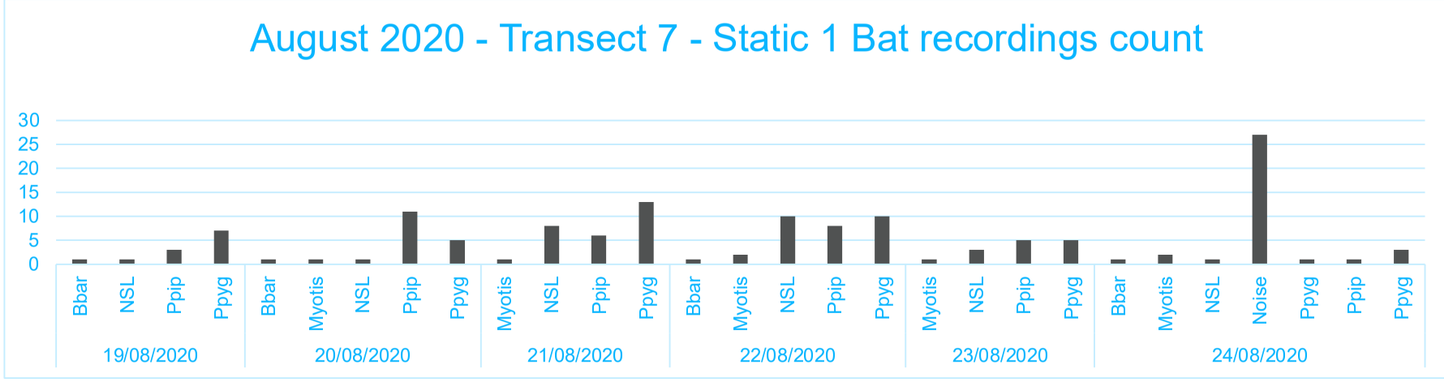

August 2020 - Transect 4 - Static 1 Bat recordings count
300
250
200
150
100
50
0
NSL Ppip Ppyg Bbar Myotis NSL Ppip Ppyg Bbar Myotis NSL Ppip Ppyg Bbar Myotis NSL Ppip Ppyg Bbar Myotis NSL Ppip Ppyg Bbar Myotis NSL Ppip Ppyg
19/08/2020
20/08/2020
21/08/2020
22/08/2020
23/08/2020
24/08/2020

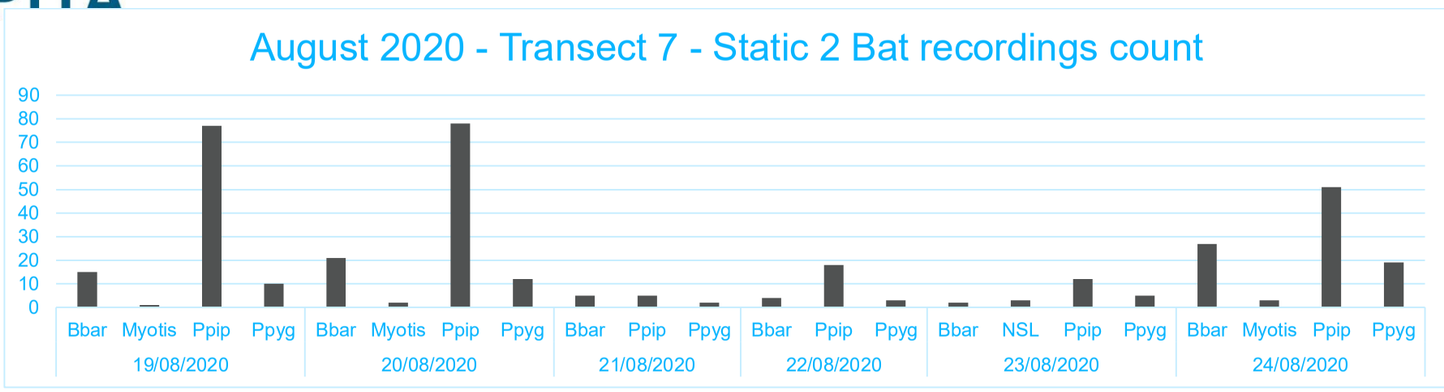

August 2020 - Transect 5 - Static 1 Bat recordings count
100
80
60
40
20
0
Myotis NSL Ppip Ppyg Myotis NSL Ppip Ppyg Myotis Ppip Bbar Myotis NSL Ppip Ppyg Myotis Ppip Ppyg Myotis NSL Ppip Ppyg Ppip
19/08/2020
20/08/2020
21/08/2020
22/08/2020
23/08/2020
24/08/2020

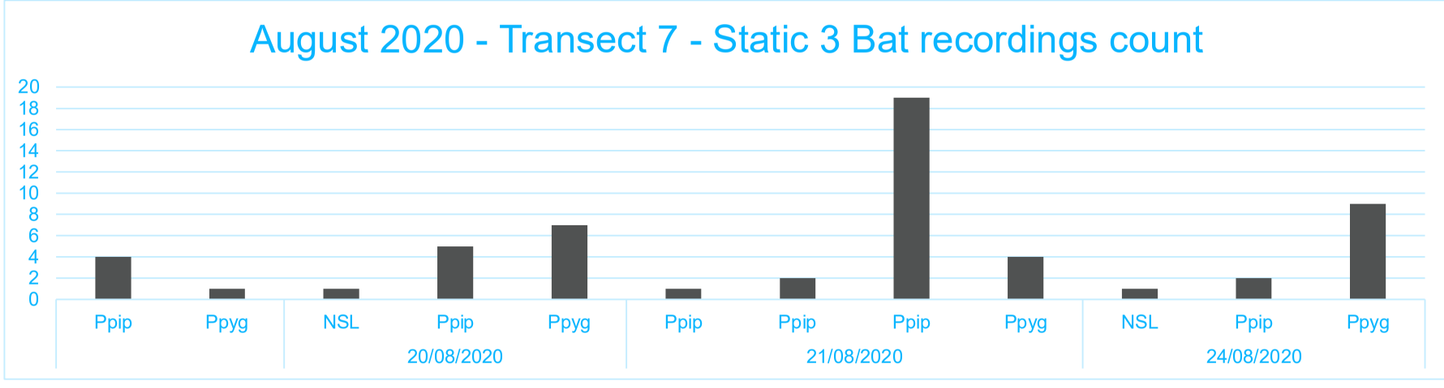

August 2020 - Transect 5 - Static 3 Bat recordings count
100
90
80
70
60
50
40
30
20
10
0
Myotis NSL Ppip Ppyg Myotis NSL Ppip Ppyg Myotis Ppip Bbar Myotis NSL Ppip Ppyg Myotis Ppip Ppyg Myotis NSL Ppip Ppyg Ppip
19/08/2020
20/08/2020
21/08/2020
22/08/2020
23/08/2020
24/08/2020


August 2020 - Transect 6 - Static 1 Bat recordings count
700
600
500
400
300
200
100
0
Bbar Myotis NSL Ppip Ppyg Bbar NSL Ppip Ppyg Bbar Myotis NSL Noise Ppip Ppyg Bbar Myotis NSL Ppip Ppyg
19/08/2020
20/08/2020
21/08/2020
22/08/2020
22/08/2020

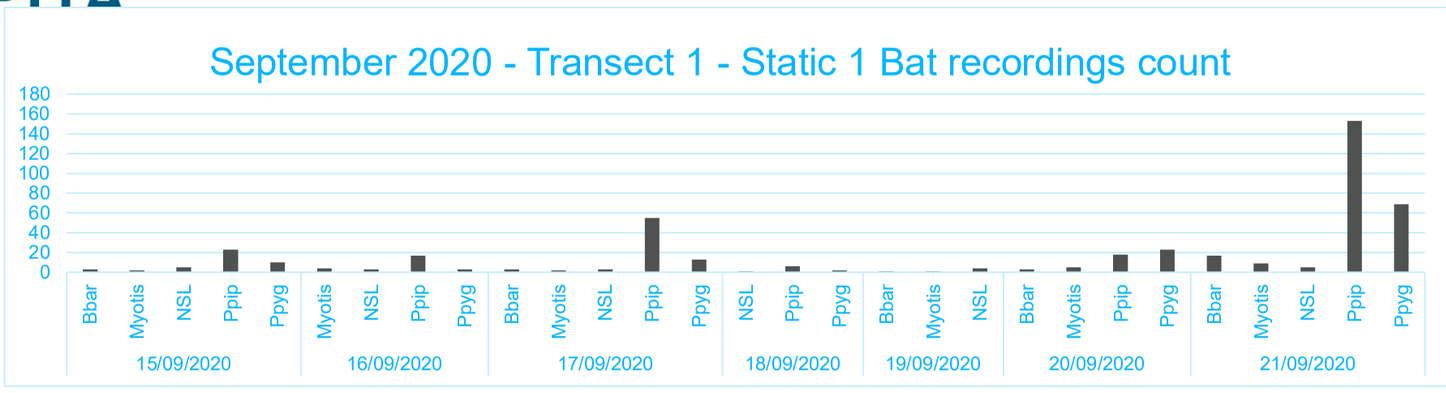


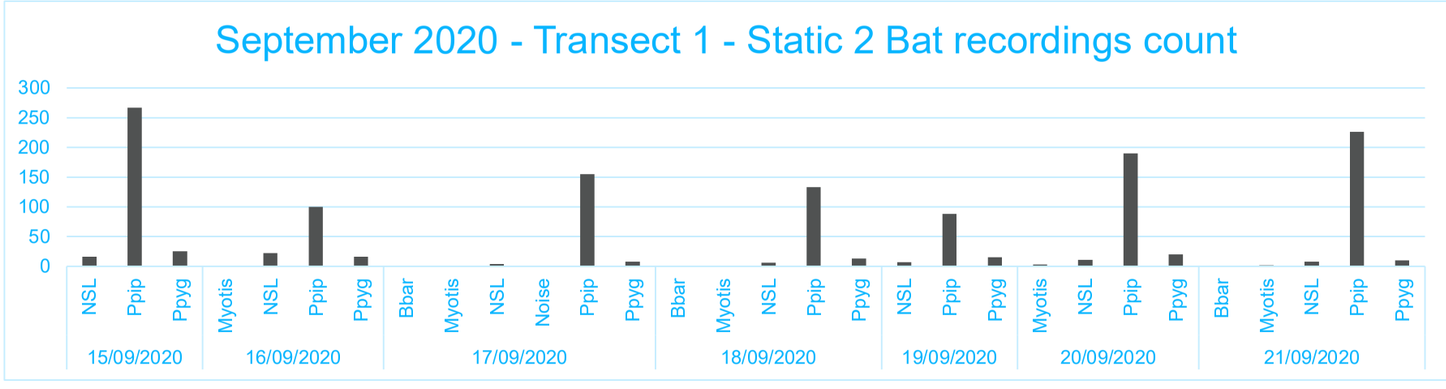


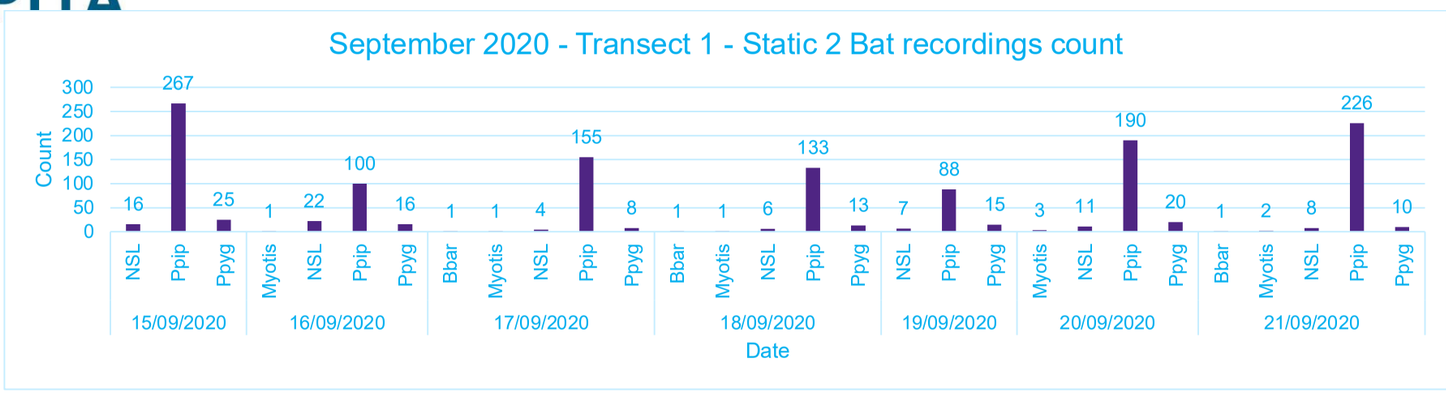


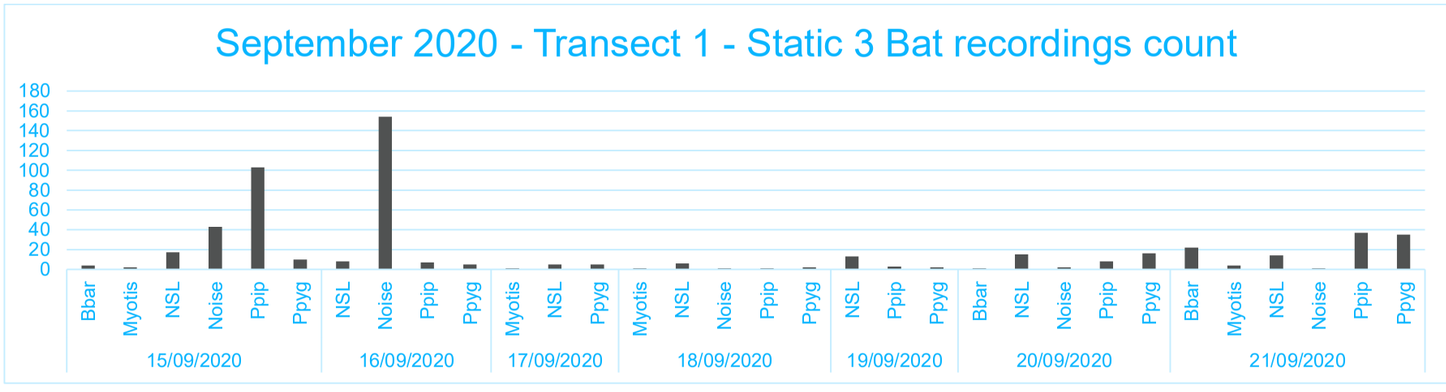


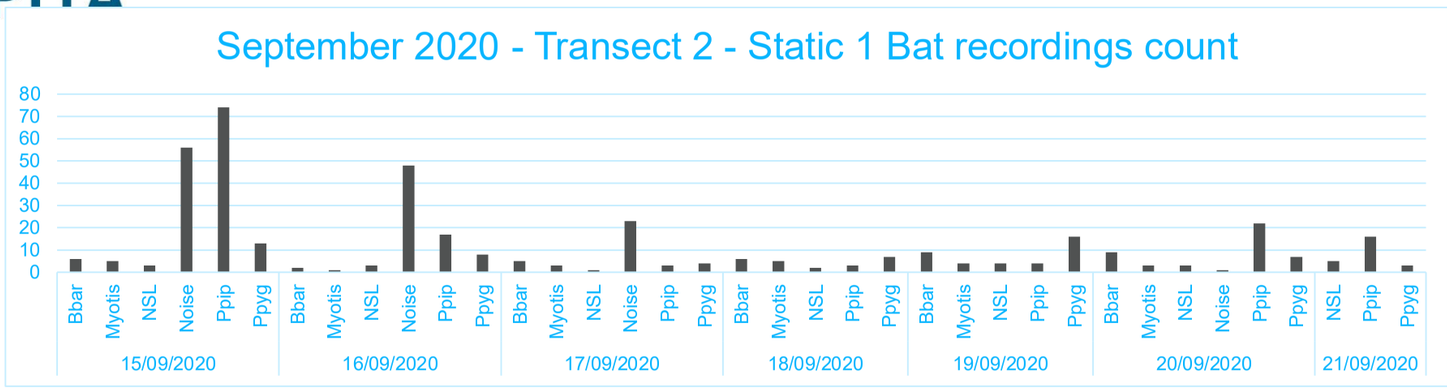
September 2020

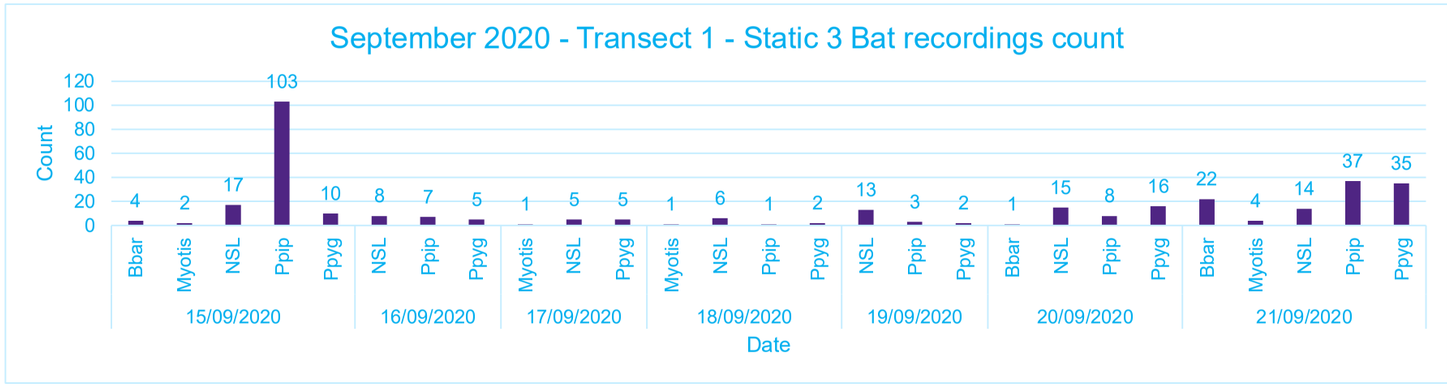

September 2020 - Transect 1 - Static 1 Bat recordings count
180
160
140
120
100
80
60
40
20
0
Bbar Myotis NSL Ppip Ppyg Myotis NSL Ppip Ppyg Bbar Myotis NSL Ppip Ppyg NSL Ppip Ppyg Bbar Myotis NSL Bbar Myotis Ppip Ppyg Bbar Myotis NSL Ppip Ppyg
15/09/2020
16/09/2020
17/09/2020
18/09/2020
19/09/2020
20/09/2020
21/09/2020

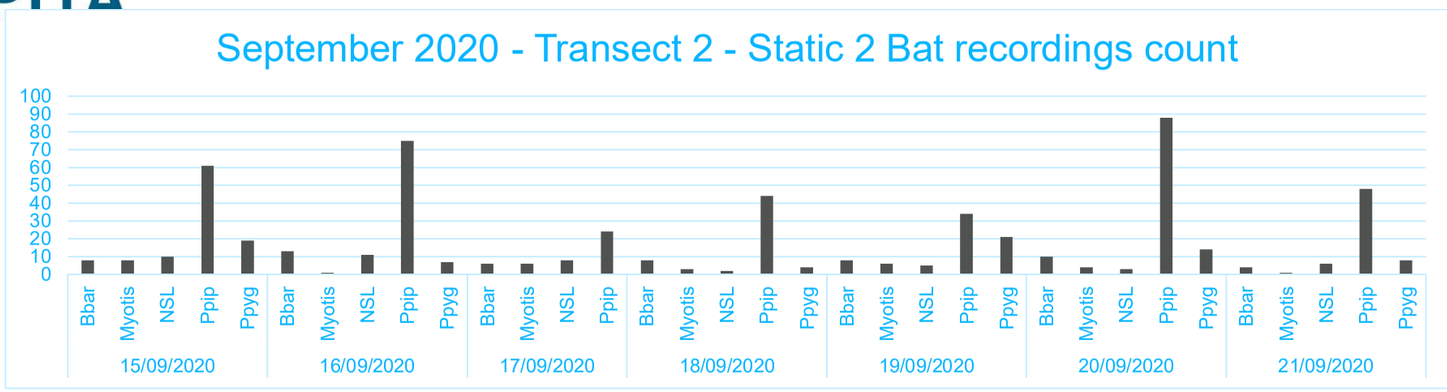

September 2020 - Transect 1 - Static 2 Bat recordings count
300
250
200
150
100
50
0
NSL Ppip Ppyg Myotis NSL Ppip Ppyg Bbar Myotis NSL Noise Ppip Ppyg Bbar Myotis NSL Ppip Ppyg NSL Ppip Ppyg Myotis NSL Ppip Ppyg Bbar Myotis NSL Ppip Ppyg
15/09/2020
16/09/2020
17/09/2020
18/09/2020
19/09/2020
20/09/2020
21/09/2020

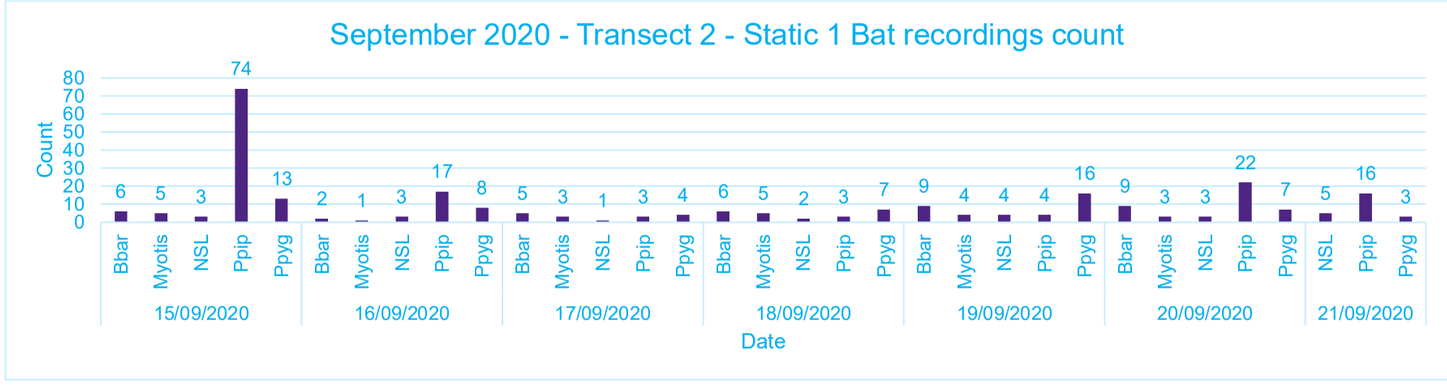

September 2020 - Transect 1 - Static 2 Bat recordings count
Count
300
250
200
150
100
50
0
16 267 25 1 22 100 16 1 1 4 155 8 1 1 6 133 13 7 88 15 3 11 190 20 1 2 8 226 10
NSL Ppip Ppyg Myotis NSL Ppip Ppyg Bbar Myotis NSL Ppip Ppyg Bbar Myotis NSL Ppip Ppyg NSL Ppip Ppyg Myotis NSL Ppip Ppyg Bbar Myotis NSL Ppip Ppyg
15/09/2020
16/09/2020
17/09/2020
18/09/2020
19/09/2020
20/09/2020
21/09/2020
Date

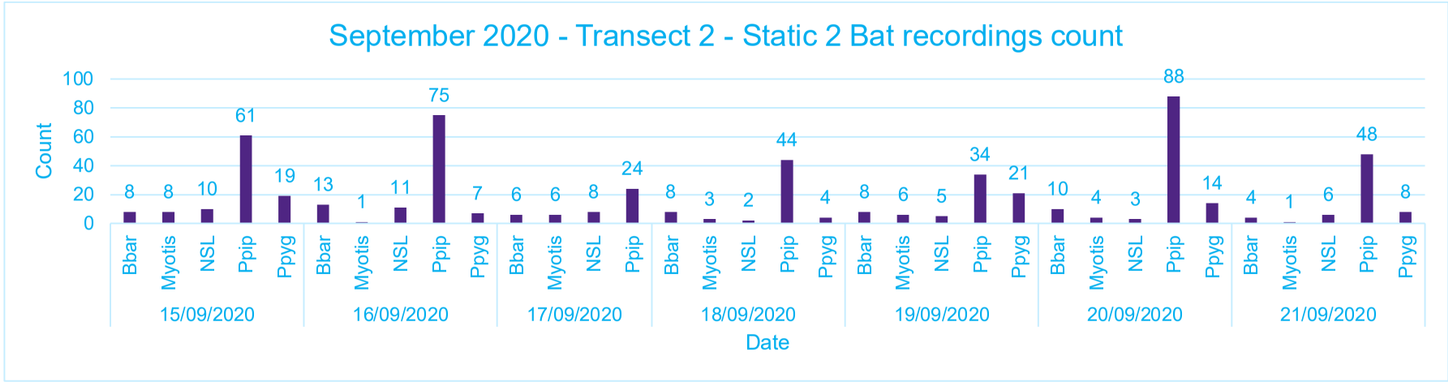

September 2020 - Transect 1 - Static 3 Bat recordings count
180
160
140
120
100
80
60
40
20
0
Bbar Myotis NSL Noise Ppip Ppyg NSL Noise Ppip Ppyg Myotis NSL Ppyg Myotis NSL Noise Ppip Ppyg NSL Ppip Ppyg Bbar NSL Noise Ppip Ppyg Bbar Myotis NSL Noise Ppip Ppyg
15/09/2020
16/09/2020
17/09/2020
18/09/2020
19/09/2020
20/09/2020
21/09/2020

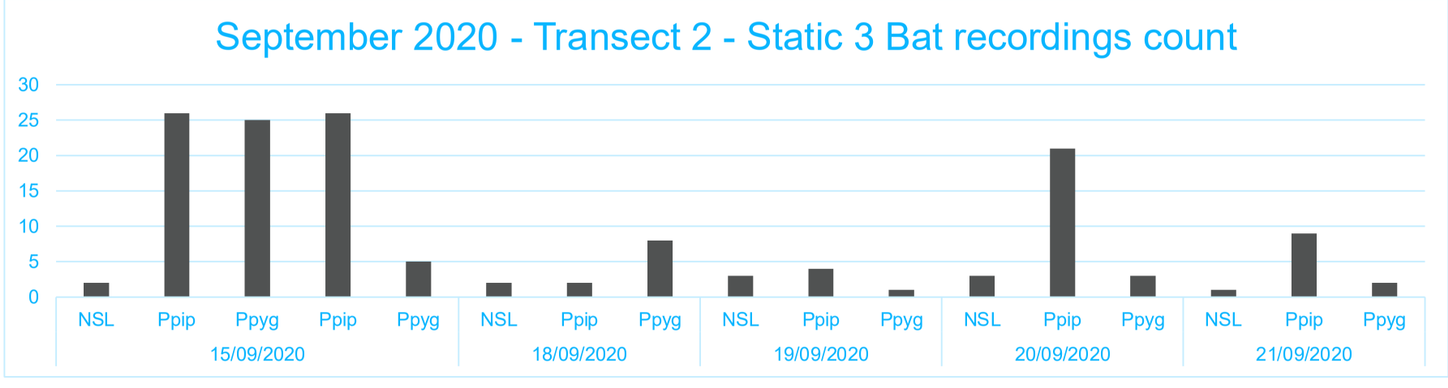

September 2020 - Transect 2 - Static 1 Bat recordings count
80
70
60
50
40
30
20
10
0
Bbar Myotis NSL Noise Ppip Ppyg
15/09/2020
16/09/2020
17/09/2020
18/09/2020
19/09/2020
20/09/2020
21/09/2020

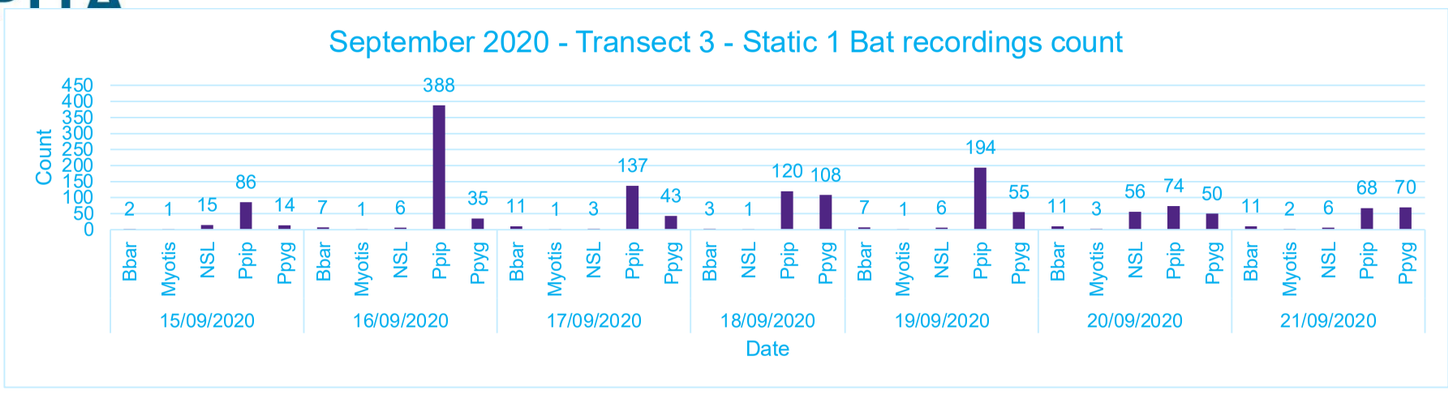

September 2020 - Transect 1 - Static 3 Bat recordings count
Count
120
100
80
60
40
20
0
4 2 17 103 10
8 7 5
1 5 5
1 6 1 2
13 3 2
1 15 8 16
22 4 14 37 35
Bbar Myotis NSL Ppip Ppyg
15/09/2020
16/09/2020
17/09/2020
18/09/2020
19/09/2020
20/09/2020
21/09/2020
Date

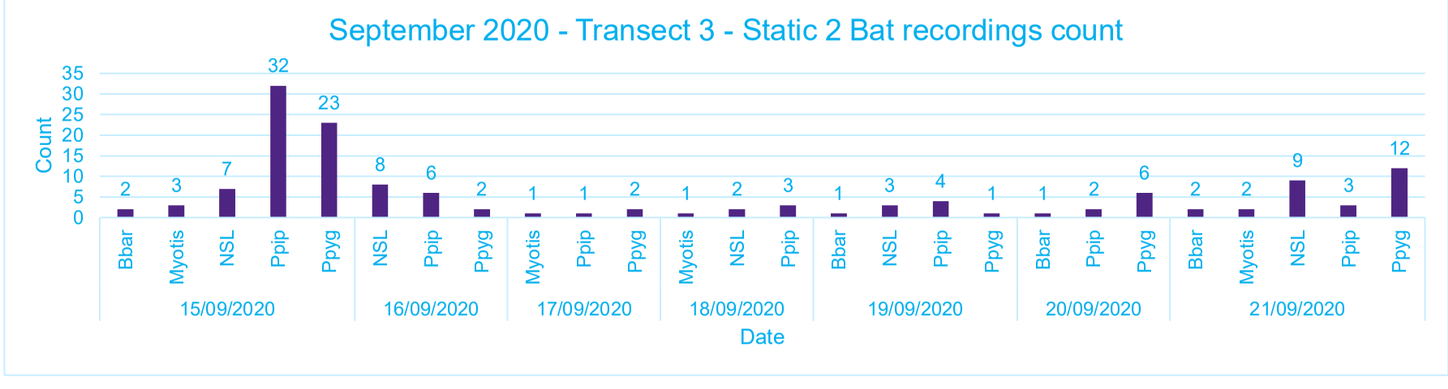

September 2020 - Transect 2 - Static 2 Bat recordings count
100
90
80
70
60
50
40
30
20
10
0
Bbar Myotis NSL Ppip Ppyg
15/09/2020
16/09/2020
17/09/2020
18/09/2020
19/09/2020
20/09/2020
21/09/2020

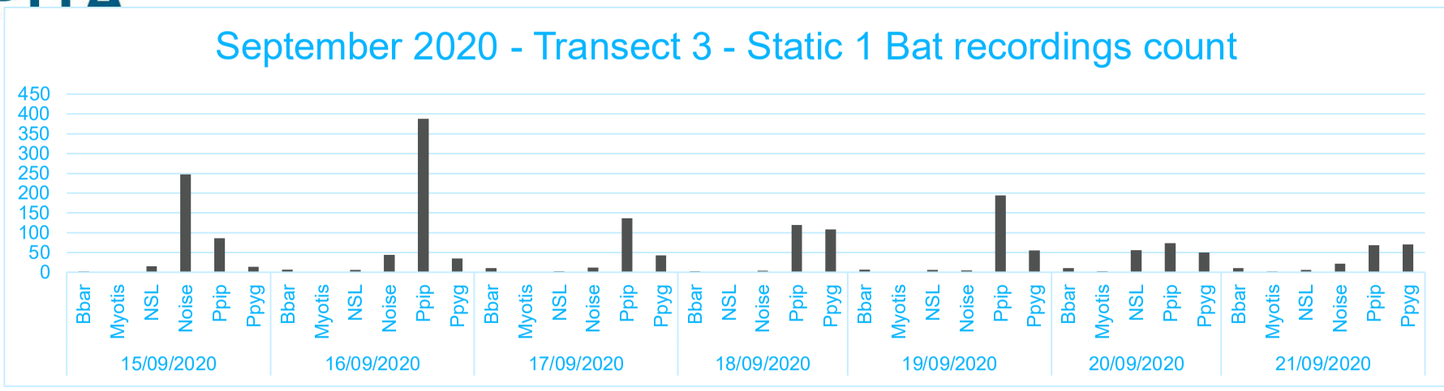

September 2020 - Transect 2 - Static 1 Bat recordings count
Count
80
70
60
50
40
30
20
10
0
6 5 3 74 13
2 1 3 17 8
5 3 1 3 4
6 5 2 3 7
9 4 4 4 16
9 3 3 22 7
5 16 3
Bbar Myotis NSL Ppip Ppyg
15/09/2020
16/09/2020
17/09/2020
18/09/2020
19/09/2020
20/09/2020
21/09/2020
Date

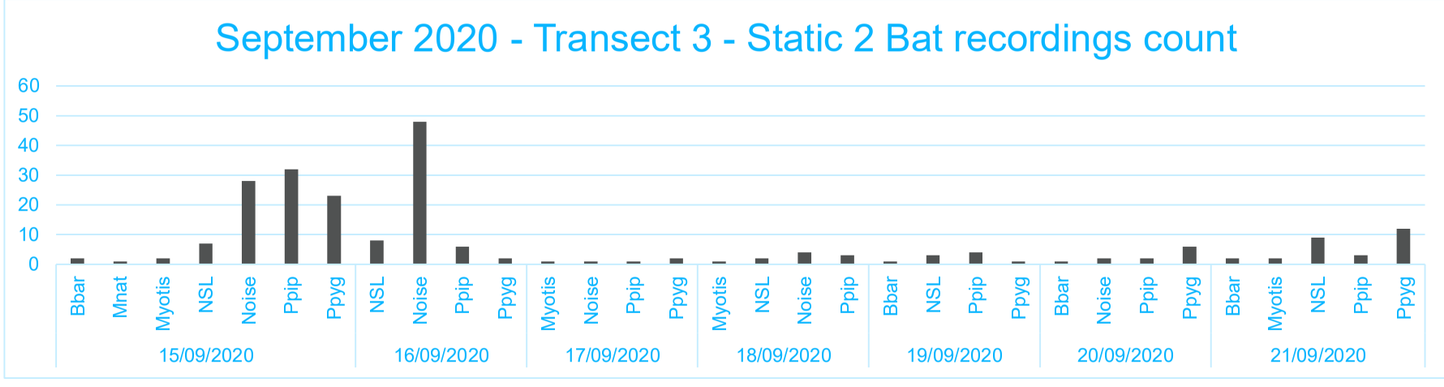

September 2020 - Transect 2 - Static 2 Bat recordings count
Count
Date
Bbar
Myotis
NSL
Ppip
Ppyg
15/09/2020
16/09/2020
17/09/2020
18/09/2020
19/09/2020
20/09/2020
21/09/2020

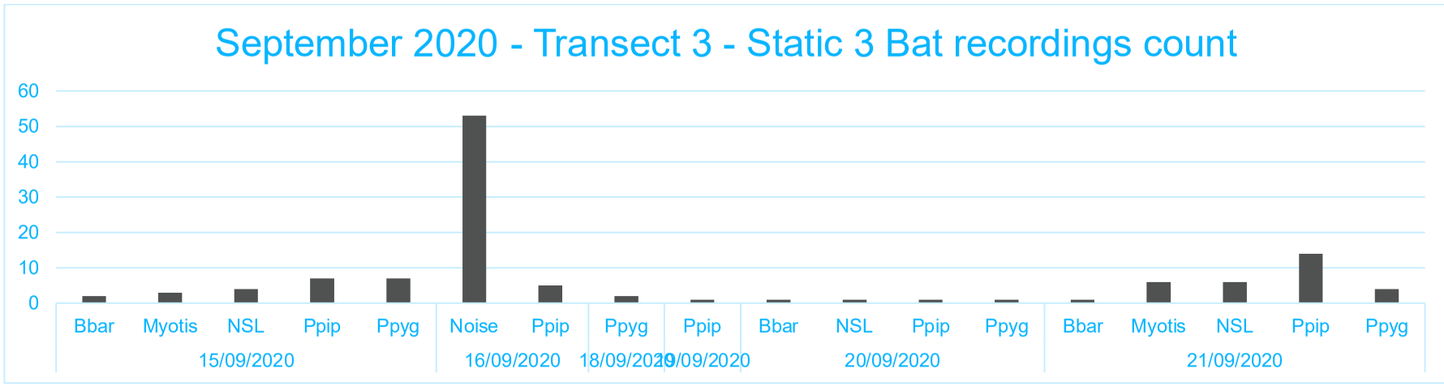

September 2020 - Transect 2 - Static 3 Bat recordings count
NSL
Ppip
Ppyg
15/09/2020
18/09/2020
19/09/2020
20/09/2020
21/09/2020

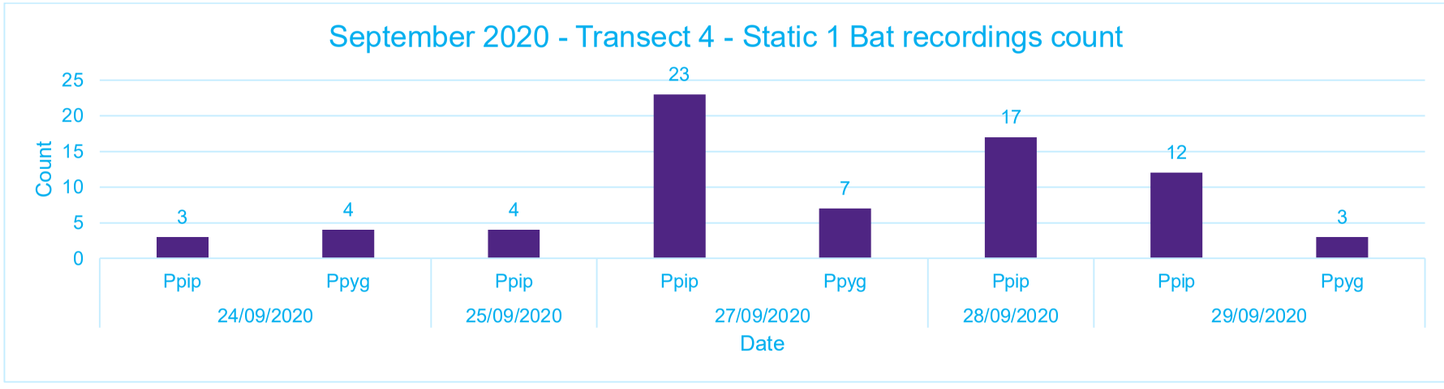

September 2020 - Transect 3 - Static 1 Bat recordings count
Count
Date
Bbar
Myotis
NSL
Ppip
Ppyg
15/09/2020
16/09/2020
17/09/2020
18/09/2020
19/09/2020
20/09/2020
21/09/2020

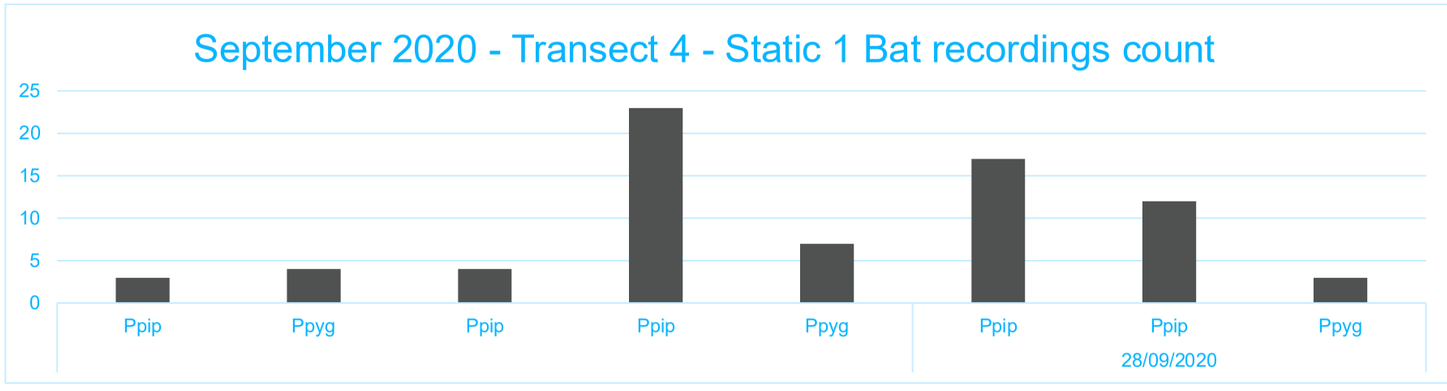

September 2020 - Transect 3 - Static 2 Bat recordings count
Count
Date
Bbar
Myotis
NSL
Ppip
Ppyg
15/09/2020
16/09/2020
17/09/2020
18/09/2020
19/09/2020
20/09/2020
21/09/2020

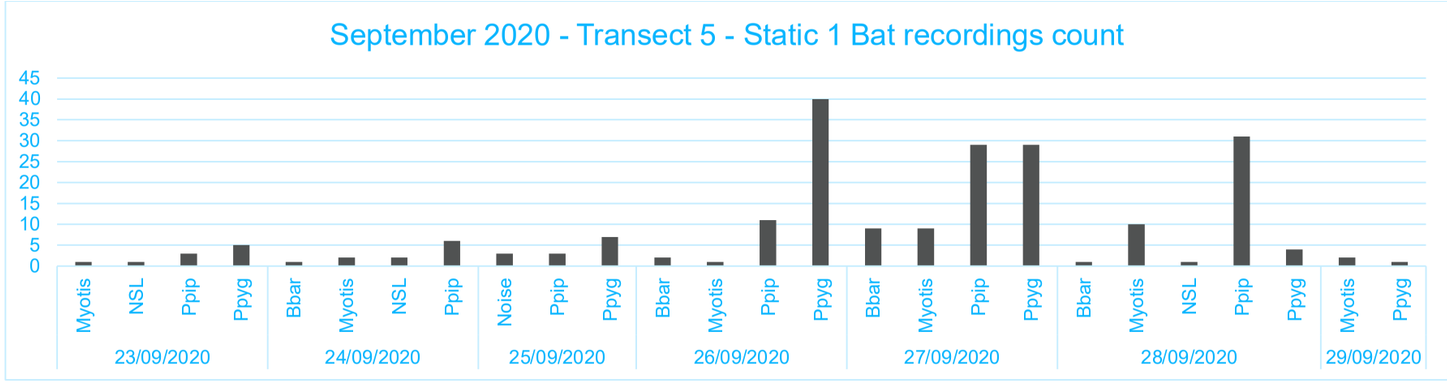

September 2020 - Transect 3 - Static 1 Bat recordings count
450
400
350
300
250
200
150
100
50
0
Bbar Myotis NSL Noise Ppip Ppyg
15/09/2020
16/09/2020
17/09/2020
18/09/2020
19/09/2020
20/09/2020
21/09/2020

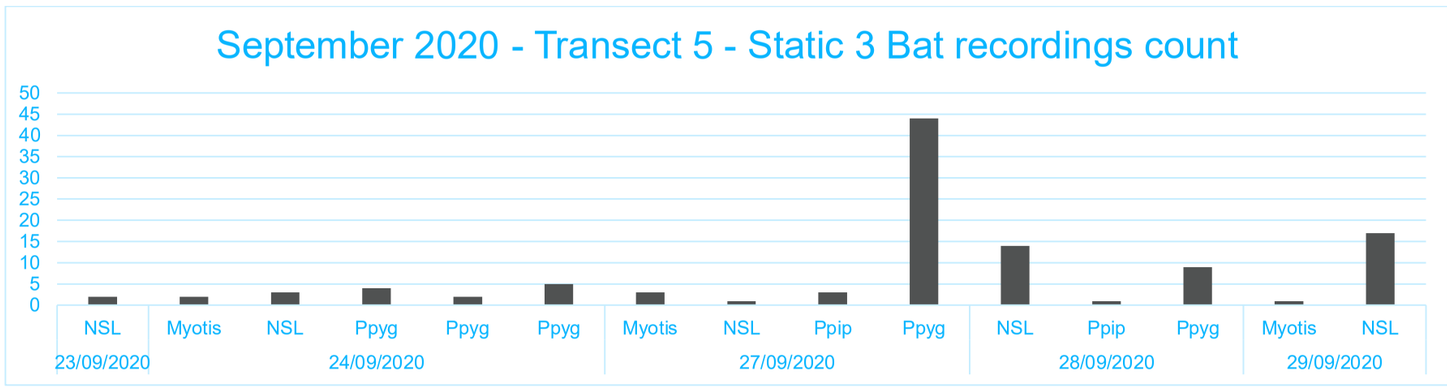

September 2020 - Transect 3 - Static 2 Bat recordings count
60
50
40
30
20
10
0
Bbar Mnat Myotis NSL Noise Ppip Ppyg
15/09/2020
16/09/2020
17/09/2020
18/09/2020
19/09/2020
20/09/2020
21/09/2020

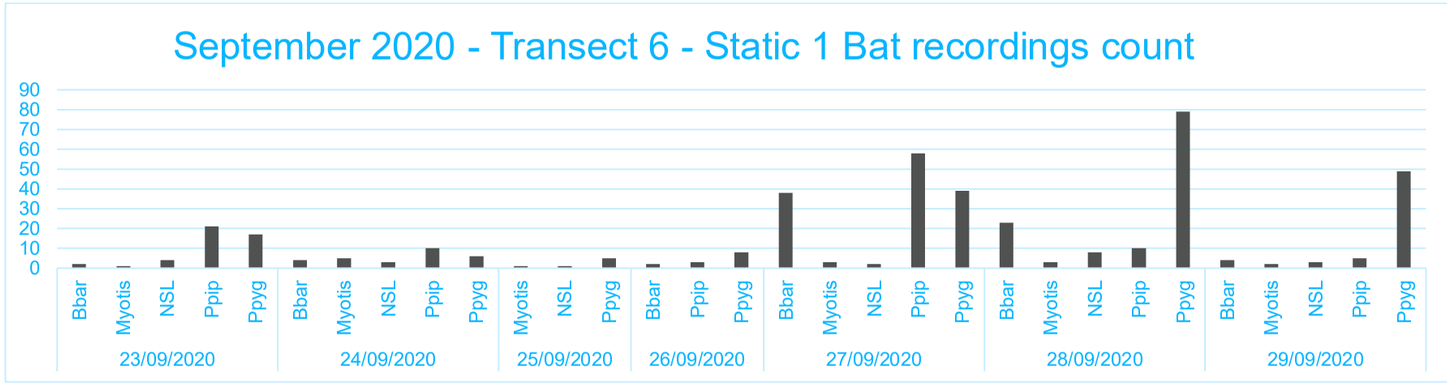

September 2020 - Transect 3 - Static 3 Bat recordings count
60
50
40
30
20
10
0
Bbar Myotis NSL Ppip Ppyg Noise Ppip Ppyg Ppip Bbar NSL Ppip Ppyg Bbar Myotis NSL Ppip Ppyg
15/09/2020
16/09/2020
18/09/2020
19/09/2020
20/09/2020
21/09/2020

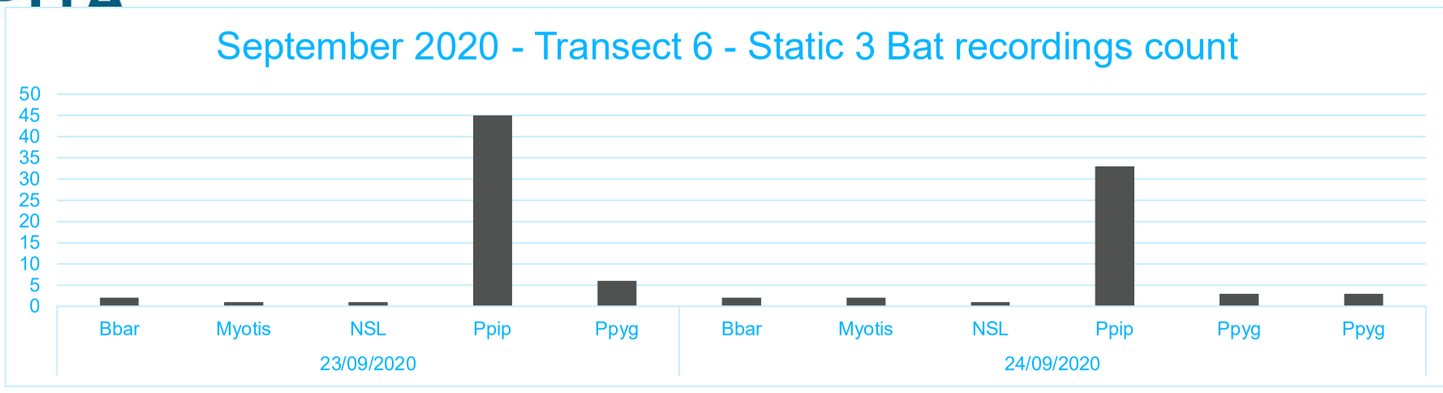

September 2020 - Transect 4 - Static 1 Bat recordings count
25
20
15
10
5
0
Count
3
4
4
23
7
17
12
3
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27/09/2020
28/09/2020
29/09/2020
Date

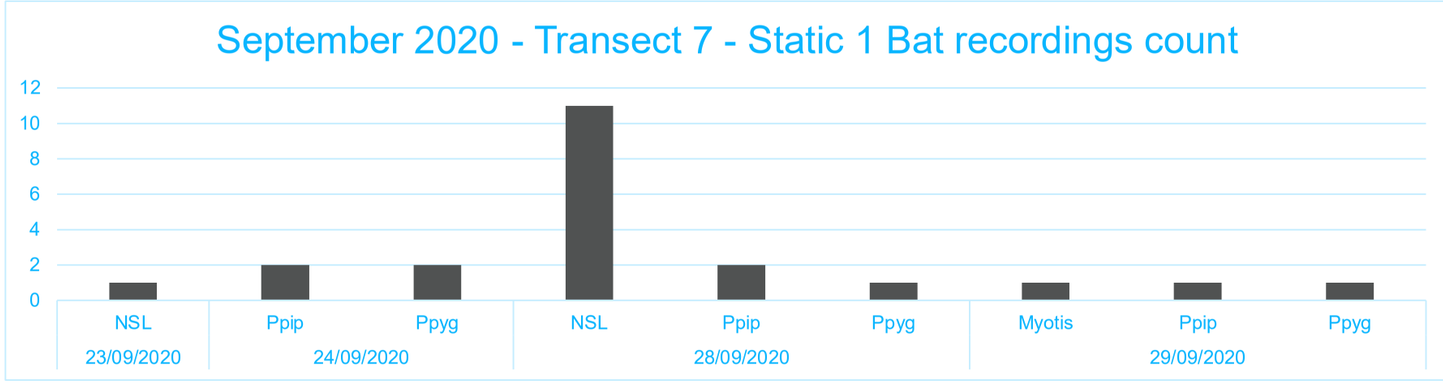

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28/09/2020

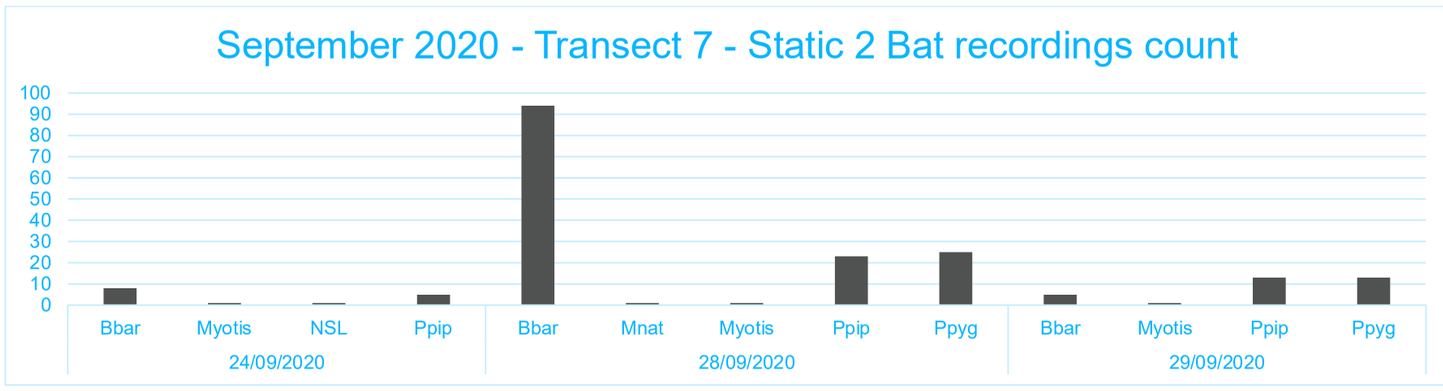

September 2020 - Transect 5 - Static 1 Bat recordings count
45
40
35
30
25
20
15
10
5
0
Myotis
NSL
Ppip
Ppyg
Bbar
Myotis
NSL
Ppip
Noise
Ppip
Ppyg
Bbar
Myotis
Ppip
Ppyg
Bbar
Myotis
Ppip
Ppyg
Bbar
Myotis
NSL
Ppip
Ppyg
Myotis
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25/09/2020
26/09/2020
27/09/2020
28/09/2020
29/09/2020

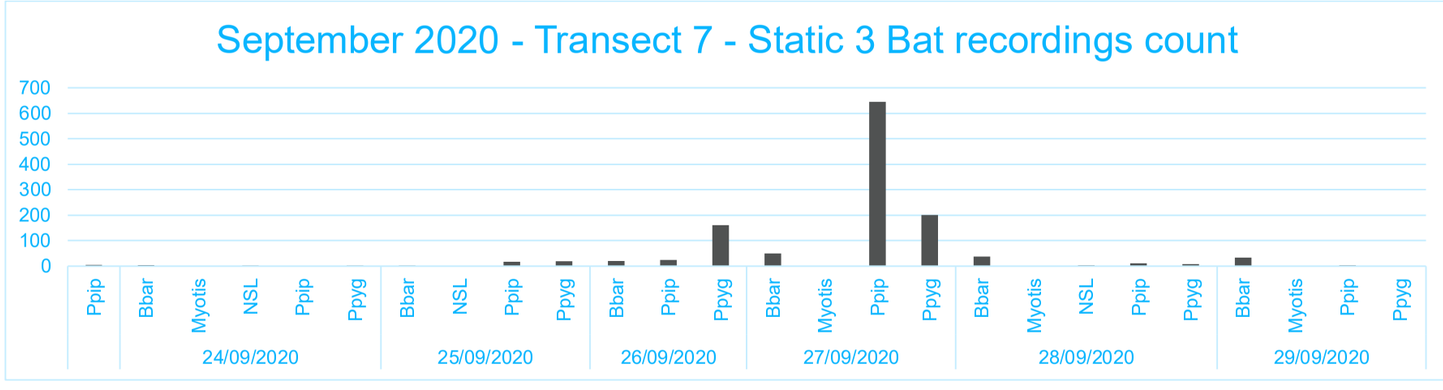

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45
40
35
30
25
20
15
10
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0
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Myotis
NSL
Ppyg
Ppyg
Ppyg
Myotis
NSL
Ppip
Ppyg
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Myotis
NSL
23/09/2020
24/09/2020
27/09/2020
28/09/2020
29/09/2020

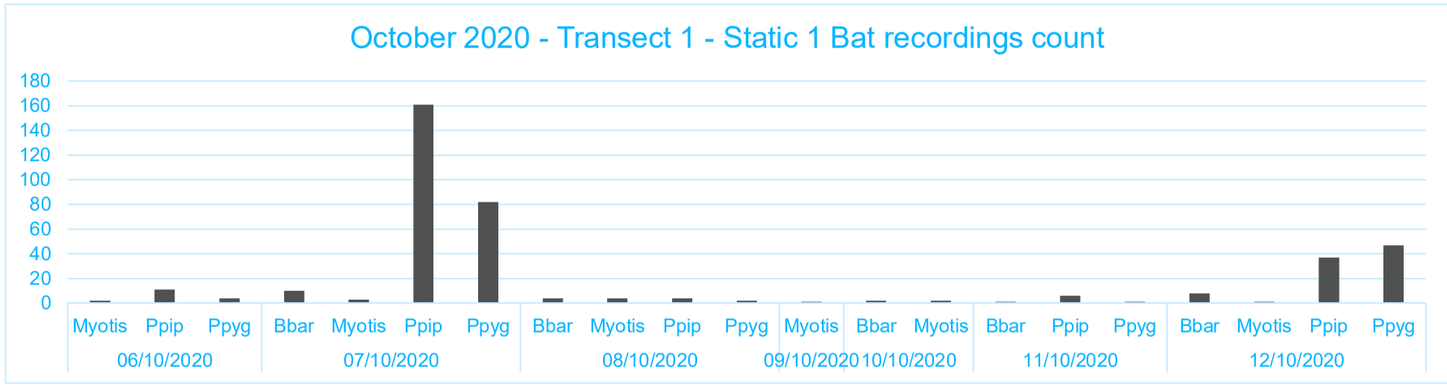

September 2020 - Transect 6 - Static 1 Bat recordings count
90
80
70
60
50
40
30
20
10
0
Bbar
Myotis
NSL
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Ppyg
Bbar
Myotis
NSL
Ppip
Ppyg
Myotis
NSL
Ppyg
Bbar
Ppip
Ppyg
Bbar
Myotis
NSL
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29/09/2020

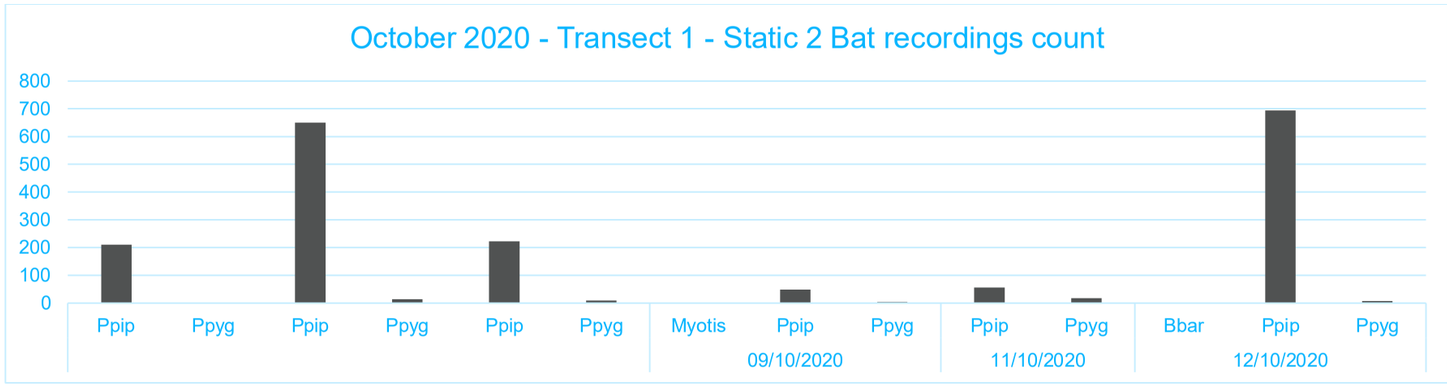

September 2020 - Transect 6 - Static 3 Bat recordings count
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45
40
35
30
25
20
15
10
5
0
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NSL
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Ppyg
Ppyg
23/09/2020
24/09/2020

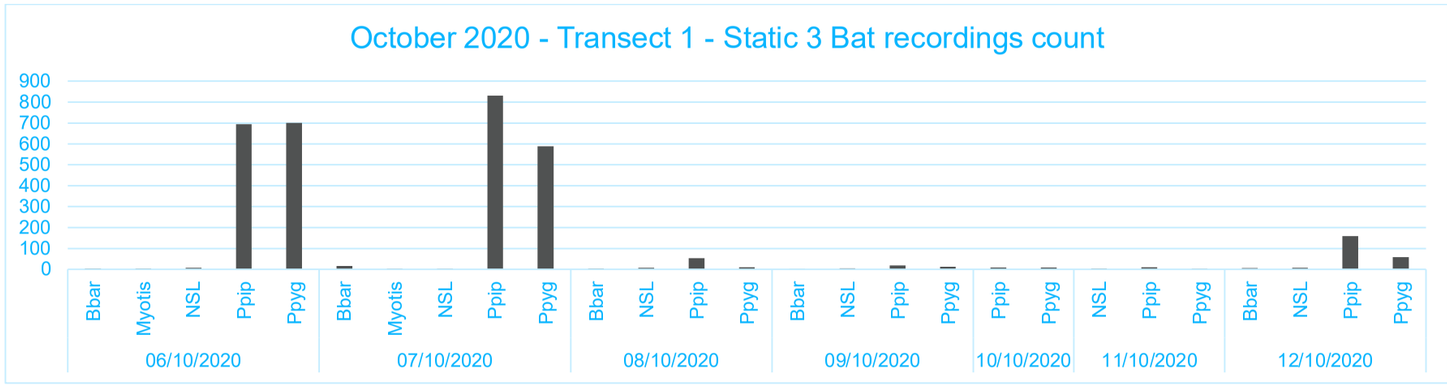

September 2020 - Transect 7 - Static 1 Bat recordings count
12
10
8
6
4
2
0
NSL
Ppip
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Ppip
Ppyg
23/09/2020
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28/09/2020
29/09/2020

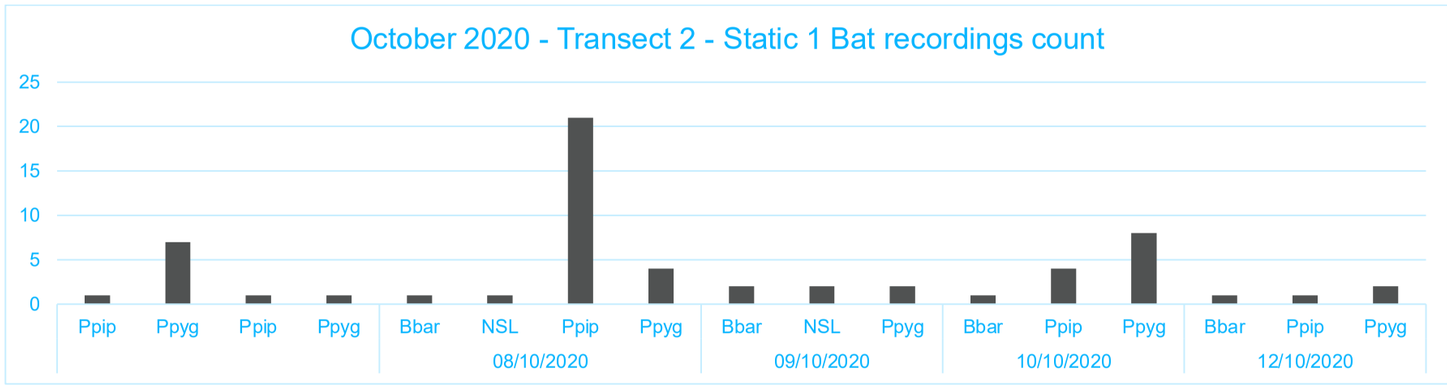

September 2020 - Transect 7 - Static 2 Bat recordings count
100
90
80
70
60
50
40
30
20
10
0
Bbar
Myotis
NSL
Ppip
Bbar
Mnat
Myotis
Ppip
Ppyg
Bbar
Myotis
Ppip
Ppyg
24/09/2020
28/09/2020
29/09/2020

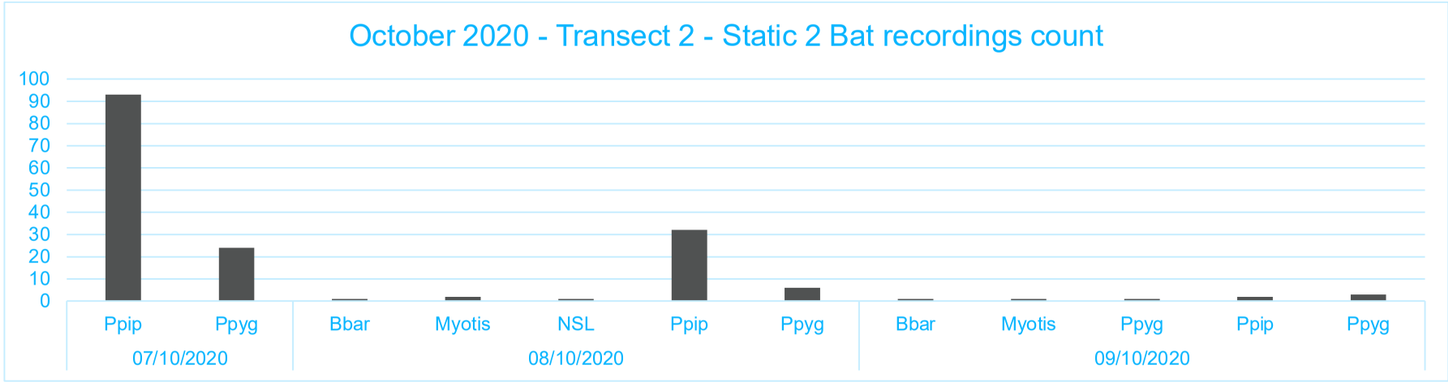

September 2020 - Transect 7 - Static 3 Bat recordings count
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600
500
400
300
200
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Bbar
NSL
Ppip
Ppyg
Bbar
Ppip
Ppyg
Bbar
Myotis
Ppip
Ppyg
Bbar
Myotis
NSL
Ppip
Ppyg
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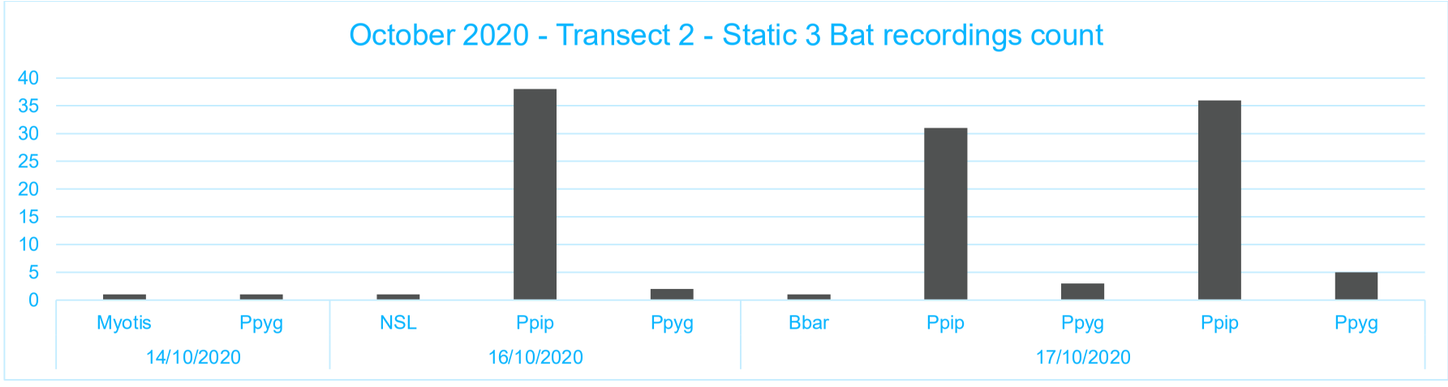

October 2020 - Transect 1 - Static 1 Bat recordings count
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160
140
120
100
80
60
40
20
0
Myotis Ppip Ppyg Bbar Myotis Ppip Ppyg Bbar Myotis Ppip Ppyg Myotis Bbar Myotis Bbar Ppip Ppyg Bbar Myotis Ppip Ppyg
06/10/2020
07/10/2020
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11/10/2020
12/10/2020

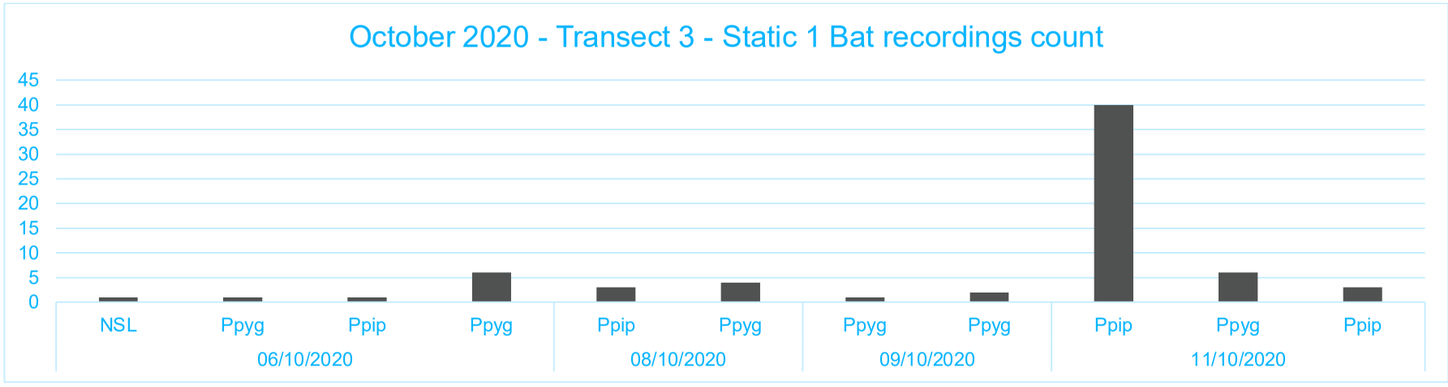

October 2020 - Transect 1 - Static 2 Bat recordings count
800
700
600
500
400
300
200
100
0
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09/10/2020
11/10/2020
12/10/2020

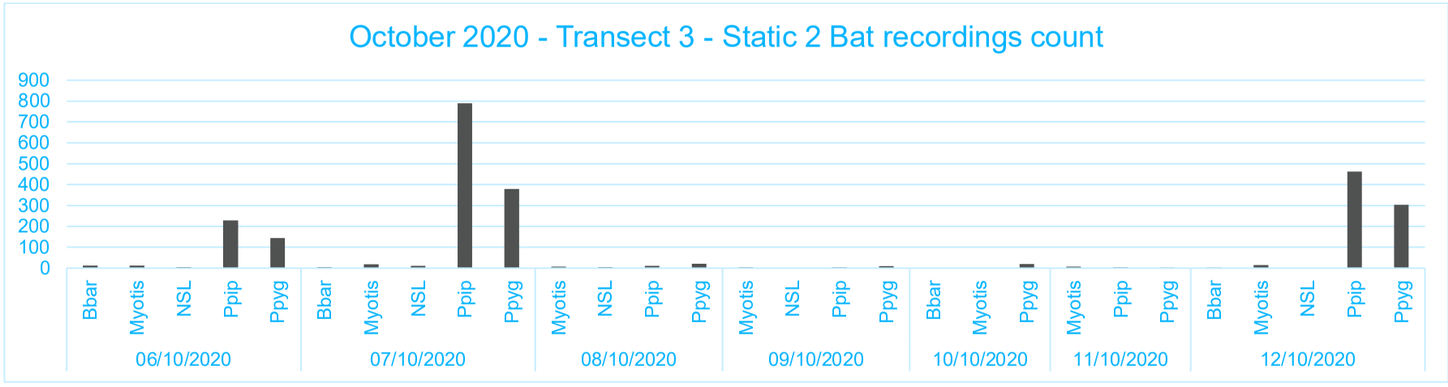

October 2020 - Transect 1 - Static 3 Bat recordings count
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800
700
600
500
400
300
200
100
0
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07/10/2020
08/10/2020
09/10/2020
10/10/2020
11/10/2020
12/10/2020

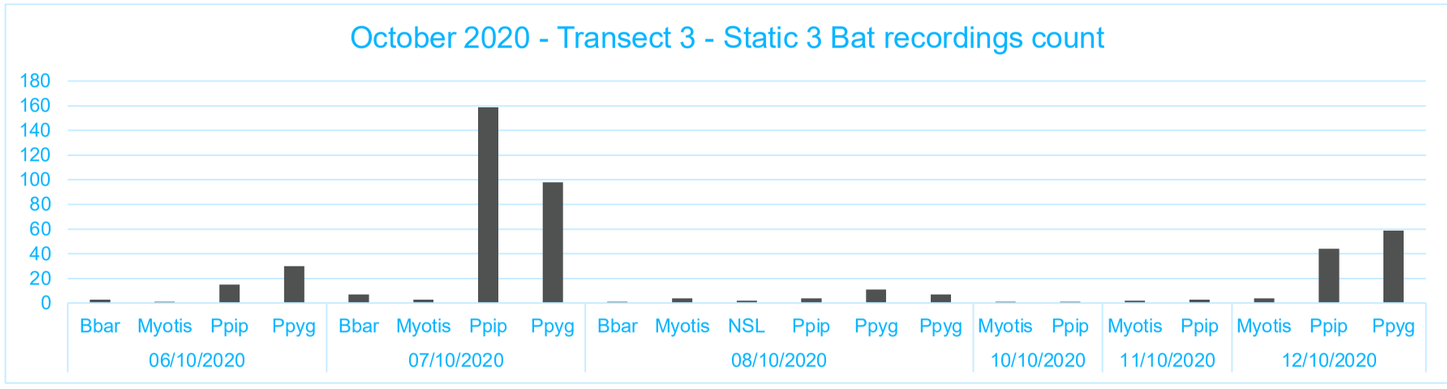

October 2020 - Transect 2 - Static 1 Bat recordings count
25
20
15
10
5
0
Ppip Ppyg Ppip Ppyg Bbar NSL Ppip Ppyg Bbar NSL Ppyg Bbar Ppip Ppyg Bbar Ppip Ppyg
08/10/2020
09/10/2020
10/10/2020
12/10/2020

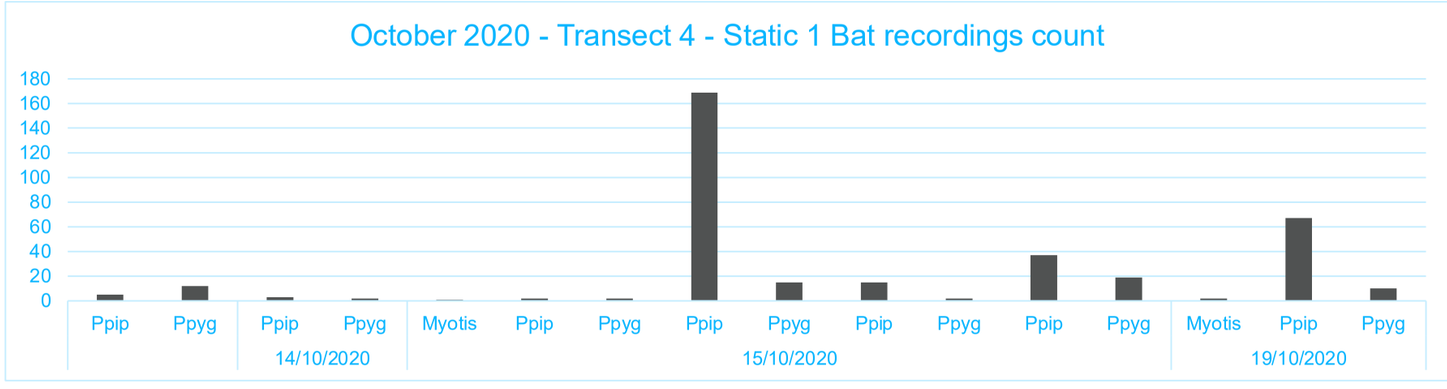

October 2020 - Transect 2 - Static 2 Bat recordings count
100
90
80
70
60
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Ppyg
Bbar
Myotis
NSL
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Ppyg
07/10/2020
08/10/2020
09/10/2020

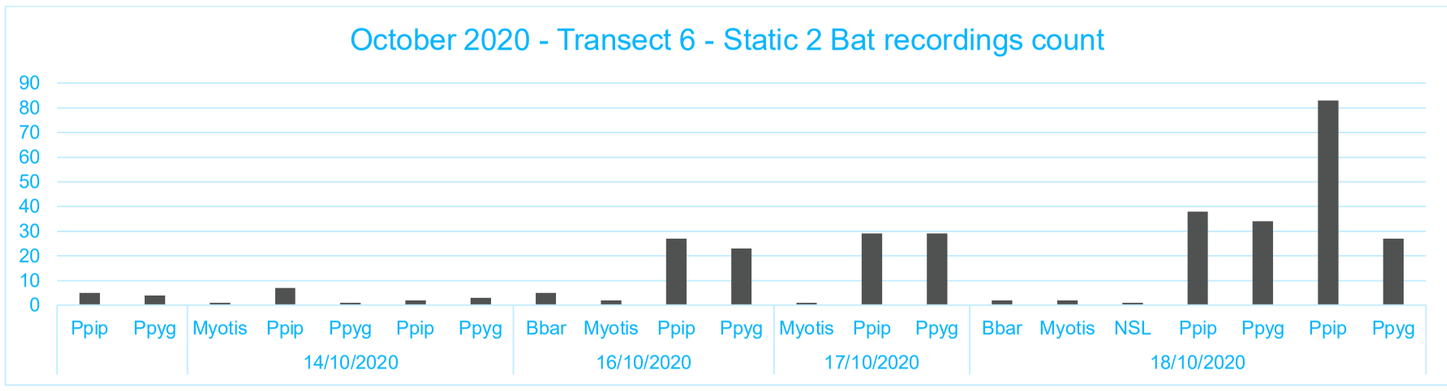

October 2020 - Transect 2 - Static 3 Bat recordings count
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35
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25
20
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10
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NSL
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16/10/2020
17/10/2020

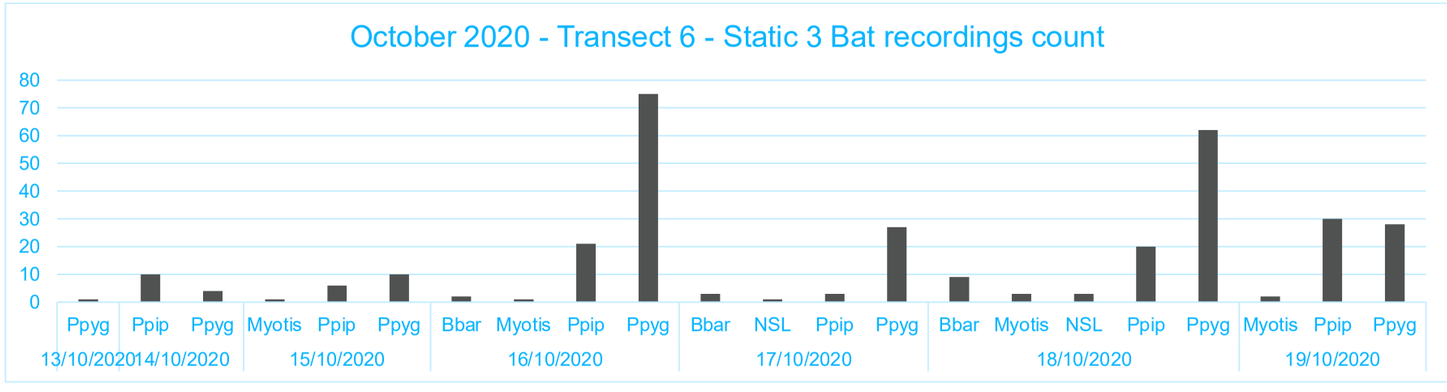

October 2020 - Transect 3 - Static 1 Bat recordings count
45
40
35
30
25
20
15
10
5
0
NSL
Ppyg
Ppip
Ppyg
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Ppip
Ppyg
Ppip
06/10/2020
08/10/2020
09/10/2020
11/10/2020

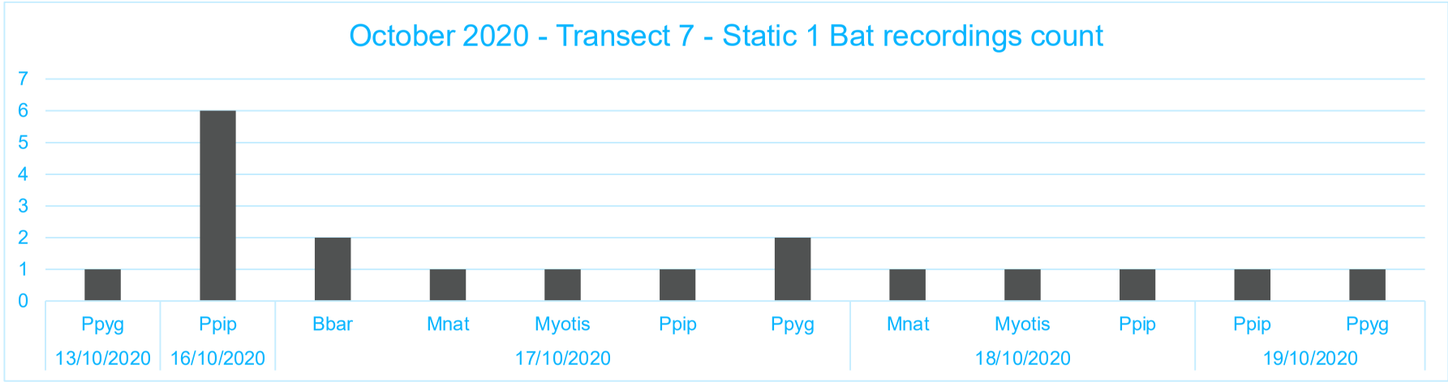

October 2020 - Transect 3 - Static 2 Bat recordings count
900
800
700
600
500
400
300
200
100
0
Bbar
Myotis
NSL
Ppip
Ppyg
Bbar
Myotis
NSL
Ppip
Ppyg
Myotis
NSL
Ppip
Ppyg
Myotis
NSL
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Bbar
Myotis
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Myotis
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Ppyg
Bbar
Myotis
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11/10/2020
12/10/2020

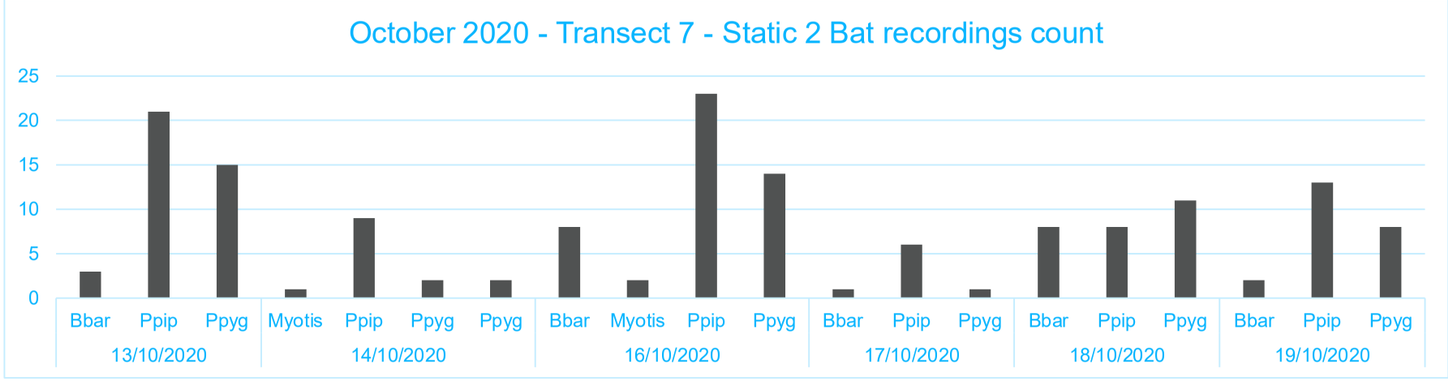

October 2020 - Transect 3 - Static 3 Bat recordings count
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160
140
120
100
80
60
40
20
0
Bbar Myotis Ppip Ppyg Bbar Myotis Ppip Ppyg Bbar Myotis NSL Ppip Ppyg Ppyg Myotis Ppip Myotis Ppip Myotis Ppip Ppyg
06/10/2020
07/10/2020
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12/10/2020

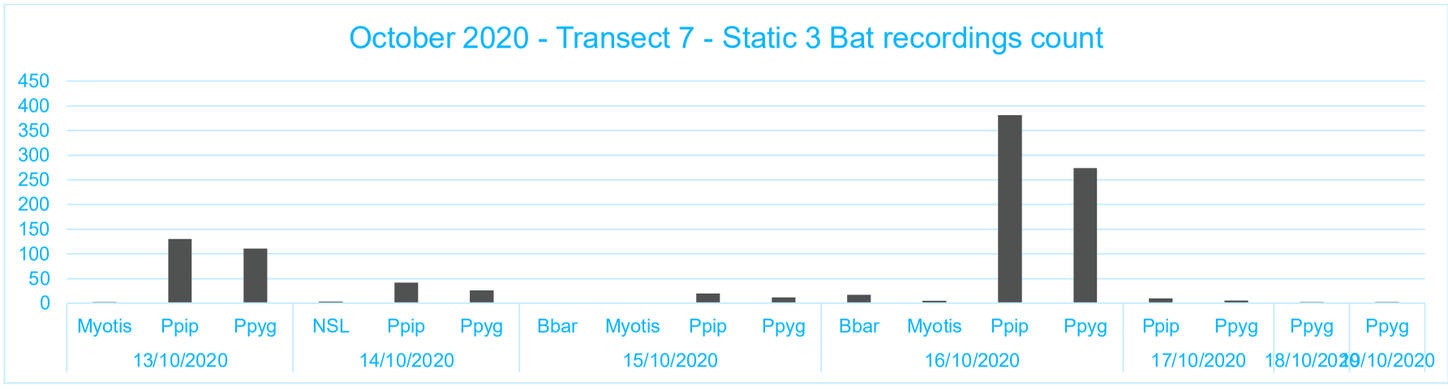

October 2020 - Transect 4 - Static 1 Bat recordings count
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160
140
120
100
80
60
40
20
0
Ppip Ppyg Ppip Ppyg Myotis Ppip Ppyg Ppip Ppyg Ppip Ppyg Ppip Ppyg Myotis Ppip Ppyg
14/10/2020
15/10/2020
19/10/2020


October 2020 - Transect 6 - Static 2 Bat recordings count
90
80
70
60
50
40
30
20
10
0
Ppip Ppyg Myotis Ppip Ppyg Ppip Ppyg Bbar Myotis Ppip Ppyg Myotis Ppip Ppyg Bbar Myotis NSL Ppip Ppyg Ppip Ppyg
14/10/2020
16/10/2020
17/10/2020
18/10/2020


October 2020 - Transect 6 - Static 3 Bat recordings count
80
70
60
50
40
30
20
10
0
Ppyg Ppip Ppyg Myotis Ppip Ppyg Bbar Myotis Ppip Ppyg Bbar NSL Ppip Ppyg Bbar Myotis NSL Ppip Ppyg Myotis Ppip Ppyg
13/10/2020
14/10/2020
15/10/2020
16/10/2020
17/10/2020
18/10/2020
19/10/2020


October 2020 - Transect 7 - Static 1 Bat recordings count
7
6
5
4
3
2
1
0
Ppyg
Ppip
Bbar
Mnat
Myotis
Ppip
Ppyg
Mnat
Myotis
Ppip
Ppip
Ppyg
13/10/2020
16/10/2020
17/10/2020
18/10/2020
19/10/2020


October 2020 - Transect 7 - Static 2 Bat recordings count
25
20
15
10
5
0
Bbar
Ppip
Ppyg
Myotis
Ppip
Ppyg
Ppyg
Bbar
Myotis
Ppip
Ppyg
Bbar
Ppip
Ppyg
Bbar
Ppip
Ppyg
Bbar
Ppip
Ppyg
13/10/2020
14/10/2020
16/10/2020
17/10/2020
18/10/2020
19/10/2020


October 2020 - Transect 7 - Static 3 Bat recordings count
450
400
350
300
250
200
150
100
50
0
Myotis
Ppip
Ppyg
NSL
Ppip
Ppyg
Bbar
Myotis
Ppip
Ppyg
Bbar
Myotis
Ppip
Ppyg
Ppip
Ppyg
Ppyg
Ppyg
13/10/2020
14/10/2020
15/10/2020
16/10/2020
17/10/2020
18/10/2020
19/10/2020



Cambridge South East Transport (CSET) Phase 2 Winter Bat Survey Report

August 2021

CAPITA

Quality Management

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Date	September 2021		
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1. Summary

Capita Real Estate & Infrastructure's Ecologists was commissioned by the Greater Cambridgeshire Partnership to undertake a series of surveys for bats across the route of Phase 2 of the Cambridge South East Transport (CSET) Project between Great Shelford to Sawston and to Babraham, Cambridgeshire (henceforth referred to as the Site).

The surveys have been carried out to provide baseline ecological information for the CSET Phase 2 Project to inform the design and environmental assessment of the proposals.

This report contains the details of bat surveys carried out between November 2020 and March 2021. Surveys included aerial hibernation inspections of suitable trees and activity surveys for bats. These were carried out to provide additional information over the winter period with particular focus on any evidence of barbastelle bats following discussion with Natural England.

The results are summarised as follows:

- Bat activity was recorded over the winter period with five species detected (including barbastelle), indicating hibernation sites may be within the local vicinity.
- No hibernating bats were recorded during the aerial tree inspections.

A previous report details the results of the 2020 survey season results, inclusive of transect surveys, emergence/re-entry surveys and static detector survey results from May to October 2020.

CAPITA

2. Introduction

2.1 Background

2.1.1. Capita Real Estate & Infrastructure's Ecologists were commissioned by the Greater Cambridgeshire Partnership (GCP) in August 2020 to undertake a series of winter bat surveys. These surveys were undertaken in relation to the development of Phase 2 of the Cambridge South East Transport (CSET) Project, (the 'Scheme').

2.1.2. The aim of this bat survey report is to summarise the results of the baseline surveys conducted between November 2020 and March 2021 to inform the design of the Scheme, and in conjunction with the Environmental Statement.

2.1.3. The data illustrated within this report follows on from the data gathered for the bat survey report covering the April-October 2020 survey season (Cambridge South East Transport (CSET) Phase 2 Bat Survey Report – Capita March 2021).

2.2 Project Description and Purpose of the Scheme

2.2.1. The Cambridge South East Transport (CSET) Project aims to create a vital link to ease congestion, offer sustainable travel choices, connect communities and support growth in the South East of Cambridge. CSET would form part of the Cambridgeshire Autonomous Metro, providing high quality, frequent and affordable public transport.

2.2.2. CSET Phase 2 comprises a segregated public transport route from the A11 (near Brabham) to the Cambridge Biomedical Campus (CBC). This would include new bus route and walking, cycling and equestrian links.

2.3 Legislation and Policy

2.3.1. Bats receive protection in the UK as a result of both legislation and planning policies. This section outlines the primary legislation protecting bats. All the information below is relevant to this report and to the work proposed at the development site.

Legislation

2.3.2. Bats are protected under Annex II of the EC Council Directive 92/43/EEC 1992 "Conservation of Natural Habitats and Wild Fauna and Flora" (the Habitats Directive) as a European Protected Species (EPS). This legislation has been transposed into UK legislation through the Conservation of Habitats and Species Regulations 2018.

2.3.3. Regulation 41 of the Conservation of Habitats and Species Regulations 2018 makes it an offence to:

- Deliberately capture, injure or kill bats
- Deliberately disturb bats, or
- Damage or destroy a breeding site or resting place of a bat; this applies whether bats are present or not. NB - breeding sites and resting places are generally referred to as roosts.

2.3.4. In addition to the above protection, all bat species in the UK are protected under Schedule 5 of the Wildlife & Countryside Act 1981 (as amended). In addition to the above, it lists the following as additional offences:

- Disturbance of an animal whilst it is occupying a place which it uses for shelter or protection. NB - places of shelter or protection are generally referred to as roosts
- Obstruct access to any structure or place which an animal uses for shelter or protection.

2.3.5. In order to permit a development where the above offences are likely to be committed a European Protected Species Licence can be obtained from Natural England where appropriate mitigation is offered to offset the negative impacts to local bat populations.

2.3.6. Section 40 of NERC Act 2006 places a statutory duty on public bodies, such as local authorities, that “every public body must, in exercising its functions have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity”.

Purpose of the Legislation

2.3.7. The purpose of the legislation is to maintain and restore bat populations within their natural range. This implies that the habitats on which they rely, and the ecology of their life cycles should not be compromised by human activities. Where activities have the potential to compromise bat populations, measures are required to be put in place to avoid impacts or compensate and mitigate for those impacts.

Planning Policy

2.3.8. National Planning Policy is set out by the National Planning Policy Framework (NPPF February 2019) combined with the guidance document Planning for Biodiversity and Geological Conservation: A Guide to Good Practice” (ODPM 2005).

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2.3.9. Biodiversity net gains are referenced strongly in terms of developing local planning policy and decision-making for development applications. The environmental test of sustainable development requires planning policy and planning decisions to help to ‘improve biodiversity’ (paragraph 8c).

2.3.10. References to biodiversity net gain elsewhere in the new NPPF (such as paragraph 175d) support the delivery of biodiversity net gain through sustainable development. Net gain for biodiversity is far more prominent than in the previous NPPF and considers a holistic landscape approach to protect, and enhance biodiversity promoting conservation, restoration and enhancement of Priority Habitats (also listed as Habitats of Principal Importance) identified under the NERC Act 2006), ecological networks and the protection and recovery of Priority Species (also listed as Species of Principal Importance) identified under the NERC Act 2006). The NPPF includes requirements for planning authorities to identifying and pursuing opportunities for securing measurable net gains for biodiversity (paragraph 174b).

2.3.11. Protected sites and species are a material consideration in determining planning applications and therefore all information relating to protected sites and species must be submitted with planning submissions for determination of the whole application. The NPPF (paragraph 175) which promotes Local Planning Authorities to assess if significant harm would occur to biodiversity and decide accordingly.

Biodiversity Policy

2.3.12. Section 40 of NERC Act 2006 places a statutory duty on public bodies, such as local authorities, that “every public body must, in exercising its functions have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity”.

2.3.13. Section 41 of the NERC Act requires the Secretary of State to draw up a list of Habitats and Species of Principal Importance which should be used to guide decision-makers (which include local authorities) in implementing their duty under Section 40. Several species of bat (listed below) are considered Species of Principal Importance, an important factor when considering proposed developments, in accordance with the Natural Environment and Rural Communities (NERC) Act 2006.

- Soprano pipistrelle *Pipistrellus pygmaeus*
- Brown long-eared *Plecotus auritus*
- Barbastelle *Barbastella barbastellus*
- Bechstein’s *Myotis bechsteinii*
- Noctule *Nyctalus noctula*

- Greater horseshoe *Rhinolophus ferrumequinum*
- Lesser horseshoe *Rhinolophus hipposideros*.

2.3.14. Additionally, four species of bat are recognised as Local Priority Species in the Cambridgeshire and Peterborough Biodiversity Group LBAP:

- Soprano pipistrelle
- Brown long-eared
- Barbastelle
- Noctule.

2.4 Personnel and Quality Assurance

2.4.1. The surveys were led by experienced ecologists and carried out in accordance with Bat Surveys for Professional Ecologists: Good Practice Guidelines, (3rd edn) (Collins, 2016). Surveys were carried out under the supervision of Capita senior staff and bat licensed ecologists Suzannah Spencer (Licence ref: 2015-15891-CLS-CLS) and James Johnston (2017-30517- CLS-CLS).

2.4.2. The Ecologists who carried out the surveys and referred by their initials in this report are: Suzannah Spencer ACIEEM, James Johnston ACIEEM, Thomas Fawley, and Mark Johnson. All surveyors have experience in conducting bat surveys and are competent in analysing bat echolocation in the field and using appropriate analysis software.

2.4.3. The surveyors who carried out the tree climbing inspection surveys were James Johnston ACIEEM and Jonny Gregson. Both are fully trained in tree climbing and aerial rescue.

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3. Methods

3.1 Survey and Report Objectives

3.1.1. The surveys and report were carried out to fulfil the following objectives.

1. To identify if any roosts are present in trees identified as having potential to support bat roosts over the hibernation period
2. To identify any evidence of usage of the site over winter by bats
3. To provide data to inform an assessment of the importance of the site for bats and bat conservation.

3.2 Desk-Based Study

3.2.1. A desk-based study including protected species records has been undertaken as part of the wider environmental assessment and is detailed in the bat survey report covering the 2020 surveys (Capita. 2021).

3.3 Field Survey

Static Detector Surveys

3.3.1. Static bat detectors (Anabat swift static detectors) were deployed in November 2020-March 2021 in the locations associated with the transect routes. The detectors were deployed to record any bat echolocation calls over the winter period but with the particular aim of identifying any barbastelle bats bat activity during the winter months.

3.3.2. In total 15 detectors were deployed November through to February inclusive, and 18 in March. Landowner restrictions during October through to February restricted the deployment of three statics. Statics were deployed for seven full days at a time to allow for consistency throughout surveys.

3.3.3. Static detectors will also be deployed over April 2021-September 2021 and will be reported in a separate report upon their completion.

3.3.4. Detectors were placed in locations in order to provide coverage of the scheme. Data was recorded from half an hour before sunset to half an hour after sunrise. The detector sound files were then analysed using Anabat Insight software to assess the level of bat activity at each location.

3.3.5. The detector sound files were analysed in Anabat Insight using the Bat-Classify Auto ID program. 10% of data was manually checked, including noise files, with 100% of files identified through Auto-ID as Noctule/Serotine/Leisler's (NSL) and brown long-eared bat manually checked.

3.3.6. Species from the *Myotis* genus of bats produce frequency modulated calls with overlapping call parameters and cannot be reliably distinguished to species level alone on call alone. As such, *Myotis* calls are identified as *Myotis sp*. Bats of the *Nyctalus* genus produce calls with overlapping call parameters, except in open environments. The two *Nyctalus* species found in this region, noctule and Leisler's, were therefore grouped together, with most bats being noted as noctule and a small number with overlapping parameters. Validating the data through manual checks follows the Bat Conservation Trust (BCT) best practice guidelines (2016).

3.3.7. Bat calls were averaged over seven nights to provide a bat call/hour index, with night length calculated as sunset to sunrise.

3.3.8. All barbastelle calls were manually checked.

3.3.9. The locations of these static detectors shown is in **Appendix A** and a description in **Table 1**.

3.3.10. **Appendix B** shows the dates of when the static detectors were deployed.

Table 1: Static detector locations

Static detector ID	Static Detector Description	Approximate Grid Reference
Transect 1 - static 1	Narrow hedge line with mature trees heading south west to north east between two arable fields. Static detector angled in a north westerly direction.	TL 46924 53227
Transect 1 - static 2	Narrow hedge line with trees heading south west to north east between two arable fields adjacent to nine wells nature reserve, within 50m of a ditch feed by a spring within nine wells woodland. Static detector angled in a north westerly direction.	TL 46092 54075
Transect 1 - static 3	Narrow hedge line with mature trees heading North west to south east between two arable fields. Static detector angled in a north easterly direction.	TL 46515 53347
Transect 2 - static 1	Attached to a tree within a line of trees heading north east to south west beside a B road in between two arable fields with a hedge line on the opposite side of the road. Static detector angled in an easterly direction.	TL 48049 52433
Transect 2 - static 2	Positioned to the bottom of a hedge line north west to south east dissecting two arable fields. Detector angled in a westerly direction.	TL 47449 53095

Transect 2 - static 3	Positioned to the bottom of a hedge line north west to south east dissecting two arable fields. Detector angled in an easterly direction.	TL 47999 51972
Transect 3 - static 1	Positioned within a small section of unmanaged arable land, bordered by woodland and open arable fields with a ditch running north to south. Static detector angled in a south easterly direction.	TL 48660 50798
Transect 3 - static 2	Positioned on the edge of as strip of woodland heading east to west bordering an arable field. Static angled in a northerly direction.	TL 47994 51132
Transect 3 - static 3	Positioned on the edge of a narrow strip of hedge line with trees heading east to west bordering an arable field to the north. A Medium sized waterbody is in the adjacent land parcel to the south. Detector facing north.	TL 49074 50790
Transect 4 - static 1	Within the corner of a field, with tree lines heading south to north, and west to east. Detector facing north easterly direction.	TL 50708 49418
Transect 4 - static 2	Unable to deploy securely due to high use of public footpath. Alternative locations too close to existing detectors or unsecure.	TL 49429 49951
Transect 4 - static 3	Unable to deploy securely due to high use of public footpath. Alternative locations too close to existing detectors or unsecure.	TL 50406 49996
Transect 5 - static 1	Positioned on an ash tree on a tree line heading east to west. Bordered to the south by arable fields, with a ford and river adjacent to the north of the woodland strip. A mature ash and pine woodland are immediately to the north west. Detector angled south.	TL 51318 49707
Transect 5 - static 2	Unable to deploy securely	TL 50757 49840
Transect 5 - static 3	Positioned on a tree within a small section of young plantation trees. Detector angled south with a small man-made reservoir to the north west and arable fields to the south.	TL 51759 49400
Transect 6 - static 1	Positioned on a beech tree, in a short line of 4 trees within a hedge line heading east to west. Arable fields border the hedge line to the north and south. Detector angled north.	TL 51852 49807
Transect 6 - static 2	Unable to deploy securely	TL 52039 50232
Transect 6 - static 3	Positioned on a tree within a hedge line with trees heading north east to south west. An arable field is to the east and west with a farm track running adjacent to the east. Detector angled east.	TL 51453 50017
Transect 7 - static 1	Positioned on a tree within a woodland strip heading south east to north west, between an arable field and an A Road. Detector angled north easterly direction.	TL 52570 49824
Transect 7 - static 2	Positioned on a tree beside a farm track. Farm track heading north to south. Arable fields are adjacent to the east and west. Detector angled west.	TL 52899 50014
Transect 7 - static 3	Positioned on a tree on the edge of a woodland beside a farm track. Farm track heading east to	TL 52787 50613

	west. An arable field is adjacent to the south. Detector angled south.	

Aerial Roost Inspection Surveys via Tree Climbing

3.4.1. Four trees previously identified as having moderate or high suitability to support bat roosts during ground level roost assessments and subsequent aerial inspections during 2020 (Capita, 2021), were climbed in the hibernation period and aerial roost inspections of potential roost features (PRFs) carried out. Inspections were to determine whether the PRFs were supporting roosting bats during the winter hibernation period. The locations of these trees are shown in **Appendix C**. Eight trees identified as requiring climbing (High/Moderate suitability trees) but due to access being denied by the landowners, they were not surveyed.

3.4.2. The aerial inspections were undertaken once per month between December 2020 and February 2021. Results of these inspections are found in **Table 2.**

3.4.3. The survey consisted of each tree being climbed using a harness and ropes or ladder, where appropriate. The PRFs identified during the previous assessments were inspected using torches and/or an endoscope to look for evidence of use by bats and collect information on the PRF. Whilst in the tree, climbers checked for additional features not visible from the ground and any found were inspected using the endoscope and/or torch. Notes were made on the current condition of the PRFs and the presence or absence of bats or signs of bats, as well as any roost competitors such as nesting birds or invertebrates.

3.5 Limitations and Assumptions

Tree climbing

3.5.1. Only 4 trees could be climbed in the bat hibernation period due to landowner access permission (eight not accessible). This is a constraint, but it is not considered to be a significant limitation as none of these trees are being removed.

Static detectors

3.5.2. Transects 1, 2, 3 were deployed together, followed by Transects 4, 5, 6 and 7 deployed the following week. As five nights deployment would cause them to fall on a weekend, it was determined to deploy for seven nights to ensure consistency.

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3.5.3. Transect 5 static detectors were not deployed in November-February due to landowner permissions not being granted in relation to the location of their game birds and disturbance. It was not possible to deploy four static detectors due to security and lack of suitable locations as described in **Table 1.** Due to the number and distribution of the remaining static detectors the impact of this is negligible and the validity and assumptions of this report are not negatively impacted as all areas of the scheme were still covered. As a result, 15 detectors were deployed across the scheme from November – February and 18 detectors in March.

3.5.4. Noise files were recorded during the deployment of the statics. This is consistent across devices and is explained by weather conditions and the sensitivity settings of the statics.

3.5.5. These deviations do not impact the validity and accuracy of the data. Sufficient data has been collected to provide a sufficient assessment of the usage of the site by bats over the winter period. A cause for noise files is due to increased wind and rain during the dates of deployment. Analysis of some of the noise files indicate rainfall which is consistent with winter weather expectations.

4. Results

4.1 Aerial roost inspections

4.1.1. No bats or signs of bats were found in any of the trees inspected during any inspection.

4.1.2. Some PRFs contained signs of use by birds from the presence of feathers and nesting material such as moss, twigs and grasses. However, no nests were currently in use. Many features contained woodlice and other invertebrates.

4.1.3. **Table 2** details the results of the aerial roost inspections.

Table 2: Aerial roost inspection survey results

Tree ID	Grid Reference	Tree species	December 2020 (14th, 15th)	January 2021 (26th,27th)	February 2021 (16th,17th)
22	TL 48429 50918	Willow	No evidence of bats present. Cobwebs present in some features	No evidence of bats present. Cobwebs present in some features	No evidence of bats present. Cobwebs present in some features
23	TL 51861 49806	Oak	No evidence of bats present. Feathers still present in 5 m knothole, but nest is now inactive.	No evidence of bats present. Feathers still present in 5 m knothole, but nest remains inactive.	No evidence of bats present. Feathers still present in 5 m knothole, but nest remains inactive.
24	TL 51906 49786	Oak	This tree has now partially fallen making many features no longer present. No evidence of bats present. Some features filled with acorns. Evidence of old bird nests present, but currently inactive.	Tree remains in same state with no further limb loss. No evidence of bats present. Some features filled with acorns. Evidence of old bird nests present but remain inactive.	Tree remains in same state with no further limb loss. No evidence of bats present. Some features filled with acorns. Evidence of old bird nests present but remain inactive.
25	TL 51953 49769	Oak	No evidence of bats present. Woodlice present throughout helical split.	No evidence of bats present. Woodlice present throughout helical split. Feature at base of split is damp and cobwebs present in knothole.	No evidence of bats present. Woodlice present throughout helical split. Feature at base of split is damp and cobwebs present in knothole.

4.2 Static detector survey results

4.2.1. Static detector maps showing the locations of the static detectors are provided in **Appendix A** and are described in **Table 1**. The results of the data collected from the static detectors is detailed in the sections below with percentage of bat sound recordings per species noted in brackets (round to the nearest 0.5 to account for slight inaccuracies in the sound analysis).

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November

Transect 1

4.2.2. **Static 1** – A total of five species were detected with the following number of sound recordings: 1,878 (66.5%) common pipistrelle, 798 (28.5%) soprano pipistrelle, 5 (>1%) *Myotis* species, 8 (>1%) NSL and **126 (4.5%) barbastelle bat** out of a total of 2,611 recordings; the remainder were noise.

4.2.3. **Static 2** - A total of four species were detected with the following number of sound recordings: 3,577 (92.5%) common pipistrelle, 281 (7%) soprano pipistrelle, 2 (>1%) NSL and **1 (>1%) barbastelle bat** out of a total of 3,766 recordings; the remainder were noise.

4.2.4. **Static 3** - A total of five species were detected with the following number of sound recordings: 483 (62.5%) common pipistrelle, 202 (26.5%) soprano pipistrelle, 18 (2.5%) *Myotis* species, 6 (>1%) NSL and **59 (7.5%) barbastelle bat** out of a total of 802 recordings; the remainder were noise.

Transect 2

4.2.5. **Static 1** - A total of four species were detected with the following number of sound recordings: 23 (46.5%) common pipistrelle, 21 (42.5%) soprano pipistrelle, 4 NSL (8%) and **1 (2%) barbastelle bat** out of a total of 774 recordings; the remainder were noise.

4.2.6. **Static 2** - A total of four species were detected with the following number of sound recordings: 686 (95.5%) common pipistrelle, 15 (2%) soprano pipistrelle, 2 (>1%) *Myotis* species and **16 (2.5%) barbastelle bat** out of a total of 448 recordings; the remainder were noise.

4.2.7. **Static 3** - A total of four species were detected with the following number of sound recordings: 278 (69.5%) common pipistrelle, 112 (27%) soprano pipistrelle, 3 (>1%) NSL and **8 (2%) barbastelle bat** out of a total of 448 recordings; the remainder were noise.

Transect 3

4.2.8. **Static 1** - A total of four species were detected with the following number of sound recordings: 559 (88.5%) common pipistrelle, 69 (11%) soprano pipistrelle, 2 (>1%) NSL and **1 (>1%) barbastelle bat** out of a total of 754 recordings; the remainder were noise.

4.2.9. **Static 2** - A total of five species were detected with the following number of sound recordings: 420 (60.5%) common pipistrelle, 257 (37%) soprano pipistrelle, 11 (1.5%) *Myotis* species, 2 (>1%) NSL and **4 (>1%) barbastelle bat** out of a total of 986 recordings; the remainder were noise.

4.2.10. **Static 3** - A total of five species were detected with the following number of sound recordings: 138 (69%) common pipistrelle, 50 (25%) soprano pipistrelle, 5 (2.5%) *Myotis* species, 3 (1.5%) NSL and **4 (2%) barbastelle bat** out of a total of 383 recordings; the remainder were noise.

Transect 4

4.2.11. **Static 1** - A total of two species were detected with the following number of sound recordings 516 (82.5%) common pipistrelle and 109 (17.5%) soprano pipistrelle out of a total of 1,516 recordings the remainder were noise.

Transect 6

4.2.12. **Static 1** -. A total of four species were detected with the following number of sound recordings: 4 (33.5%) common pipistrelle, 2 (16.5%) soprano pipistrelle, 5 (41.5%) *Myotis* species and **1 (8.5%) barbastelle bat**, out of a total of 4,286 recordings; the remainder were noise.

4.2.13. **Static 3** - A total of two species were detected with the following number of sound recordings: 1 (50%) common pipistrelle and 1 (50%) soprano pipistrelle, out of a total of 614 recordings; the remainder were noise.

Transect 7

4.2.14. **Static 1** - A total of two species were detected with the following number of sound recordings: 6 (75%) *Myotis* species and **2 (25%) barbastelle bat,** out of a total of 5115 recordings; the remainder were noise.

4.2.15. **Static 2** - A total of three species were detected with the following number of sound recordings 6 (38%) common pipistrelle, 5 (31%) soprano pipistrelle and 5 (31%) *Myotis* species out of a total of 617 recordings; the remainder were noise.

4.2.16. **Static 3 -** A total of one species was detected with the following number of sound recordings 2 (100%) *Myotis* species out of a total of 537 recordings; the remainder were noise

December

Transect 1

4.2.17. **Static 1** – No bat species were recorded. A total of 890 noise files were recorded.

4.2.18. **Static 2** - A total of one species was detected in 42 sound recordings. 100% common pipistrelle out of a total of 906 recordings, the remainder were noise.

4.2.19. **Static 3** - A total of one species was detected in 6 sound recordings. (100%) common pipistrelle out of a total of 2,675 recordings, the remainder were noise.

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Transect 2

4.2.20. **Static 1** - No bat species were recorded. A total of 6,629 noise files were recorded

4.2.21. **Static 2** - No bat species were recorded. A total of 570 noise files were recorded

4.2.22. **Static 3** - No bat species were recorded. A total of 146 noise files were recorded

Transect 3

4.2.23. **Static 1** - A total of one species was detected in one sound recording. (100%) common pipistrelle out of a total of 261 recordings, the remainder were noise.

4.2.24. **Static 2** - No bat species were recorded. A total of 2,545 noise files were recorded.

4.2.25. **Static 3** - A total of one species was detected in 2 sound recordings. (100%) common pipistrelle out of a total of 455 recordings, the remainder were noise.

Transect 4

4.2.26. **Static 1** - A total of one species was detected in one sound recordings. (100%) common pipistrelle out of a total of 1,283 recordings, the remainder were noise.

Transect 6

4.2.27. **Static 1** -. A total of three species were detected in the following number of sound recordings: 17 (27.5%) common pipistrelle, 44 (71%) soprano pipistrelle and 1 (1.5%) *Myotis* species, out of a total of 4,540 recordings; the remainder were noise.

4.2.28. **Static 3** - A total of two species were detected with the following number of sound recordings: 26 (50%) common pipistrelle and 26 (50%) soprano pipistrelle, out of a total of 872 recordings; the remainder were noise.

Transect 7

4.2.29. **Static 1** - No bat species were recorded. A total of 3,325 noise files were recorded.

4.2.30. **Static 2** - A total of four species were detected with the following number of sound recordings 20 (64.5%) common pipistrelle, 6 (19.5%) soprano pipistrelle, 1 (3%) *Myotis* species and **4 (13%) barbastelles** out of a total of 1039 recordings; the remainder were noise.

4.2.31. **Static 3** - A total of three species were detected with the following number of sound recordings 5 (33%) common pipistrelle, 1 (1%) soprano pipistrelle, and **12 (66%) barbastelle bats** out of a total of 185 recordings; the remainder were noise.

January

Transect 1

4.2.32. **Static 1** – A total of four species were detected with the following number of sound recordings: 19 (40.5%) common pipistrelle, 14 (30%) soprano pipistrelle, 2 (2%) *Myotis* species and **12 (28.5%) barbastelle bat** out of a total of 2,253 recordings the remainder were noise.

4.2.33. **Static 2** - A total of one species was detected with the following number of sound recordings: 80 (100%) common pipistrelle out of a total of 1192 recordings the remainder were noise.

4.2.34. **Static 3** - A total of two species were detected with the following number of sound recordings: 10 (92%) soprano pipistrelle and 1 (8%) *Myotis* species out of a total of 1,126 recordings the remainder were noise.

Transect 2

4.2.35. **Static 1** - A total of two species were detected with the following number of sound recordings 1 common pipistrelle (25%) and 3 (75%) soprano pipistrelle out of a total of 6,613 recordings the remainder were noise.

4.2.36. **Static 2** - A total of two species were detected with the following number of sound recordings: 22 common pipistrelle (96%) and **1 (4%) barbastelle bat** out of a total of 662 recordings the remainder were noise.

4.2.37. **Static 3** - No bat species were recorded. A total of 329 noise files were recorded

Transect 3

4.2.38. **Static 1** - No bat species were recorded. A total of 522 noise files were recorded

4.2.39. **Static 2** - A total of one *Myotis* species was detected in one sound recording out of a total of 1,236 recordings the remainder were noise.

4.2.40. **Static 3** - No bat species were recorded. A total of 1,910 noise files were recorded

Transect 4

4.2.41. **Static 1** - A total of one species was detected with the following number of sound recordings: 2 (100%) soprano pipistrelle out of a total of 531 recordings the remainder were noise.

Transect 6

4.2.42. **Static 1** - A total of one species was detected with the following number of sound recordings: 3 (100%) soprano pipistrelle out of a total of 1,504 recordings the remainder were noise.

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4.2.43. **Static 3** - A total of one species was detected with the following number of sound recordings: 1 (100%) *Myotis* species out of a total of 498 recordings the remainder were noise.

Transect 7

4.2.44. **Static 1** - No bat species were recorded. A total of 2,105 noise files were recorded.

4.2.45. **Static 2** - A total of two species were detected with the following number of sound recordings: 2 (50%) common pipistrelle and **2 (50%) barbastelle**, out of a total of 144 recordings; the remainder were noise.

4.2.46. **Static 3** - No bat species were recorded. A total of 545 noise files were recorded.

February

Transect 1

4.2.47. **Static 1** – A total of two species were detected with the following number of sound recordings 2 (40%) *Myotis* species and **3 (60%) barbastelle bat** out of a total of 269 recordings the remainder were noise.

4.2.48. **Static 2** - No bat species were recorded. A total of 252 noise files were recorded

4.2.49. **Static 3** - A total of three species were detected with the following number of sound recordings 9 (30%) common pipistrelle, 12 (40%) soprano pipistrelle and **9 (30%) barbastelle bat** out of a total of 466 recordings the remainder were noise.

Transect 2

4.2.50. **Static 1** - A total of one species was detected with the following number of sound recordings: **1 (100%) barbastelle bat** out of a total of 355 recordings the remainder were noise.

4.2.51. **Static 2** - No bat species were recorded. A total of 193 noise files were recorded

4.2.52. **Static 3** - No bat species were recorded. A total of 53 noise files were recorded

Transect 3

4.2.53. **Static 1** - No bat species were recorded. A total of 632 noise files were recorded

4.2.54. **Static 2** - A total of one species was detected with the following number of sound recordings 3 (100%) common pipistrelle out of a total of 352 recordings the remainder were noise.

4.2.55. **Static 3** - A total of two species were detected with the following number of sound recordings: 1 (16%) common pipistrelle and 5 (84%) soprano pipistrelle, out of a total of 872 recordings; the remainder were noise.

Transect 4

4.2.56. **Static 1** - A total of one species was detected with the following number of sound recordings: 2 (100%) common pipistrelle out of a total of 1,406 recordings the remainder were noise.

Transect 6

4.2.57. **Static 1** -. No bat species were recorded. A total of 2,073 noise files were recorded

4.2.58. **Static 3** - No bat species were recorded. A total of 1,532 noise files were recorded

Transect 7

4.2.59. **Static 1** - No bat species were recorded. A total of 1,569 noise files were recorded.

4.2.60. **Static 2** - A total of two species were detected with the following number of sound recordings: 1 (50%) common pipistrelle and **1 (50%) barbastelle**, out of a total of 2,391 recordings; the remainder were noise.

4.2.61. **Static 3** - No bat species were recorded. A total of 311 noise files were recorded.

March

Transect 1

4.2.62. **Static 1** – A total of two species were detected with the following number of sound recordings: 2 (15%) *Myotis* species and **11 (84%) barbastelle bat** out of a total of 269 recordings the remainder were noise.

4.2.63. **Static 2** - No bat species were recorded. A total of 665 noise files were recorded

4.2.64. **Static 3** - A total of three species were detected with the following number of sound recordings: 10 (83%) soprano pipistrelle, 1 (8.5%) *Myotis sp.* and one **(8.5%) barbastelle bat** out of a total of 633 recordings; the remainder were noise.

Transect 2

4.2.65. **Static 1** - No bat species were recorded. A total of 1,208 noise files were recorded

4.2.66. **Static 2** - No bat species were recorded. A total of 168 noise files were recorded

4.2.67. **Static 3** - A total of two species were detected with the following number of sound recordings: 40 (85%) common pipistrelle and 7 (15%) soprano pipistrelle, out of a total of 872 recordings; the remainder were noise.

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Transect 3

4.2.68. **Static 1** - A total of one species was detected with the following number of sound recordings: 3 (100%) common pipistrelle out of a total of 212 recordings; the remainder were noise.

4.2.69. **Static 2** - A total of three species were detected with the following number of sound recordings: 10 (55.5%) common pipistrelle, 6 (33.5%) soprano pipistrelle and 2 (11%) *Myotis sp*. out of a total of 885 recordings; the remainder were noise.

4.2.70. **Static 3** - A total of two species were detected with the following number of sound recordings: 1 (50%) soprano pipistrelle and 1 (50%) *Myotis sp*., out of a total of 1,315 recordings; the remainder were noise.

Transect 4

4.2.71. **Static 1** - A total of two species were detected with the following number of sound recordings: 1 (50%) common pipistrelle and 1 (50%) soprano pipistrelle out of a total of 1,405 recordings; the remainder were noise.

Transect 5

4.2.72. **Static 1** - A total of three species were detected with the following number of sound recordings: 13 (52%) common pipistrelle, 4 (16%) soprano pipistrelle and 8 (32%) *Myotis sp*. out of a total of 5,468 recordings; the remainder were noise.

4.2.73. **Static 3** - A total of four species were detected with the following number of sound recordings: 4 (40%) common pipistrelle, 1 (10%) soprano pipistrelle 3 (30%) *Myotis sp*. and 4 (20%) NSL out of a total of 355 recordings; the remainder were noise.

Transect 6

4.2.74. **Static 1** - A total of three species were detected with the following number of sound recordings: 10 (59%) soprano pipistrelle, 4 (23.5%) *Myotis sp*. and 3 (17.5%) NSL out of a total of 3,426 recordings; the remainder were noise.

4.2.75. **Static 3** - A total of three species were detected with the following number of sound recordings: 2 (28.5%) common pipistrelle, 4 (57.5%) soprano pipistrelle and 1 (14%) NSL out of a total of 2,606 recordings; the remainder were noise

Transect 7

4.2.76. **Static 1** - A total of one species was detected with the following number of sound recordings 2 (100%) common pipistrelle out of a total of 609 recordings; the remainder were noise.

4.2.77. **Static 2** - A total of three species were detected with the following number of sound recordings: 6 (60%) common pipistrelle, 1 (10%) soprano pipistrelle and **3 (30%) barbastelle bat** out of a total of 1,906 recordings; the remainder were noise

4.2.78. **Static 3** - A total of three species were detected with the following number of sound recordings: 11 (32.5%) common pipistrelle, 1 (3%) *Myotis sp*., and **22 (64.5%) barbastelle bat** out of a total of 3474 recordings; the remainder were noise.

Summary of Results

4.2.79. A summary table is provided below that shows the percentage of the all bat calls for each species at each static location throughout the survey period November – March.

Table 3: Percentage of total bat sound recordings per species (Nov- Mar)

Static ID	Ppip	Ppyg	Myotis Sp.	NSL	Barbastelle
Transect 1 Static 1	65.9%	28.2%	0.4%	0.3%	5.3%
Transect 1 Static 2	92.9%	7.1%	0.0%	0.1%	>0.1%
Transect 1 Static 3	60.2%	28.3%	2.4%	0.7%	8.3%
Transect 2 Static 1	44.4%	44.4%	0.0%	7.4%	3.7%
Transect 2 Static 2	95.4%	2.0%	0.3%	0.0%	2.3%
Transect 2 Static 3	71.0%	26.6%	0.0%	0.7%	1.8%
Transect 3 Static 1	88.7%	10.9%	0.0%	0.3%	0.2%
Transect 3 Static 2	60.5%	36.7%	2.0%	0.3%	0.6%
Transect 3 Static 3	67.1%	26.7%	2.9%	1.4%	1.9%
Transect 4 Static 1	82.3%	17.7%	0.0%	0.0%	0.0%
Transect 5 Static 1	52.0%	16.0%	32.0%	0.0%	0.0%
Transect 5 Static 3	33.3%	8.3%	25.0%	33.3%	0.0%
Transect 6 Static 1	22.3%	62.8%	10.6%	3.2%	1.1%
Transect 6 Static 3	46.8%	50.0%	1.6%	1.6%	0.0%
Transect 7 Static 1	20.0%	0.0%	60.0%	0.0%	20.0%
Transect 7 Static 2	55.6%	19.0%	9.5%	0.0%	15.9%
Transect 7 Static 3	29.6%	1.9%	5.6%	0.0%	63.0%
Total across all statics	77.9%	18.3%	0.8%	0.3%	2.7%

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5. Conclusion

5.1. Evidence of at least five species of bats: common and soprano pipistrelle, Myotis species, NSL and barbastelle bats were recorded during the winter surveys and found to be present across the seven transect locations through recordings from the static detectors.

5.2. Barbastelle is of particular note being an Annex II species and one of the rarer species recorded in the UK, and with Eversden and Wimpole Woods SAC (barbastelle one of the qualifying features) lying approximately 10 km west of the route. Although the overall number of recordings was relatively low, the recoding of bats throughout the winter months may indicate nearby hibernation roosts, particularly for barbastelle at Transect 7 in the east of the site, where a high percentage of recordings for this species was identified. The surveys recorded barbastelle across the majority of the scheme.

5.3. The aerial inspections during the bat hibernation period recorded no bats or any evidence of bats.

5.4. Summer static surveys are also being undertaken in 2021 to inform barbastelle activity levels. These additional surveys will be subject to an additional report.

6. References

Capita (March 2021). *Cambridge South East Transport (CSET) Phase 2 Bat Survey Report*

Collins, J. (ed. (2016). *Bat Surveys for Professional Ecologists —Good Practice* Guidelines, 3rd edition, Bat Conservation Trust, London.

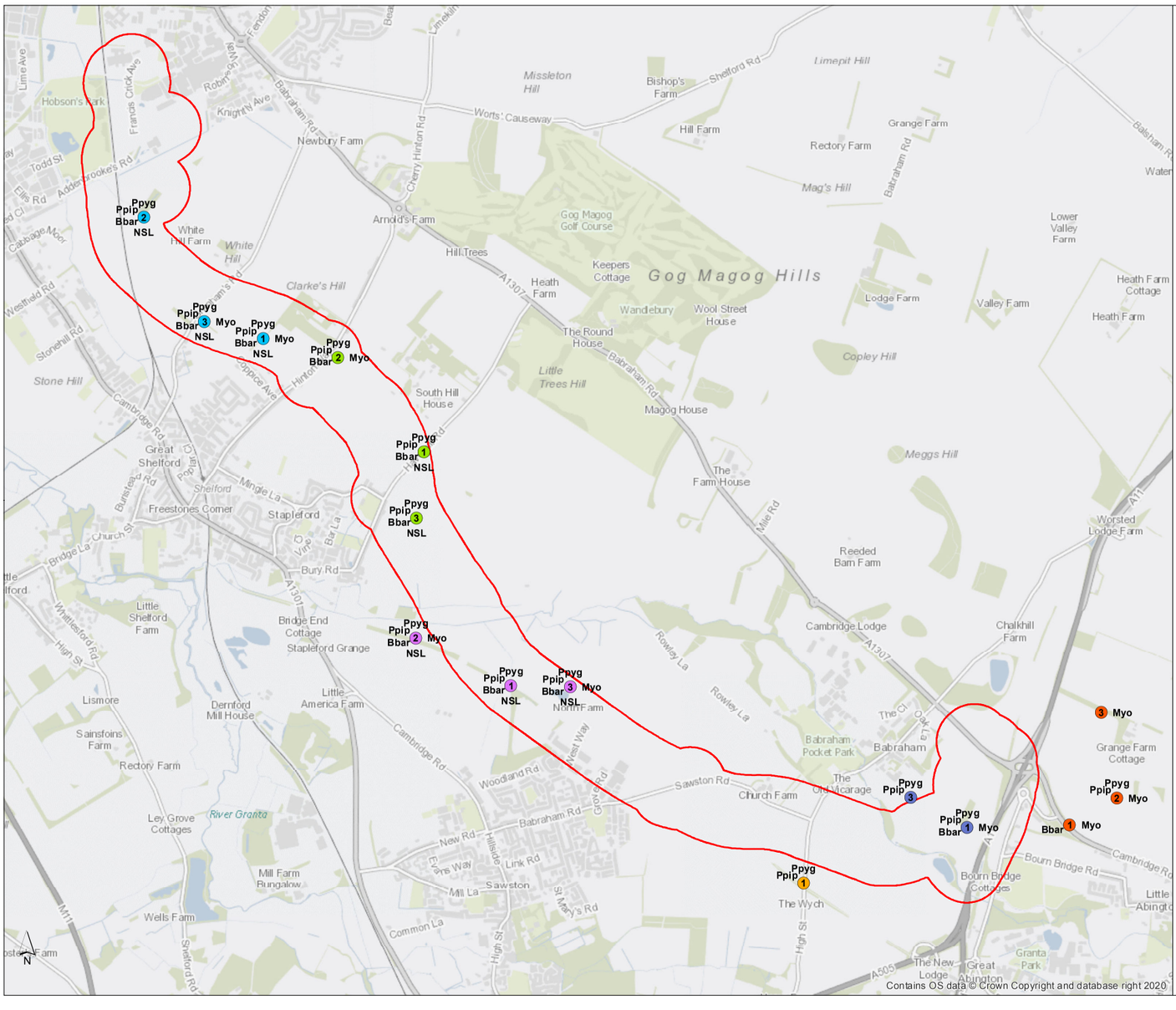
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Appendices

Appendix A – Static Detector Location Map and Species Recorded

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Huntingdon
PE29 6SZ

Tel +44 077 1378 5585



KEY:

Scheme red line boundary

Static locations

- Transect 1
- Transect 2
- Transect 3
- Transect 4
- Transect 6
- Transect 7

SPECIES
Ppip – Common pipistrelle
Ppyg – Soprano pipistrelle
NSL – Noctule/Serotine/Leislers
Bbar – Barbastelle
Myo – Myotis species

Rev.	Drwn	Chkd	Appd	Description	Date
01	SH	TF	TB	For Issue	14/04/2021
01.1	SH	TF	TB	Created	16/03/2021

Purpose of Issue
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Project
CSET

Drawing
CSET Static Detector Locations and Species Recorded November 2020

Scale @ A3	Drawn	Checked	Approved
1:25,000	SH	TF	TB

Project No: CS099797
Date: 14/04/2021

Drawing Identifier
Project - Originator - Zone - Level - FileType - Role - Number
Revision: P02

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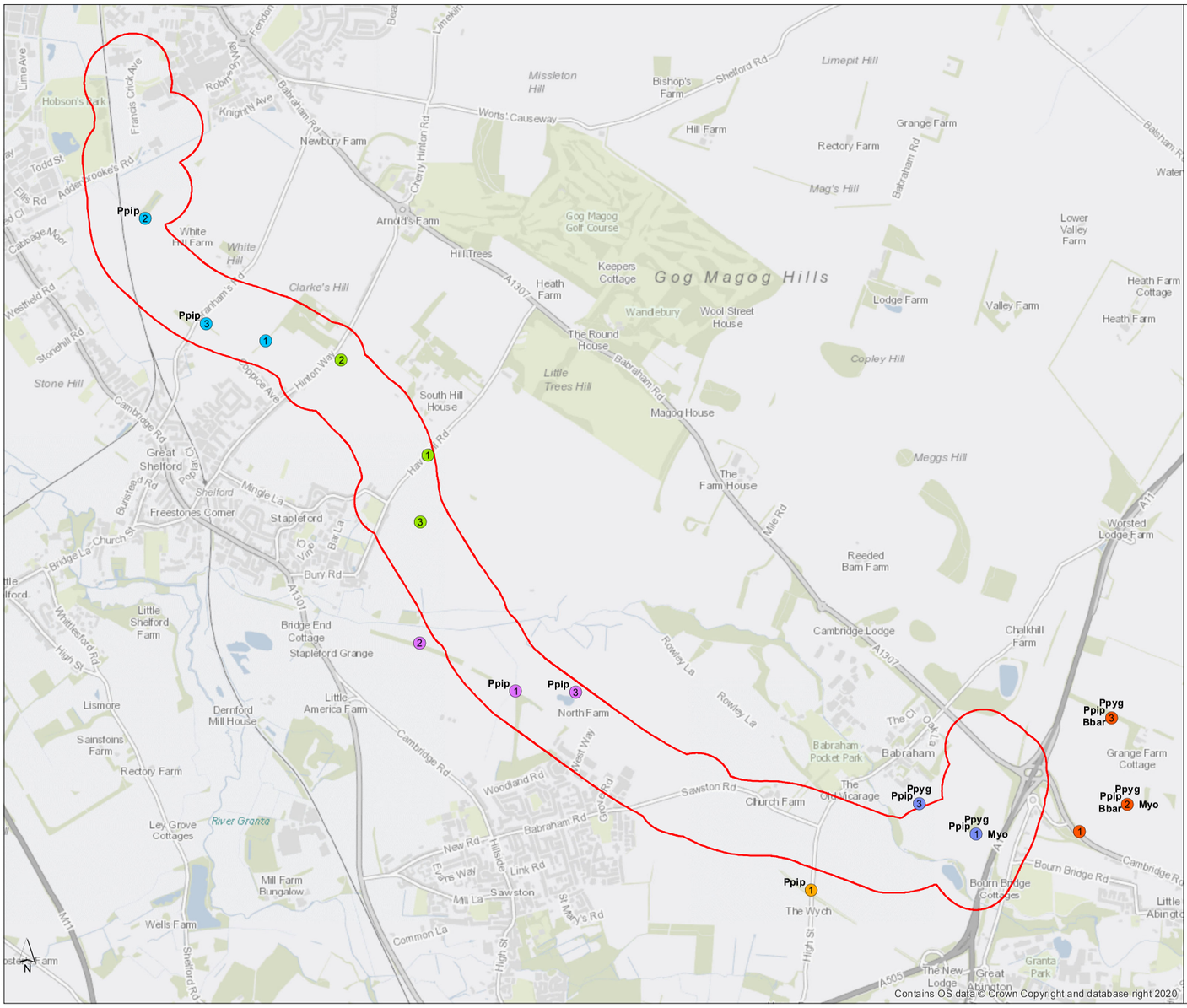
KEY:

Scheme red line boundary

Static locations

- Transect 1
- Transect 2
- Transect 3
- Transect 4
- Transect 6
- Transect 7

SPECIES
Ppip – Common pipistrelle
Ppyg – Soprano pipistrelle
NSL – Noctule/Serotine/Leislers
Bbar – Barbastelle
Myo – Myotis species



Rev.	Drwn	Chkd	Appd	Description	Date
01	SH	TF	TB	For Issue	14/04/2021
01.1	SH	TF	TB	Created	16/03/2021

Purpose of Issue
S2 - Issued for Information

Classification
Commercial in Confidence

Client
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Project
CSET

Drawing
CSET Static Detector Locations and Species Recorded December 2020

Scale @ A3	Drawn	Checked	Approved
1:25,000	SH	TF	TB

Project No: CS099797
Date: 14/04/2021

Drawing Identifier
Project - Originator - Zone - Level - FileType - Role - Number
Revision: P02

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KEY:

Scheme red line boundary

Static locations

- Transect 1
- Transect 2
- Transect 3
- Transect 4
- Transect 6
- Transect 7

SPECIES
Ppip – Common pipistrelle
Ppyg – Soprano pipistrelle
NSL – Noctule/Serotine/Leislers
Bbar – Barbastelle
Myo – Myotis species

Rev.	Drwn	Chkd	Appd	Description	Date
01	SH	TF	TB	For Issue	14/04/2021
01.1	SH	TF	TB	Created	16/03/2021

Purpose of Issue
S2 - Issued for Information

Classification
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Client
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Project
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Drawing
CSET Static Detector Locations and Species Recorded January 2021

Scale @ A3	Drawn	Checked	Approved
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Project No: CS099797
Date: 14/04/2021

Drawing Identifier
Project - Originator - Zone - Level - FileType - Role - Number: P02

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KEY:

Scheme red line boundary

Static locations

- Transect 1
- Transect 2
- Transect 3
- Transect 4
- Transect 6
- Transect 7

SPECIES
Ppip – Common pipistrelle
Ppyg – Soprano pipistrelle
NSL – Noctule/Serotine/Leislers
Bbar – Barbastelle
Myo – Myotis species

Rev.	Drwn	Chkd	Appd	Description	Date
01	SH	TF	TB	For Issue	14/04/2021
01.1	SH	TF	TB	Created	16/03/2021

Purpose of Issue
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Project
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Drawing
CSET Static Detector Locations and Species Recorded February 2021

Scale @ A3	Drawn	Checked	Approved
1:25,000	SH	TF	TB

Project No: CS099797
Date: 14/04/2021

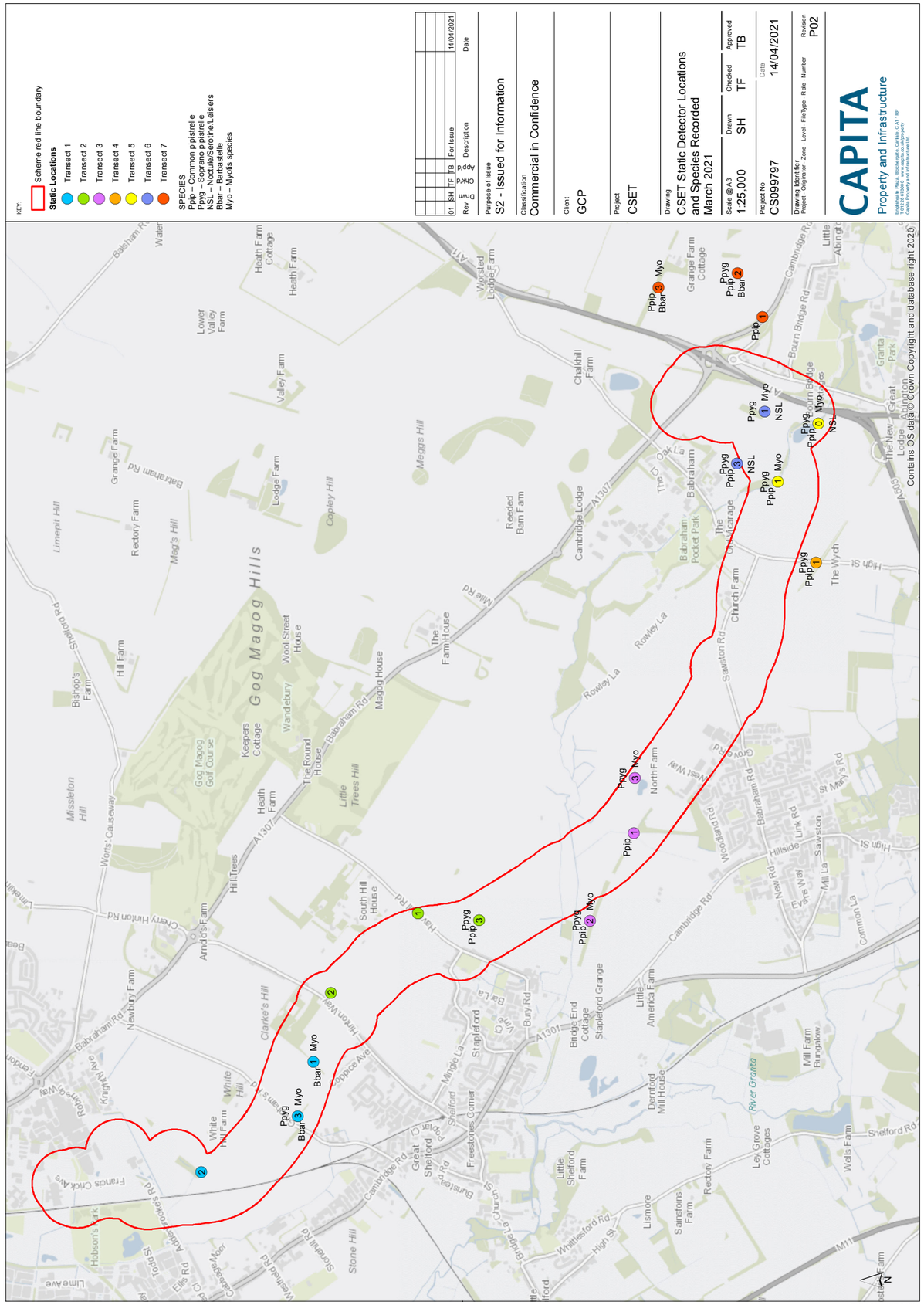
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Appendix B – Static Deployment Dates

Table 4: November 2020 static dates

Static detector ID	Date of deployment	Date of collection
Transect 1 - static 1	03/11/2020	10/11/2020
Transect 1 - static 2	03/11/2020	10/11/2020
Transect 1 - static 3	03/11/2020	10/11/2020
Transect 2 - static 1	03/11/2020	10/11/2020
Transect 2 - static 2	03/11/2020	10/11/2020
Transect 2 - static 3	03/11/2020	10/11/2020
Transect 3 - static 1	03/11/2020	10/11/2020
Transect 3 - static 2	03/11/2020	10/11/2020
Transect 3 - static 3	03/11/2020	10/11/2020
Transect 4 - static 1	11/11/2020	18/11/2020
Transect 4 - static 2	Not deployed	Not deployed
Transect 4 - static 3	Not deployed	Not deployed
Transect 5 - static 1	Not deployed	Not deployed
Transect 5 - static 2	Not deployed	Not deployed
Transect 5 - static 3	Not deployed	Not deployed
Transect 6 - static 1	11/11/2020	18/11/2020
Transect 6 - static 2	Not deployed	Not deployed
Transect 6 - static 3	11/11/2020	18/11/2020
Transect 7 - static 1	11/11/2020	18/11/2020
Transect 7 - static 2	11/11/2020	18/11/2020
Transect 7 - static 3	11/11/2020	18/11/2020

Table 5: December 2020 static dates

Static detector ID	Date of deployment	Date of collection
Transect 1 - static 1	01/12/2020	08/12/2020
Transect 1 - static 2	01/12/2020	08/12/2020
Transect 1 - static 3	01/12/2020	08/12/2020
Transect 2 - static 1	01/12/2020	08/12/2020
Transect 2 - static 2	01/12/2020	08/12/2020
Transect 2 - static 3	01/12/2020	08/12/2020
Transect 3 - static 1	01/12/2020	08/12/2020
Transect 3 - static 2	01/12/2020	08/12/2020
Transect 3 - static 3	01/12/2020	08/12/2020
Transect 4 - static 1	08/12/2020	15/12/2020
Transect 4 - static 2	Not deployed	Not deployed
Transect 4 - static 3	Not deployed	Not deployed
Transect 5 - static 1	Not deployed	Not deployed
Transect 5 - static 2	Not deployed	Not deployed
Transect 5 - static 3	Not deployed	Not deployed
Transect 6 - static 1	08/12/2020	15/12/2020
Transect 6 - static 2	Not deployed	Not deployed
Transect 6 - static 3	08/12/2020	15/12/2020
Transect 7 - static 1	08/12/2020	15/12/2020
Transect 7 - static 2	08/12/2020	15/12/2020
Transect 7 - static 3	08/12/2020	15/12/2020

Table 6: January 2021 static dates

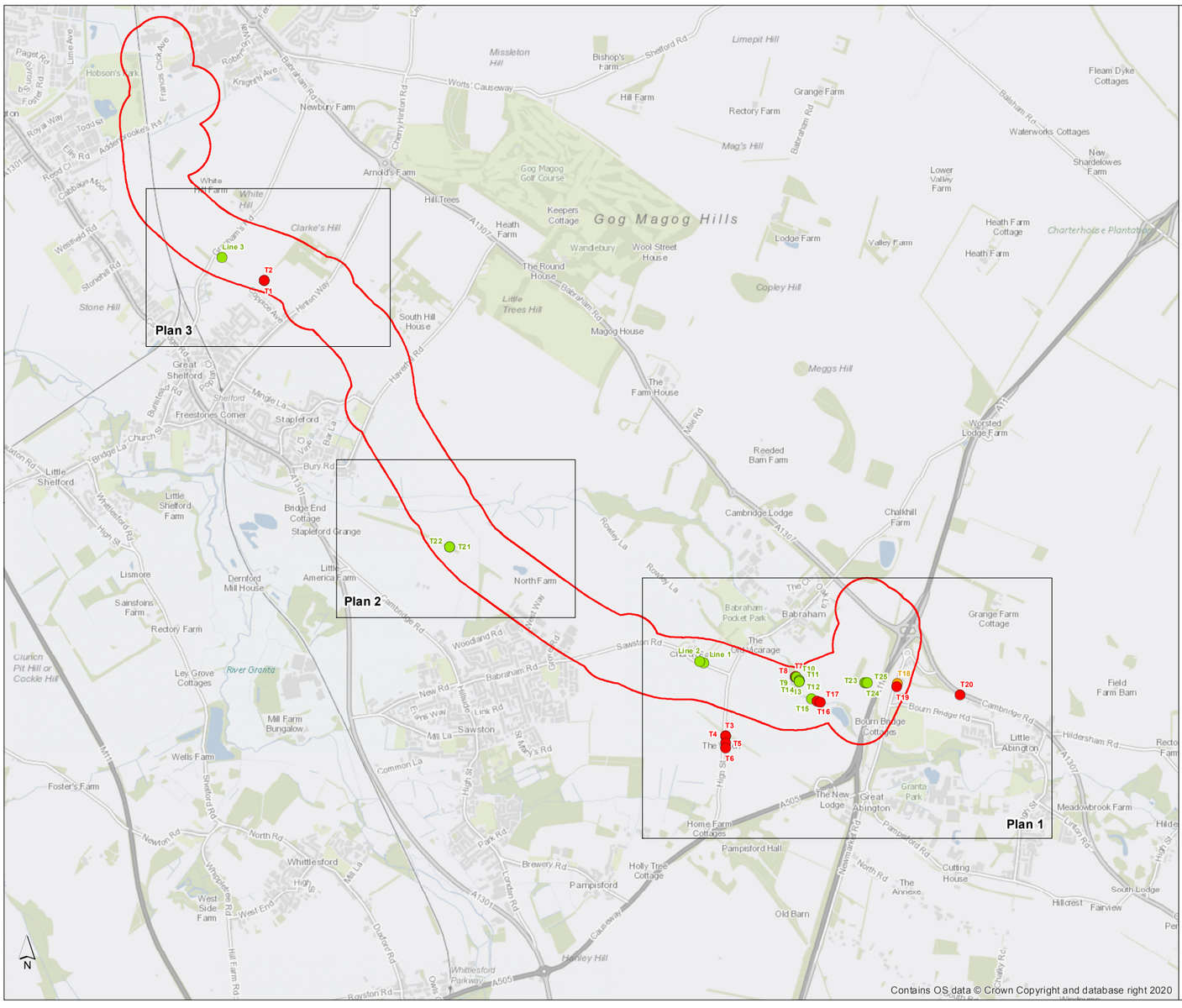
Static detector ID	Date of deployment	Date of collection
Transect 1 - static 1	05/01/2021	12/01/2021
Transect 1 - static 2	05/01/2021	12/01/2021
Transect 1 - static 3	05/01/2021	12/01/2021
Transect 2 - static 1	05/01/2021	12/01/2021
Transect 2 - static 2	05/01/2021	12/01/2021
Transect 2 - static 3	05/01/2021	12/01/2021
Transect 3 - static 1	05/01/2021	12/01/2021
Transect 3 - static 2	05/01/2021	12/01/2021
Transect 3 - static 3	05/01/2021	12/01/2021
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Transect 4 - static 2	Not deployed	Not deployed
Transect 4 - static 3	Not deployed	Not deployed
Transect 5 - static 1	Not deployed	Not deployed
Transect 5 - static 2	Not deployed	Not deployed
Transect 5 - static 3	Not deployed	Not deployed
Transect 6 - static 1	12/01/2021	19/01/2021
Transect 6 - static 2	12/01/2021	Not deployed
Transect 6 - static 3	12/01/2021	19/01/2021
Transect 7 - static 1	12/01/2021	19/01/2021
Transect 7 - static 2	12/01/2021	19/01/2021
Transect 7 - static 3	12/01/2021	19/01/2021

Table 7: February 2021 static dates

Static detector ID	Date of deployment	Date of collection
Transect 1 - static 1	04/02/2021	11/02/2021
Transect 1 - static 2	04/02/2021	11/02/2021
Transect 1 - static 3	04/02/2021	11/02/2021
Transect 2 - static 1	04/02/2021	11/02/2021
Transect 2 - static 2	04/02/2021	11/02/2021
Transect 2 - static 3	04/02/2021	11/02/2021
Transect 3 - static 1	04/02/2021	11/02/2021
Transect 3 - static 2	04/02/2021	11/02/2021
Transect 3 - static 3	04/02/2021	11/02/2021
Transect 4 - static 1	11/02/2021	17/02/2021
Transect 4 - static 2	Not deployed	Not deployed
Transect 4 - static 3	Not deployed	Not deployed
Transect 5 - static 1	Not deployed	Not deployed
Transect 5 - static 2	Not deployed	Not deployed
Transect 5 - static 3	Not deployed	Not deployed
Transect 6 - static 1	11/02/2021	17/02/2021
Transect 6 - static 2	11/02/2021	Not deployed
Transect 6 - static 3	11/02/2021	17/02/2021
Transect 7 - static 1	11/02/2021	17/02/2021
Transect 7 - static 2	11/02/2021	17/02/2021
Transect 7 - static 3	11/02/2021	17/02/2021

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Appendix C – Tree location map



KEY:

- Survey Area

Bat Roost Potential

- High potential
- Moderate potential
- Negligible potential

Rev	Drwn	Chkd	Appd	Description	Date
01	SH	TF	TB	For Issue	18/01/2021
01.1	SH	TF	TB	Created	23/10/2020

Purpose of Issue
S2 - Issued for Information

Classification
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Project
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Drawing
CSET Bat Roost Potential - Trees
Overview plan

Scale @ A3	Drawn	Checked	Approved
1:30,000	SH	TF	TB

Project No
CS099797

Date
18/01/2021

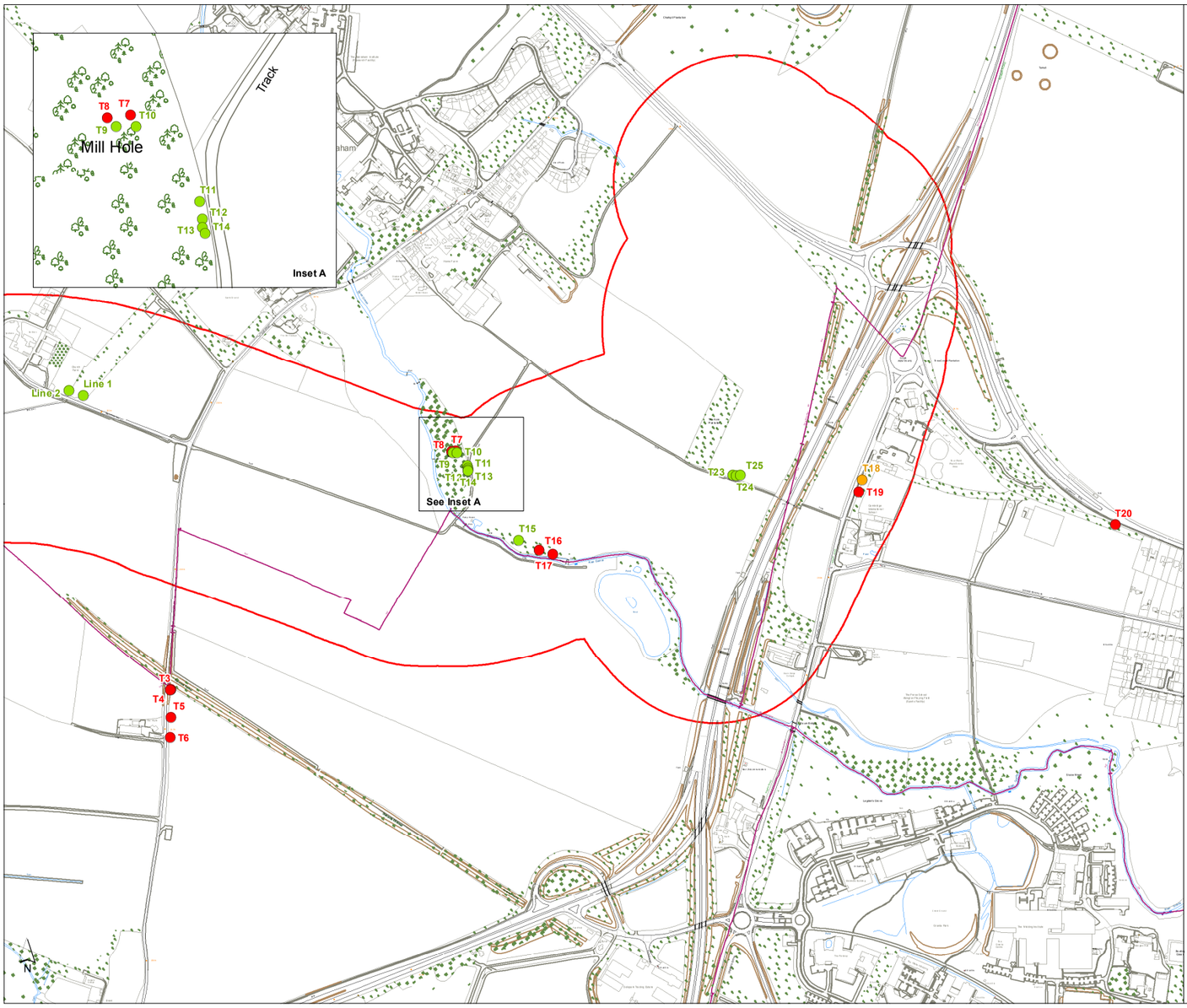
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KEY:

- Survey Area

Bat Roost Potential

- High potential
- Moderate potential
- Negligible potential

Rev	Drwn	Chkd	Appd	Description	Date
01	SH	TF	TB	For Issue	18/01/2021
01.1	SH	TF	TB	Created	23/10/2020

Purpose of Issue
S2 - Issued for Information

Classification
Commercial in Confidence

Client
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Project
CSET

Drawing
CSET Bat Roost Potential - Trees
Plan 1 of 3

Scale @ A3	Drawn	Checked	Approved
1:7,500	SH	TF	TB

Project No
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Date
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Project - Originator - Zone - Level - FileType - Role - Number

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KEY:

Survey Area

Bat Roost Potential

- High potential
- Moderate potential
- Negligible potential

Rev.	Drwn	Chk'd	App'd	Description	Date
01	SH	TF	TB	For Issue	18/01/2021
01.1	SH	TF	TB	Created	23/10/2020

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Classification
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Client
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Project
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Drawing
CSET Bat Roost Potential - Trees
Plan 2 of 3

Scale @ A3	Drawn	Checked	Approved
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Project No
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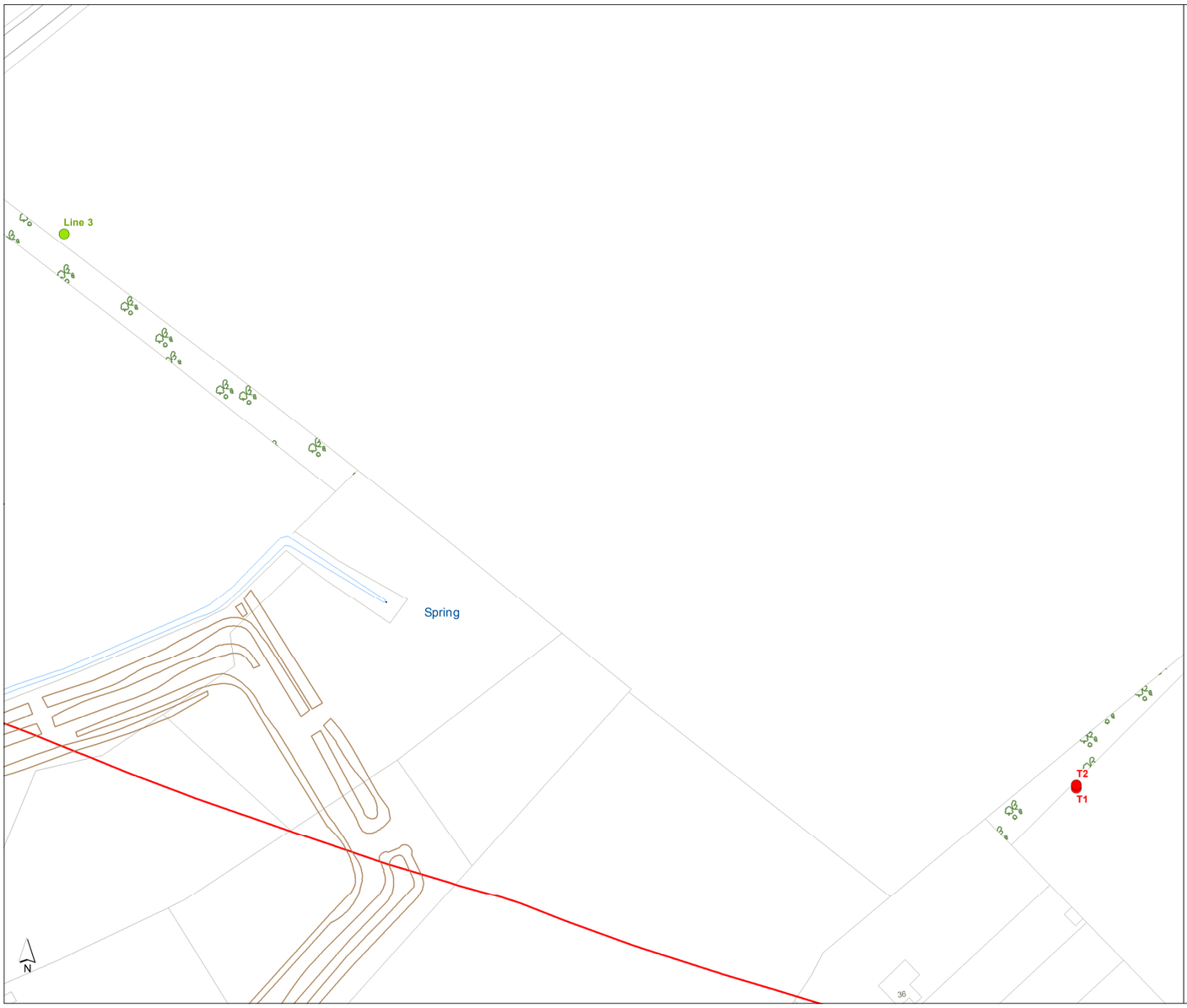
Date
18/01/2021

Drawing Identifier
Project - Originator - Zone - Level - FileType - Role - Number

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KEY:

Survey Area

Bat Roost Potential

- High potential
- Moderate potential
- Negligible potential

Rev.	Drwn	Chk'd	App'd	Description	Date
01	SH	TF	TB	For Issue	18/01/2021
01.1	SH	TF	TB	Created	23/10/2020

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Classification
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Project
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Drawing
CSET Bat Roost Potential - Trees
Plan 3 of 3

Scale @ A3	Drawn	Checked	Approved
1:1,250	SH	TF	TB

Project No
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Date
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Project - Originator - Zone - Level - FileType - Role - Number

Revision
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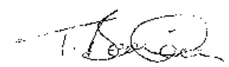
Cambridgeshire South East Transport (CSET)

Bat Survey Report 2021

November 2021

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Quality Management

Job No	CS/101272-02		
Project	Cambridgeshire South East Transport (CSET)		
Location	Trumpington to Babraham, Cambridgeshire		
Title	Cambridgeshire South East Transport (CSET) Bat Survey Report		
Document Ref	Bat Survey Report 2021	**Issue / Revision**	02
File reference	CSET Bat Survey Report Rev 1 Oct21.docx (sharepoint.com)		
Date	November 2021		
Prepared by	Jonathon Gregson Assistant Ecologist	Signature (for file)	
Prepared by	Mark Johnson Assistant Ecologist	Signature (for file)	
Reviewed by	James Johnston ACIEEM Principal Ecologist	Signature (for file)	
Authorised by	Tabatha Boniface CEnv MCIEEM Technical Director	Signature (for file)	

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1. Summary

Capita Real Estate & Infrastructure's Ecologists were commissioned by the Greater Cambridgeshire Partnership to undertake a series of surveys for bats across the route of the Cambridge South East Transport (CSET) between Great Shelford to Sawston and to Babraham, Cambridgeshire (henceforth referred to as the Site).

This report includes the results of all preliminary roost assessments, bat emergence/re-entry and bat activity surveys conducted during the 2021 survey season that have been carried out to provide additional information on how bats, in particular barbastelle, are using the Site to inform the design and environmental assessment of the proposals.

Surveys were carried out between April and October 2021, focussing on the proposed areas of land to be affected by the CSET scheme.

The results are summarised as follows. A total of:

- Seven species/groups of bat were recorded during the static detector deployment consisting of barbastelle *Barbastella barbastellus*, common pipistrelle *Pipistrellus pipistrellus*, soprano pipistrelle *Pipistrellus pygmaeus*, Nathusius' pipistrelle *Pipistrellus nathusii,* noctule *Nyctalus noctula*/serotine *Eptesicus serotinus*/Leister's *Nyctalus leisleri* (NSL), *Myotis* species *Myotis spp* and brown long-eared *Plecotus auritus* (BLE).
- No bats were recorded roosting within any of the trees surveyed within close proximity to the scheme.

The range of farmland, riparian, woodland, and suburban habitats across the survey area provides a range of foraging, commuting and roosting opportunities for bat species.

2. Introduction

2.1 Background

2.1.1. Capita Real Estate & Infrastructure's Ecologists were commissioned by the Greater Cambridgeshire Partnership (GCP) in March 2020 to undertake a series of bat surveys. These surveys were undertaken in relation to the development of the Cambridge South East Transport (CSET) Project, (the 'Scheme').

2.1.2. This report includes the results of all preliminary roost assessments, bat emergence/re-entry and bat activity surveys conducted during the 2021 survey season.

2.1.3. The aim of this bat survey report is to summarise the results of the baseline static detector bat surveys conducted between April and October 2021 to inform the design of the Scheme, and in conjunction with the Environmental Statement, provide sufficient information to allow the Local Planning Authority (LPA) when deciding whether to grant planning permission for the Scheme, to do so in full knowledge of the likely significant effects on bat species, and any avoidance or mitigation measures that will be required to address any likely significant effects.

2.2 Project Description and Purpose of the Scheme

2.2.1. The Cambridge South East Transport (CSET) project aims to create a new public transport route which would link the Cambridge Biomedical Campus via Great Shelford, Stapleford and Sawston to a new travel hub near the A11/A1307 with connections to Babraham and Granta Park.

2.2.2. The route will be entirely off-road, only interacting with other traffic at junctions. Junctions between existing roads and the new public transport route would be controlled by traffic lights. Alongside this new public transport route would be a new path for active travel. The section between Babraham and Sawston has been reviewed in terms of its detailed alignment, to reduce the impact on farm operations and reduce impacts on landscape character in the area.

2.3 Legislation and Policy

2.3.1. Bats receive protection in the UK as a result of both legislation and planning policies. This section outlines the primary legislation protecting bats. All the information below is relevant to this report and to the work proposed at the development site.

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Legislation

2.3.2. Bats are protected under Annex II of the EC Council Directive 92/43/EEC 1992 "Conservation of Natural Habitats and Wild Fauna and Flora" (the Habitats Directive) as a European Protected Species (EPS). This legislation has been transposed into UK legislation through the Conservation of Habitats and Species Regulations 2018.

2.3.3. Regulation 41 of the Conservation of Habitats and Species Regulations 2017 (as amended) makes it an offence to:

- Deliberately capture, injure, or kill bats
- Deliberately disturb bats, or
- Damage or destroy a breeding site or resting place of a bat; this applies whether bats are present or not. NB - breeding sites and resting places are generally referred to as roosts.

2.3.4. In addition to the above protection, all bat species in the UK are protected under Schedule 5 of the Wildlife & Countryside Act 1981 (as amended). In addition to the above, it lists the following as additional offences:

- Disturbance of an animal whilst it is occupying a place which it uses for shelter or protection. NB - places of shelter or protection are generally referred to as roosts
- Obstruct access to any structure or place which an animal uses for shelter or protection.

2.3.5. In order to permit a development where the above offences are likely to be committed a European Protected Species Licence can be obtained from Natural England where appropriate mitigation is offered to offset the negative impacts to local bat populations.

Natural Environment and Rural Communities (NERC) Act 2006

2.3.6. Section 40 of NERC Act 2006 places a statutory duty on public bodies, such as local authorities, that "every public body must, in exercising its functions have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity".

Purpose of the Legislation

2.3.7. The purpose of the legislation is to maintain and restore bat populations within their natural range. This implies that the habitats on which they rely, and the ecology of their life cycles should not be compromised by human activities. Where activities have the potential to compromise bat populations, measures are required to be put in place to avoid impacts or compensate and mitigate for those impacts.

Planning Policy

2.3.8. National Planning Policy is set out by the National Planning Policy Framework (NPPF July 2021) combined with the guidance document Planning for Biodiversity and Geological Conservation: A Guide to Good Practice" (ODPM 2005).

2.3.9. Biodiversity net gains are referenced strongly in terms of developing local planning policy and decision-making for development applications. The environmental test of sustainable development requires planning policy and planning decisions to help to 'improve biodiversity' (paragraph 8c).

2.3.10. References to biodiversity net gain elsewhere in the new NPPF (such as paragraph 175d) support the delivery of biodiversity net gain through sustainable development. Net gain for biodiversity is far more prominent than in the previous NPPF and considers a holistic landscape approach to protect, and enhance biodiversity promoting conservation, restoration, and enhancement of Priority Habitats (also listed as Habitats of Principal Importance) identified under the NERC Act 2006), ecological networks and the protection and recovery of Priority Species (also listed as Species of Principal Importance) identified under the NERC Act 2006). The NPPF includes requirements for planning authorities to identifying and pursuing opportunities for securing measurable net gains for biodiversity (paragraph 174b).

2.3.11. Protected sites and species are a material consideration in determining planning applications and therefore all information relating to protected sites and species must be submitted with planning submissions for determination of the whole application. The NPPF (paragraph 175) which promotes Local Planning Authorities to assess if significant harm would occur to biodiversity and decide accordingly.

Biodiversity Policy

2.3.12. Section 41 of the NERC Act requires the Secretary of State to draw up a list of Habitats and Species of Principal Importance which should be used to guide decision-makers (which include local authorities) in implementing their duty under Section 40. Several species of bat (listed below) are considered Species of Principal Importance, an important factor when considering proposed developments, in accordance with the NERC Act 2006.

- Soprano pipistrelle *Pipistrellus pygmaeus*

- Brown long-eared *Plecotus auritus*
- Barbastelle *Barbastella barbastellus*
- Bechstein's *Myotis bechsteinii*
- Noctule *Nyctalus noctula*
- Greater horseshoe *Rhinolophus ferrumequinum*
- Lesser horseshoe *Rhinolophus hipposideros*.

2.3.13. Additionally, four species of bat are recognised as Priority Species in the Cambridgeshire and Peterborough Biodiversity Group Local Biodiversity Action Plan (LBAP):

- Soprano pipistrelle
- Brown long eared
- Barbastelle
- Noctule.

2.4 Personnel and Quality Assurance

2.4.1. The surveys were led by experienced ecologists and carried out in accordance with Bat Surveys for Professional Ecologists: Good Practice Guidelines, (3rd ed) (Collins, 2016). Surveys were carried out under the supervision of bat licensed ecologist James Johnston (2017-30517-CLS-CLS).

2.4.2. The Capita surveyors who carried out the surveys in this report are James Johnson ACIEEM, Philip Dutt MCIEEM, Alex Scott, Mark Johnson, and Jonathon Gregson.

2.4.3. The surveyors who carried out the tree climbing inspection surveys were James Johnston, Jonathon Gregson, and Mark Johnson. All are fully trained in tree climbing and aerial rescue.

3. Methods

3.1 Survey and Report Objectives

3.1.1. The surveys and report were carried out to fulfil the following objectives:

1. To identify any features on site with the potential to support bats.
2. To identify any evidence of usage of the site by bats.
3. To provide data to inform an assessment of the importance of the site for bats and bat conservation, in particularly barbastelle.

3.2 Desk-Based Study

3.2.1. Local ecological records were obtained from Cambridgeshire and Peterborough Environmental Records Centre in July 2020 from within 2km of the scheme.

3.2.2. Incidental Information was gathered from local news articles in relation to bats.

3.3 Field Survey

Tree Preliminary Roost Assessment Surveys

3.2.3. The Preliminary Roost Assessments (PRAs) for trees was undertaken on the 23rd June and 4th August 2021.

3.2.4. Due to a lack of access in 2020, all accessible trees within an 80 m meter buffer from the scheme boundary around North Farm were subject to a preliminary roost assessment.

3.2.5. Tree assessments were initially undertaken from ground level, using high-powered torches and binoculars, where necessary, for the inspection of any Potential Roost Features (PRFs). An endoscope was available for use by Ecologists with a Level 2 bat licence.

3.2.6. Trees were assessed for the presence of suitable roosting features including holes in the trunk and lifted bark and signs of bat presence including droppings, staining and scratch marks. All trees with low, moderate or high potential were identified using a small metal disc where landowner permission allowed, and their location and species detail recorded to inform further surveys.

3.2.7. Trees that were scoped in for further assessment were those assessed as having moderate or high potential for roosting features based on the Bat Conservation Trust (BCT) guidance outlined in Table 1.

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Aerial Roost Inspection Surveys

3.2.8. In March 2021, four trees within North Farm which had been assessed as having moderate potential to support roosting bats were identified for aerial roost inspections. The details of these four trees are as follows:

- T2 – TL 49175 50501 – Ash, moderate.
  - (F1) Callus roll at 3 m, west facing, 4 cm diameter. Moderate. Further surveys required.
  - (F2) Callus roll at 2.5 m facing east, 3 cm diameter, 4 cm deep. No further surveys required.
- T3 – TL 49181 50516 – Ash, moderate.
  - (F1) Callus roll at 3 m, south-east facing, 6 cm diameter.
  - (F2) Two rot holes at 1.5 m and 2.5 m, both west facing. Further surveys required.
- T4 – TL 49178 50520 – Ash, moderate.
  - (F1) Callus roll and light ivy cover.
  - (F2) Callus roll at 3 m, south facing, 7 cm diameter. Further surveys required.
- T5 – TL 49181 50546 – Ash, moderate.
  - (F1) Ivy cover, light and dead.
  - (F2) Woodpecker hole at 5 m, south facing. Further surveys required.

3.2.9. The tree climbing inspections were carried out on the 5th May 2021.

3.2.10. The aerial survey consisted of each tree being climbed using a harness and ropes. The PRFs identified during the ground level assessment were inspected using torches and/or an endoscope to look for evidence of use by bats and collect information on the PRF.

3.2.11. Whilst in the tree, climbers checked for additional features not visible from the ground and, if present, inspected them using the endoscope and torch. The size, both internal and external, of the PRF was noted, as well as the condition within the PRF. The potential for each PRF to host bats was graded either high, moderate, low or negligible. PRFs were either downgraded where no feature with the potential for roosting was found, retained at the original assessed potential, upgraded to high potential or identified as a confirmed roost if a bat or evidence of bats (droppings, scratch marks) were found.

3.2.12. The overall assessment of roosting suitability of each tree was updated based on the highest potential feature identified during the aerial inspections.

Table 1: Bat Roost Potential Categories

Roost Potential Category	Description of Roosting Habitat	Commuting and Foraging Habitats
Negligible	Negligible habitat features on site unlikely to be used by roosting bats.	Negligible habitat features on site likely to be used by commuting or foraging bats only.
Low	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, shelter, appropriate conditions and / or suitable surrounding habitat to be used on a regular basis.	Habitat that could be used by small numbers of commuting bats such as gappy hedgerows or a vegetated stream, but isolated, e.g., not very connected habitat to the surrounding landscape by other habitats such as trees, hedges, or water courses. 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	A structure or tree with one or more potential roost features that could be used by bats due to their size, shelter, protection, conditions, and surrounding habitat but unlikely to support a roost of high conservation status (with respect to roost type only- the assessments in this table are made irrespective of species conservation status, which is established after presence is confirmed).	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.
High	A structure or tree with one or more potential roost feature that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions, and surrounding habitat.	Continuous, high quality habitat that is well connected to the wider landscape that it is likely to be used regularly by commuting bats such as river valleys, streams, hedgerows, lines or trees and woodland edge. High quality habitat that is well connected to the wider landscape that is likely to be used regularly by foraging bats such as broadleaved woodland, tree-lined water courses and grazed parkland.

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Roost Potential Category	Description of Roosting Habitat	Commuting and Foraging Habitats
		Site is close to and connected to known roosts.

Static Detector Surveys

3.2.13. Static bat detectors (Anabat Swift) were deployed in April - October 2021 in the locations associated with the transect routes surveyed in 2020. Seventeen detectors were deployed over five consecutive nights each month from April to October 2021.

3.2.14. Following a PRA assessment of the woodland boundary between North Farm and the Cambridge Football Club (FC) site, an additional detector was deployed (Transect 3 – Static 4) in August - October 2021. Static detector deployment dates are detailed in Appendix B.

3.2.15. Detectors recorded full spectrum sound files from half an hour before sunset to half an hour after sunrise. The sound files were then analysed using Anabat Insight software to identify the species present and indicate the level of bat activity at each deployment location.

3.2.16. Acoustic analysis was completed using the following workflow:

- All sound files were run through the auto-ID plugin BatClassify at a tag certainty threshold of 75%.
- All files labelled as barbastelle, NSL (noctule, serotine, Leisler's), brown long-eared bat and any of the *Myotis* species were manually checked.
- 10% of common pipistrelle, soprano pipistrelle and undetermined pipistrelle species were manually checked or, if they numbered less than 50, all were manually checked.
- 10% of unlabelled (noise) files were manually checked or, if they numbered less than 50, all were manually checked. If a high proportion of these unlabelled noise files contained bat passes, more files were checked.

3.2.17. The following principles were followed during manual acoustic analysis. When calls are identified to species level it is confirmed using call parameters which are characteristic of the species with regards to the location of the static detector in both a regional and habitat context. Certain species produce highly similar calls with overlapping parameters and cannot be reliably distinguished to species level

using acoustic analysis alone. When a call cannot be reliably distinguished, it has been labelled as one of a group of possible species.

3.2.18. All calls from a species within the *Myotis* genus has been labelled as *Myotis sp*.

3.2.19. Any calls that are unable to be differentiated between noctule and Leisler's bats have been grouped under the *Nyctalus sp* label. In certain environments, *Nyctalus* bats cannot be reliably distinguished from serotine bats, in which case these calls have been labelled as NSL (noctule, serotine, Leisler's).

3.2.20. Validating the data through manual checks follows the BCT Good Practice Guidelines (2016). The locations of these static detectors are shown in Appendix A and a description in Table 2.

Table 2: Static Detector Locations

Static Detector ID	Static Detector Description	Approximate Grid Reference
Transect 1 – Static 1	Narrow hedge line with mature trees heading south west to north east between two arable fields. Static detector pointing in north westerly direction.	TL 46924 53227
Transect 1 – Static 2	Narrow hedge line with trees heading south west to north east between two arable fields adjacent to Nine Wells Nature Reserve, within 50m of a ditch fed by a spring within Nine Wells woodland. Static detector pointing north westerly.	TL 46092 54075
Transect 1 – Static 3	Narrow hedge line with mature trees heading north west to south east between two arable fields. Static detector pointing north easterly.	TL 46515 53347
Transect 2 – Static 1	Attached to a tree within a line of trees heading north east to south west beside a B road in between two arable fields with a hedge line on the opposite side of the road. Static detector points easterly.	TL 48049 52433
Transect 2 – Static 2	Positioned at the end of a hedge line north west to south east dissecting two arable fields. Detector points westerly.	TL 47449 53095
Transect 2 – Static 3	Positioned at the bottom of a hedge line north west to south east dissecting two arable fields. Detector points easterly.	TL 47999 51972
Transect 3 – Static 1	Positioned within a small section of unmanaged arable land, bordered by woodland and open arable fields with a ditch running north to south. Static detector points south easterly.	TL 48660 50798

Static Detector ID	Static Detector Description	Approximate Grid Reference
Transect 3 – Static 2	Positioned on the edge of a strip of woodland heading east to west bordering an arable field. Static facing northerly.	TL 47994 51132
Transect 3 – Static 3	Positioned on the edge of a narrow strip of hedge line with trees heading east to west bordering an arable field to the north. A medium sized waterbody is in the adjacent land parcel to the south. Detector facing north.	TL 49074 50790
Transect 3 – Static 4	Attached to wooden fencing along driveway inside entrance to North Farm site. Adjacent to southern woodland boundary and industrial estate, bordering arable land the east. Detector pointing west.	TL 49155 50493
Transect 4 – Static 1	Within the corner of a field, with tree lines heading south to north and west to east. Detector facing north easterly.	TL 50708 49418
Transect 4 – Static 2	Unable to deploy securely due to high use public footpath. Alternative locations too close to existing detectors or unsecure.	TL 49429 49951
Transect 4 – Static 3	Unable to deploy securely due to high use public footpath. Alternative locations too close to existing detectors or unsecure.	TL 50406 49996
Transect 5 – Static 1	Positioned on an ash tree on a tree line heading east to west. Bordered to the south by arable fields with a ford and river adjacent to the north of the woodland strip. A mature ash and pine woodland are immediately to the north west. Detector pointing south.	TL 51318 49707
Transect 5 – Static 2	Unable to deploy securely.	TL 50757 49840
Transect 5 – Static 3	Positioned on a tree within a small section of young plantation trees. Detector facing south with a small man-made reservoir to the north west and arable fields to the south.	TL 51759 49400
Transect 6 – Static 1	Positioned on a beech tree in a short line of 4 trees within a hedge line heading east to west. Arable fields border the hedge line to the north and south. Detector pointing north.	TL 51852 49807
Transect 6 – Static 2	Unable to deploy securely.	TL 52039 50232
Transect 6 – Static 3	Positioned on a tree within a hedge line with trees heading north east to south west. An arable field is to the east and west with a farm track running adjacent to the east. Detector facing east.	TL 51453 50017
Transect 7 – Static 1	Positioned on a tree within a woodland strip heading south east to north west, between	TL 52570 49824

Static Detector ID	Static Detector Description	Approximate Grid Reference
	an arable field and an A Road. Detector facing north easterly.	
Transect 7 – Static 2	Positioned on a tree beside a farm track. Farm track heading north to south. Arable fields are adjacent to the east and west. Detector facing west.	TL 52899 50014
Transect 7 – Static 3	Positioned on a tree on the edge of a woodland beside a farm track. Farm track heading east to west. An arable field is adjacent to the south. Detector facing south.	TL 52787 50613

Emergence and Re-Entry Surveys

3.2.21. Trees were selected for emergence/re-entry surveys based on their suitability assessed during the Preliminary Roost Assessment and tree climbing surveys, the location of the tree in relation to the scheme and if they had been identified as being affected directly or indirectly by the proposed scheme.

3.2.22. Trees with low potential were not surveyed further. Trees with moderate potential required two surveys.

3.2.23. Tree T5 was identified as being of moderate potential and therefore surveyed twice. No other trees were of sufficient quality to require further surveys.

3.2.24. Emergence surveys were undertaken within the months of July, and August 2021. Dates are shown in Table 3.

Table 3: Tree Emergence/Re-entry Survey Dates

Tree	Survey no.	Date	Dusk/ Dawn	Sunset/ Sunrise	Start/End Time	Temp °C	Rain	Wind	Cloud Cover
T5	1	13/07/2021	Dusk	21:15	21:00/22:45	17	0	1	50
	2	04/08/2021	Dusk	20:44	20:29/22:14	18	0	1	0

3.2.25. Surveyors were strategically positioned around the tree focusing on areas where potential access points had been identified during the Preliminary Roost Assessment, to be able to observe any bats leaving or entering roosts.

3.2.26. All observed bat passes were recorded on a plan, noting the time, the location and, where possible, the direction of flight, species and behaviour of the bat (i.e. commuting, foraging, social calling). Importance was placed on noting the location of any points where bats were observed leaving or entering the tree. The weather details were also noted.

3.2.27. Capita's surveyors were equipped with Anabat Walkabout detectors.

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3.2.28. After completion of each survey session, digital bat recordings were analysed using Anabat Insight analysis software to confirm species identification.

3.2.29. The emergence surveys commenced 15 minutes prior to sunset and continued for 1.5-2 hours after sunset.

3.2.30. The re-entry surveys commenced 1.5 hours before sunrise and continued for 15 minutes past sunrise.

3.4 Limitations and Assumptions

Static detectors

3.3.1. It was not possible to deploy four static detectors due to security and lack of suitable locations as described in Table 2. Due to the number and distribution of the remaining static detectors the impact of this on the survey results is considered negligible and the validity and assumptions of this report are not negatively impacted.

3.3.2. The number of detectors deployed was increased in August due to landowner permission being granted to access North Farm.

3.3.3. The following static deviations occurred:

- June Transect 6 Static 3 - no recordings of bat species occurred. Device appeared to have malfunctioned and was therefore redeployed in the same month (June) for another week.
- October Transect 1 Static 3 - no recordings of bat species occurred. Device appeared to have malfunctioned and was therefore redeployed in the same month (October) for another week.
- August Transect 5 Static 1 - recorded for the first four nights only due to noise files filling the memory cards.
- August Transect 7 Static 3 - recorded for the first four nights only due to noise files filling the memory cards.

3.3.4. These deviations whilst not providing fully comparative data, do not impact the validity and accuracy of the data as sufficient data has been collected during the rest of the season and site to provide a sufficient bat assessment of the site.

3.3.5. A cause for excess noise files is likely due to increased wind and rain during the dates of deployment. Analysis of some of the noise files indicate rainfall. However, this likely unsuitable weather does not appear to have affected the number of bat calls recorded during these months when compared to other months. The site is very open and even light breeze through vegetation may increase the noise files

significantly. Reducing the sensitivity of the detectors was discussed, but this may have led to a decrease in bat calls being recording.

Trees

3.3.6. Access to the woodland on North Farm's southern boundary was restricted by a six-foot high metal fence. This meant that visibility of potential bat roosting features was limited.

3.3.7. Identification of potential roosting features was limited by the presence of substantial ivy cladding on several ash trees on the southern boundary of North Farm. The masking effect of this ivy was taken into account when assessing the overall roosting potential of these trees.

3.3.8. This limitation does not impact the validity and assumptions of this report.

4. Results

4.1 Desk Study

4.1.1. The local ecological records search included the following notable bat records having been recorded within 2km of CSET.

1. Brown long-eared bat *Plecotus auritus*
2. Common pipistrelle *Pipistrellus*
3. Daubenton's bat *Myotis daubentonii*
4. Nathusius's pipistrelle *Pipistrellus nathusii*
5. Natterer's bat *Myotis nattereri*
6. Noctule bat *Nyctalus noctula*
7. Serotine *Eptesicus serotinus*
8. Soprano pipistrelle *Pipistrellus pygmaeus*
9. Western barbastelle *Barbastella barbastellus.*

4.1.2. A barbastelle bat was identified roosting in the grounds of The Perse School, Cambridge's Upper School Site, as described in an article published on their website on 22nd September 2021 (The Perse School, 2021). This observation is located 650 m north east of the northern end of the Scheme.

4.2 Tree Roost Assessment Survey

Results

4.2.1. The woodland along North Farm's southern boundary was surveyed from ground-level in order to assess any individual trees suitable to support roosting bats. The majority of the trees in the woodland were clad with a heavy ivy (which in itself can provide bat roosting features) and it was not possible to see any other features because of the dense foliage present at the time of the survey. A static detector was therefore deployed on the edge of the woodland to record any bat activity in the vicinity. None of the other trees in the woodland were noted to have any visible PRF.

4.2.2. A total of 5,721 sound files were recorded of which 248 contained bats. These bats were identified as the following species or groups of species:

- 37 barbastelle (14.9%)
- 103 common pipistrelle (41.5%)
- 74 soprano pipistrelle (29.8%)
- 28 NSL (11.3%)
- 2 *Myotis* species (<1%)
- 4 BLE (1.6%)

4.2.3. The following results show the calls by species which were recorded on the detector around sunset. It has been split by species due to the different emergence times of species.

- Common and soprano pipistrelle were frequently recorded on the detector around sunset ±5 minutes.
- Barbastelle and myotis sp. were not recorded near to the time of sunset or sunrise.
- NSL were recorded within 15 minutes of sunset on a single night in August.
- BLE were recorded within 1 hour of sunset on a single night in August.

4.2.4. Tree climbing was undertaken in May 2021. The four trees due for aerial inspection were previously identified as ash by Mott Macdonald but were re-identified as walnut *Juglans regia*.

4.2.5. All PRF identified by the preliminary ground-level assessment carried out by Mott MacDonald were found and inspected. Tree T5 retained a moderate potential to support roosting bats following assessment. Trees T2, T3 and T4 were downgraded from moderate to negligible.

4.2.6. Table 4 details the results of the preliminary roost assessment results of all trees surveyed with moderate or above suitability.

Table 4: Tree Climbing Roost Inspection Survey Results

Tree ID	Grid Reference	Tree Species and Condition	Assessment Prior to Tree Climb	Tree Climb Assessment
2	TL 49175 50501	Walnut (previously ash)	Moderate	**Negligible** – Features from GLA were unsuitable
3	TL 49181 50516	Walnut (previously ash)	Moderate	**Negligible** – Features from

Tree ID	Grid Reference	Tree Species and Condition	Assessment Prior to Tree Climb	Tree Climb Assessment
				GLA were unsuitable
4	TL 49178 50520	Walnut (previously ash)	Moderate	**Negligible** – Features from GLA were unsuitable
5	TL 49181 50546	Walnut (previously ash)	Moderate	**Moderate** - Woodpecker hole at 5 m, south facing, extends.

4.3 Tree Emergence/Re-entry Survey Results

4.3.1. During the emergence/re-entry surveys, no roosts were recorded.

4.3.2. Common and soprano pipistrelle were recorded foraging and commuting during emergence surveys in very low numbers. Noctules were occasionally recorded commuting high above the survey site.

4.3.3. The level of bat activity during these surveys is considered to be very low.

4.4 Static Detector Survey Results

4.4.1. Maps showing the locations of the static detectors are provided in Appendix A and are described in Table 2. The results of the data collected from the static detectors is detailed in the sections below with percentage of bat sound recordings per species noted in Table 5.

4.4.2. Where the totals of individual bat species or species groups does not equal the total number of files containing bats, this is due to files containing multiple species of bats.

April 2021

Transect 1

- **Static 1** - A total of 87 sound files were recorded of which 13 contained bats. These bats were identified as the following species or groups of species:
  - 8 common pipistrelle (61.5%)
  - 1 soprano pipistrelle (7.7%)

- 4 *Myotis* species (30.8%)

- **Static 2** – A total of 222 sound files were recorded, of which 17 contained bats. These bats were identified as the following species or groups of species:
    - 5 common pipistrelle (29.4%)
    - 4 soprano pipistrelle (23.5%)
    - 8 NSL (47.1%)
- **Static 3** – A total of 217 sound files were recorded of which 172 contained bats. These bats were identified as the following species or groups of species:
    - **11 barbastelle (5.9 %)**
    - 27 common pipistrelle (14.4%)
    - 147 soprano pipistrelle (78.2%)
    - 1 NSL (>1%)
    - 2 *Myotis* species (1.1%)

Transect 2

- **Static 1** – A total of 58 sound files were recorded of which 5 contained bats. These bats were identified as the following species or groups of species:
    - 1 common pipistrelle (20%)
    - 1 soprano pipistrelle (20%)
    - 2 NSL (40%)
    - 1 *Myotis* species (20%)

- **Static 2** – A total of 101 sound files were recorded of which 3 contained bats. These bats were identified as the following species or groups of species:
    - 1 common pipistrelle (33.3%)
    - 2 *Myotis* species (66.6%)
- **Static 3** – A total of 125 sound files were recorded of which 3 contained bats. These bats were identified as the following species or groups of species:

- 1 common pipistrelle (33.3%)
- 1 soprano pipistrelle (33.3%)
- 1 *Myotis* species (33.3%)

Transect 3

- **Static 1** – A total of 88 sound files were recorded of which 34 contained bats. These bats were identified as the following species or groups of species:
    - 21 common pipistrelle (60%)
    - 7 soprano pipistrelle (20%)
    - 7 *Myotis* species (20%)
- **Static 2** – A total of 712 sound files were recorded of which 465 contained bats. These bats were identified as the following species or groups of species:
    - **3 barbastelle (<1%)**
    - 341 common pipistrelle (67.1%)
    - 149 soprano pipistrelle (29.3%)
    - 1 NSL (>1%)
    - 14 *Myotis* species (3.8%)
- **Static 3** – A total of 169 sound files were recorded of which 42 contained bats. These bats were identified as the following species or groups of species:
    - 25 common pipistrelle (59.5%)
    - 15 soprano pipistrelle (35.7%)
    - 2 *Myotis* species (4.8%)

Transect 4

- **Static 1** – A total of 297 sound files were recorded of which 55 contained bats. These bats were identified as the following species or groups of species:
    - 50 common pipistrelle (90.9%)
    - 3 soprano pipistrelle (5.5%)

- 1 NSL (1.8%)
- 1 *Myotis* species (1.8%)

Transect 5

- **Static 1** - A total of 3,080 sound files were recorded of which 3,032 contained bats. These bats were identified as the following species or groups of species:
    - **1 barbastelle (<1%)**
    - 2,061 common pipistrelle (53.6%)
    - 1,733 soprano pipistrelle (45.1%)
    - 29 NSL (1%)
    - 20 *Myotis* species (<1%)
        - Including Daubenton's bat confirmed with social calls.
- **Static 3** – A total of 237 sound files were recorded of which 208 contained bats. These bats were identified as the following species or groups of species:
    - 85 common pipistrelle (31%)
    - 40 soprano pipistrelle (14.6%)
    - 135 NSL (49.3%)
    - 14 *Myotis* species (5.1%)
        - Including Daubenton's bat confirmed with social calls.

Transect 6

- **Static 1** – A total of 65 sound files were recorded of which 52 contained bats. These bats were identified as the following species or groups of species:
    - 44 common pipistrelle (84.6%)
    - 3 soprano pipistrelle (5.8%)
    - 2 NSL (3.8%)
    - 3 *Myotis* species (5.8%)

- **Static 3** – A total of 126 sound files were recorded of which 36 contained bats. These bats were identified as the following species or groups of species:
    - 12 common pipistrelle (33.3%)
    - 5 soprano pipistrelle (13.9%)
    - 10 NSL (27.8%)
    - 9 *Myotis* species (25%)

Transect 7

- **Static 1** – A total of 110 sound files were recorded of which 1 contained bats. This bat was identified as 1 NSL (100%)
- **Static 2** – A total of 73 sound files were recorded of which 13 contained bats. These bats were identified as the following species or groups of species:
    - **2 barbastelle (15.4%)**
    - 5 common pipistrelle (38.5%)
    - 1 soprano pipistrelle (7.7%)
    - 1 NSL (7.7%)
    - 4 *Myotis* species (30.8%)
- **Static 3** – A total of 163 sound files were recorded of which 26 contained bats. These bats were identified as the following species or groups of species:
    - **18 barbastelle (69.2%)**
    - 8 common pipistrelle (30.8%)

May 2021

Transect 1

- **Static 1** - A total of 676 sound files were recorded of which 642 contained bats. These bats were identified as the following species or groups of species:
    - **144 barbastelle (21.1%)**

- 406 common pipistrelle (59.6%)
- 116 soprano pipistrelle (17%)
- 9 NSL (1.3%)
- 6 *Myotis* species (<1%)

- **Static 2** – A total of 2,046 sound files were recorded, of which 343 contained bats. These bats were identified as the following species or groups of species:
  - **14 barbastelle (4%)**
  - 301 common pipistrelle (86.2%)
  - 16 soprano pipistrelle (4.6%)
  - 17 NSL (4.9%)
  - 1 *Myotis* species (<1%)

- **Static 3** – A total of 5,634 sound files were recorded, of which 1,809 contained bats. These bats were identified as the following species or groups of species:
  - **23 barbastelle (1.1%)**
  - 1520 common pipistrelle (69.9%)
  - 598 soprano pipistrelle (27.5%)
  - 30 NSL (1.4%)
  - 2 *Myotis* species (<1%)
  - 1 BLE (<1%)

Transect 2

- **Static 1** – A total of 1,378 sound files were recorded of which 23 contained bats. These bats were identified as the following species or groups of species:
  - 13 common pipistrelle (56.5%)
  - 7 soprano pipistrelle (30.4%)
  - 3 NSL (13%)

CAPITA

- **Static 2** – A total of 725 sound files were recorded of which 404 contained bats. These bats were identified as the following species or groups of species:
  - **9 barbastelle (2.2%)**
  - 377 common pipistrelle (90.5%)
  - 26 soprano pipistrelle (6.2%)
  - 5 NSL (1.2%)

- **Static 3** – A total of 1,140 sound files were recorded of which 411 contained bats. These bats were identified as the following species or groups of species:
  - **8 barbastelle (1.9%)**
  - 305 common pipistrelle (71.9%)
  - 100 soprano pipistrelle (23.6%)
  - 5 NSL (1.2%)
  - 6 *Myotis* species (1.4%)

Transect 3

- **Static 1** – A total of 773 sound files were recorded of which 250 contained bats. These bats were identified as the following species or groups of species:
  - **12 barbastelle (4.5%)**
  - 180 common pipistrelle (68.2%)
  - 56 soprano pipistrelle (21.2%)
  - 1 Nathusius' pipistrelle (<1%)
  - 4 NSL (1.5%)
  - 11 *Myotis* species (4.2%)

- **Static 2** – A total of 1,992 sound files were recorded of which 1,764 contained bats. These bats were identified as the following species or groups of species:
  - **18 barbastelle (<1%)**

- 1600 common pipistrelle (82%)
- 293 soprano pipistrelle (15%)
- 5 NSL (<1%)
- 36 *Myotis* species (1.8%)

- **Static 3** – A total of 3,357 sound files were recorded of which 1,621 contained bats. These bats were identified as the following species or groups of species:
  - 716 common pipistrelle (39.3%)
  - 657 soprano pipistrelle (36%)
  - 439 NSL (24.1%)
  - 11 *Myotis* species (<1%)

Transect 4

- **Static 1** – A total of 1,825 sound files were recorded of which 647 contained bats. These bats were identified as the following species or groups of species:
  - **2 barbastelle (<1%)**
  - 642 common pipistrelle (99.1%)
  - 3 soprano pipistrelle (<1%)
  - 1 *Myotis* species (<1%)

Transect 5

- **Static 1** - A total of 1,284 sound files were recorded of which 124 contained bats. These bats were identified as the following species or groups of species:
  - **1 barbastelle (<1 %)**
  - 90 common pipistrelle (64.7 %)
  - 37 soprano pipistrelle (26.6 %)
  - 11 *Myotis* species (7.9 %)

CAPITA

- **Static 3** – A total of 1,031 sound files were recorded of which 223 contained bats. These bats were identified as the following species or groups of species:
  - 105 common pipistrelle (40.4%)
  - 147 soprano pipistrelle (56.5%)
  - 5 NSL (1.9%)
  - 3 *Myotis* species (1.2%)

Transect 6

- **Static 1** – A total of 1,185 sound files were recorded of which 151 contained bats. These bats were identified as the following species or groups of species:
  - 141 common pipistrelle (93.4%)
  - 8 soprano pipistrelle (5.3%)
  - 2 NSL (1.3%)
- **Static 3** – A total of 3,535 sound files were recorded of which 519 contained bats. These bats were identified as the following species or groups of species:
  - 478 common pipistrelle (91%)
  - 30 soprano pipistrelle (5.7%)
  - 11 NSL (2.1%)
  - 6 *Myotis* species (1.1%)

Transect 7

- **Static 1** – A total of 1,819 sound files were recorded, of which 37 contained bats. These bats were identified as the following species or groups of species:
  - 29 common pipistrelle (78.4%)
  - 6 soprano pipistrelle (16.2%)
  - 2 NSL (5.4%)

- **Static 2** – A total of 1,390 sound files were recorded of which 123 contained bats. These bats were identified as the following species or groups of species:
    - **8 barbastelle (6.5%)**
    - 94 common pipistrelle (75.8%)
    - 17 soprano pipistrelle (13.7%)
    - 1 NSL (<1%)
    - 4 *Myotis* species (3.2%)
- **Static 3** – A total of 4,863 sound files were recorded, of which 38 contained bats. These bats were identified as the following species or groups of species:
    - **10 barbastelle (25.6%)**
    - 18 common pipistrelle (46.2%)
    - 11 soprano pipistrelle (28.2%)

Transect 1

- **Static 1** - A total of 1,809 sound files were recorded of which 1,649 contained bats. These bats were identified as the following species or groups of species:
    - **48 barbastelle (2.8%)**
    - 1289 common pipistrelle (74.6%)
    - 264 soprano pipistrelle (15.3%)
    - 94 NSL (5.4%)
    - 7 *Myotis* species (<1%)
    - 27 BLE (1.6%)
- **Static 2** – A total of 1,776 sound files were recorded of which 1,638 contained bats. These bats were identified as the following species or groups of species:
    - **1 barbastelle (<1%)**

    - 1417 common pipistrelle (79.6%)
    - 268 soprano pipistrelle (15%)
    - 94 NSL (5.3%)
    - 1 *Myotis* species (<1%)
- **Static 3** – A total of 5,753 sound files were recorded of which 5,712 contained bats. These bats were identified as the following species or groups of species:
    - **1 barbastelle (<1%)**
    - 5484 common pipistrelle (91.7%)
    - 328 soprano pipistrelle (5.5%)
    - 1 Nathusius' pipistrelle (<1%)
    - 164 NSL (2.7%)
    - 3 *Myotis* species (<1%)
    - 2 BLE (<1%)

Transect 2

- **Static 1** – A total of 122 sound files were recorded of which 59 contained bats. These bats were identified as the following species or groups of species:
    - **2 barbastelle (3.3%)**
    - 23 common pipistrelle (38.3%)
    - 8 soprano pipistrelle (13.3%)
    - 27 NSL (45%)
- **Static 2** – A total of 1,557 sound files were recorded of which 1,515 contained bats. These bats were identified as the following species or groups of species:
    - **3 barbastelle (<1%)**
    - 1463 common pipistrelle (95.2%)

- 20 soprano pipistrelle (1.3%)
- 50 NSL (3.3%)
- 1 BLE (<1%)

- **Static 3** – A total of 1,001 sound files were recorded of which 900 contained bats. These bats were identified as the following species or groups of species:
  - 768 common pipistrelle (81%)
  - 134 soprano pipistrelle (14.1%)
  - 14 NSL (4.7%)
  - 1 BLE (<1%)

Transect 3

- **Static 1** – A total of 492 sound files were recorded of which 463 contained bats. These bats were identified as the following species or groups of species:
  - **3 barbastelle (<1%)**
  - 290 common pipistrelle (57.7%)
  - 167 soprano pipistrelle (33.2%)
  - 35 NSL (7%)
  - 8 *Myotis* species (1.6%)
- **Static 2** – A total of 1,882 sound files were recorded of which 1,831 contained bats. These bats were identified as the following species or groups of species:
  - **3 barbastelle (<1%)**
  - 1,470 common pipistrelle (72%)
  - 328 soprano pipistrelle (16.1%)
  - 217 NSL (10.6%)
    - Including noctule and Leisler's bat social calls.
  - 12 *Myotis* species (<1%)
  - 11 BLE (<1%)

CAPITA

- **Static 3** – A total of 863 sound files were recorded of which 632 contained bats. These bats were identified as the following species or groups of species:
  - **1 barbastelle (<1%)**
  - 378 common pipistrelle (57%)
  - 210 soprano pipistrelle (31.7%)
  - 72 NSL (10.9%)
  - 1 *Myotis* species (<1%)
  - 1 BLE (<1%)

Transect 4

- **Static 1** – A total of 2,330 sound files were recorded of which 669 contained bats. These bats were identified as the following species or groups of species:
  - **2 barbastelle (<1%)**
  - 633 common pipistrelle (92.3%)
  - 47 soprano pipistrelle (6.9%)
  - 1 NSL (<1%)
  - 3 *Myotis* species (<1%)

Transect 5

- **Static 1** - A total of 4,842 sound files were recorded of which 4,178 contained bats. These bats were identified as the following species or groups of species:
  - **6 barbastelle (<1%)**
  - 3506 common pipistrelle (73.3%)
  - 1227 soprano pipistrelle (25.6%)
  - 17 NSL (<1%)
  - 29 *Myotis* species (<1%)
- **Static 3** – A total of 139 sound files were recorded of which 101 contained bats. These bats were identified as the following species or groups of species:

- 33 common pipistrelle (31.7%)
- 49 soprano pipistrelle (47.1%)
- 7 NSL (6.7%)
- 15 *Myotis* species (14.4%)

Transect 6

- **Static 1** – A total of 3,080 sound files were recorded of which 1,422 contained bats. These bats were identified as the following species or groups of species:
  - **17 barbastelle (1.2%)**
  - 1379 common pipistrelle (96.4%)
  - 28 soprano pipistrelle (2%)
  - 2 NSL (<1%)
  - 5 BLE (<1%)
- **Static 3** – A total of 76 sound files were recorded of which 37 contained bats. These bats were identified as the following species or groups of species:
  - 27 common pipistrelle (67.5%)
  - 10 soprano pipistrelle (2 %)
  - *1 Myotis* species (2.5%)
  - 2 BLE (5%)

Transect 7

- **Static 1** – A total of 2,257 sound files were recorded of which 101 contained bats. These bats were identified as the following species or groups of species:
  - 36 common pipistrelle (35%)
  - 3 soprano pipistrelle (2.9%)
  - 60 NSL (58.3%)
  - 4 *Myotis* species (3.9%)

CAPITA

- **Static 2** – A total of 718 sound files were recorded of which 287 contained bats. These bats were identified as the following species or groups of species:
  - **2 barbastelle (<1%)**
  - 243 common pipistrelle (83.2%)
  - 41 soprano pipistrelle (14%)
  - 4 NSL (1.4%)
  - 2 *Myotis* species (<1%)
- **Static 3** – A total of 3,773 sound files were recorded of which 609 contained bats. These bats were identified as the following species or groups of species:
  - **7 barbastelle (1.1%)**
  - 522 common pipistrelle (83%)
  - 98 soprano pipistrelle (15.6%)
  - 1 NSL (<1%)
  - 1 *Myotis* species (<1%)

July 2021

Transect 1

- **Static 1** – A total of 858 sound files were recorded of which 798 contained bats. These bats were identified as the following species or groups of species:
  - **8 barbastelle (1%)**
  - 572 common pipistrelle (71.7%)
  - 73 soprano pipistrelle (9.1%)
  - 141 NSL (17.7%)
  - 2 *Myotis* species (>1%)
  - 2 BLE (>1%)

- **Static 2** - A total of 555 sound files were recorded of which 483 contained bats. These bats were identified as the following species or groups of species:
    - 363 common pipistrelle (75.2%)
    - 90 soprano pipistrelle (18.6%)
    - 30 NSL (6.2%)
- **Static 3** - A total of 1,217 sound files were recorded of which 1,165 contained bats. These bats were identified as the following species or groups of species:
    - 975 common pipistrelle (83.7%)
    - 137 soprano pipistrelle (11.8%)
    - 51 NSL (4.4%)
    - 2 *Myotis* species (>1%)

Transect 2

- **Static 1** - A total of 476 sound files were recorded of which 243 contained bats. These bats were identified as the following species or groups of species:
    - **1 barbastelle (>1%)**
    - 105 common pipistrelle (43.2%)
    - 40 soprano pipistrelle (16.5%)
    - 97 NSL (39.9%)
- **Static 2** - A total of 510 sound files were recorded of which 335 contained bats. These bats were identified as the following species or groups of species:
    - 263 common pipistrelle (78.5%)
    - 25 soprano pipistrelle (7.5%)
    - 47 NSL (14%)
- **Static 3** - A total of 805 sound files were recorded of which 726 contained bats. These bats were identified as the following species or groups of species:
    - 468 common pipistrelle (64.5%)

    - 214 soprano pipistrelle (29.5%)
    - 44 NSL (6%)

Transect 3

- **Static 1** - A total of 516 sound files were recorded of which 397 contained bats. These bats were identified as the following species or groups of species:
    - **1 barbastelle (>1 %)**
    - 289 common pipistrelle (72.8%)
    - 94 soprano pipistrelle (23.7%)
    - 11 NSL (2.8%)
    - 2 *Myotis* species (>1%)
- **Static 2** - A total of 157 sound files were recorded of which 129 contained bats. These bats were identified as the following species or groups of species:
    - **2 barbastelle (1.6%)**
    - 68 common pipistrelle (52.7%)
    - 34 soprano pipistrelle (26.4%)
    - 22 NSL (17.1%)
    - 3 *Myotis* species (2.3%)
- **Static 3** - A total of 661 sound files were recorded of which 146 contained bats. These bats were identified as the following species or groups of species:
    - 64 common pipistrelle (43.8%)
    - 61 soprano pipistrelle (41.8%)
    - 20 NSL (13.7%)
    - 1 *Myotis* species (>1%)

Transect 4

- **Static 1** - A total of 419 sound files were recorded of which 280 contained bats. These bats were identified as the following species or groups of species:
    - **7 barbastelle (2.5%)**
    - 227 common pipistrelle (81.1%)
    - 29 soprano pipistrelle (10.4%)
    - 17 NSL (6.1%)

Transect 5

- **Static 1** - A total of 1,639 sound files were recorded of which 638 contained bats. These bats were identified as the following species or groups of species:
    - **5 barbastelle (>1%)**
    - 270 common pipistrelle (42.3%)
    - 337 soprano pipistrelle (52.8%)
    - 13 NSL (2%)
    - 13 *Myotis* species (2%)
- **Static 3** - A total of 160 sound files were recorded, of which 132 contained bats. These bats were identified as the following species or groups of species:
    - 57 common pipistrelle (43.2%)
    - 54 soprano pipistrelle (40.9%)
    - 12 NSL (9.1%)
    - 9 *Myotis* species (6.8%)

Transect 6

- **Static 1** - A total of 1,267 sound files were recorded of which 1,183 contained bats. These bats were identified as the following species or groups of species:

    - 972 common pipistrelle (82.2%)
    - 187 soprano pipistrelle (15.8%)
    - 10 NSL (<1%)
    - 14 *Myotis* species (1.2%)
- **Static 3** - A total of 1,528 sound files were recorded of which 428 contained bats. These bats were identified as the following species or groups of species:
    - **1 barbastelle (>1%)**
    - 316 common pipistrelle (73.8%)
    - 102 soprano pipistrelle (23.8%)
    - 8 NSL (1.9%)
    - 1 *Myotis* species (>1%)

Transect 7

- **Static 1** - A total of 201 sound files were recorded of which 75 contained bats. These bats were identified as the following species or groups of species:
    - 52 common pipistrelle (69.3%)
    - 18 soprano pipistrelle (24%)
    - 2 NSL (2.7%)
    - 3 *Myotis* species (4%)
- **Static 2** - A total of 1,927 sound files were recorded of which 479 contained bats. These bats were identified as the following species or groups of species:
    - **3 barbastelle (<1%)**
    - 358 common pipistrelle (74.7%)
    - 113 soprano pipistrelle (23.6%)
    - 3 NSL (<1%)
    - 2 *Myotis* species (<1%)

- **Static 3** - A total of 238 sound files were recorded of which 191 contained bats. These bats were identified as the following species or groups of species:
    - **6 barbastelle (3.1%)**
    - 135 common pipistrelle (70.7%)
    - 44 soprano pipistrelle (23%)
    - 6 NSL (3.1%)

August 2021

Transect 1

- **Static 1** – A total of 2,530 sound files were recorded, of which 1,841 contained bats. These bats were identified as the following species or groups of species:
    - **21 barbastelle (1.1%)**
    - 1332 common pipistrelle (72.4%)
    - 421 soprano pipistrelle (22.9%)
    - 64 NSL (3.5%)
    - 1 *Myotis* species (<1%)
    - 2 BLE (<1%)
- **Static 2** - A total of 6,589 sound files were recorded, of which 322 contained bats. These bats were identified as the following species or groups of species:
    - **16 barbastelle (5%)**
    - 174 common pipistrelle (54%)
    - 34 soprano pipistrelle (10.6%)
    - 97 NSL (30.1%)
    - 1 *Myotis* species (<1%)
- **Static 3** – A total of 6,596 sound files were recorded of which 6,002 contained bats. These bats were identified as the following species or groups of species:

- **11 barbastelle (<1%)**
- 4598 common pipistrelle (76.6%)
- 1033 soprano pipistrelle (17.2%)
- 359 NSL (6%)
- 1 *Myotis* species (<1%)

Transect 2

- **Static 1** – A total of 1,033 sound files were recorded of which 22 contained bats. These bats were identified as the following species or groups of species:
    - **5 barbastelle (23.7%)**
    - 5 common pipistrelle (23.7%)
    - 7 soprano pipistrelle (31.8%)
    - 5 NSL (23.7%)
- **Static 2** – A total of 9,699 sound files were recorded of which 292 contained bats. These bats were identified as the following species or groups of species:
    - **43 barbastelle (14.7%)**
    - 228 common pipistrelle (78.1%)
    - 5 soprano pipistrelle (1.7%)
    - 16 NSL (5.5%)
- **Static 3** – A total of 13,439 sound files were recorded of which 392 contained bats. These bats were identified as the following species or groups of species:
    - **8 barbastelle (2%)**
    - 301 common pipistrelle (76.8%)
    - 61 soprano pipistrelle (15.6%)
    - 21 NSL (5.4%)
    - 1 *Myotis* species (<1%)

Transect 3

- **Static 1** – A total of 4,080 sound files were recorded, of which 215 contained bats. These bats were identified as the following species or groups of species:
    - **15 barbastelle (7%)**
    - 150 common pipistrelle (69.8%)
    - 27 soprano pipistrelle (12.6%)
    - 23 NSL (10.7%)
- **Static 2** – A total of 4,055 sound files were recorded of which 2,141 contained bats. These bats were identified as the following species or groups of species:
    - **12 barbastelle (<1%)**
    - 1707 common pipistrelle (79.8%)
    - 342 soprano pipistrelle (16%)
    - 71 NSL (3.3%)
    - 4 *Myotis* species (<1%)
    - 2 BLE (<1%)
- **Static 3** - A total of 5,443 sound files were recorded of which 856 contained bats. These bats were identified as the following species or groups of species:
    - **14 barbastelle (1.6%)**
    - 337 common pipistrelle (39.4%)
    - 456 soprano pipistrelle (53.3%)
    - 45 NSL (5.3%)
    - 4 *Myotis* species (<1%).
- **Static 4** - A total of 5,721 sound files were recorded of which 248 contained bats. These bats were identified as the following species or groups of species:

CAPITA

- **37 barbastelle (14.9%)**
- 103 common pipistrelle (41.5%)
- 74 soprano pipistrelle (29.8%)
- 28 NSL (11.3%)
- 2 *Myotis* species (<1%)
- 4 BLE (1.6%)

Transect 4

- **Static 1** - A total of 870 sound files were recorded of which 203 contained bats. These bats were identified as the following species or groups of species:
    - **3 barbastelle (1.5%)**
    - 29 common pipistrelle (14.3%)
    - 156 soprano pipistrelle (76.8%)
    - 14 NSL (6.9%)
    - 1 *Myotis* species (<1%)

Transect 5

- **Static 1** – A total of 15,457 sound files were recorded of which 527 contained bats. These bats were identified as the following species or groups of species:
    - **24 barbastelle (4.6%)**
    - 190 common pipistrelle (36.1%)
    - 290 soprano pipistrelle (55%)
    - 17 NSL (3.2%)
    - 6 *Myotis* (1.1%)
- **Static 3** - A total of 13,788 sound files were recorded of which 305 contained bats. These bats were identified as the following species or groups of species:

- **6 barbastelle (2%)**
- 131 common pipistrelle (43%)
- 120 soprano pipistrelle (39.3%)
- 25 NSL (8.2%)
- 23 *Myotis* species (7.5%)

Transect 6

- **Static 1** – A total of 10,014 sound files were recorded of which 1,045 contained bats. These bats were identified as the following species or groups of species:
  - **8 barbastelle (<1%)**
  - 298 common pipistrelle (28.5%)
  - 729 soprano pipistrelle (69.8%)
  - 6 NSL (<1%)
  - 3 *Myotis* species (<1%)
- **Static 3** – A total of 14,832 sound files were recorded of which 764 contained bats. These bats were identified as the following species or groups of species:
  - **54 barbastelle (6.6%)**
  - 193 common pipistrelle (23.6%)
  - 493 soprano pipistrelle (60.3%)
  - 68 NSL (8.3%)
  - 10 *Myotis* species (1.2%)

Transect 7

- **Static 1** – A total of 1,370 sound files were recorded of which 28 contained bats. These bats were identified as the following species or groups of species:
  - **3 barbastelle (10.7%)**
  - 14 common pipistrelle (50%)

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  - 4 soprano pipistrelle (14.3%)
  - 4 NSL (14.3%)
  - *2 Myotis* species (7.1%)
  - 1 BLE (3.6%)
- **Static 2** – A total of 11,526 sound files were recorded of which 472 contained bats. These bats were identified as the following species or groups of species:
  - **16 barbastelle (3.4%)**
  - 163 common pipistrelle (34.5%)
  - 287 soprano pipistrelle (60.8%)
  - 5 NSL (1. %)
  - 1 *Myotis* species (<1%)
- **Static 3** – A total of 16,084 sound files were recorded of which 314 contained bats. These bats were identified as the following species or groups of species:
  - **40 barbastelle (12.7%)**
  - 222 common pipistrelle (70. %)
  - 46 soprano pipistrelle (14.6%)
  - 5 NSL (1.6%)
  - 1 BLE (<1%)

September 2021

Transect 1

- **Static 1** – A total of 1,038 sound files were recorded of which 588 contained bats. These bats were identified as the following species or groups of species:
  - **4 barbastelle (<1%)**
  - 333 common pipistrelle (56.6%)
  - 198 soprano pipistrelle (33.7%)

- 40 NSL (6.8%)
- 12 *Myotis* species (2%)
- 1 BLE (<1%)

- **Static 2** – A total of 2,528 sound files were recorded of which 528 contained bats. These bats were identified as the following species or groups of species:
  - 345 common pipistrelle (65.3%)
  - 29 soprano pipistrelle (5.5%)
  - 154 NSL (29.2%)
- **Static 3** – A total of 11,219 sound files were recorded of which 323 contained bats. These bats were identified as the following species or groups of species:
  - **43 barbastelle (13.3%)**
  - 195 common pipistrelle (60.4%)
  - 48 soprano pipistrelle (14.9%)
  - 33 NSL (10.2%)
  - 4 *Myotis* species (1.2%)

Transect 2

- **Static 1** – A total of 450 sound files were recorded of which 22 contained bats. These bats were identified as the following species or groups of species:
  - **1 barbastelle (4.5%)**
  - 1 common pipistrelle (4.5%)
  - 12 soprano pipistrelle (54.5%)
  - 8 NSL (36.4%)

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- **Static 2** – A total of 7,214 sound files were recorded of which 316 contained bats. These bats were identified as the following species or groups of species:
  - **12 barbastelle (3.8%)**
  - 236 common pipistrelle (74.7%)
  - 35 soprano pipistrelle (11.1%)
  - 23 NSL (7.3%)
  - 8 *Myotis* species (2.5%)
  - 2 BLE (<1%)
- **Static 3** – A total of 14,521 sound files were recorded of which 115 contained bats. These bats were identified as the following species or groups of species:
  - **12 barbastelle (10.4%)**
  - 51 common pipistrelle (44.3%)
  - 25 soprano pipistrelle (21.7%)
  - 26 NSL (22.6%)
  - 1 *Myotis* species (<1%)

Transect 3

- **Static 1** – A total of 4,231 sound files were recorded of which 102 contained bats. These bats were identified as the following species or groups of species:
  - **16 barbastelle (15.7%)**
  - 38 common pipistrelle (37.3%)
  - 27 soprano pipistrelle (26.5%)
  - 18 NSL (17.6%)
  - 3 *Myotis* species (2.9%)

- **Static 2** – A total of 511 sound files were recorded of which 116 contained bats. These bats were identified as the following species or groups of species:
    - **3 barbastelle (2.6%)**
    - 43 common pipistrelle (37.1%)
    - 47 soprano pipistrelle (40.5%)
    - 22 NSL (19%)
    - 1 *Myotis* species (<1%)
- **Static 3** – A total of 7,511 sound files were recorded of which 189 contained bats. These bats were identified as the following species or groups of species:
    - **7 barbastelle (3.7%)**
    - 34 common pipistrelle (18%)
    - 141 soprano pipistrelle (74.6%)
    - 5 NSL (2.6%)
    - 2 *Myotis* species (1.1%)
- **Static 4** – A total of 577 sound files were recorded of which 251 contained bats. These bats were identified as the following species or groups of species:
    - **11 barbastelle (4.4%)**
    - 162 common pipistrelle (64.5%)
    - 56 soprano pipistrelle (22.3%)
    - 18 NSL (7.2%)
    - 2 *Myotis* species (<1%)
    - 2 BLE (<1%)

Transect 4

- **Static 1** – A total of 1,245 sound files were recorded, of which 276 contained bats. These bats were identified as the following species or groups of species:

    - **6 barbastelle (2.2%)**
    - 126 common pipistrelle (45.7%)
    - 130 soprano pipistrelle (47.1%)
    - 12 NSL (4.3%)
    - 2 *Myotis* species (<1%)

Transect 5

- **Static 1** – A total of 1,775 sound files were recorded of which 283 contained bats. These bats were identified as the following species or groups of species:
    - **2 barbastelle (<1%)**
    - 19 common pipistrelle (6.7%)
    - 237 soprano pipistrelle (83.7%)
    - 15 NSL (5.3%)
    - 10 *Myotis* species (3.5%)
- **Static 3** – A total of 5,886 sound files were recorded of which 71 contained bats. These bats were identified as the following species or groups of species:
    - **13 barbastelle (18.3%)**
    - 13 common pipistrelle (18.3%)
    - 26 soprano pipistrelle (36.6%)
    - 10 NSL (14.1%)
    - 9 *Myotis* species (12.7%)

Transect 6

- **Static 1** -. A total of 2,641 sound files were recorded of which 676 contained bats. These bats were identified as the following species or groups of species:
    - **1 barbastelle (<1%)**
    - 104 common pipistrelle (15.4%)

- 563 soprano pipistrelle (83.3%)
- 8 NSL (1.2%)

- **Static 3** – A total of 8,512 sound files were recorded of which 351 contained bats. These bats were identified as the following species or groups of species:
  - **19 barbastelle (5.4 %)**
  - 89 common pipistrelle (25.4 %)
  - 202 soprano pipistrelle (57.5 %)
  - 35 NSL (10 %)
  - 6 *Myotis* species (1.7 %)

Transect 7

- **Static 1** – A total of 1,284 sound files were recorded of which 32 contained bats. These bats were identified as the following species or groups of species:
  - **6 barbastelle (18.8%)**
  - 11 common pipistrelle (34.4%)
  - 7 soprano pipistrelle (21.9%)
  - 7 NSL (21.9%)
  - 1 *Myotis* species (3.1 %)

- **Static 2** – A total of 5,360 sound files were recorded of which 307 contained bats. These bats were identified as the following species or groups of species:
  - **16 barbastelle (5.2%)**
  - 217 common pipistrelle (70.7%)
  - 71 soprano pipistrelle (23.1%)
  - 3 NSL (1%)

- **Static 3** – A total of 8,841 sound files were recorded of which 208 contained bats. These bats were identified as the following species or groups of species:
  - **31 barbastelle (14.9%)**
  - 101 common pipistrelle (48.6%)
  - 70 soprano pipistrelle (33.7%)
  - 3 NSL (1.4%)
  - 3 *Myotis* species (1.4%)

October 2021

Transect 1

- **Static 1** – A total of 1,747 sound files were recorded of which 1,515 contained bats. These bats were identified as the following species or groups of species:
  - **10 barbastelle (<1%)**
  - 980 common pipistrelle (64.7%)
  - 499 soprano pipistrelle (32.9%)
  - 13 NSL (<1%)
  - 13 *Myotis* species (<1%)

- **Static 2** – A total of 2,305 sound files were recorded of which 1,195 contained bats. These bats were identified as the following species or groups of species:
  - **3 barbastelle (<1%)**
  - 1007 common pipistrelle (84.3%)
  - 164 soprano pipistrelle (13.7%)
  - 20 NSL (1.7%)
  - 1 *Myotis* species (<1 %)

- **Static 3** – A total of 4,170 sound files were recorded of which 3,802 contained bats. These bats were identified as the following species or groups of species:
    - **3 barbastelle (<1%)**
    - 2833 common pipistrelle (74.5%)
    - 931 soprano pipistrelle (24.5%)
    - 24 NSL (<1%)
    - 11 *Myotis* species (<1%)

Transect 2

- **Static 1** – A total of 82 sound files were recorded of which 45 contained bats. These bats were identified as the following species or groups of species:
    - 1 common pipistrelle (2.2%)
    - 14 soprano pipistrelle (31.1%)
    - 30 NSL (66.7%)
- **Static 2** – A total of 454 sound files were recorded of which 255 contained bats. These bats were identified as the following species or groups of species:
    - **1 barbastelle (<1%)**
    - 225 common pipistrelle (88.2%)
    - 13 soprano pipistrelle (5.1%)
    - 14 NSL (5.5%)
    - 2 *Myotis* species (<1%)
- **Static 3** – A total of 939 sound files were recorded of which 890 contained bats. These bats were identified as the following species or groups of species:
    - **1 barbastelle (<1%)**
    - 607 common pipistrelle (68.2%)
    - 272 soprano pipistrelle (30.6%)
    - 9 NSL (1%)

    - 1 *Myotis* species (<1%)

Transect 3

- **Static 1** – A total of 1,139 sound files were recorded of which 83 contained bats. These bats were identified as the following species or groups of species:
    - 59 common pipistrelle (71.1%)
    - 21 soprano pipistrelle (25.3%)
    - 3 NSL (3.6%)
- **Static 2** – A total of 5,837 sound files were recorded of which 5,793 contained bats. These bats were identified as the following species or groups of species:
    - **18 barbastelle (<1%)**
    - 3762 common pipistrelle (64.9%)
    - 1833 soprano pipistrelle (31.6%)
    - 169 NSL (2.9%)
    - 9 *Myotis* species (<1%)
    - 2 BLE (<1%)
- **Static 3** – A total of 1,110 sound files were recorded, of which 766 contained bats. These bats were identified as the following species or groups of species:
    - **5 barbastelle (<1%)**
    - 278 common pipistrelle (36.3%)
    - 463 soprano pipistrelle (60.4%)
    - 17 NSL (2.2%)
    - 3 *Myotis* species (<1%)
- **Static 4** – A total of 89 sound files were recorded of which 69 contained bats. These bats were identified as the following species or groups of species:
    - **7 barbastelle (10.1%)**
    - 47 common pipistrelle (68.1%)

- 13 soprano pipistrelle (18.8%)
- 2 NSL (2.9%)

Transect 4

- **Static 1** – A total of 498 sound files were recorded of which 440 contained bats. These bats were identified as the following species or groups of species:
  - 311 common pipistrelle (70.7%)
  - 111 soprano pipistrelle (25.2%)
  - 16 NSL (3.6%)
  - 2 *Myotis* species (<1%)

Transect 5

- **Static 1** – A total of 170 sound files were recorded of which 138 contained bats. These bats were identified as the following species or groups of species:
  - **1 barbastelle (<1%)**
  - 32 common pipistrelle (23.2%)
  - 93 soprano pipistrelle (67.4%)
  - 8 NSL (5.8%)
  - 4 *Myotis* species (2.9%)
- **Static 3** – A total of 71 sound files were recorded of which 53 contained bats. These bats were identified as the following species or groups of species:
  - 5 common pipistrelle (9.4%)
  - 20 soprano pipistrelle (37.7%)
  - 17 NSL (32.1%)
  - 11 *Myotis* species (20.8%)

Transect 6

- **Static 1** – A total of 212 sound files were recorded of which 174 contained bats. These bats were identified as the following species or groups of species:

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- **6 barbastelle (3.4%)**
- 87 common pipistrelle (50%)
- 79 soprano pipistrelle (45.4%)
- 1 NSL (<1%)
- 1 *Myotis* species (<1%)
- **Static 3** – A total of 303 sound files were recorded of which 204 contained bats. These bats were identified as the following species or groups of species:
  - **5 barbastelle (2.5%)**
  - 13 common pipistrelle (6.4%)
  - 167 soprano pipistrelle (81.9%)
  - 16 NSL (7.8%)
  - 3 *Myotis* species (1.5%)

Transect 7

- **Static 1** – A total of 56 sound files were recorded of which 23 contained bats. These bats were identified as the following species or groups of species:
  - **1 barbastelle (4.3%)**
  - 9 common pipistrelle (39.1%)
  - 4 soprano pipistrelle (17.4%)
  - 9 NSL (39.1%)
- **Static 2** – A total of 329 sound files were recorded of which 244 contained bats. These bats were identified as the following species or groups of species:
  - **1 barbastelle (<1%)**
  - 148 common pipistrelle (60.7%)
  - 92 soprano pipistrelle (37.7%)
  - 3 NSL (1.2%)

- **Static 3** – A total of 12,199 sound files were recorded of which 146 contained bats. These bats were identified as the following species or groups of species:
  - **38 barbastelle (26%)**
  - 49 common pipistrelle (33.6%)
  - 49 soprano pipistrelle (33.6%)
  - 9 NSL (6.2%)
  - 1 *Myotis* species (<1%)

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Table 5: Total Counts and Percentages of Bat Sound Recordings per Species or Species Group

Static ID		Barbastelle		Common pipistrelle		Soprano pipistrelle		Nathusius' pipistrelle		NSL		*Myotis* species		BLE	
		Total at static location	% of bats at static location	Total at static location	% of bats at static location	Total at static location	% of bats at static location	Total at static location	% of bats at static location	Total at static location	% of bats at static location	Total at static location	% of bats at static location	Total at static location	% of bats at static location
Transect 1	Static 1	**235***	**3.3**	4920	68.7	1572	21.9	0	0	361	5	45	0.6	**32***	0.4
	Static 2	34	0.7	3612	77.3	605	12.9	0	0	420	9	4	0.1	0	0
	Static 3	92	0.5	**15632***	79.6	3222	16.4	**1***	<0.1	**662***	3.4	25	0.1	3	<0.1
Transect 2	Static 1	9	2.1	149	35.5	89	21.2	0	0	172	41	1	0.2	0	0
	Static 2	68	2.2	2793	88.5	124	3.9	0	0	155	4.9	12	0.4	3	0.1
	Static 3	29	0.8	2501	71.6	833	23.8	0	0	119	3.4	10	0.3	1	<0.1
Transect 3	Static 1	47	2.9	1027	64.2	399	25	**1***	0.1	94	5.9	31	1.9	0	0
	Static 2	59	0.5	8991	70.9	3026	23.9	0	0	507	4	79	0.6	15	0.1
	Static 3	27	0.6	1832	40.8	2003	44.7	0	0	598	13.3	24	0.5	1	<0.1
	Static 4	55	9.7	312	54.9	143	25.2	0	0	48	8.5	4	0.7	6	1.1
Transect 4	Static 1	20	0.8	2018	78	479	18.5	0	0	61	2.4	10	0.4	0	0
Transect 5	Static 1	40	0.4	6168	59.6	**3954***	38.2	0	0	99	1	**93***	0.9	0	0
	Static 3	19	1.6	445	36.6	456	37.5	0	0	211	17.4	84	6.9	0	0
Transect 6	Static 1	32	0.7	3025	64.2	1597	33.9	0	0	31	0.7	21	0.4	5	0.1
	Static 3	79	3.3	1128	47.0	1009	42.0	0	0	148	6.2	36	1.5	2	0.1
Transect 7	Static 1	10	3.3	151	50.5	42	14.0	0	0	85	28.4	10	3.3	1	0.3
	Static 2	48	2.4	1228	61.4	622	31.1	0	0	88	4.4	13	0.7	0	0
	Static 3	150	8.7	1055	61	494	28.6	0	0	24	1.4	5	0.3	1	0.1
Total across all statics		1053	1.3	56987	68.5	20669	24.9	2	<0.1	3883	4.7	507	0.6	70	0.1

* denotes max count for each species/species group.

5. Conclusion

5.1.1. Evidence of at least seven species/groups of bat: barbastelle, common, soprano, and Nathusius' pipistrelle, *Myotis* species, noctule/serotine/Leisler's (NSL) and brown long-eared (BLE) bats were recorded during the surveys and found to be present across the seven transect locations through recordings from the static detectors.

5.1.2. The presence of barbastelle bats is of particular note being an Annex II species and one of the rarer species recorded in the UK particularly with Eversden and Wimpole Woods SAC (that has been designated for the colony of barbastelle bats associated with the trees in Wimpole Woods[1]) lying approximately 10 km west of the route.

5.1.3. Barbastelle bats were recorded at all static locations with the highest number of barbastelle passes recorded at:

- Transect 1 S1 in May (144) – North-west of the site.
- Transect 6 S3 in August (54) – South-east of the site.
- Transect 1 S1 in June (48) - North-west of the site.
- Transect 1 S3 in September (43) - North-west of the site.
- Transect 2 S2 in August (43) - North-west of the site.

5.1.4. No bat roosts have been recorded during the 2021 survey season in the trees in close proximity to North Farm. Due to the recording times on the static detector near the woodland to the south of North Farm, common and soprano pipistrelle may be using trees in the woodland as roosting sites. However, none of the trees are to be directly impacted by the scheme.

5.1.5. Sufficient survey effort consisting of tree PRAs, static detector deployment, emergence/re-entry surveys of trees have been undertaken during 2021 to provide a comprehensive survey data throughout the scheme.

5.1.6. The total number of recordings and species found, combined with the presence of habitats suitable of supporting bats including woodlands, open fields, waterbodies, and linear habitat features such as rivers, streams and hedge lines, show that the survey route provides suitable habitats for foraging and commuting bats.

[1] JNCC Eversden and Wimpole Woods SAC information sheet. Available: https://sac.jncc.gov.uk/site/UK0030331

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6. References

Collins, J. (2016) *Bat Surveys for Professional Ecologists —Good Practice Guidelines, 3rd edition.* Bat Conservation Trust, London.

JNCC (2021) Eversden and Wimpole Woods https://sac.jncc.gov.uk/site/UK0030331

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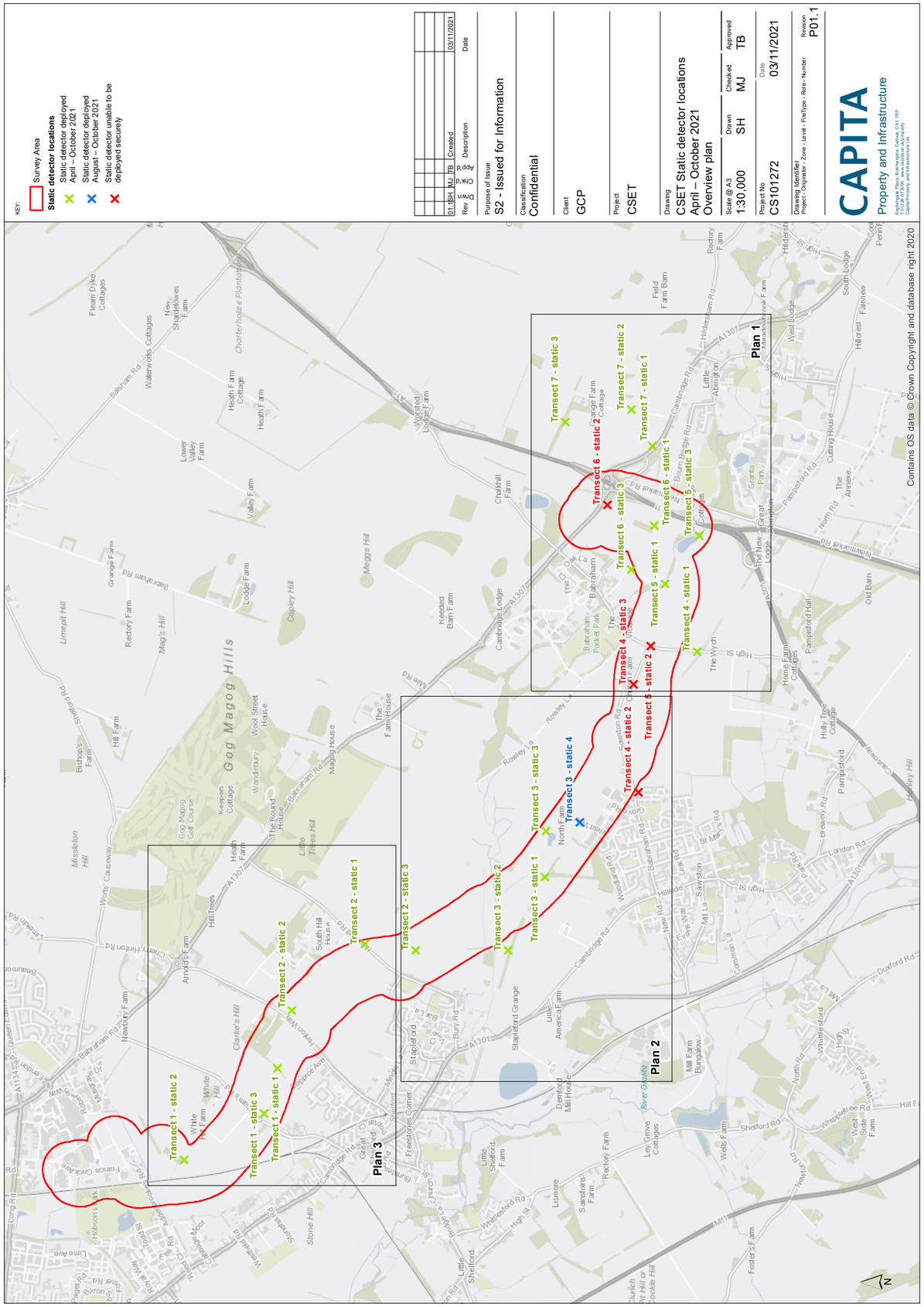
WYG. (Dec 2019). *Cambridge South East Transport Strategy (CSET). Bat Activity Report*

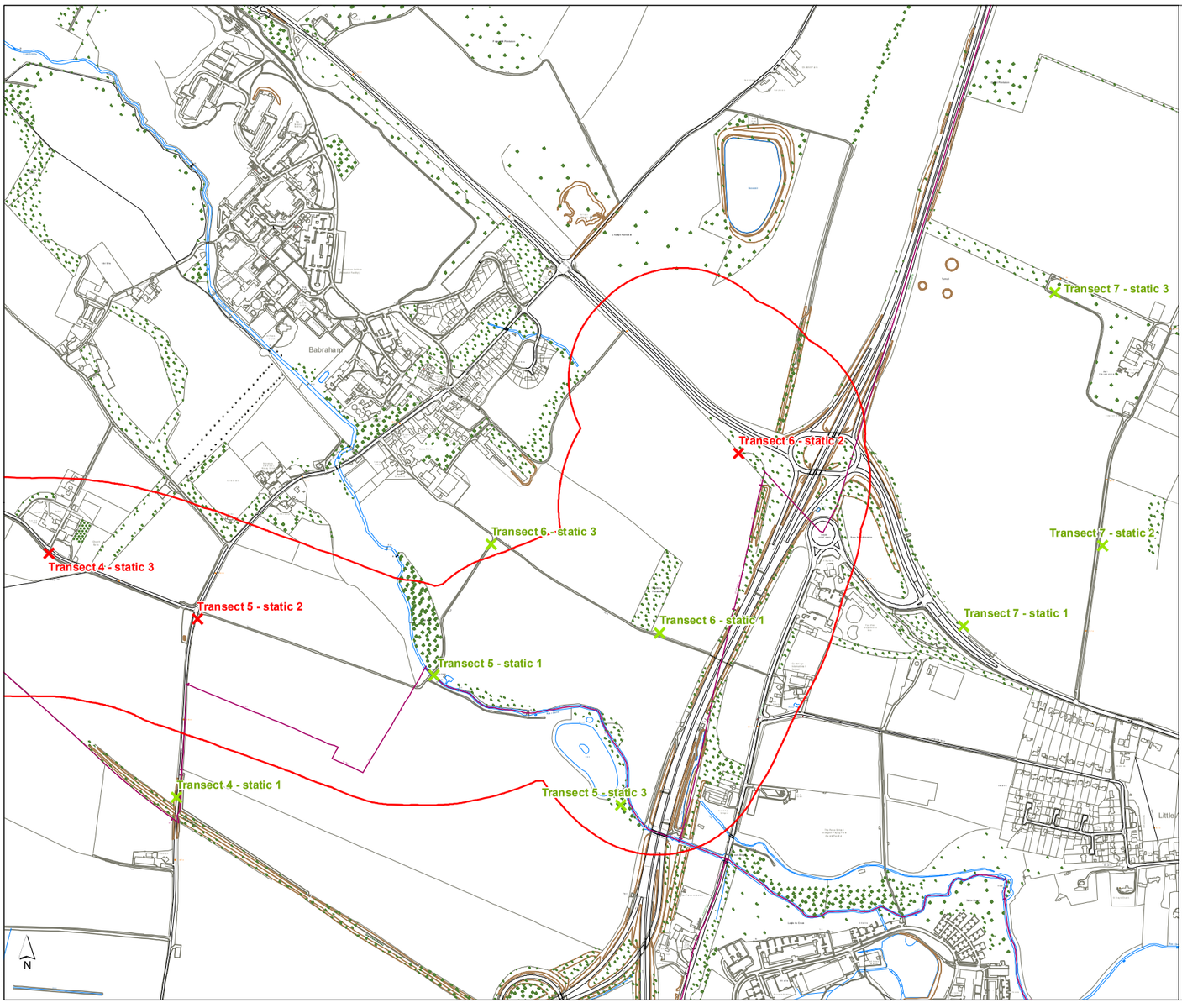
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Appendices

Appendix A – Static Detector Location Map





KEY:

Survey Area

Static detector locations

- April – October 2021
- Static detector deployed August – October 2021
- Static detector unable to be deployed securely

Rev.	Drawn	Chk'd	App'd	Description	Date
01.1	SH	MJ	TB	Created	03/11/2021

Purpose of Issue
S2 - Issued for Information

Classification
Confidential

Client
GCP

Project
CSET

Drawing
CSET Static detector locations
April – October 2021
Plan 1

Scale @ A3	Drawn	Checked	Approved
1:8,500	SH	MJ	TB

Project No
CS101272

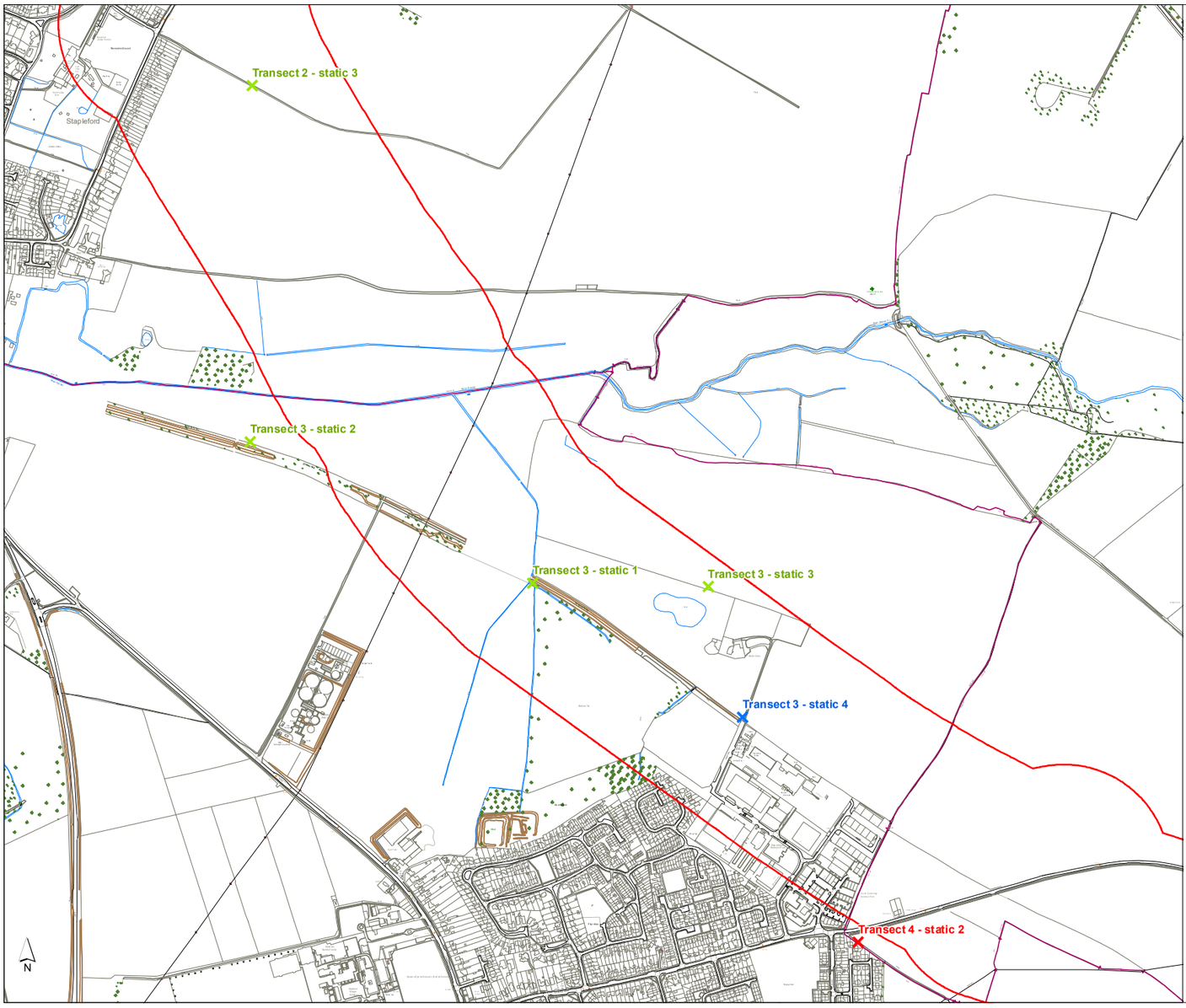
Date
03/11/2021

Drawing Identifier
Project - Originator - Zone - Level - FileType - Role - Number

Revision
P01.1

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KEY:

Survey Area

Static detector locations

- April – October 2021
- Static detector deployed August – October 2021
- Static detector unable to be deployed securely

Rev.	Drawn	Chk'd	App'd	Description	Date
01.1	SH	MJ	TB	Created	03/11/2021

Purpose of Issue
S2 - Issued for Information

Classification
Confidential

Client
GCP

Project
CSET

Drawing
CSET Static detector locations
April – October 2021
Plan 2

Scale @ A3	Drawn	Checked	Approved
1:8,500	SH	MJ	TB

Project No
CS101272

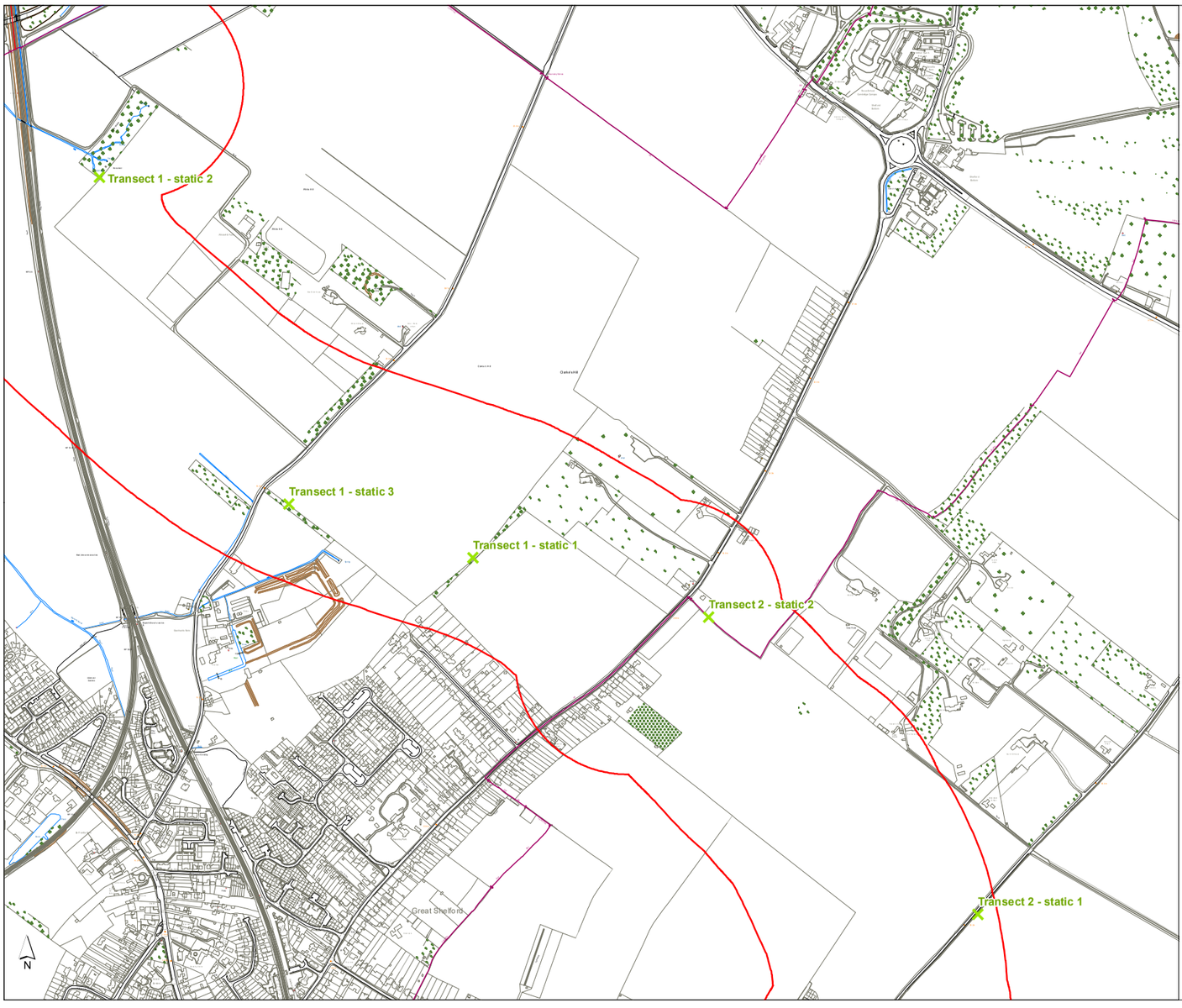
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03/11/2021

Drawing Identifier
Project - Originator - Zone - Level - FileType - Role - Number

Revision
P01.1

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KEY:

Survey Area

Static detector locations

- April – October 2021
- Static detector deployed August – October 2021
- Static detector unable to be deployed securely

Rev.	Drawn	Chk'd	App'd	Description	Date
01.1	SH	MJ	TB	Created	03/11/2021

Purpose of Issue
S2 - Issued for Information

Classification
Confidential

Client
GCP

Project
CSET

Drawing
CSET Static detector locations
April – October 2021
Plan 3

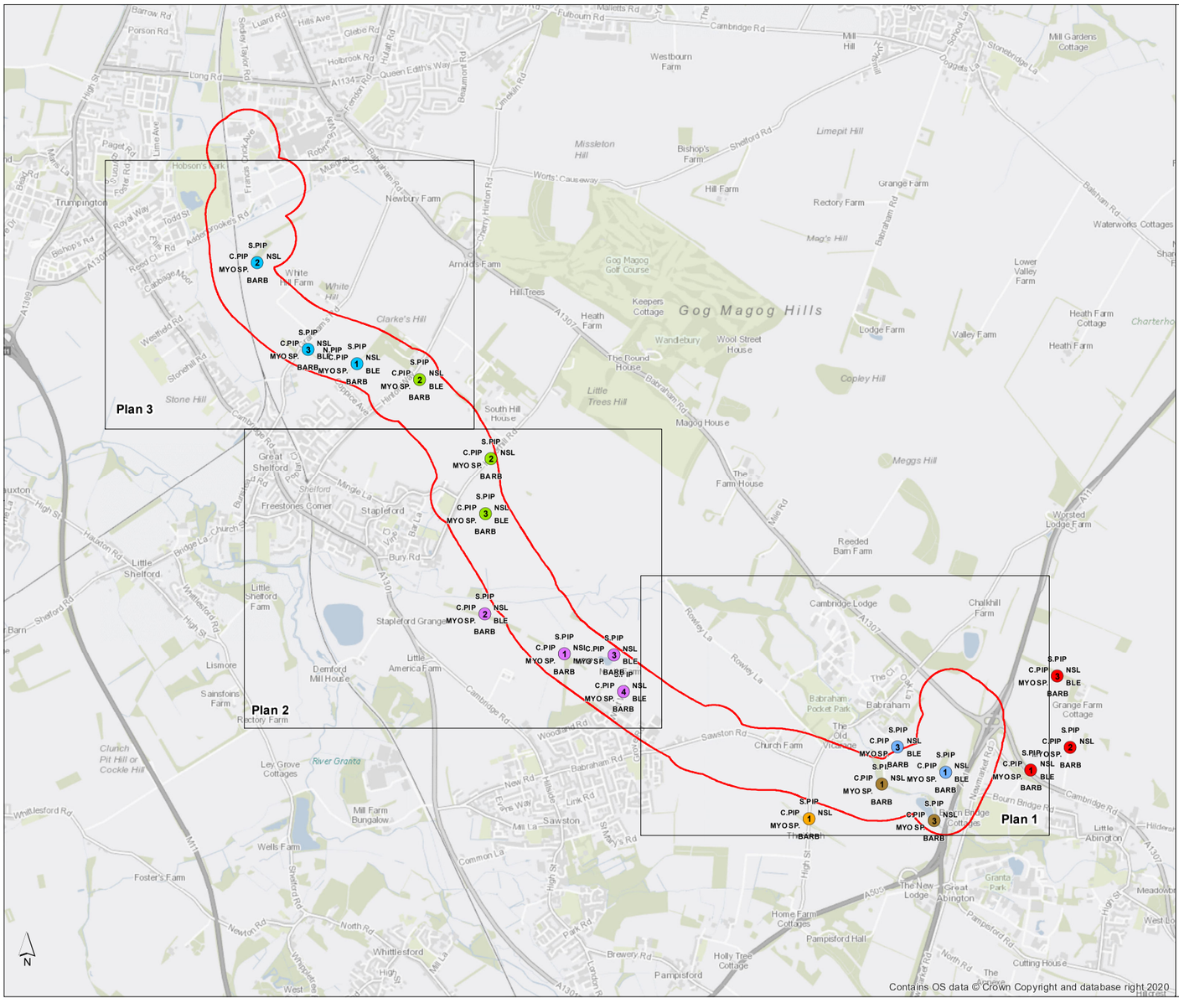
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Project No: CS101272
Date: 03/11/2021

Drawing Identifier
Project - Originator - Zone - Level - FileType - Role - Number
Revision: P01.1

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KEY:

Survey Area

Static Detector locations

- Transect 1
- Transect 2
- Transect 3
- Transect 4
- Transect 5
- Transect 6
- Transect 7

SPECIES
BARB – Barbastelle
C.PIP – Common pipistrelle
S.PIP – Soprano pipistrelle
NSL – Noctule/Serotine/Leislers
MYO SP. – Myotis species
BLE. – Brown Long-eared
N.PIP – Nathusius' pipistrelle

Rev.	Drawn	Chk'd	App'd	Description	Date
01.1	SH	MJ	TB	Created	04/11/2021

Purpose of Issue
S2 - Issued for Information

Classification
Confidential

Client
GCP

Project
CSET

Drawing
CSET Static detector locations
April – October 2021
Overview plan

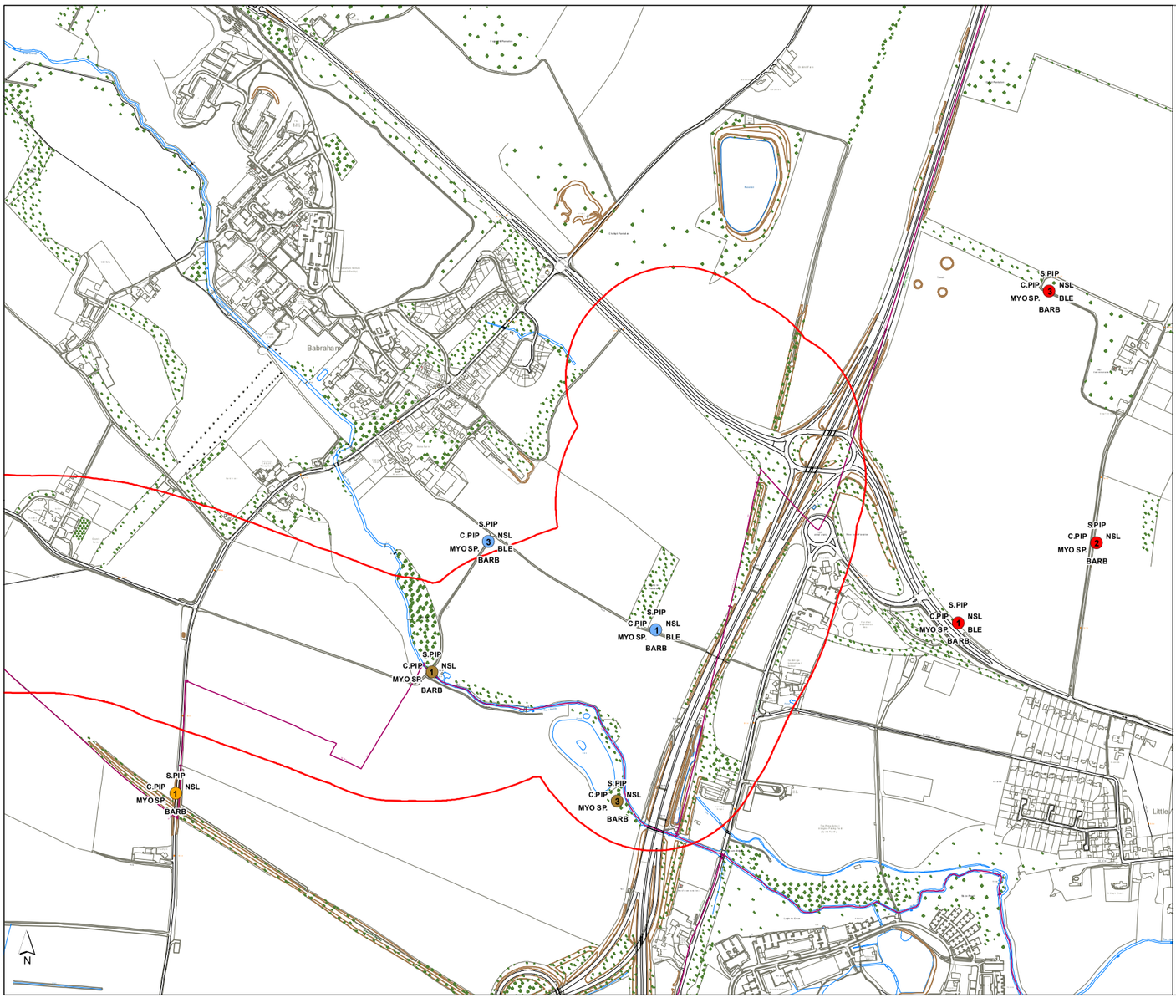
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Project No: CS101272
Date: 04/11/2021

Drawing Identifier
Project - Originator - Zone - Level - FileType - Role - Number
Revision: P01.1

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KEY:

Survey Area

Static Detector locations

- Transect 1
- Transect 2
- Transect 3
- Transect 4
- Transect 5
- Transect 6
- Transect 7

SPECIES
BARB – Barbastelle
C.PIP – Common pipistrelle
S.PIP – Soprano pipistrelle
NSL – Noctule/Serotine/Leislers
MYO SP. – Myotis species
BLE. – Brown Long-eared
N.PIP – Nathusius' pipistrelle

Rev.	Drawn	Chk'd	App'd	Description	Date
01.1	SH	MJ	TB	Created	04/11/2021

Purpose of Issue
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Drawing
CSET Static detector locations - Species
Plan 1 of 3

Scale @ A3	Drawn	Checked	Approved
1:8,500	SH	MJ	TB

Project No
CS101272

Date
04/11/2021

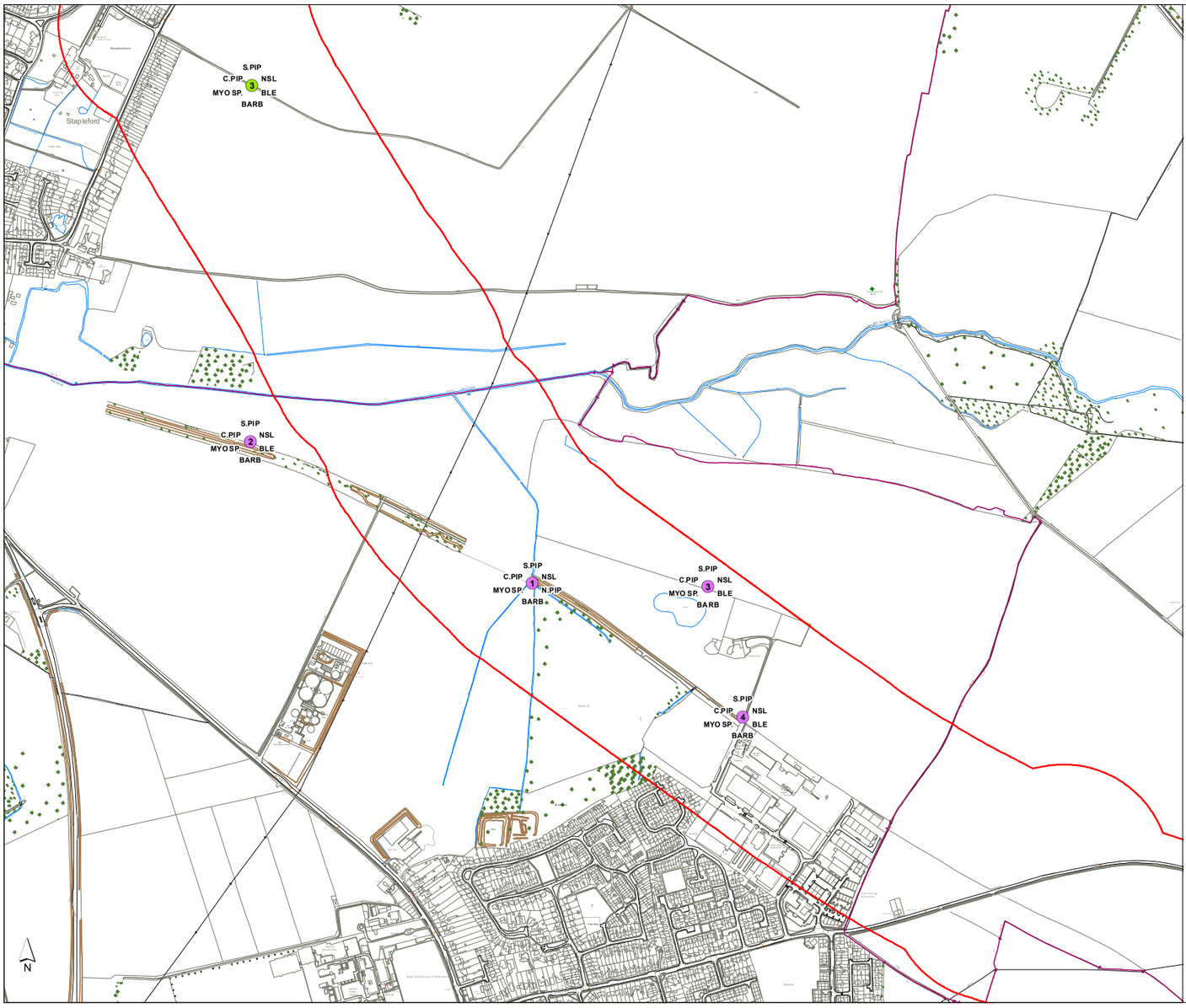
Drawing Identifier
Project - Originator - Zone - Level - FileType - Role - Number

Revision
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KEY:

Survey Area

Static Detector locations

- Transect 1
- Transect 2
- Transect 3
- Transect 4
- Transect 5
- Transect 6
- Transect 7

SPECIES
BARB – Barbastelle
C.PIP – Common pipistrelle
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Purpose of Issue
S2 - Issued for Information

Classification
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Client
GCP

Project
CSET

Drawing
CSET Static detector locations - Species
Plan 2 of 3

Scale @ A3	Drawn	Checked	Approved
1:8,500	SH	MJ	TB

Project No
CS101272

Date
04/11/2021

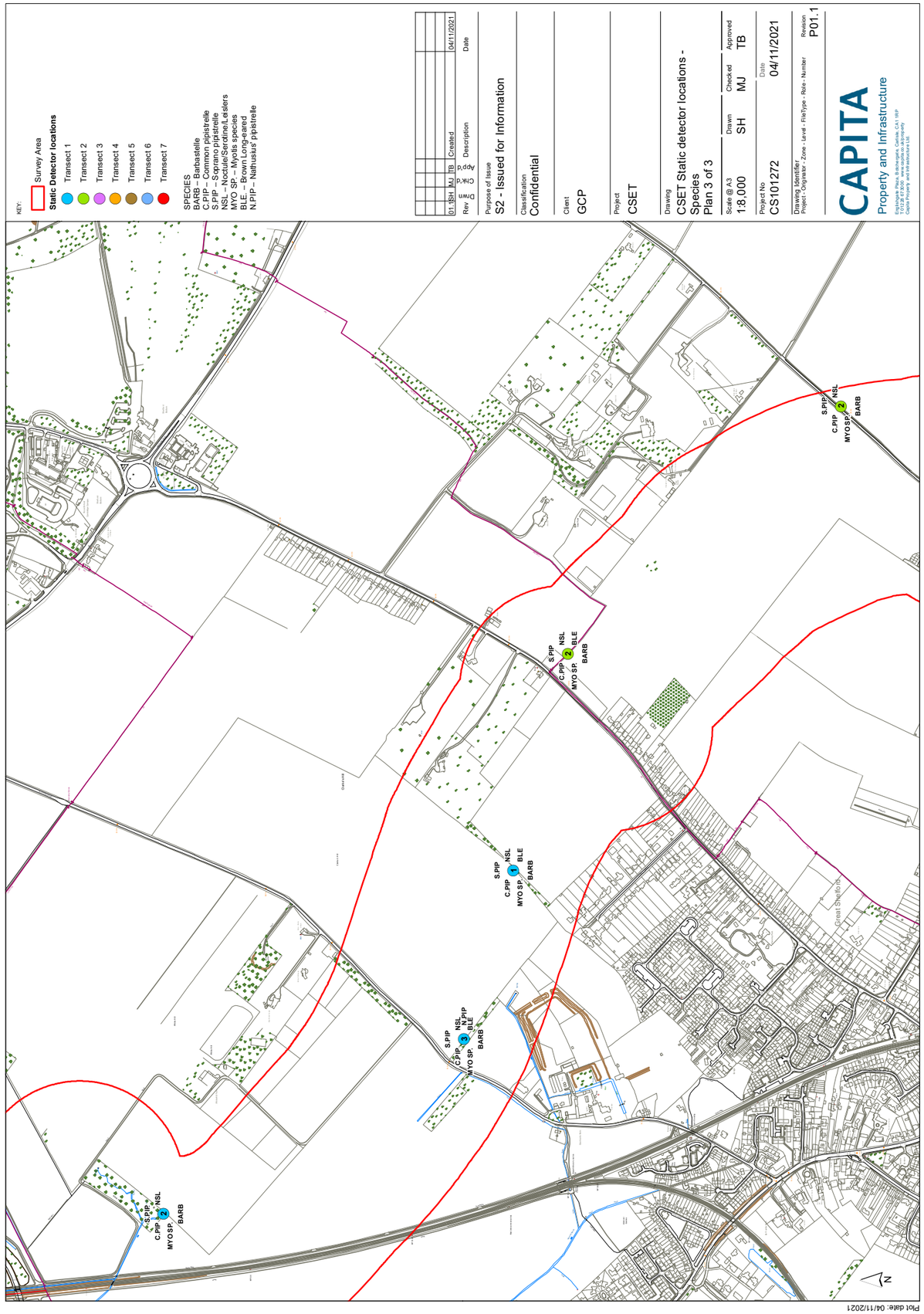
Drawing Identifier
Project - Originator - Zone - Level - FileType - Role - Number

Revision
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Appendix B – Static Deployment Dates

Table 6: April Static Deployment Dates

Static Detector ID	Date of Deployment	Date of Collection
Transect 1 – Static 1	07/04/2021	20/04/2021
Transect 1 – Static 2	07/04/2021	20/04/2021
Transect 1 – Static 3	07/04/2021	20/04/2021
Transect 2 – Static 1	07/04/2021	20/04/2021
Transect 2 – Static 2	07/04/2021	20/04/2021
Transect 2 – Static 3	07/04/2021	20/04/2021
Transect 3 – Static 1	07/04/2021	20/04/2021
Transect 3 – Static 2	07/04/2021	20/04/2021
Transect 3 – Static 3	07/04/2021	20/04/2021
Transect 4 – Static 1	20/04/2021	30/04/2021
Transect 5 – Static 1	20/04/2021	30/04/2021
Transect 5 – Static 3	20/04/2021	30/04/2021
Transect 6 – Static 2	20/04/2021	30/04/2021
Transect 6 – Static 3	20/04/2021	30/04/2021
Transect 7 – Static 1	20/04/2021	30/04/2021
Transect 7 – Static 2	20/04/2021	30/04/2021
Transect 7 – Static 3	20/04/2021	30/04/2021

Table 7: May Static Deployment Dates

Static Detector ID	Date of Deployment	Date of Collection
Transect 1 – Static 1	11/05/2021	17/05/2021
Transect 1 – Static 2	11/05/2021	17/05/2021
Transect 1 – Static 3	11/05/2021	17/05/2021
Transect 2 – Static 1	11/05/2021	17/05/2021
Transect 2 – Static 2	11/05/2021	17/05/2021
Transect 2 – Static 3	11/05/2021	17/05/2021
Transect 3 – Static 1	11/05/2021	17/05/2021
Transect 3 – Static 2	11/05/2021	17/05/2021
Transect 3 – Static 3	11/05/2021	17/05/2021
Transect 4 – Static 1	18/05/2021	24/05/2021
Transect 5 – Static 1	18/05/2021	24/05/2021
Transect 5 – Static 3	18/05/2021	24/05/2021
Transect 6 – Static 2	18/05/2021	24/05/2021
Transect 6 – Static 3	18/05/2021	24/05/2021
Transect 7 – Static 1	18/05/2021	24/05/2021
Transect 7 – Static 2	18/05/2021	24/05/2021
Transect 7 – Static 3	18/05/2021	24/05/2021

Table 8: June Static Deployment Dates

Static Detector ID	Date of Deployment	Date of Collection
Transect 1 – Static 1	08/06/2021	14/06/2021
Transect 1 – Static 2	08/06/2021	14/06/2021
Transect 1 – Static 3	08/06/2021	14/06/2021
Transect 2 – Static 1	08/06/2021	14/06/2021
Transect 2 – Static 2	08/06/2021	14/06/2021
Transect 2 – Static 3	08/06/2021	14/06/2021
Transect 3 – Static 1	08/06/2021	14/06/2021
Transect 3 – Static 2	08/06/2021	14/06/2021
Transect 3 – Static 3	08/06/2021	14/06/2021
Transect 4 – Static 1	15/06/2021	22/06/2021

Static Detector ID	Date of Deployment	Date of Collection
Transect 5 – Static 1	15/06/2021	22/06/2021
Transect 5 – Static 3	15/06/2021	22/06/2021
Transect 6 – Static 2	15/06/2021	22/06/2021
Transect 6 – Static 3	22/06/2021	29/06/2021
Transect 7 – Static 1	15/06/2021	22/06/2021
Transect 7 – Static 2	15/06/2021	22/06/2021
Transect 7 – Static 3	15/06/2021	22/06/2021

Table 9: July Static Deployment Dates

Static Detector ID	Date of Deployment	Date of Collection
Transect 1 – Static 1	14/07/2021	19/07/2021
Transect 1 – Static 2	14/07/2021	19/07/2021
Transect 1 – Static 3	14/07/2021	19/07/2021
Transect 2 – Static 1	14/07/2021	19/07/2021
Transect 2 – Static 2	14/07/2021	19/07/2021
Transect 2 – Static 3	14/07/2021	19/07/2021
Transect 3 – Static 1	14/07/2021	19/07/2021
Transect 3 – Static 2	14/07/2021	19/07/2021
Transect 3 – Static 3	14/07/2021	19/07/2021
Transect 4 – Static 1	20/07/2021	27/07/2021
Transect 4 – Static 2	20/07/2021	27/07/2021
Transect 4 – Static 3	20/07/2021	27/07/2021
Transect 5 – Static 1	20/07/2021	27/07/2021
Transect 5 – Static 2	20/07/2021	27/07/2021
Transect 5 – Static 3	20/07/2021	27/07/2021
Transect 6 – Static 1	20/07/2021	27/07/2021
Transect 6 – Static 2	20/07/2021	27/07/2021
Transect 6 – Static 3	20/07/2021	27/07/2021
Transect 7 – Static 1	20/07/2021	27/07/2021
Transect 7 – Static 2	20/07/2021	27/07/2021
Transect 7 – Static 3	20/07/2021	27/07/2021

Table 10: August Static Deployment Dates

Static Detector ID	Date of Deployment	Date of Collection
Transect 1 – Static 1	03/08/2021	16/08/2021
Transect 1 – Static 2	03/08/2021	16/08/2021
Transect 1 – Static 3	03/08/2021	16/08/2021
Transect 2 – Static 1	03/08/2021	16/08/2021
Transect 2 – Static 2	03/08/2021	16/08/2021
Transect 2 – Static 3	03/08/2021	16/08/2021
Transect 3 – Static 1	03/08/2021	16/08/2021
Transect 3 – Static 2	03/08/2021	16/08/2021
Transect 3 – Static 3	03/08/2021	16/08/2021
Transect 3 – Static 4	17/08/2021	24/08/2021
Transect 4 – Static 1	17/08/2021	24/08/2021
Transect 4 – Static 2	17/08/2021	24/08/2021
Transect 4 – Static 3	17/08/2021	24/08/2021
Transect 5 – Static 1	17/08/2021	24/08/2021
Transect 5 – Static 2	17/08/2021	24/08/2021
Transect 5 – Static 3	17/08/2021	24/08/2021
Transect 6 – Static 1	17/08/2021	24/08/2021
Transect 6 – Static 2	17/08/2021	24/08/2021
Transect 6 – Static 3	17/08/2021	24/08/2021

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Static Detector ID	Date of Deployment	Date of Collection
Transect 7 – Static 1	17/08/2021	24/08/2021
Transect 7 – Static 2	17/08/2021	24/08/2021
Transect 7 – Static 3	17/08/2021	24/08/2021

Table 11: September Deployment Static Dates

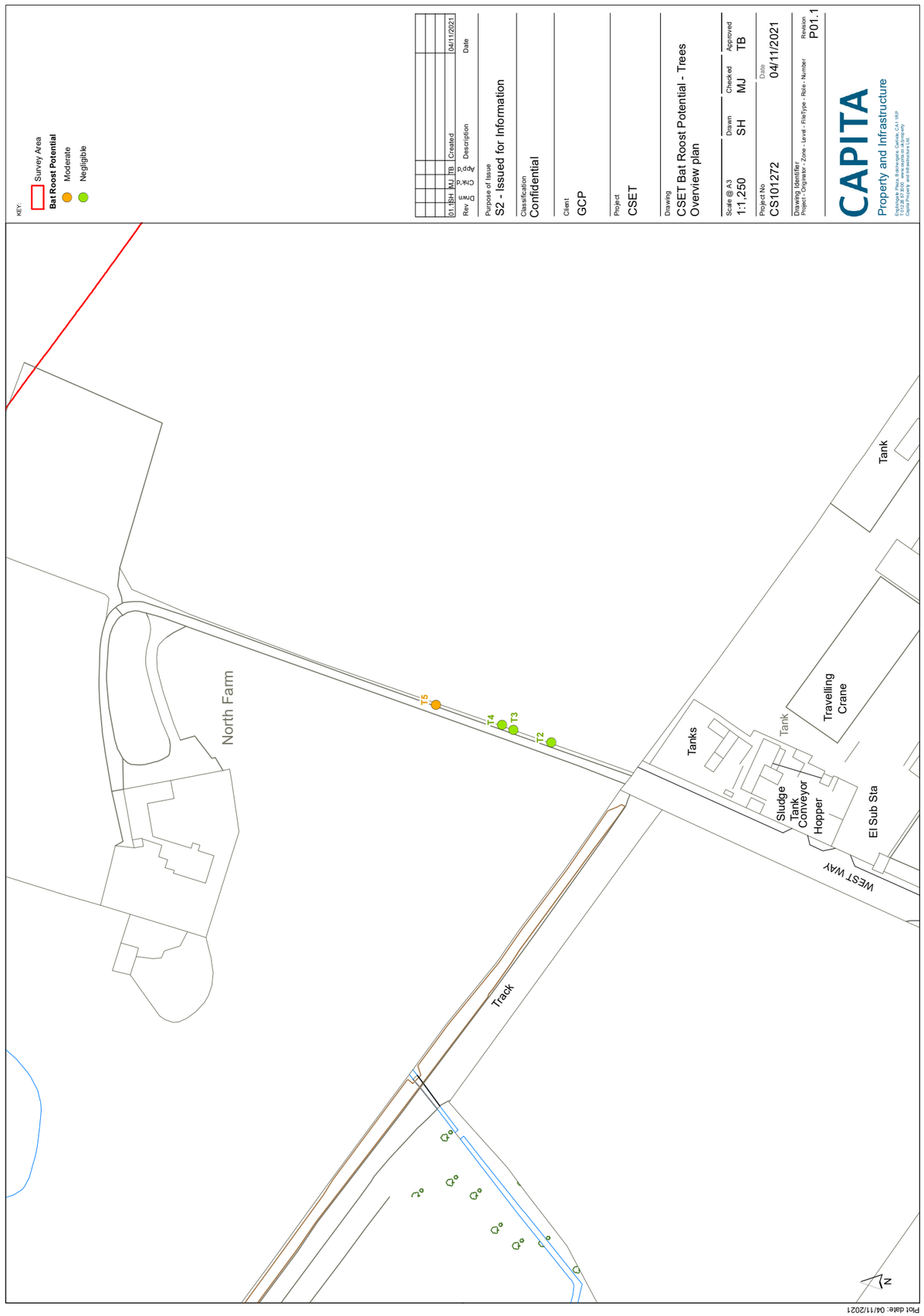
Static Detector ID	Date of Deployment	Date of Collection
Transect 1 – Static 1	01/09/2021	06/09/2021
Transect 1 – Static 2	01/09/2021	06/09/2021
Transect 1 – Static 3	01/09/2021	06/09/2021
Transect 2 – Static 1	01/09/2021	06/09/2021
Transect 2 – Static 2	01/09/2021	06/09/2021
Transect 2 – Static 3	01/09/2021	06/09/2021
Transect 3 – Static 1	01/09/2021	06/09/2021
Transect 3 – Static 2	01/09/2021	06/09/2021
Transect 3 – Static 3	01/09/2021	06/09/2021
Transect 3 – Static 4	07/09/2021	14/09/2021
Transect 4 – Static 1	07/09/2021	14/09/2021
Transect 4 – Static 2	07/09/2021	14/09/2021
Transect 4 – Static 3	07/09/2021	14/09/2021
Transect 5 – Static 1	07/09/2021	14/09/2021
Transect 5 – Static 2	07/09/2021	14/09/2021
Transect 5 – Static 3	07/09/2021	14/09/2021
Transect 6 – Static 1	07/09/2021	14/09/2021
Transect 6 – Static 2	07/09/2021	14/09/2021
Transect 6 – Static 3	07/09/2021	14/09/2021
Transect 7 – Static 1	07/09/2021	14/09/2021
Transect 7 – Static 2	07/09/2021	14/09/2021
Transect 7 – Static 3	07/09/2021	14/09/2021

Table 12: October Static Deployment Dates

Static Detector ID	Date of Deployment	Date of Collection
Transect 1 – Static 1	05/10/2021	11/10/2021
Transect 1 – Static 2	05/10/2021	11/10/2021
Transect 1 – Static 3	11/10/2021	19/10/2021
Transect 2 – Static 1	05/10/2021	11/10/2021
Transect 2 – Static 2	05/10/2021	11/10/2021
Transect 2 – Static 3	05/10/2021	11/10/2021
Transect 3 – Static 1	05/10/2021	11/10/2021
Transect 3 – Static 2	05/10/2021	11/10/2021
Transect 3 – Static 3	05/10/2021	11/10/2021
Transect 3 – Static 4	12/10/2021	19/10/2021
Transect 4 – Static 1	12/10/2021	19/10/2021
Transect 4 – Static 2	12/10/2021	19/10/2021
Transect 4 – Static 3	12/10/2021	19/10/2021
Transect 5 – Static 1	12/10/2021	19/10/2021
Transect 5 – Static 2	12/10/2021	19/10/2021
Transect 5 – Static 3	12/10/2021	19/10/2021
Transect 6 – Static 1	12/10/2021	19/10/2021
Transect 6 – Static 2	12/10/2021	19/10/2021
Transect 6 – Static 3	12/10/2021	19/10/2021
Transect 7 – Static 1	12/10/2021	19/10/2021

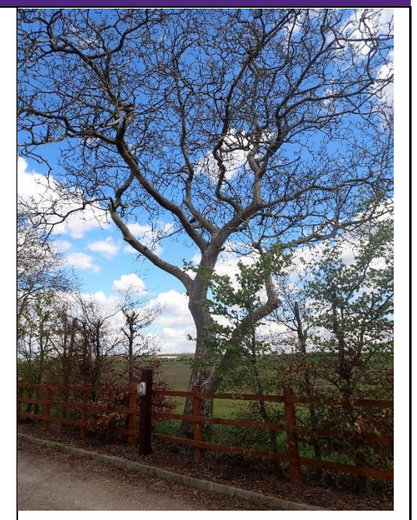
Static Detector ID	Date of Deployment	Date of Collection
Transect 7 – Static 2	12/10/2021	19/10/2021
Transect 7 – Static 3	12/10/2021	19/10/2021

Appendix C - Tree Location Map



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Appendix D - Tree Reference Photos

Tree ID	Grid Reference	Tree species and condition	Overall assessment of roosting potential	Photo
T2	TL 49175 50501	Walnut	Negligible	
T3	TL 49181 50516	Walnut	Negligible	

Tree ID	Grid Reference	Tree species and condition	Overall assessment of roosting potential	Photo
T4	TL 49178 50520	Walnut	Negligible	
T5	TL 49181 50546	Walnut	Moderate	

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Greater Cambridge Partnership

Cambridge South East Transport (CSET) Phase 2

Summer Bat Survey Report



December 2022

Public

Greater Cambridge Partnership

Cambridge South East Transport (CSET) Phase 2

Summer Bat Survey Report

Type of document (version) Public

Project no. ED/000553

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Transect Route Maps
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Cambridge South East Transport (CSET) Phase 2
Project No.: ED/000553
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1

Summary

1 Summary

WSP Real Estate & Infrastructure's (WSP RE&I) Ecologists were commissioned by the Greater Cambridge Partnership (GCP) to undertake studies for bats in relation to the development of the Cambridge South East Transport (CSET) Phase 2.

The surveys have been carried out in 2022 to provide an update of baseline ecological information carried out initially in 2020 and 2021. CSET is now moving forward towards planning submission and update surveys have been commissioned to supplement baseline information with an update from surveys carried out in 2022.

This report describes the methods and results of Preliminary Roost Assessment (PRA) surveys for buildings, ground-level tree assessments, as well as transect surveys and the deployment of static detectors conducted between August and October 2022. These have been carried out to provide additional information on how bats, in particularly barbastelle *Barbastella barbastellus*, are distributed across the Scheme, to inform the design and environmental assessment of the proposals.

Nine of the 12 buildings surveyed in 2020 and within close proximity to the Scheme, were assessed as having 'Negligible' potential to support roosting bats as there were no potential roost features which would support roosting bats and no evidence of bat presence was found during the survey. No further surveys are required. In the unlikely event that bats are found during the works, these must stop immediately, and a bat licensed ecologist be contacted straight away to advise on the management of the scheme and the need for licensing to be in place. The remaining three buildings are residential dwellings on Sawston Road where no access was permitted; therefore, these are categorised as 'Unknown'.

Of the 39 trees surveyed, two were assessed as high and 13 as moderate potential for supporting roosting bats. These trees will require emergence and re-entry surveys to be carried out on them between April to August.

The static detector deployment recorded six species/groups of bat, consisting of barbastelle, common pipistrelle *Pipistrellus pipistrellus*, soprano pipistrelle *Pipistrellus pygmaeus*, noctule *Nyctalus noctula*/serotine *Eptesicus serotinus*/Leisler's *Nyctalus leisleri* (NSL), *Myotis* species *Myotis spp.* and brown long-eared *Plecotus auritus* (BLE).

Barbastelle bats were recorded at all 18 static detector location points.

Barbastelle, common pipistrelle, soprano pipistrelle, noctule/serotine/Leisler's (NSL[1]), brown long-eared bats and, *Myotis* bat species were recorded during the transect surveys.

The farmland, riparian, woodland, and suburban habitats across the survey area provides a range of foraging, commuting and roosting opportunities for bat species.

A series of recommendations are provided in Section 5 of this report that, if adopted, would ensure negative impacts to biodiversity are avoided or limited and the development is managed in line with legislation protecting habitats and species and incorporates positive conservation and enhancement as required to achieve sustainable developments.

[1] A widely used grouping of bat calls for large bats whose calls can overlap in sound analysis

2

Introduction

Public

2 Introduction

2.1 Background

WSP Real Estate & Infrastructure's (WSP RE&I) Ecologists were commissioned by the Greater Cambridge Partnership (GCP) in July 2022 to undertake a series of bat surveys. These surveys were undertaken in relation to the development of the Cambridge South East Transport scheme.

The aim of this bat survey report is to summarise the results of the baseline Preliminary Roost Assessments for buildings, trees and bat activity surveys conducted between August and October 2022 to inform the design of the Scheme. These surveys are required to update surveys undertaken in 2020 and 2021.

2.2 Project Description and Purpose of the Scheme

The Cambridge South East Transport (CSET) aims to create a vital link to ease congestion, offer sustainable travel choices, connect communities, and support growth in the South East of Cambridge. CSET will form part of the Cambridgeshire Autonomous Metro, providing high quality, frequent and affordable public transport.

CSET Phase 2 comprises a segregated public transport route from the A11 (near Babraham) to the Cambridge Biomedical Campus (CBC). This bus route would include new walking, cycling and equestrian links.

2.3 Legislation and Policy

Bats receive protection in the UK as a result of both legislation and planning policies. This section outlines the primary legislation protecting bats. All the information below is relevant to this report and to the work proposed at the development site.

2.3.1 Legislation

Conservation of Habitats and Species Regulations 2017 (as amended)

Bats are protected under Annex II of the EC Council Directive 92/43/EEC 1992 "Conservation of Natural Habitats and Wild Fauna and Flora" (the Habitats Directive) as a European Protected Species (EPS). This legislation has been transposed into UK legislation through the Conservation of Habitats and Species Regulations 2018.

Regulation 43 of the Conservation of Habitats and Species Regulations 2017 (as amended) makes it an offence to:

- Deliberately capture, injure, or kill bats
- Deliberately disturb bats, or

- Damage or destroy a breeding site or resting place of a bat; this applies whether bats are present or not. NB - breeding sites and resting places are generally referred to as roosts.

Purpose of the Legislation

The purpose of the legislation is to maintain and restore bat populations within their natural range. This implies that the habitats on which they rely, and the ecology of their life cycles should not be compromised by human activities. Where activities have the potential to compromise bat populations, measures are required to be put in place to avoid impacts or compensate and mitigate for those impacts.

Wildlife & Countryside Act 1981 (as amended)

In addition to the above protection, all bat species in the UK are protected under Schedule 5 of the Wildlife & Countryside Act 1981 (as amended). In addition to the above, it lists the following as additional offences:

- Disturbance of an animal whilst it is occupying a place which it uses for shelter or protection. NB - places of shelter or protection are generally referred to as roosts
- Obstruct access to any structure or place which an animal uses for shelter or protection.

In order to permit a development where the above offences are likely to be committed a European Protected Species Licence can be obtained from Natural England where appropriate mitigation is offered to offset the negative impacts to local bat populations.

Natural Environment and Rural Communities (NERC) Act 2006

Section 40 of NERC Act 2006 places a statutory duty on public bodies, such as local authorities, that “every public body must, in exercising its functions have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity”.

2.3.2 Planning Policy

National Planning Policy

National Planning Policy is set out by the National Planning Policy Framework (Ministry of Housing, Communities & Local Government, July 2021).

Biodiversity net gains are referenced strongly in terms of developing local planning policy and decision-making for development applications. The environmental test of sustainable development requires planning policy and planning decisions to help to ‘improve biodiversity’ (paragraph 8c).

References to biodiversity net gain elsewhere in the new NPPF (such as paragraph 174d) support the delivery of biodiversity net gain through sustainable development. Net gain for biodiversity is far more prominent than in the previous NPPF and considers a holistic landscape approach to protect, and enhance biodiversity promoting conservation, restoration and enhancement of Priority Habitats (also listed as Habitats of Principal Importance) identified under the NERC Act 2006), ecological networks and the protection and recovery of Priority Species (also listed as Species of Principal Importance) identified under the NERC Act 2006). The NPPF includes requirements for planning authorities to identifying and pursuing opportunities for securing measurable net gains for biodiversity (paragraph 179b).

Protected sites and species are a material consideration in determining planning applications and therefore all information relating to protected sites and species must be submitted with planning submissions for determination of the whole application. The NPPF (paragraph 180) which promotes Local Planning Authorities to assess if significant harm would occur to biodiversity and decide accordingly.

2.3.3 Biodiversity Policy

Section 41 of the NERC Act requires the Secretary of State to draw up a list of Habitats and Species of Principal Importance which should be used to guide decision-makers (which include local authorities) in implementing their duty under Section 40. Several species of bat (listed below) are considered Species of Principal Importance, an important factor when considering proposed developments, in accordance with the NERC Act 2006.

- Soprano pipistrelle *Pipistrellus pygmaeus*
- Brown long-eared *Plecotus auritus*
- Barbastelle *Barbastella barbastellus*
- Bechstein’s *Myotis bechsteinii*
- Noctule *Nyctalus noctula*
- Greater horseshoe *Rhinolophus ferrumequinum*
- Lesser horseshoe *Rhinolophus hipposideros.*

Local Biodiversity Policies

Under the Cambridgeshire and Peterborough Biodiversity Group, four species of bat are recognised as a Local Biodiversity Action Plan (LBAP) Priority Species.

- Soprano pipistrelle
- Brown long-eared bat
- Barbastelle
- Noctule.

2.4 Personnel and Quality Assurance

All ecologists employed by WSP RE&I adopt best practice working methods including the Chartered Institute of Ecology and Environmental Management's (CIEEM) code of professional and all fieldwork is carried out in accordance with current best practice guidelines and under the supervision of senior staff and appropriately licensed ecologists.

The surveys were led by Ecologist, Mark Johnson and assisted by Assistant Ecologist, Tom Norman and Associate Arboriculturist, Gareth Meadows. Surveyors are referred to by their initials in subsequent tables.

Mark Johnson is an Ecologist with five years' experience and is a competent field surveyor. He previously undertook the bat surveys on CSET (2020 and 2021), as well as radio tracking and activity surveys on HS2 and Preliminary Roost Assessments (PRAs) for a range of projects. He has also gained endoscope survey training experience with his local bat group (BrumBats) and is an accredited agent on a Level 2 Natural England Class Licence.

Tom Norman is an Assistant Ecologist with four years' experience as a bat surveyor. He has previously assisted with activity surveys such as emergence/re-entry and transects, as well as static detector deployment on HS2 and on behalf of Highways England.

3

Methodology

3 Methodology

3.1 Survey and Report Objectives

The surveys and report were carried out to fulfil the following objectives:

1. To identify any features on site with the potential to support bats.
2. To identify any evidence of usage of the site by bats.
3. To provide data to inform an assessment of the importance of the site for bats and bat conservation, in particularly barbastelle.

3.2 Data Search

A local records search was obtained from the Cambridgeshire and Peterborough Environmental Records Centre (CPERC) in October 2022 to obtain information on protected or notable species within a 5 km radius of the alignment. This updated the previous data search obtained in 2020.

3.3 Field Survey

3.3.1 Preliminary Roost Assessment Inspection - Buildings

The external inspection survey of the 12 buildings (where access was possible) was undertaken on 15 August 2022 following standard Bat Conservation Trust (BCT) survey guidance (Collins, 2016). Weather conditions on the 15 August were warm (22°C to 30°C) with some periods of intermittent drizzle. A gentle breeze was present throughout the survey (Beaufort scale Force 3). The exterior of the buildings was searched from the ground using a high-powered torch and close-focusing binoculars (where necessary) for:

- Features which could provide bats with access into roosting spaces or provide roosting spaces (such as gaps under roofing tiles, gaps in ridge tiles, gaps in soffit boxes, gaps under lead flashing and cracks and crevices in the stonework); and
- Evidence of the presence of bats such as bat droppings on windows, windowsills, walls and the ground, or scratch marks or staining from bat's fur around possible roost access/egress points.

The building was then assigned a category defining their likelihood to support roosting bats in accordance with Table 3-1 below.

Table 3-1 – Categories of Bat Roosting Suitability of Buildings (adapted from Collins, 2016)

Level of Bat Roosting Suitability	Rationale
Negligible	A structure with no or very limited roosting opportunities for bats and no evidence of use by bats and where the feature is isolated from foraging habitat.
Low	A structure with one or more potential roost sites that could be used by bats opportunistically. However, these potential roost sites do not provide enough space, shelter, protection, appropriate conditions (temperature, humidity etc) and/or suitable surrounding habitat to be used on a regular basis by a larger number of bats (i.e. unlikely to be suitable for maternity or hibernation).
Moderate	A structure 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 of high conservation status (with respect to roost type only i.e. maternity or hibernation roosts).
High	A structure with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions, and surrounding habitat.
Confirmed	Presence of bats or evidence of recent use by bats.

The building numbers used in this report were the same as those assigned in previous reports for ease of reference and to avoid future confusion.

3.3.2 Ground-Level Tree Assessments

An assessment of the likelihood for trees to provide roosting opportunities for bats was also conducted in accordance with current bat survey Good Practice Guidance (Collins, 2016) in August 2022.

The 39 trees were inspected from the ground using binoculars and a high-powered torch as necessary. The following information was recorded for each tree (as required).

- Species of tree
- Description of the tree; and

- A description of any feature(s) with suitability to support roosting bats such as woodpecker holes, rot holes, splits or cracks, dead limbs, ivy cover and/or flaking bark.

Evidence of the use of these features by bats, such as characteristic staining, scratch marks and droppings, was searched for around suitable features, with specific provision for bats (i.e. bat boxes), where present, also recorded.

The Bat Conservation Trust has developed a survey protocol (Collins, 2016) which categorises the suitability for trees to support roosting bats. Using the categories detailed below, an assessment was made of the suitability for each tree/group of trees included within the survey to support roosting bats:

- **Known or Confirmed Roost**: Confirmed bat roost with field evidence of the presence of bats (trees where bat(s), and/or clear evidence of bat use, were found to be present).
- **High Suitability**: Trees with multiple highly suitable features capable of supporting larger roosts.
- **Moderate Suitability**: Trees with definite bat suitability supporting fewer features than high suitability trees.
- **Low Suitability**: Trees with no obvious suitability although the tree is of a size and age that elevated surveys may result in cracks or crevices being found; or the tree supports some features which may have limited suitability to support bats.
- **Negligible Suitability**: Trees with no suitability to support bat roosts (trees with no obvious features with suitability to support a bat roost).

3.3.3 Transect Surveys

Transect Survey Methodology

This report documents the transect surveys conducted in August, September and October 2022. Surveys were undertaken in accordance to BCT guidelines for a site with low/moderate habitat suitability for bats.

Dusk transects commenced at sunset and ended approximately two hours after sunset. Two surveyors walked the predetermined route at a slow, constant speed whist recording observations of bats such as the species, number of bats, location, direction of flight, behaviour and flight height (where bats were clearly visible). Stopping points were implemented at regular intervals along the route at key areas of habitat (shown in Appendix A). Surveyors stopped for five minutes at each stopping point and observed bat activity from a stationary location. The transect direction was reversed for each survey and the starting point was varied.

Anabat Walkabout bat detectors were used to record full-spectrum bat calls. A summary of the survey dates is shown in Table 3-2. Surveys were carried out in appropriate weather conditions and timings, detailed in the Appendix B.

Table 3-2 – Transect Survey Date Summary

Transect number	Month	Date
1	August	08/08/22
	September	01/09/22
	October	05/10/22
2	August	10/08/22
	September	05/09/22
	October	10/10/22
3	August	15/08/22
	September	07/09/22
	October	12/10/22
4	August	17/08/22
	September	08/09/22
	October	17/10/22
5	August	18/08/22
	September	12/09/22
	October	26/10/22
6	August	23/08/22
	September	15/09/22
	October	27/10/22
7	August	31/08/22
	September	20/09/22
	October	20/10/22

Transect Evaluation

Transect Data

Transect sound data was analysed for bat calls using Anabat Insight (version 2.0.6-3-g73846db). All sound files were auto identified using the Bat Classify algorithm in Anabat Insight. A minimum of 10% of files identified as noise by Bat Classify (i.e. those that fell under a 70% probability of being a bat) were manually checked by an experienced ecologist. Calls of rarer bat species, or which were queried by the first checker, were quality assured by a second bat ecologist. Manually checking auto-identification follows best-practice, outlined in (Rydell et al, 2017)[2] and (BCT, 2016).

Species from the *Myotis* genus of bats produce frequency modulated calls with overlapping call parameters and cannot be reliably distinguished to species level on call alone. As such, *Myotis* calls are identified to genus level only.

Bats of the *Nyctalus* and *Eptesicus* genus produce calls with overlapping call parameters, except in open environments. The two *Nyctalus* species found in this region; noctule and Leisler's and the single *Eptesicus* species found in this region; serotine, were therefore grouped together, except where the call could be clearly distinguished as noctule or serotine.

Occasionally, soprano and common pipistrelle calls overlapped, and these calls were identified as *Pipistrellus sp*.

Heat Maps

Geo-referenced sound files were combined with manually mapped non-echolocating bat records from the field surveys, totalling 898 bat data points, to create a heatmap which illustrates the intensity of bat activity for the period August and October 2022.

The kernel density algorithm in QGIS 3.16.4 was used to generate the heatmap with the number of bat data points (kernels) within a 471m radius defining the intensity of bat activity. This was illustrated using seven colour categories, ranging from red (most intense) to green (least intense).

[2] Rydell, J., Nyman, S., Eklöf, J., Jones, G & Russo, D. (2017) Testing the performances of automated identification of bat echolocation calls: A request for prudence. Ecological Indicators 78, pp416-420.

The 471m search radius is the optimal bandwidth for this dataset, calculated using the optimal band with (hopt) equation, as described in (Fotheringham et al, 2000)3 : hopt = [2/3n]1/4σ, where n = 898 data points, and σ = 2856m standard distance4. Additional parameters applied to the kernel density algorithm are a quartic kernel, and a quantile data classification. The selected parameters are considered best fit to the bat point data, following trials with the dataset.

General bat flight lines, behaviour and flight height were also mapped from the transect surveys which, combined with intensity of bat activity (the heatmap), has been used to assess the risk to bats across the scheme.

ESRI's ArcGIS Online World Imagery has been used as the heatmap and other maps satellite base mapping.

3.3.4 Static Detector Surveys

Eighteen static bat detectors (Anabat Swift) were deployed for five consecutive nights once a month in August to October 2022, in the same locations as those used in 2020, with Transect 1 Static 4 added following North Farm access in 2021. These were split into two groups. Transect 1, 2, 3 were deployed together one week, followed by Transects 4, 5, 6 and 7 deployed the following week. Static deployment dates can be found in Appendix C.

Detectors recorded full spectrum sound files from half an hour before sunset to half an hour after sunrise. The sound files were then analysed using Anabat Insight software to identify the species present and indicate the level of bat activity at each deployment location.

Acoustic analysis was completed using the following workflow:

- All sound files were run through the auto-ID plugin BatClassify at a tag certainty threshold of 75%.
- All files labelled as barbastelle, NSL (noctule, serotine, Leisler's), brown long-eared bat and any of the *Myotis* species were manually checked.
- 10% of common pipistrelle, soprano pipistrelle and undetermined pipistrelle species were manually checked or, if they numbered less than 50, all were manually checked.

[3] Fotheringham, A.S., C. Brunsdon, & M. Charlton. (2000) Quantitative Geography: Perspectives on Spatial Data Analysis. Sage Publications Ltd, 2000

[4] Standard distance is a measure of overall dispersion around the mean centre (the mean latitude and longitude coordinates of the dataset). This calculated using the spatial point pattern analysis function in QGIS 3.16.3.

- 10% of unlabelled (noise) files were manually checked or, if they numbered less than 50, all were manually checked. If a high proportion of these unlabelled noise files contained bat passes, more files were checked.

The following principles were followed during manual acoustic analysis. When calls are identified to species level it is confirmed using call parameters which are characteristic of the species with regards to the location of the static detector in both a regional and habitat context. Certain species produce highly similar calls with overlapping parameters and cannot be reliably distinguished to species level using acoustic analysis alone. When a call cannot be reliably distinguished, it has been labelled as one of a group of possible species.

All calls from a species within the *Myotis* genus have been labelled as *Myotis sp*.

Any calls that are unable to be differentiated between noctule and Leisler's bats have been grouped under the *Nyctalus sp.* label. In certain environments, *Nyctalus* bats cannot be reliably distinguished from serotine bats, in which case these calls have been labelled as NSL (noctule, serotine, Leisler's).

Validating the data through manual checks follows the BCT Good Practice Guidelines (2016). A map showing the location of these static detectors can be found in Appendix D and a description in Table 3-3.

Table 3-3 – Static Detector Locations

Static Detector ID	Static Detector Description	Approximate Grid Reference
Transect 1 – Static 1	Narrow hedge line with mature trees heading south-west to north-east between two arable fields. Static detector pointing in north westerly direction.	TL 46904 53206
Transect 1 – Static 2	Narrow hedge line with trees heading south-west to north-east between two arable fields adjacent to Nine Wells Nature Reserve, within 50 m of a ditch fed by a spring within Nine Wells woodland. Static detector pointing north westerly.	TL 46091 54070
Transect 1 – Static 3	Narrow hedge line with mature trees heading north-west to south-east between two arable fields. Static detector pointing north easterly.	TL 46598 53281
Transect 2 – Static 1	Attached to a tree within a line of trees heading north-east to south-west beside a B-road in between two arable fields with a hedge line on the opposite side of the road. Static detector points easterly.	TL 48049 52433
Transect 2 – Static 2	Positioned at the end of a hedge line north-west to south-east dissecting two arable fields. Detector points westerly.	TL 47439 53106
Transect 2 – Static 3	Positioned at the bottom of a hedge line north-west to south-east dissecting two arable fields. Detector points easterly.	TL 47871 52042
Transect 3 – Static 1	Positioned within a small section of unmanaged arable land, bordered by woodland and open arable fields with a ditch running north to south. Static detector points south easterly.	TL 48676 50819
Transect 3 – Static 2	Positioned on the edge of a strip of woodland heading east to west bordering an arable field. Static facing northerly.	TL 47934 51151
Transect 3 – Static 3	Positioned on the edge of a narrow strip of hedge line with trees heading east to west bordering an arable field to the north. A medium sized waterbody is in the adjacent land parcel to the south. Detector facing north.	TL 49302 50371
Transect 3 – Static 4	Attached to wooden fencing along driveway inside entrance to North Farm site. Adjacent to southern woodland boundary and industrial estate, bordering arable land in the east. Detector pointing west.	TL 49156 50479
Transect 4 – Static 1	Within the corner of a field, with tree lines heading south to north and west to east. Detector facing north easterly.	TL 50708 49418
Transect 4 – Static 2	Unable to deploy securely due to high use public footpath. Alternative locations too close to existing detectors or unsecure.	TL 49429 49951
Transect 4 – Static 3	Unable to deploy securely due to high use public footpath. Alternative locations too close to existing detectors or unsecure.	TL 50406 49996
Transect 5 – Static 1	Positioned on an ash tree on a tree line heading east to west. Bordered to the south by arable fields with a ford and river adjacent to the north of the woodland strip. A mature ash and pine woodland are immediately to the north-west. Detector pointing south.	TL 51318 49707
Transect 5 – Static 2	Unable to deploy securely.	TL 50765 49864
Transect 5 – Static 3	Positioned on a tree within a small section of young plantation trees. Detector facing south with a small man-made reservoir to the north-west and arable fields to the south.	TL 51738 49407

Static Detector ID	Static Detector Description	Approximate Grid Reference
Transect 6 – Static 1	Positioned on a beech tree in a short line of 4 trees within a hedge line heading east to west. Arable fields border the hedge line to the north and south. Detector pointing north.	TL 51849 49807
Transect 6 – Static 2	Unable to deploy securely.	TL 52060 50215
Transect 6 – Static 3	Positioned on a tree within a hedge line with trees heading north-east to south-west. An arable field is to the east and west with a farm track running adjacent to the east. Detector facing east.	TL 51430 49989
Transect 7 – Static 1	Positioned on a tree within a woodland strip heading south-east to north-west, between an arable field and an A Road. Detector facing north easterly.	TL 52570 49824
Transect 7 – Static 2	Positioned on a tree beside a farm track. Farm track heading north to south. Arable fields are adjacent to the east and west. Detector facing west.	TL 52901 50072
Transect 7 – Static 3	Positioned on a tree on the edge of a woodland beside a farm track. Farm track heading east to west. An arable field is adjacent to the south. Detector facing south.	TL 52773 50621

3.4 Limitations and Assumptions

WSP Real Estate & Infrastructure's Ecologists were commissioned by the Greater Cambridge Partnership to undertake studies for bats to inform the CSET Scheme in late July 2022. This meant a delay in starting the surveys until August 2022 due to mobilisation. Due to the timing of our commission, dusk/dawn emergence/re-entry surveys were not able to be carried out on High and Moderate potential trees in 2022. Should project programme allow, these surveys should be conducted in the 2023 survey season.

3.4.1 Static Detectors

It was not possible to deploy four static detectors on every transect route due to security and lack of suitable locations as described in Table 3-10. Due to the number and distribution of the remaining static detectors the impact of this on the survey results is considered negligible and the validity and assumptions of this report are not negatively impacted.

The following static deviations occurred:

- August Transect 1 Static 2, Transect 2 Static 2 and Transect 3 Static 1 - recording error resulted in 5 days' worth of files becoming corrupted and unreadable in the analysis software. This is thought to be due to the extreme hot weather experienced at the time.
- October Transect 5 Static 1 - no recordings of bat species occurred. Device appeared to have malfunctioned and was therefore redeployed in the same month (October) for another week.
- October Transect 5 Static 3 - no recordings of bat species occurred. Device appeared to have malfunctioned and was therefore redeployed in the same month (October) for another week.

These deviations whilst not providing fully comparative data, do not impact the validity and accuracy of the data as sufficient data has been collected during the rest of the season and site to provide a sufficient bat assessment of the site.

3.4.2 Buildings

No access was possible to the internal of buildings and only external assessments were conducted.

There were some constraints with regard to the external assessment of three residential dwellings (B9, B10 and B11) on Sawston Road. No access was possible at the time of survey meaning an assessment of likely roosting suitability was not undertaken on these buildings. These are therefore categorised as 'Unknown' but due to the current route realignment, are now beyond the 50m buffer and are not to be directly affected by the proposals.

3.4.3 Transects

Guidance states that one survey visit per month in appropriate weather conditions for bats, with at least one survey comprising a dusk and pre-dawn within one 24-hour period, is the recommended survey effort for moderate suitability habitats for bats within BCT guidance (2016). However, for health and safety reasons, only dusk surveys were carried out, relative to the surveys conducted in 2020.

4

Results

Public

4 Results

4.1 Desk-Based Study

The local ecological records search included the following notable bat records which have been recorded within 5 km of the alignment.

1. Brown long-eared bat *Plecotus auritus*
2. Common pipistrelle *Pipistrellus pipistrellus*
3. Daubenton's bat *Myotis daubentonii*
4. Leisler's bat *Nyctalus leisleri*
5. Nathusius's pipistrelle *Pipistrellus nathusii*
6. Natterer's bat *Myotis nattereri*
7. Noctule bat *Nyctalus noctula*
8. Serotine *Eptesicus serotinus*
9. Soprano pipistrelle *Pipistrellus pygmaeus*
10. Western barbastelle *Barbastella barbastellus*
11. Whiskered bat *Myotis mystacinus.*

4.2 Preliminary Bat Roost Assessment – Buildings

A total of 12 buildings/structures were inspected and assessed in order to determine their likelihood to support roosting bats. These results are summarised below with the detailed results of the external, where accessible, inspection survey provided in Table 4-1. Their locations are shown in Appendix E and photographs of each of the buildings are provided in Appendix F.

The buildings were classified as having the following levels of roosting suitability:

Table 4-1 – Preliminary Roost Assessment building survey results

Building Number	Grid Reference	Building Type and Description	Roost Potential
B1	TL 46144 54556	Recently built scientific/office building. Well-sealed and of metal/glass construction. External inspected conducted from public right of way. No internal access.	Negligible

Building Number	Grid Reference	Building Type and Description	Roost Potential
B2	TL 49167 50418	Steel structure cement factory. Very dusty, well used and dangerous to inspect or approach.	Negligible
B3	TL 49282 50329	Demolished	Negligible
B4	TL 49283 50358	Demolished	Negligible
B5	TL 49318 50311	Demolished	Negligible
B6	TL 49318 50311	Demolished	Negligible
B7	TL 49448 50253	Single sheet steel structure used as commercial units. External is well maintained, some shutters were open and internally the roof was a single sheet with sections of clear plastic.	Negligible
B8	TL 49432 50226	Single sheet steel structure used as commercial units. External is well maintained, some shutters were open and internally the roof was a single sheet with sections of clear plastic.	Negligible
B9	TL 50397 50062	Residential dwelling – No access and shielded from public view by tall boundary trees and fences/gates.	Unknown
B10	TL 50421 50050	Residential dwelling – No access and shielded from public view by tall boundary trees and fences/gates.	Unknown
B11	TL 50460 50032	Residential dwelling – No access and shielded from public view by tall boundary trees and fences/gates.	Unknown
B12	TL 51346 49707	Wooden shed/pump house. Felt covered roof in reasonable condition, internals housed pumping machinery. No suitable areas for roosting bats.	Negligible

None of the buildings surveyed have any suitability for supporting roosting bats.

Access to B9, B10 and B11 was not permitted. However, the buildings are 50m distance from the current proposed scheme and separated by an existing road. Therefore, no further surveys are required on these buildings with the current design.

4.3 Ground-Level Tree Assessment

The Ground Level Tree Assessment (GLTA) survey identified 15 trees with the suitability to support roosting bats. These included two trees assessed as high (T13, and T18) and 13 trees assessed as having moderate suitability to support bat roosts (T09, T10, T11, T12, T14, T15, T22, T23, T24, T25, T26, T27, and NF05).

The locations of these trees/tree groups are shown in Appendix G with full data for each provided in Appendix H. Photographs of trees with high and moderate levels of suitability are included in Appendix I.

4.4 Transect Surveys

The tables below summarise the bat activity recorded along each route per month.

A transect map summarising bat species distribution and activity, as well as a heatmap summarising the relative intensity of bat activity are provided in Appendix J and K.

Table 4-2 – Transect 1 Survey Results Summary

Month	Summary
August	The species recorded during the August visit at Transect 1 were noctule, NSL, soprano pipistrelle and common pipistrelle with first detection of each species occurring in that order. Most bat passes were common pipistrelle and the activity of all bats were loosely grouped along the hedgerows near to Nine Wells Wood in the north, the hedgerows approaching and adjacent to the gardens near listening point 5 and at listening point 6. The first bat recorded was a noctule heard but not seen at 20:39 over listening stop 4. The first soprano pipistrelle was detected at 21:16 with two foraging passes observed along the hedge near listening point 2, west of Nine Wells Wood. One other soprano pipistrelle pass was heard but not seen near to listening point 1. Two detections of NSL bats were recorded and both were heard and not seen. The first was at 21:17 near to listening point 1 and the second was at the hedgerow leading to listening point 5. The first common pipistrelle was detected at 21:32 with over 10 passes heard but not seen near to Nine Wells Wood. Four foraging passes were observed along the hedgerow leading to listening point 5 and five more foraging passes were observed after listening point 5 flying to and from the nearby gardens.

Month	Summary
	The last detections of the survey were more than 10 common pipistrelle foraging passes observed around a streetlight near listing point 6. Common pipistrelle were recorded frequently throughout the southern section of the transect.
September	The species recorded during the September visit at Transect 1 were soprano pipistrelle, common pipistrelle, and an unidentified large bat i.e. NSL with the first detection of each species occurring in that order. Most of the activity during this visit was detected along the hedgerow between listening points 3 and 4 with noticeably higher activity levels of common pipistrelle compared to the rest of the transect. The first bat recorded was a soprano pipistrelle heard but not seen at 19:56 at listening point 5. Soprano pipistrelle were heard but not seen on eight occasions intermittently for the remainder of the transect. Two clusters of four and five passes were detected along the hedgerow between listening points 3 and 4, the remainder of the occurrences were of one or two passes. The first common pipistrelle was observed and detected at 20:14 foraging along the woodland edge north-west of listening point 6. Common pipistrelle were detected eight more times throughout the remainder of the transect with a minimum of two passes and on one occasion, two bats observed foraging together. Two clusters of over ten common pipistrelle foraging passes were detected along the hedgerow between listening points 3 and 4. A further five passes were heard but not seen over listening point 3. The first NSL bat was detected at 20:15 with three passes heard but not seen near to listening point 6. Two further NSL passes were heard but not seen, one at 21:07 at the north of the transect between listening points 1 and 2, and the last near the end of the survey near to listening point 5.
October	The species recorded during the October visit at Transect 1 were noctule, soprano pipistrelle and common pipistrelle with first detection of each species occurring in that order. Activity was associated with Nine Wells Wood, the hedgerow corner at listening point 3 and the line of trees leading to listening point 5. The first bat recorded was a noctule heard but not seen at 18:47 at the northern end of the transect. Two heard only noctule passes and six foraging passes were observed over near Nine Wells Wood. The first soprano pipistrelle was heard but not seen at 18:59, shortly after listening point 1 at the north end of the transect. Further passes from this species were detected throughout the remainder of the survey on three occasions associated with the hedgerows and boundary trees just south of the centre of the transect, west of static 1.

Month	Summary
	The first common pipistrelle was observed and detected at 19:09, foraging at the hedgerow corner above listening point 3 with ten passes recorded. Later, more than ten common pipistrelle passes were heard but not seen foraging along the tree line leading to listening point 5 and again over 10 foraging passes were heard but not seen along the same treeline on the return walk.

Table 4-3 – Transect 2 Survey Results Summary

Month	Summary
August	The species recorded during the August visit at Transect 2 were noctule, common pipistrelle, soprano pipistrelle and NSL with the first detection of each species occurring in that order. The majority of activity occurred along the field boundary hedgerow at listening point 10 and around the streetlighting by garages at the entrance to Gog Magog Way. The first bat recorded was a noctule at 20:54 at the northern end of the transect, seen heading west. Further NSL passes were heard at listening point 9, and along the hedgerow at listening point 10, south of Haverhill Road. The first common pipistrelle was heard but not seen at 21:06 while at listening point 7. A further pass was from this species was heard just prior to listening point 9, and another seen foraging east across the field. Five passes were recorded around streetlighting near the transect mid-point, and foraging behaviour seen along Haverhill Road, close to static 1. The first soprano pipistrelle was seen foraging along the hedgerow near listening point 9 at 21:18. Ten passes were recorded around streetlighting near Gog Magog Way, and again by static 3, just prior to listening point 10.
September	The species recorded during the September visit at Transect 2 were common pipistrelle, NSL and soprano pipistrelle with the first detection of each species occurring in that order. Most of the activity detected was from NSL bats, though common pipistrelle was also recorded throughout. The first bat recorded was a common pipistrelle at 20:16. Another was seen foraging north-east along a hedgerow to listening point 8. A further three passes of this species were heard along the remainder of the transect route. The first NSL was heard not seen at 20:23. Foraging passes were noted just prior to and at listening point 9, along the field boundary hedgerow. A single pass was heard at listening point 7 and a further 5 passes heard in the northern section of the transect near to static 2.

Month	Summary
	A soprano pipistrelle was seen foraging back and forth at 20:24 by the garages off Gog Magog Way. A further 5 passes by this species were heard during the remainder of the transect.
October	The October visit at Transect 2 had low levels of activity throughout. Common pipistrelle, soprano pipistrelle and brown long-eared bat were recorded with the first detection of each species occurring in that order. The first bat record was for a common pipistrelle at 18:56, seen heading north-west towards Haverhill Road. A further 4 passes by common pipistrelle were heard not seen. One brown long-eared and three soprano pipistrelle passes were also heard not seen were the remainder of the transect. The temperature dropped to 11°C by the end point.

Table 4-4 – Transect 3 Survey Results Summary

Month	Summary
August	The species recorded during the August visit at Transect 3 were noctule, common pipistrelle and soprano pipistrelle with the first detection of each species occurring in that order. Two noctule passes were observed commuting south from the River Granta at 20:34 and three soprano pipistrelle passes were heard not seen near to listening point 12. The rest of the activity recorded throughout night was of common pipistrelle with over 10 foraging passes observed along the hedge listening point 12.
September	**A barbastelle bat was detected on two occasions during the September visit at Transect 3.** Both occasions were single passes which were heard and not seen: the first at 20:45 was north of listening point 12 along the line of trees, and the second at 20:54 was west of listening point 11 near the River Granta. The other species recorded during this visit were noctule, common pipistrelle, soprano pipistrelle, and an unidentified NSL bat with the first detection of these species occurring in that order.
October	**A barbastelle bat was detected on two occasions during the October visit at Transect 3.** Both occasions were singles passes which were heard and not seen and both were encountered on the boundary of North Farm, the first at 19:17 west of static 3 and the second at 19:21 en route to listening point 13b. The other species recorded during this visit were noctule, soprano pipistrelle, common pipistrelle and an unidentified NSL bat with the first detection of these species occurring in that order.

Table 4-5 – Transect 4 Survey Results Summary

Month	Summary
August	The species recorded during the August visit at Transect 4 were NSL, soprano pipistrelle and common pipistrelle with the first detection of each species occurring in that order. The first bat recorded was a NSL at 20:24. A further five single passes for this species were heard not seen over the remaining duration of the transect. Two recordings of soprano pipistrelle were picked up during the survey. The first was 10+ passes in the field corner under canopy at listening point 16, and the second was for three passes heard not seen at 22:01. Multiple common pipistrelle recordings were heard during the transect however only one was observed foraging at 21:17, back and forth along the southern edge of Sawston Road.
September	**A barbastelle bat was detected once during the September visit at Transect 4.** The pass was heard but not seen at 20:36 near the linear woodland west of listening point 16. The other species recorded during this visit were NSL, soprano pipistrelle and common pipistrelle with the first detection of these species occurring in that order. All but one of these recordings, with exception of a soprano pipistrelle seen foraging north along High Street near listening point 16, were heard not seen.
October	**A barbastelle bat was detected on two occasions during the October visit at Transect 4.** Both occasions were single passes which were heard and not seen. The first was heard at 19:19 during the stop at listening point 16 and the second was heard north of listening point 16 along High Street at 19:24. The other species recorded during this visit were soprano pipistrelle, NSL, noctule and common pipistrelle with the first detection of these species occurring in that order. High levels of common pipistrelle activity was heard at listening points 15, 16, and north of listening point 16 along High Street heading towards the junction with Sawston Road.

Table 4-6 – Transect 5 Survey Results Summary

Month	Summary
August	The species recorded during the August visit at Transect 5 were common pipistrelle, NSL and soprano pipistrelle with the first detection of each species occurring in that order.

Month	Summary
	The first bat recorded was a common pipistrelle seen foraging north-east along a hedgerow at 20:49. A further two were seen foraging north along High Street and two more were observed foraging back and forth in the north-west section of the transect. NSL and soprano pipistrelle were heard not seen in low numbers during the transect.
September	The September visit at Transect 5 had low activity levels. Only one noctule pass was recorded which was heard and not seen north-west of the start point at listening point 19. Two groups of common pipistrelle passes were detected. The first was a cluster of five passes which were heard and not seen at the field corner near to the off ramp on Newmarket Road. The second was a series of ten foraging passes observed on the track leading from Newmarket Road to the southern end of High Street.
October	**A barbastelle bat was detected once during the October visit at Transect 5.** The bat was heard and not seen at 18:37 near to listening point 17 on the track linking Newmarket Road to the southern end of High Street. The other species recorded during this visit were NSL, soprano pipistrelle and common pipistrelle with the first detection of these species occurring in that order.

Table 4-7 – Transect 6 Survey Results Summary

Month	Summary
August	**A barbastelle bat was detected once during the August visit at Transect 6.** The bat was heard and not seen at 22:03 near to listening point 22, between the listening point and the riparian woodland bordering the River Granta. The other species recorded during this visit were NSL, soprano pipistrelle and common pipistrelle with the first detection of these species occurring in that order.
September	**A barbastelle bat was detected on two occasions during the September visit at Transect 6.** The first was a single pass which was heard and not seen at 20:31 near the field-side edge of the woodland south-west of the Four Went Ways Services roundabout (A11 and Cambridge Road). The second was also heard and not seen at 21:01, this time south-east of the A11 roundabout and near to the smaller roundabout near the services on Newmarket Road. The other species recorded during this visit were soprano pipistrelle, NSL, common pipistrelle and natterer's bat with the first detection of these species occurring in that order.

Month	Summary
October	**A barbastelle bat was detected on two occasions during the September visit at Transect 6.** Both passes were heard and not seen. The first was heard at 18:35 near to listening point 20 at the woodland east of Babraham. The second was heard at listening point 21 near to the rectangular block of woodland in the centre of the arable fields at this location at 18:54. The other species recorded during this visit were noctule, soprano pipistrelle and NSL with the first detection of these species occurring in that order. Overall, the activity levels on this visit were low with the majority of detections resulting from two clusters of soprano pipistrelle foraging passes.

Table 4-8 – Transect 7 Survey Results Summary

Month	Summary
August	The species recorded during the August visit at Transect 7 were noctule, soprano pipistrelle, common pipistrelle and NSL with the first detection of each species occurring in that order. The first bat recorded was a NSL which was heard not seen at 19:52. A further four single passes for this species were heard not seen, as well as a cluster of 10+ passes along Bourn Bridge Road towards listening point 26. Two soprano pipistrelle were seen foraging both south along the farm track and west near at woodland block at Grange Farm. Further foraging activity was also heard near the listening point 25 on the field boundary with Cambridge Road (A1307). One common pipistrelle was seen foraging back and forth along a woodland strip close to static 3. Another was heard not seen just north of listening point 25.
September	**A barbastelle bat was detected on two occasions during the September visit at Transect 7.** Both were single passes which were heard and not seen. The first was heard at 19:51 on the linear woodland on the northern boundary of the field north-west of Four Went Ways Services roundabout. The second was heard at 20:02 on the unnamed track on the eastern boundary of this same field. The other species recorded during this visit were NSL, noctule, soprano pipistrelle, Daubenton's bat and common pipistrelle with the first detection of these species occurring in that order.
October	The species recorded during the October visit at Transect 7 were soprano pipistrelle, common pipistrelle and noctule with the first detection of each species occurring in that order. Overall, the activity levels on this visit were low with the majority of detections resulting from one cluster of common pipistrelle foraging passes.

The August to October transects captured consistent commuting directional trends and foraging areas.

Heatmaps

The heatmaps in Appendix J show the relative intensity of bat activity across the site.

Map 1 highlights three high intensity areas of bat activity in the north of the Scheme, including Nine Wells Wood and adjoining hedgerows, the woodland strip to pinch point north of Great Shelford and the hedgerows along Haverhill Road (all foraging activity).

The old railway corridor which runs over the High Street, Babraham, has a high intensity of bat foraging and is associated with the large mature trees sited along the old railway embankment.

The species distribution map in Appendix K shows similar trends to those found in 2020. The general distribution of each species is summarised in Table 4-9.

Table 4-9 - Transect Species Distribution Summary

Species	Summary
Barbastelle	**Low levels of barbastelle activity were present across the Scheme.** Recordings were noted along North Farm's northern boundary, the hedgerow between listening point 15 and 16, close to the woodland block north of the ford crossing point through the River Granta and along the old railway south of Babraham.
Common pipistrelle	Common pipistrelle were abundant throughout the Scheme. The species was notably present at high density along the adjoining hedgerows south-west of Nine Wells Wood, near to listening point 3. Also, along the woodland strip east of Whitwell Farm, and along the extensive hedgerow between listening point 15 and 16.
Soprano pipistrelle	Soprano pipistrelle were abundant throughout the Scheme. The species was notably present at high / moderate density along the woodland strip east of Whitwell Farm, around the streetlighting by garages at the entrance to Gog Magog Way, and near listening point 25 on the field boundary with Cambridge Road (A1307).
Noctule, Serotine, and Leisler's	Moderate numbers of NSL bats were recorded, scattered from the far north of the Scheme at listening point 1, down to Grange Farm.
Myotis sp.	*Myotis* are present in very low numbers within the southern section of the Scheme, within Transects 6 and 7.
Brown long-eared	A single brown long-eared bat was picked up within Transect 2.

4.5 Static Detector Survey

The results of the data collected from the static detectors is detailed in the sections below with percentage of bat sound recordings per species noted in Table 4-10.

Where the totals of individual bat species or species groups does not equal the total number of files containing bats, this is due to files containing multiple species of bats.

4.5.1 August 2022

Transect 1

- **Static 1** - A total of 1,163 sound files were recorded; however, a fault with the detector thought to be the result of extreme temperatures caused the files to become unreadable by the analysis software.
- **Static 2** - A total of 2,185 sound files were recorded; however, a fault with the detector thought to be the result of extreme temperatures caused the files to become unreadable by the analysis software.
- **Static 3 -** A total of 952 sound files were recorded of which 199 contained bats. These bats were identified as the following species or groups of species.
  - 52 common pipistrelle (26.1%)
  - 109 soprano pipistrelle (54.8%)
  - 37 NSL (18.6%)
  - *1 Myotis* species (<1%)

Transect 2

- **Static 1** - A total of 6,324 sound files were recorded of which 73 contained bats. These bats were identified as the following species or groups of species.
  - **1 barbastelle (1.4%)**
  - 32 common pipistrelle (43.8%)
  - 36 soprano pipistrelle (49.3%)
  - 4 NSL (5.5%)
- **Static 2** - A total of 5,634 sound files were recorded of which 727 contained bats. These bats were identified as the following species or groups of species.
  - **5 barbastelle (<1%)**
  - 440 common pipistrelle (60.5%)
  - 233 soprano pipistrelle (32.0%)
  - 43 NSL (5.9%)
  - *6 Myotis* species (<1%)
- **Static 3** - A total of 645 sound files were recorded of which 301 contained bats. These bats were identified as the following species or groups of species.
  - 202 common pipistrelle (67.1%)
  - 71 soprano pipistrelle (23.6%)

- 27 NSL (9.0%)
- *1 Myotis* species (<1%)

Transect 3

- **Static 1** - A total of 749 sound files were recorded; however, a fault with the detector thought to be the result of extreme temperatures caused the files to become unreadable by the analysis software.
- **Static 2** - A total of 1,620 sound files were recorded of which 471 contained bats. These bats were identified as the following species or groups of species.
  - **1 barbastelle (<1%)**
  - 82 common pipistrelle (17.4%)
  - 204 soprano pipistrelle (43.3%)
  - 181 NSL (38.4%)
  - *2 Myotis* species (1%)
  - 1 BLE (<1%)
- **Static 3** - A total of 4,000 sound files were recorded of which 298 contained bats. These bats were identified as the following species or groups of species.
  - **5 barbastelle (1.7%)**
  - 66 common pipistrelle (22.1%)
  - 189 soprano pipistrelle (63.4%)
  - 19 NSL (6.4%)
  - *18 Myotis* species (6.0%)
  - 1 BLE (<1%)
- **Static 4** - A total of 235 sound files were recorded of which 205 contained bats. These bats were identified as the following species or groups of species.
  - **5 barbastelle (2.4%)**
  - 96 common pipistrelle (46.8%)
  - 62 soprano pipistrelle (30.2%)
  - 36 NSL (17.6%)
  - *5 Myotis* species (2.4%)
  - 1 BLE (<1%)

Transect 4

- **Static 1** - A total of 376 sound files were recorded of which 76 contained bats. These bats were identified as the following species or groups of species.
  - **4 barbastelle (5.3%)**
  - 34 common pipistrelle (44.7%)
  - 35 soprano pipistrelle (46.1%)
  - 3 NSL (3.9%)x

Transect 5

- **Static 1** - A total of 2,113 sound files were recorded of which 236 contained bats. These bats were identified as the following species or groups of species.
  - **6 barbastelle (2.5%)**
  - 83 common pipistrelle (35.2%)
  - 105 soprano pipistrelle (44.5%)
  - 35 NSL (14.8%)
  - *7 Myotis* species (3.0%)
- **Static 3** - A total of 566 sound files were recorded of which 153 contained bats. These bats were identified as the following species or groups of species.
  - 7 common pipistrelle (4.6%)
  - 108 soprano pipistrelle (70.6%)
  - 37 NSL (24.2%)
  - *1 Myotis* species (<1%)

Transect 6

- **Static 1** - A total of 3,569 sound files were recorded of which 150 contained bats. These bats were identified as the following species or groups of species.
  - **2 barbastelle (1.3%)**
  - 32 common pipistrelle (21.3%)
  - 74 soprano pipistrelle (49.3%)
  - 41 NSL (27.3%)
  - *1 Myotis* species (<1%)

- **Static 3** - A total of 10,025 sound files were recorded of which 301 contained bats. These bats were identified as the following species or groups of species.
  - **18 barbastelle (6.0%)**
  - 177 common pipistrelle (58.8%)
  - 88 soprano pipistrelle (29.2%)
  - 16 NSL (5.3%)
  - *1 Myotis* species (<1%)
  - 1 BLE (<1%)

Transect 7

- **Static 1** - A total of 1,562 sound files were recorded of which 374 contained bats. These bats were identified as the following species or groups of species.
  - **1 barbastelle (<1%)**
  - 199 common pipistrelle (53.2%)
  - 162 soprano pipistrelle (43.3%)
  - 12 NSL (3.2%)
- **Static 2** - A total of 3,045 sound files were recorded of which 726 contained bats. These bats were identified as the following species or groups of species.
  - **3 barbastelle (<1%)**
  - 433 common pipistrelle (59.6%)
  - 290 soprano pipistrelle (39.9%)
- **Static 3** - A total of 676 sound files were recorded of which 542 contained bats. These bats were identified as the following species or groups of species.
  - 303 common pipistrelle (55.9%)
  - 233 soprano pipistrelle (43.0%)
  - 5 NSL (<1%)
  - 1 BLE (<1%)

4.5.2 September 2022

Transect 1

- **Static 1** - A total of 537 sound files were recorded of which 504 contained bats. These bats were identified as the following species or groups of species.

- **14 barbastelle (2.8%)**
- 346 common pipistrelle (68.7%)
- 115 soprano pipistrelle (22.8%)
- 21 NSL (4.2%)
- *6 Myotis* species (1.2%)
- 2 BLE (<1%)

- **Static 2** - A total of 592 sound files were recorded of which 558 contained bats. These bats were identified as the following species or groups of species.
  - **1 barbastelle (<1%)**
  - 356 common pipistrelle (63.8%)
  - 168 soprano pipistrelle (30.1%)
  - 33 NSL (5.9%)
- **Static 3** - A total of 772 sound files were recorded of which 270 contained bats. These bats were identified as the following species or groups of species.
  - **5 barbastelle (1.9%)**
  - 68 common pipistrelle (25.2%)
  - 172 soprano pipistrelle (63.7%)
  - 23 NSL (8.5%)
  - *2 Myotis* species (<1%)

Transect 2

- **Static 1** - A total of 13,160 sound files were recorded of which 395 contained bats. These bats were identified as the following species or groups of species.
  - 26 common pipistrelle (6.6%)
  - 366 soprano pipistrelle (92.7%)
  - 2 NSL (<1%)
  - *1 Myotis* species (<1%)
- **Static 2** - A total of 1,660 sound files were recorded of which 258 contained bats. These bats were identified as the following species or groups of species.
  - **5 barbastelle (1.9%)**
  - 150 common pipistrelle (58.1%)
  - 15 soprano pipistrelle (5.8%)

- 86 NSL (33.3%)
- *2 Myotis* species (<1%)

- **Static 3** - A total of 10,364 sound files were recorded of which 262 contained bats. These bats were identified as the following species or groups of species.
  - **6 barbastelle (2.3%)**
  - 202 common pipistrelle (77.1%)
  - 37 soprano pipistrelle (14.1%)
  - 17 NSL (6.5%)

Transect 3

- **Static 1** - A total of 181 sound files were recorded of which 39 contained bats. These bats were identified as the following species or groups of species.
  - **1 barbastelle (2.6%)**
  - 11 common pipistrelle (28.2%)
  - 14 soprano pipistrelle (35.9%)
  - 13 NSL (33.3%)
- **Static 2** - A total of 497 sound files were recorded of which 395 contained bats. These bats were identified as the following species or groups of species.
  - 88 common pipistrelle (22.3%)
  - 243 soprano pipistrelle (61.5%)
  - 62 NSL (15.7%)
  - 2 *Myotis* species (<1%)
- **Static 3** - A total of 1,584 sound files were recorded of which 132 contained bats. These bats were identified as the following species or groups of species.
  - **1 barbastelle (<1%)**
  - 27 common pipistrelle (20.5%)
  - 56 soprano pipistrelle (42.4%)
  - 22 NSL (16.7%)
  - 26 *Myotis* species (19.7%)
- **Static 4** - A total of 476 sound files were recorded of which 378 contained bats. These bats were identified as the following species or groups of species.
  - **28 barbastelle (7.4%)**

- 168 common pipistrelle (44.4%)
- 130 soprano pipistrelle (34.4%)
- 42 NSL (11.1%)
- 7 *Myotis* species (1.9%)
- 3 BLE (<1%)

Transect 4

- **Static 1** - A total of 112 sound files were recorded of which 87 contained bats. These bats were identified as the following species or groups of species.
  - **1 barbastelle (1.1%)**
  - 35 common pipistrelle (40.2%)
  - 49 soprano pipistrelle (56.3%)
  - 2 NSL (2.3%)

Transect 5

- **Static 1** - A total of 123 sound files were recorded of which 106 contained bats. These bats were identified as the following species or groups of species.
  - 70 common pipistrelle (66.0%)
  - 34 soprano pipistrelle (32.1%)
  - 2 NSL (1.8%)
- **Static 3** - A total of 7,107 sound files were recorded of which 536 contained bats. These bats were identified as the following species or groups of species.
  - **1 barbastelle (>1%)**
  - 1 common pipistrelle (>1%)
  - 525 soprano pipistrelle (97.9%)
  - 9 NSL (1.7%)

Transect 6

- **Static 1** - A total of 277 sound files were recorded of which 43 contained bats. These bats were identified as the following species or groups of species.
  - 8 common pipistrelle (18.6%)
  - 31 soprano pipistrelle (72.1%)
  - 4 NSL (9.3%)

- **Static 3** - A total of 970 sound files were recorded of which 38 contained bats. These bats were identified as the following species or groups of species.
  - **2 barbastelle (5.3%)**
  - 12 common pipistrelle (31.6%)
  - 18 soprano pipistrelle (47.4%)
  - 6 NSL (15.8%)

Transect 7

- **Static 1** - A total of 92 sound files were recorded of which 33 contained bats. These bats were identified as the following species or groups of species.
  - 15 common pipistrelle (45.5%)
  - 14 soprano pipistrelle (42.4%)
  - 4 NSL (12.1%)
- **Static 2** - A total of 1,088 sound files were recorded of which 326 contained bats. These bats were identified as the following species or groups of species.
  - **2 barbastelle (<1%)**
  - 155 common pipistrelle (47.5%)
  - 167 soprano pipistrelle (51.2%)
  - 2 NSL (<1%)
- **Static 3** - A total of 1071 sound files were recorded of which 86 contained bats. These bats were identified as the following species or groups of species.
  - **3 barbastelle (3.5%)**
  - 24 common pipistrelle (27.9%)
  - 31 soprano pipistrelle (36.0%)
  - 25 NSL (29.1%)
  - 3 *Myotis* species (3.5%)

4.5.3 October 2022

Transect 1

- **Static 1** - A total of 379 sound files were recorded of which 351 contained bats. These bats were identified as the following species or groups of species.
  - **7 barbastelle (2.0%)**

- 154 common pipistrelle (43.9%)
- 175 soprano pipistrelle (49.9%)
- 13 NSL (3.7%)
- 1 *Myotis* species (<1%)
- 1 BLE (<1%)

- **Static 2** - A total of 551 sound files were recorded of which 514 contained bats. These bats were identified as the following species or groups of species.
  - **2 barbastelle (<1%)**
  - 408 common pipistrelle (79.4%)
  - 99 soprano pipistrelle (19.3%)
  - 5 NSL (1.0%)
- **Static 3** - A total of 1,597 sound files were recorded of which 628 contained bats. These bats were identified as the following species or groups of species.
  - **5 barbastelle (<1%)**
  - 353 common pipistrelle (56.2%)
  - 250 soprano pipistrelle (39.8%)
  - 20 NSL (3.2%)

Transect 2

- **Static 1** - A total of 726 sound files were recorded of which 7 contained bats. These bats were identified as the following species or groups of species.
  - **1 barbastelle (14.3%)**
  - 3 common pipistrelle (42.9%)
  - 1 soprano pipistrelle (14.3%)
  - 2 NSL (28.6%)
- **Static 2** - A total of 1,909 sound files were recorded of which 112 contained bats. These bats were identified as the following species or groups of species.
  - **1 barbastelle (<1%)**
  - 73 common pipistrelle (65.2%)
  - 29 soprano pipistrelle (25.9%)
  - 7 NSL (6.3%)
  - 2 *Myotis* species (1.8%)

- **Static 3** - A total of 1,303 sound files were recorded of which 1195 contained bats. These bats were identified as the following species or groups of species.
  - 978 common pipistrelle (81.9%)
  - 195 soprano pipistrelle (16.3%)
  - 22 NSL (1.8%)

Transect 3

- **Static 1** - A total of 282 sound files were recorded of which 175 contained bats. These bats were identified as the following species or groups of species.
  - 13 common pipistrelle (7.4%)
  - 142 soprano pipistrelle (81.1%)
  - 20 NSL (11.4%)
- **Static 2** - A total of 3,354 sound files were recorded of which 3226 contained bats. These bats were identified as the following species or groups of species.
  - **7 barbastelle (<1%)**
  - 1,244 common pipistrelle (38.6%)
  - 1,911 soprano pipistrelle (59.2%)
  - 63 NSL (2.0%)
  - 1 *Myotis* species (<1%)
- **Static 3** - A total of 613 sound files were recorded of which 484 contained bats. These bats were identified as the following species or groups of species.
  - **8 barbastelle (1.7%)**
  - 232 common pipistrelle (47.9%)
  - 234 soprano pipistrelle (48.3%)
  - 7 NSL (1.4%)
  - 3 *Myotis* species (<1%)
- **Static 4** - A total of 381 sound files were recorded of which 101 contained bats. These bats were identified as the following species or groups of species.
  - **9 barbastelle (8.9%)**
  - 41 common pipistrelle (40.6%)
  - 29 soprano pipistrelle (28.7%)
  - 22 NSL (21.7%)

Transect 4

- **Static 1** - A total of 642 sound files were recorded of which 199 contained bats. These bats were identified as the following species or groups of species.
  - **1 barbastelle (<1%)**
  - 114 common pipistrelle (57.3%)
  - 81 soprano pipistrelle (40.7%)
  - 3 NSL (1.5%)

Transect 5

- **Static 1** - A total of 129 sound files were recorded of which 20 contained bats. These bats were identified as the following species or groups of species.
  - 9 common pipistrelle (45.0%)
  - 11 soprano pipistrelle (55.0%)
- **Static 3** - A total of 228 sound files were recorded of which 26 contained bats. These bats were identified as the following species or groups of species.
  - **1 barbastelle (3.8%)**
  - 2 common pipistrelle (7.7%)
  - 3 soprano pipistrelle (11.5%)
  - 19 NSL (73.1%)
  - 1 *Myotis* species (3.8%)

Transect 6

- **Static 1** - A total of 1,604 sound files were recorded of which 75 contained bats. These bats were identified as the following species or groups of species.
  - 2 common pipistrelle (2.7%)
  - 66 soprano pipistrelle (88%)
  - 7 NSL (9.3%)
- **Static 3** - A total of 302 sound files were recorded of which 139 contained bats. These bats were identified as the following species or groups of species.
  - 117 common pipistrelle (84.2%)
  - 18 soprano pipistrelle (12.9%)
  - 4 NSL (2.9%)

Transect 7

- **Static 1** - A total of 1,687 sound files were recorded of which 5 contained bats. These bats were identified as the following species or groups of species.
  - 1 soprano pipistrelle (20%)
  - 4 NSL (80%)
- **Static 2** - A total of 974 sound files were recorded of which 298 contained bats. These bats were identified as the following species or groups of species.
  - **2 barbastelle (<1%)**
  - 196 common pipistrelle (65.8%)
  - 96 soprano pipistrelle (32.2%)
  - 4 *Myotis* species (1.3%)
- **Static 3** - A total of 384 sound files were recorded of which 65 contained bats. These bats were identified as the following species or groups of species.
  - 32 common pipistrelle (49.2%)
  - 33 soprano pipistrelle (50.8%)

Table 4-10 – Total Counts and Percentages of Bat Sound Recordings per Species or Species Group

Static ID		Barbastelle		Common pipistrelle		Soprano pipistrelle		NSL		*Myotis* species		BLE	
		Total at static location	% of bats at static location	Total at static location	% of bats at static location	Total at static location	% of bats at static location	Total at static location	% of bats at static location	Total at static location	% of bats at static location	Total at static location	% of bats at static location
Transect 1	Static 1	21	2.5	500	58.5	290	34.0	34	4.0	7	<1	2	<1
	Static 2	3	<1	764	71.3	267	24.9	38	3.5	0	0	0	0
	Static 3	10	<1	473	43.1	531	48.4	80	7.3	3	<1	0	0
Transect 2	Static 1	2	<1	401	49.2	403	49.4	8	1.0	1	<1	0	0
	Static 2	11	1.0	663	60.4	277	25.3	136	12.4	10	<1	0	0
	Static 3	6	<1	1382	78.5	303	17.2	66	3.8	1	<1	0	0
Transect 3	Static 1	1	<1	24	11.2	156	72.9	33	15.4	0	0	0	0
	Static 2	8	<1	1569	36.9	2358	55.5	306	7.2	5	<1	1	<1
	Static 3	14	1.5	325	35.6	479	52.4	48	5.3	47	5.1	1	<1
	Static 4	42	6.2	305	44.7	221	32.4	100	14.7	12	1.7	2	<1
Transect 4	Static 1	6	1.7	183	50.6	165	45.6	8	2.2	0	0	0	0
Transect 5	Static 1	6	1.7	162	44.8	150	41.4	37	10.2	7	1.9	0	0
	Static 3	2	<1	10	1.4	636	89.0	65	9.1	2	<1	0	0

Static ID		Barbastelle		Common pipistrelle		Soprano pipistrelle		NSL		*Myotis* species		BLE	
		Total at static location	% of bats at static location	Total at static location	% of bats at static location	Total at static location	% of bats at static location	Total at static location	% of bats at static location	Total at static location	% of bats at static location	Total at static location	% of bats at static location
Transect 6	Static 1	2	<1	42	15.7	171	63.8	52	19.4	1	<1	0	0
	Static 3	20	4.2	306	64.0	124	25.9	26	5.4	1	<1	1	<1
Transect 7	Static 1	1	<1	214	51.9	177	43.0	20	4.9	0	0	0	0
	Static 2	7	<1	784	58.1	553	41.0	2	<1	4	<1	0	0
	Static 3	3	<1	359	51.8	297	42.9	30	4.3	3	<1	1	<1

5

Interpretation and Recommendations

Public

5 Interpretation and Recommendations

5.1.1 Interpretation

Evidence of six species/groups of bat: barbastelle, common and soprano pipistrelle, *Myotis* species, noctule/serotine/Leisler's (NSL) and brown long-eared (BLE) bats were recorded during the surveys and found to be present across the seven transect locations through recordings from the static detectors.

The presence of barbastelle bats is of particular note being an Annex II species and one of the rarer species recorded in the UK particularly with Eversden and Wimpole Woods SAC (which is designated for the colony of barbastelle bats associated with the trees in Wimpole Woods[5]) lying approximately 10 km west of the route.

Barbastelle bats were recorded at all static locations and therefore are present across the entire Scheme. A map showing this can be found in Appendix L. The highest number of barbastelle passes recorded at:

- Transect 3 S4 in September (28)
- Transect 6 S3 in August (18)
- Transect 1 S1 in September (14)
- Transect 3 S4 in October (9)
- Transect 3 S3 in October (8)

The total number of recordings and species found, combined with the presence of habitats suitable of supporting bats including woodlands, open fields, waterbodies, and linear habitat features such as rivers, streams and hedge lines show that the survey route provides suitable habitats for roosting, foraging and commuting bats.

The PRA building survey found no buildings with potential to provide any suitable bat roosting features.

The GLTA found two high suitability trees and 13 moderate suitability trees. Two of the trees identified in 2020 as being suitable for bats have come down during a weather event between these surveys.

[5] JNCC Eversden and Wimpole Woods SAC information sheet. Available: https://sac.jncc.gov.uk/site/UK0030331

5.1.2 Further Surveys

Following the result of the GLTA survey of trees on site, the below surveys, mitigation and enhancement measures will be required prior to the commencement of any works to the trees following the results of the Preliminary Roost Assessments.

Due to the route realignment, further GLTA of trees within 50m of the new route may be required. These will be conducted in Winter 2022/23.

Further survey work in the form of emergence and re-entry surveys will be required on all trees with confirmed bat roost/s or high and moderate suitability for a bat roost prior to the commencement of any works. These surveys would need to be conducted in accordance with current best practice guidance.

Trees with moderate suitability to support bat roosts require one emergence and one re-entry survey. Trees with high suitability or confirmed roosts to support bat roosts require three emergence and re-entry surveys. **Note** – trees with low suitability do not need any further survey work, but any felling or lopping works should be subject to a precautionary methodology to be followed to ensure no impact to roosting bats occurs should they be present.

Should any confirmed roosts, or further roosts, be recorded within a tree to be felled or impacted that would result in damage or loss of a bat roost, an EPS Mitigation Licence will be required from Natural England. This will need to include full survey details and a mitigation strategy to replace the roost lost to ensure that the development does not result in any detriment to the local population of bats.

Full details of the required mitigation will need to be designed and determined following the above surveys, but an example of possible mitigation required is given below:

- Working methodologies to avoid timings of when bats are likely to be using the roosts (i.e. conducting works when bats are least likely to be in these roosts).
- Sensitive lighting schemes to avoid lighting roosts and habitat used for foraging to minimise the development's impacts on local bat populations.
- Ensure foraging and commuting routes around retained roosts or new roost features are protected and enhanced as part of the development or created where new roosts are built.

Compensation for any lost roosts will need to be provided on a like-for-like basis. Examples of suitable features includes:

- Integrated bat boxes within any proposed new buildings.
- Stand-alone bat boxes on poles near connected vegetation (e.g. rocket bat box etc).
- Bat boxes installed on retained trees.

- Veteranisation of retained mature trees to provide naturalised roost features.

Winter static surveys are also being undertaken in 2022-2023 to inform barbastelle activity levels during the hibernation period.

6

References

Public

6 References

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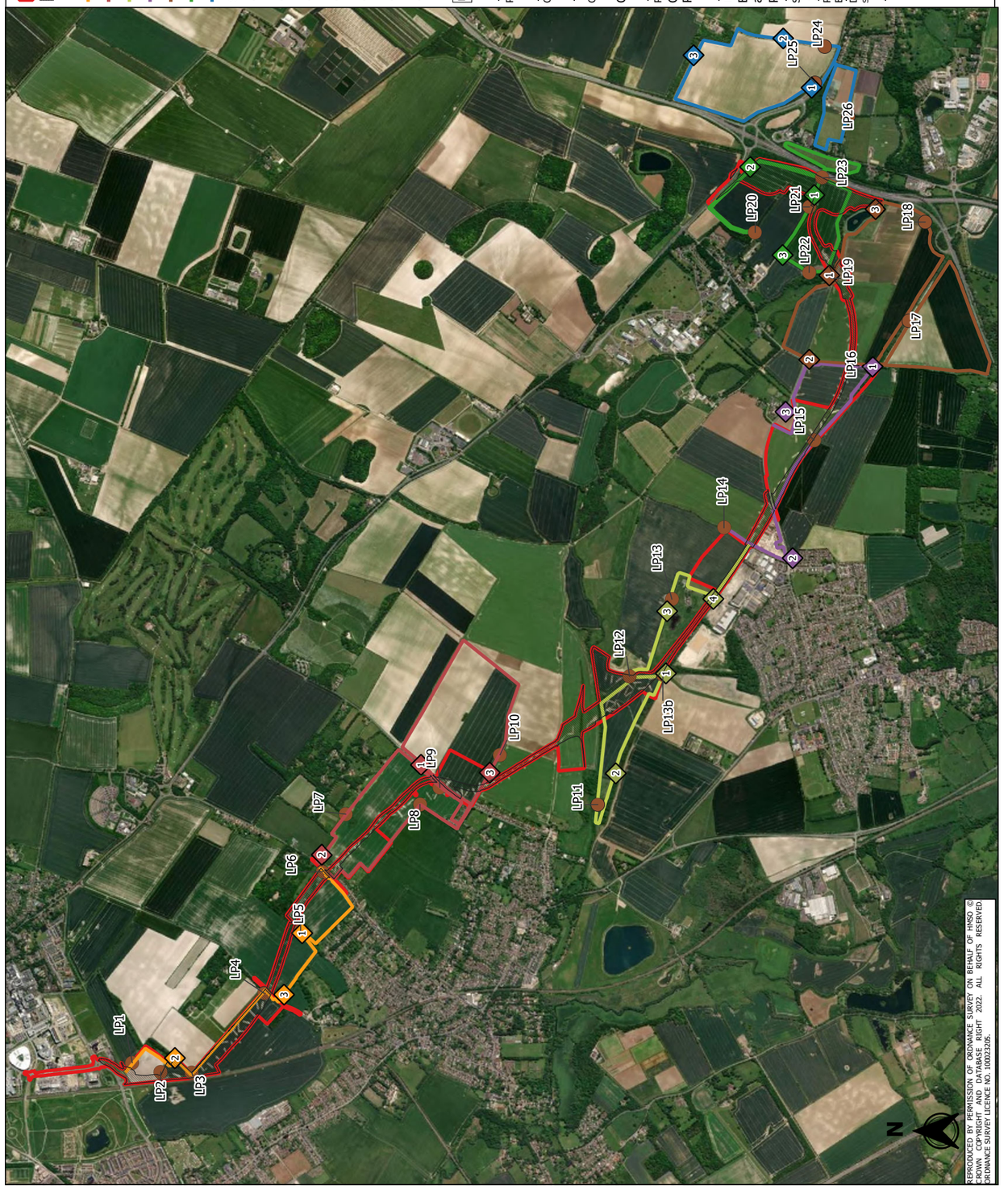
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Appendix A

Transect Route Maps

Public



Appendix B

Transect Survey Details

Public

Table B-1 – Transect 1 Survey Details

Month	Date	Sunset/ Sunrise	Start/ End	Temp (°C)	Rain	Cloud Cover (%)	Humidity (%RH)	Wind (Beaufort scale 1-12)	Personnel
Aug	08/08/22	20:38	20:38	21	N	0	66	3	MJ & TN
			22:38	19	N	5	75	3	
Sep	01/09/22	19:48	19:48	20	N	87	55	3	MJ & TN
			21:48	18	N	85	67	3	
Oct	05/10/22	18:28	18:28	14	N	70	75	4	MJ & TN
			20:38	12	N	0	69	4	

Table B-2 – Transect 2 Survey Details

Month	Date	Sunset/ Sunrise	Start/ End	Temp (°C)	Rain	Cloud Cover (%)	Humidity (%RH)	Wind (Beaufort scale 1-12)	Personnel
Aug	10/08/22	20:33	20:33	24	N	0	51	2	MJ & TN
			22:33	19	N	5	75	3	
Sep	05/09/22	19:38	19:38	20	N	60	78	3	MJ & TN
			21:38	19	N	50	83	2	
Oct	10/10/22	18:16	18:16	13	N	40	55	2	MJ & TN
			20:18	11	N	85	65	3	

Table B-3 – Transect 3 Survey Details

Month	Date	Sunset/ Sunrise	Start/ End	Temp (°C)	Rain	Cloud Cover (%)	Humidity (%RH)	Wind (Beaufort scale 1-12)	Personnel
Aug	15/08/22	20:24	20:24	24	N	45	50	2	MJ & TN
			22:24	22	N	45	65	1	
Sep	07/09/22	19:33	19:33	18	N	30	78	3	MJ & TN
			21:33	16	N	50	83	1	
Oct	12/10/22	18:12	18:12	14	N	80	74	3	MJ & TN
			20:12	14	N	100	76	3	

Table B-4 – Transect 4 Survey Details

Month	Date	Sunset/ Sunrise	Start/ End	Temp (°C)	Rain	Cloud Cover (%)	Humidity (%RH)	Wind (Beaufort scale 1-12)	Personnel
Aug	17/08/22	20:20	20:20	18	N	90	61	3	MJ & TN
			22:20	16	N	70	55	1	
Sep	08/09/22	19:31	19:31	17	N	50	88	2	MJ & TN
			21:31	16	N	50	87	1	
Oct	17/10/22	18:01	18:01	14	N	15	65	2	MJ & TN
			20:01	14	N	70	77	2	

Table B-5 – Transect 5 Survey Details

Month	Date	Sunset/ Sunrise	Start/ End	Temp (°C)	Rain	Cloud Cover (%)	Humidity (%RH)	Wind (Beaufort scale 1-12)	Personnel
Aug	18/08/22	20:17	20:17	23	N	30	53	3	MJ & TN
			22:17	23	N	40	57	2	
Sep	12/09/22	19:21	19:21	22	N	50	51	2	MJ & TN
			21:21	20	N	30	86	1	
Oct	26/10/22	17:42	17:42	16	N	10	71	3	MJ & TN
			19:42	15	N	50	81	3	

Table B-6 – Transect 6 Survey Details

Month	Date	Sunset/ Sunrise	Start/ End	Temp (°C)	Rain	Cloud Cover (%)	Humidity (%RH)	Wind (Beaufort scale 1-12)	Personnel
Aug	23/08/22	20:19	20:19	24	N	70	68	3	MJ & GM
			22;19	22	N	60	74	3	
Sep	15/09/22	19:14	19:14	16	N	60	48	2	MJ & TN
			21:14	15	N	30	57	2	
Oct	27/10/22	17:40	17:40	18	N	30	83	3	MJ & TN
			19:40	17	N	30	84	3	

Table B-7 – Transect 7 Survey Details

Month	Date	Sunset/ Sunrise	Start/ End	Temp (°C)	Rain	Cloud Cover (%)	Humidity (%RH)	Wind (Beaufort scale 1-12)	Personnel
Aug	31/08/22	19:49	19:49	19	N	5	57	3	MJ & TN
			21:49	17	N	5	66	3	
Sep	20/09/22	19:03	19:03	17	N	40	68	2	MJ & TN
			21:03	15	N	25	77	1	
Oct	20/10/22	17:54	17:54	14	N	20	92	2	MJ & TN
			19:54	13	N	10	94	2	

Appendix C

Static Deployment Dates

Table C-1 – August Static Deployment Dates

Static Detector ID	Date of Deployment	Date of Collection
Transect 1 – Static 1	09/08/2022	16/08/2022
Transect 1 – Static 2	09/08/2022	16/08/2022
Transect 1 – Static 3	09/08/2022	16/08/2022
Transect 2 – Static 1	09/08/2022	16/08/2022
Transect 2 – Static 2	09/08/2022	16/08/2022
Transect 2 – Static 3	09/08/2022	16/08/2022
Transect 3 – Static 1	09/08/2022	16/08/2022
Transect 3 – Static 2	09/08/2022	16/08/2022
Transect 3 – Static 3	09/08/2022	16/08/2022
Transect 3 – Static 4	09/08/2022	16/08/2022
Transect 4 – Static 1	17/08/2022	23/08/2022
Transect 5 – Static 1	17/08/2022	23/08/2022
Transect 5 – Static 3	17/08/2022	23/08/2022
Transect 6 – Static 1	17/08/2022	23/08/2022
Transect 6 – Static 3	17/08/2022	23/08/2022
Transect 7 – Static 1	17/08/2022	23/08/2022
Transect 7 – Static 2	17/08/2022	23/08/2022
Transect 7 – Static 3	17/08/2022	23/08/2022

Table C-2 – September Static Deployment Dates

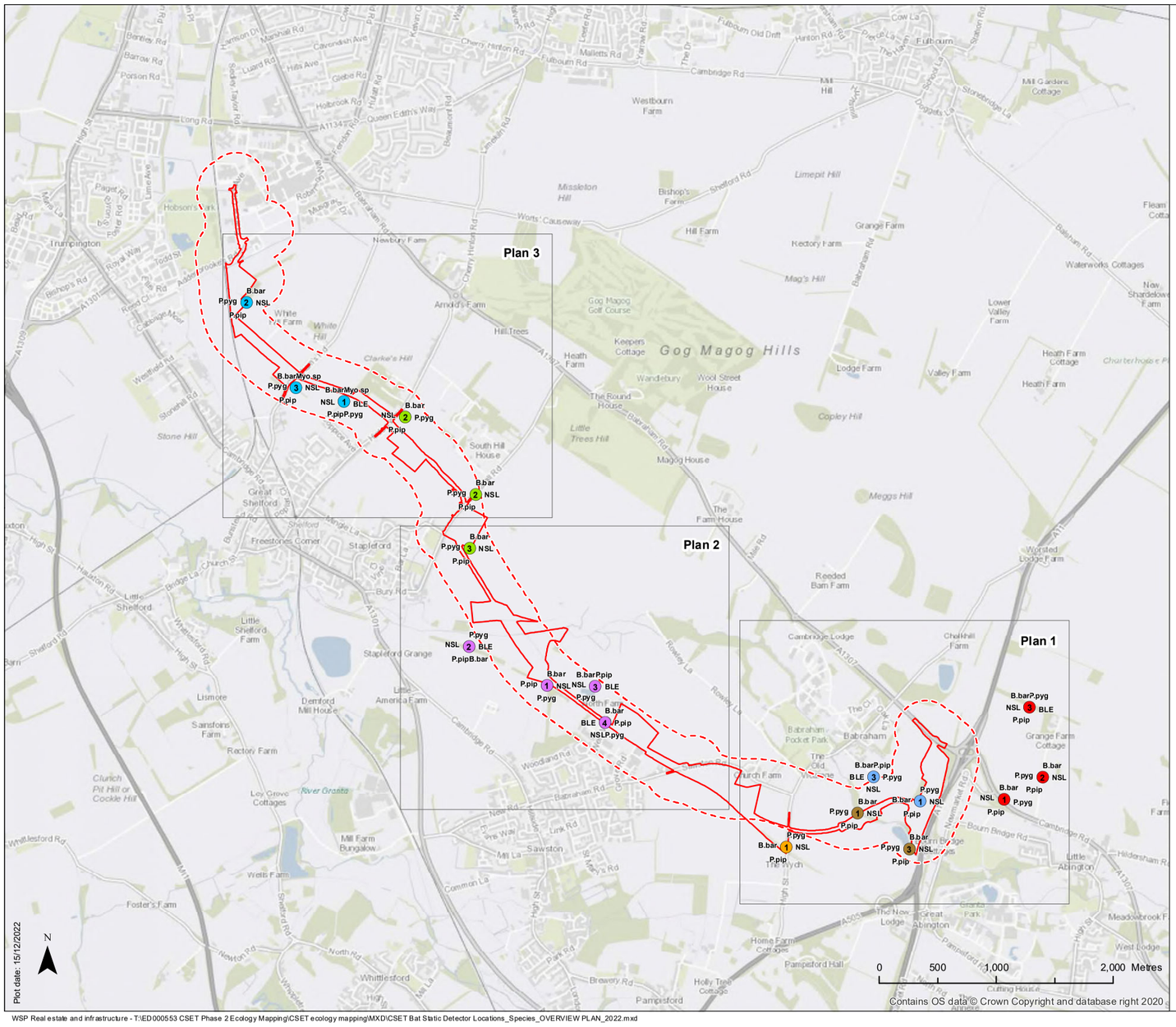
Static Detector ID	Date of Deployment	Date of Collection
Transect 1 – Static 1	06/09/2022	13/09/2022
Transect 1 – Static 2	06/09/2022	13/09/2022
Transect 1 – Static 3	06/09/2022	13/09/2022
Transect 2 – Static 1	06/09/2022	13/09/2022
Transect 2 – Static 2	06/09/2022	13/09/2022
Transect 2 – Static 3	06/09/2022	13/09/2022
Transect 3 – Static 1	06/09/2022	13/09/2022
Transect 3 – Static 2	06/09/2022	13/09/2022
Transect 3 – Static 3	06/09/2022	13/09/2022
Transect 3 – Static 4	06/09/2022	13/09/2022
Transect 4 – Static 1	14/09/2022	21/09/2022
Transect 5 – Static 1	14/09/2022	21/09/2022
Transect 5 – Static 3	14/09/2022	21/09/2022
Transect 6 – Static 1	14/09/2022	21/09/2022
Transect 6 – Static 3	14/09/2022	21/09/2022
Transect 7 – Static 1	14/09/2022	21/09/2022
Transect 7 – Static 2	14/09/2022	21/09/2022
Transect 7 – Static 3	14/09/2022	21/09/2022

Table C-3 – October Static Deployment Dates

Static Detector ID	Date of Deployment	Date of Collection
Transect 1 – Static 1	11/10/2022	18/10/2022
Transect 1 – Static 2	11/10/2022	18/10/2022
Transect 1 – Static 3	11/10/2022	18/10/2022
Transect 2 – Static 1	11/10/2022	18/10/2022
Transect 2 – Static 2	11/10/2022	18/10/2022
Transect 2 – Static 3	11/10/2022	18/10/2022
Transect 3 – Static 1	11/10/2022	18/10/2022
Transect 3 – Static 2	11/10/2022	18/10/2022
Transect 3 – Static 3	11/10/2022	18/10/2022
Transect 3 – Static 4	19/10/2022	25/10/2022
Transect 4 – Static 1	19/10/2022	25/10/2022
Transect 5 – Static 1	25/10/2022	31/10/2022
Transect 5 – Static 3	25/10/2022	31/10/2022
Transect 6 – Static 1	19/10/2022	25/10/2022
Transect 6 – Static 3	19/10/2022	25/10/2022
Transect 7 – Static 1	19/10/2022	25/10/2022
Transect 7 – Static 2	19/10/2022	25/10/2022
Transect 7 – Static 3	19/10/2022	25/10/2022

Appendix D

Static Location Maps



KEY

Red Line Boundary (24/11/2022)

Survey Area (Old)

Static Detector locations

- Transect 1
- Transect 2
- Transect 3
- Transect 4
- Transect 5
- Transect 6
- Transect 7

Bat Species

B.bar – Barbastelle
BLE. – Brown Long-eared
P.pip – Common pipistrelle
P.pyg – Soprano pipistrelle
Myo sp – Myotis species
NSL – Noctule/Serotine/Leislers



Rev	Drwn	Chk'd	App'd	Description	Date
P01.1	AC	NP	JJ	FIRST DRAFT	15/12/2022

Purpose of Issue
S2 - Issued for Information

Classification
Commercial in Confidence

Client
Greater Cambridgeshire Partnership

Project
Cambridge South East Transport (CSET) Phase 2

Drawing
CSET Static detector loctions - Species August – October 2022
Overview plan

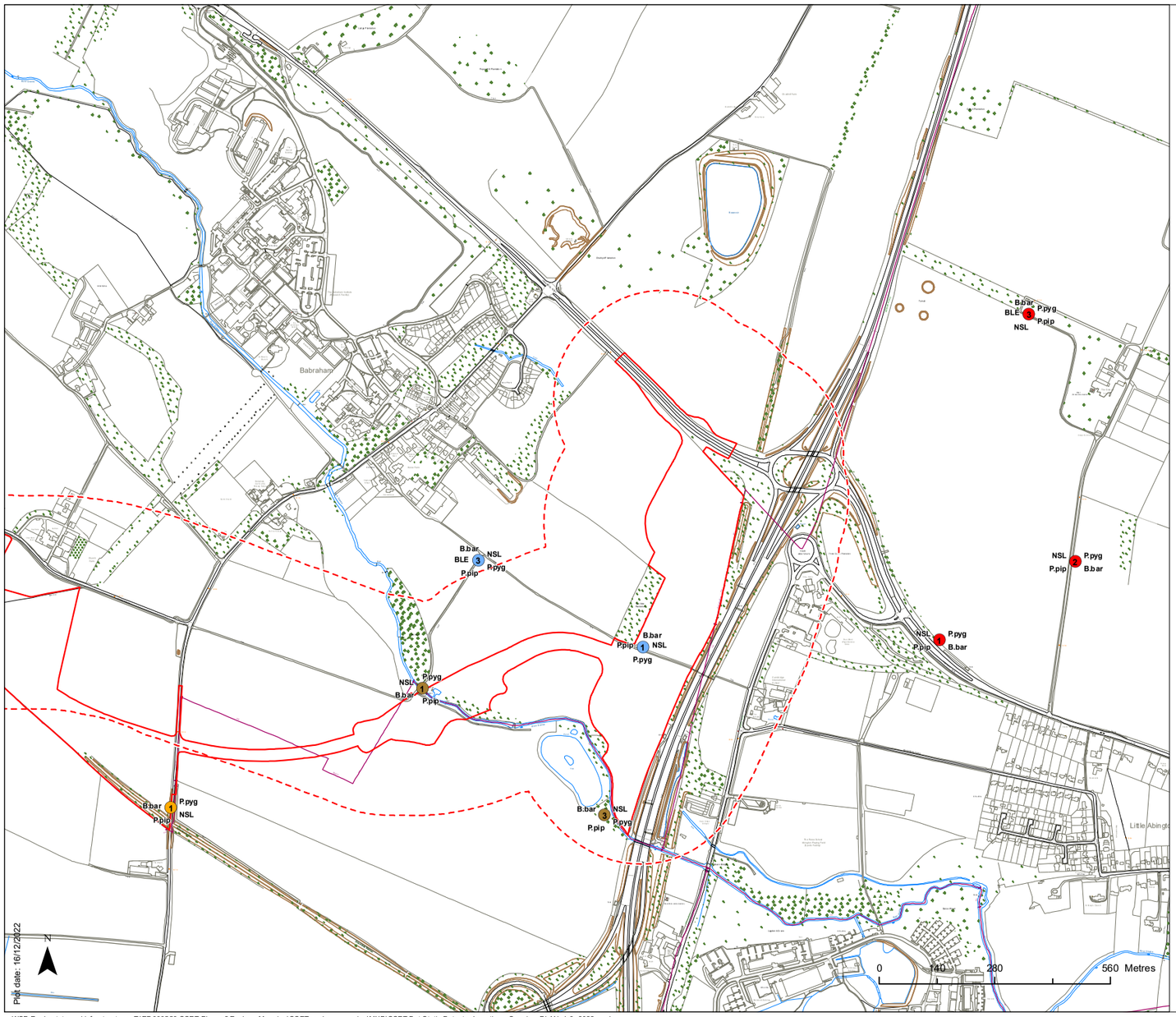
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Project No: ED000553
Date: 15/12/2022

Drawing Identifier
Project Reference-Author-Volume-Location-Type-Role-File Number
Revision: P01.1

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KEY

Red Line Boundary (24/11/2022)

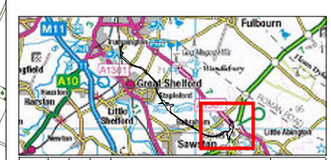
Survey Area (Old)

Static Detector locations

- Transect 4
- Transect 5
- Transect 6
- Transect 7

Bat Species

B.bar – Barbastelle
BLE. – Brown Long-eared
P.pip – Common pipistrelle
P.pyg – Soprano pipistrelle
Myo sp – Myotis species
NSL – Noctule/Serotine/Leislers



Rev	Drwn	Chk'd	App'd	Description	Date
P01.1	AC	NP	JJ	FIRST DRAFT	15/12/2022

Purpose of Issue
S2 - Issued for Information

Classification
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Client
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Project
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Drawing
CSET Static detector loctions - Species August – October 2022

Plan 1 of 3

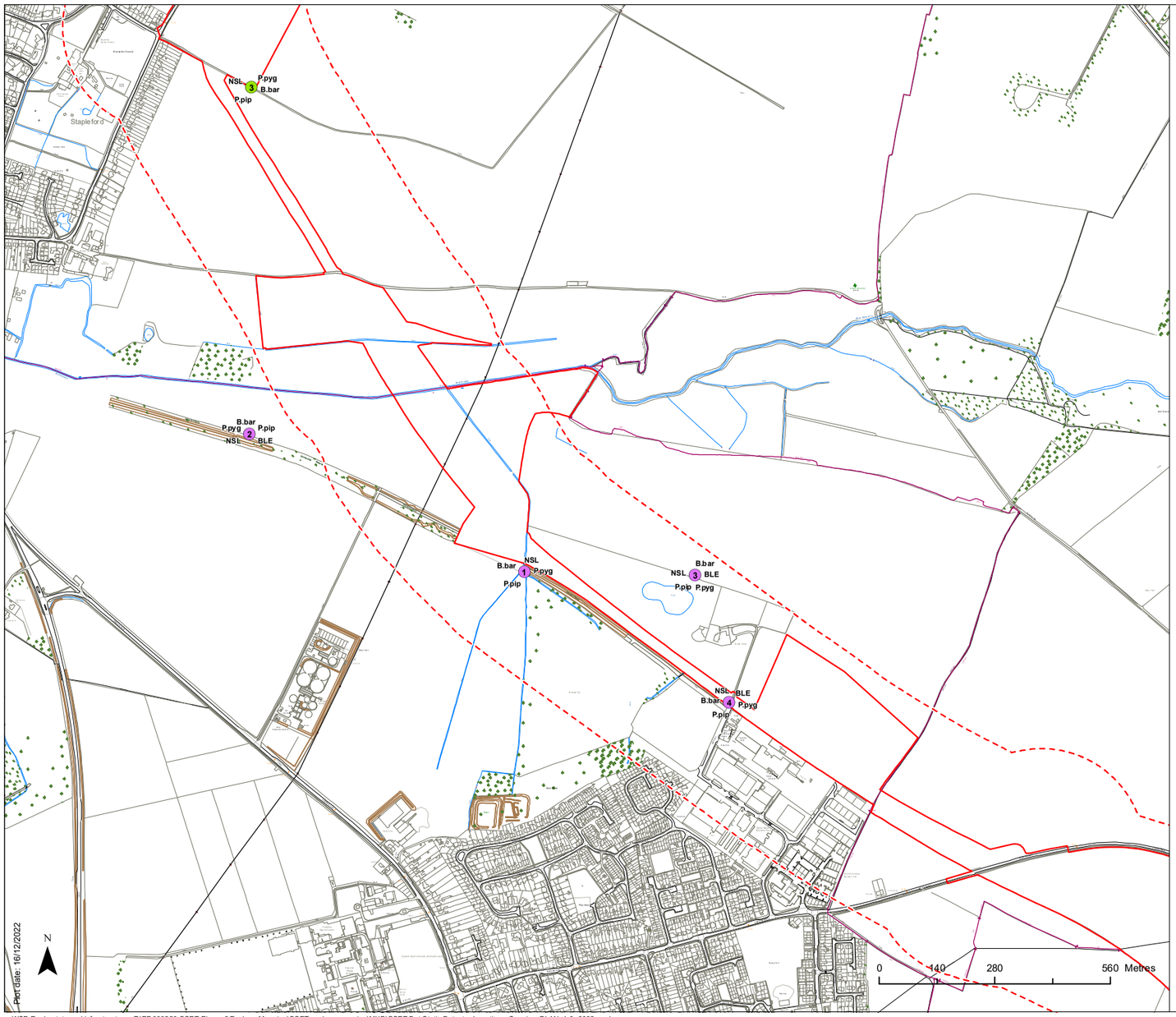
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Date: 16/12/2022

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KEY

Red Line Boundary (24/11/2022)

Survey Area (Old)

Static Detector locations

Transect 2

Transect 3

Bat Species

B.bar – Barbastelle
BLE. – Brown Long-eared
P.pip – Common pipistrelle
P.pyg – Soprano pipistrelle
Myo sp – Myotis species
NSL – Noctule/Serotine/Leislers



Rev	Drwn	Chk'd	App'd	Description	Date
P01.1	AC	NP	JJ	FIRST DRAFT	15/12/2022

Purpose of Issue
S2 - Issued for Information

Classification
Commercial in Confidence

Client
Greater Cambridgeshire Partnership

Project
Cambridge South East Transport (CSET) Phase 2

Drawing
CSET Static detector loctions - Species August – October 2022

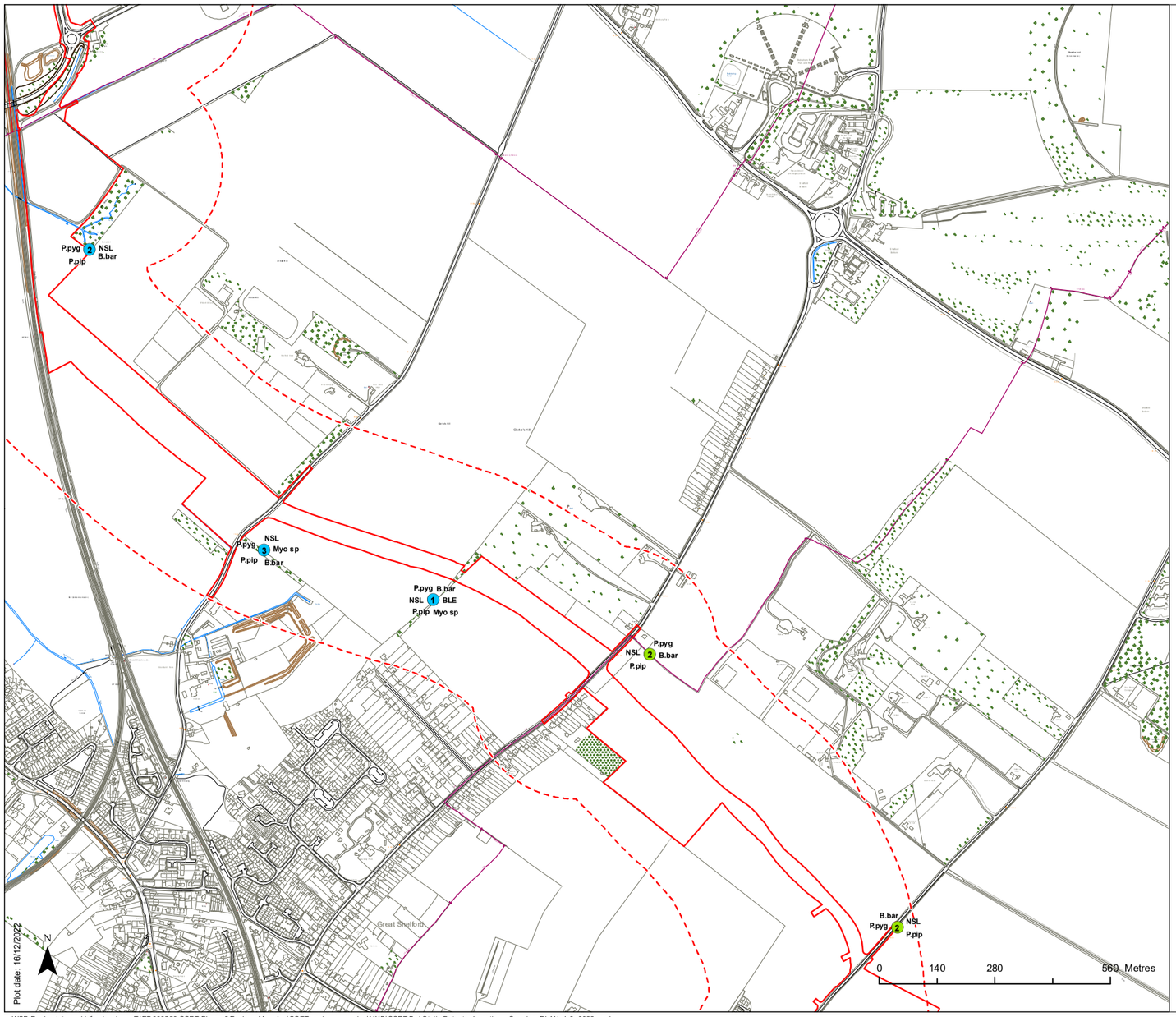
Plan 2 of 3

Scale @ A3	Drawn	Checked	Approved
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Project No: ED000553
Date: 16/12/2022

Drawing Identifier
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Revision: P01.1

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KEY

Red Line Boundary (24/11/2022)

Survey Area (Old)

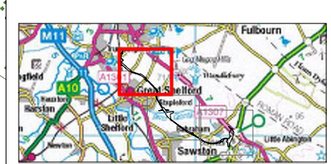
Static Detector locations

Transect 1

Transect 2

Bat Species

B.bar – Barbastelle
BLE. – Brown Long-eared
P.pip – Common pipistrelle
P.pyg – Soprano pipistrelle
Myo sp – Myotis species
NSL – Noctule/Serotine/Leislers



Rev	Drwn	Chk'd	App'd	Description	Date
P01.1	AC	NP	JJ	FIRST DRAFT	15/12/2022

Purpose of Issue
S2 - Issued for Information

Classification
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Client
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Project
Cambridge South East Transport (CSET) Phase 2

Drawing
CSET Static detector loctions - Species August – October 2022

Plan 3 of 3

Scale @ A3	Drawn	Checked	Approved
1:8,500	AC	NP	JJ

Project No: ED000553
Date: 16/12/2022

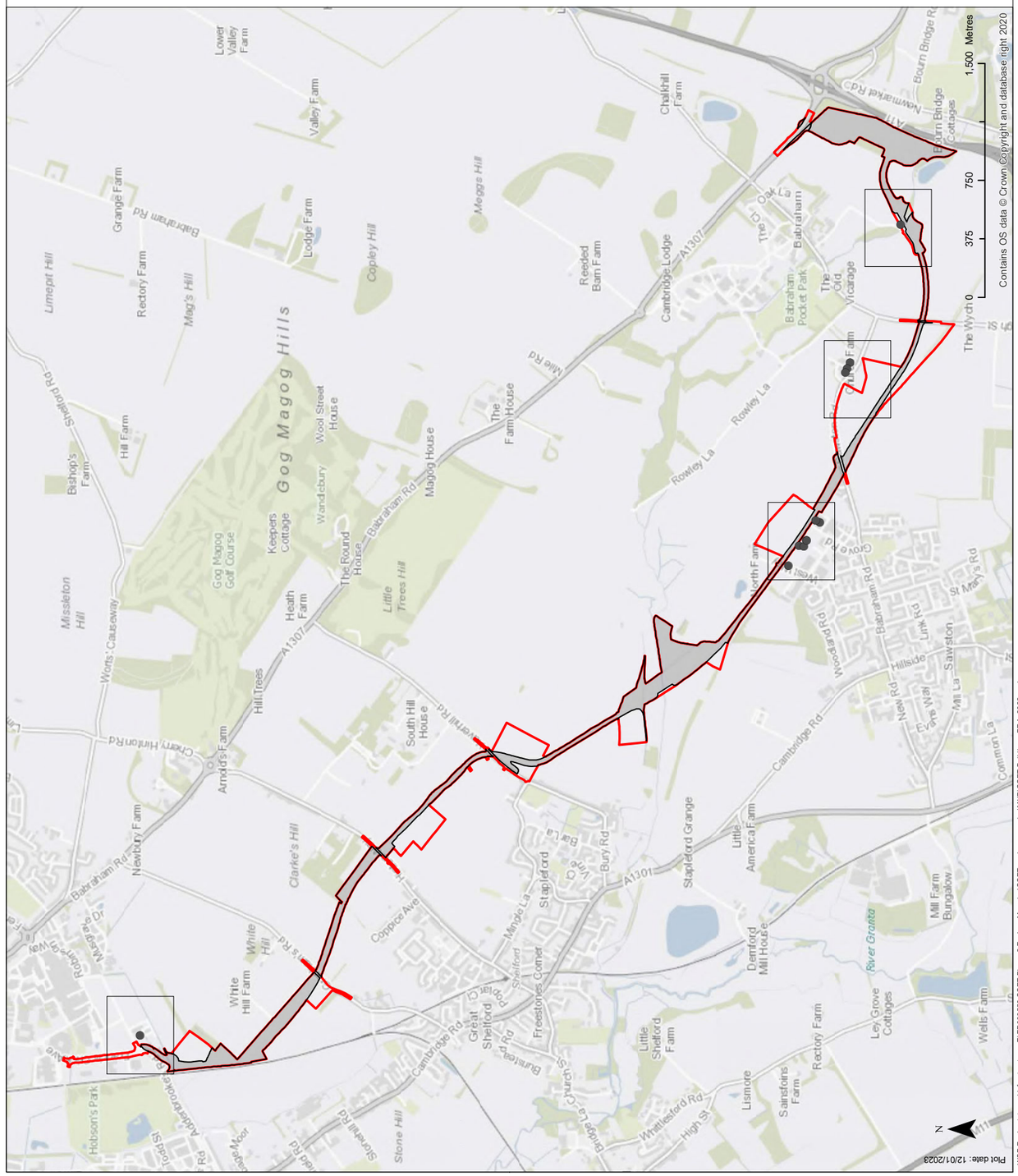
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Revision: P01.1

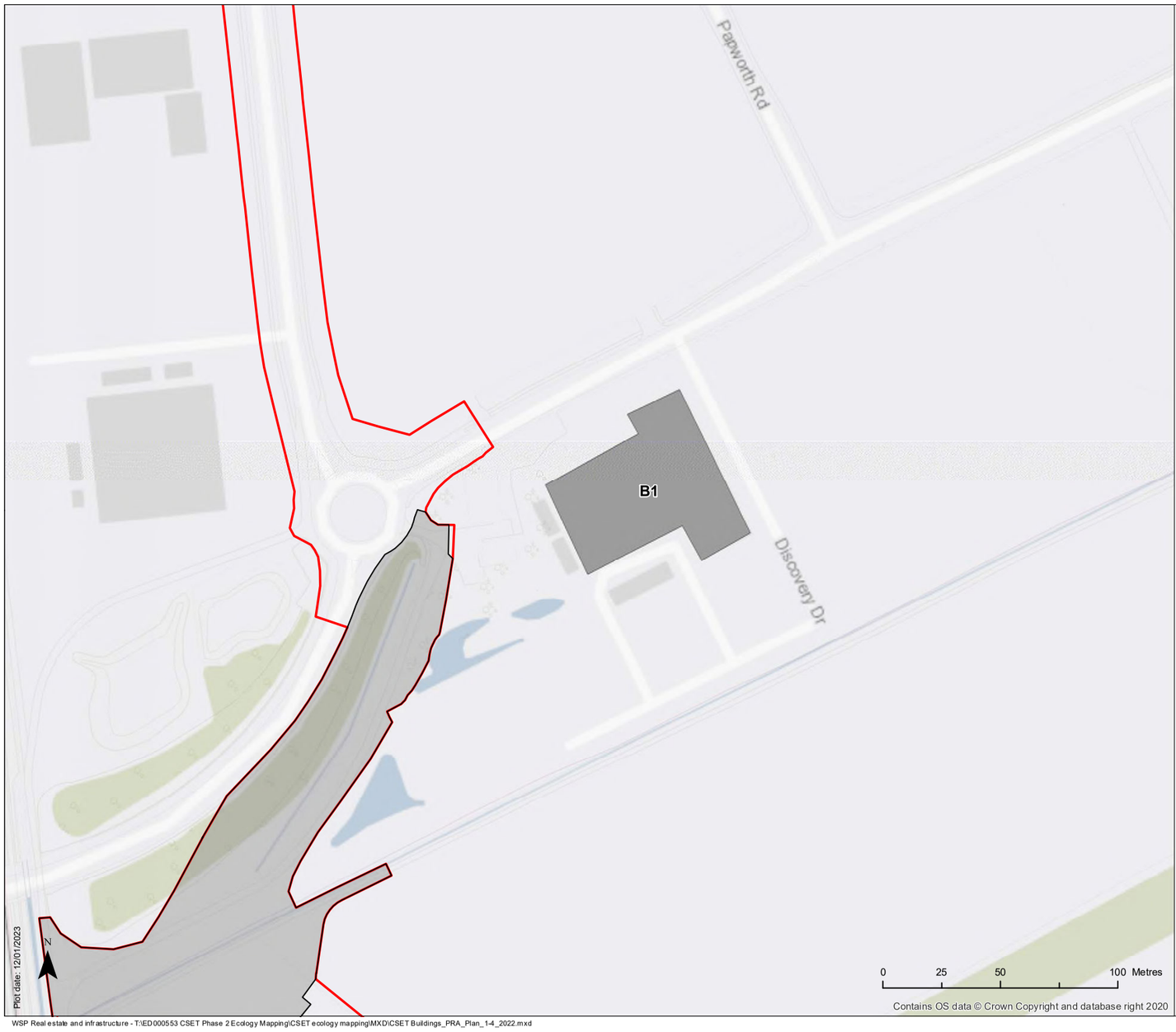
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Appendix E

Building Location Maps

Public





KEY

- Red Line Boundary (24/11/2022)
- Route Alignment
- Buildings within 50m from route alignment
- Permanent Land Take



Rev	Drwn	Chk'd	App'd	Description	Date
P01	AC	MJ	JJ	FOR ISSUE	12/01/2022

Purpose of Issue
S2 - Issued for Information

Classification
Commercial in Confidence

Client
Greater Cambridgeshire Partnership

Project
Cambridge South East Transport (CSET) Phase 2

Drawing
CSET Buildings PRA

Plan 1 of 4

Scale @ A3	Drawn	Checked	Approved
1:1,500	AC	MJ	JJ

Project No: ED000553
Date: 12/01/2023

Drawing Identifier
Project Reference-Author-Volume-Location-Type-Role-File Number: STND-WSP-EBD-XX-GS-LE-1067
Revision: P01

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KEY

- Red Line Boundary (24/11/2022)
- Route Alignment
- Buildings within 50m from route alignment
- Permanent Land Take



Rev	Drwn	Chk'd	App'd	Description	Date
P01	AC	MJ	JJ	FOR ISSUE	12/01/2022

Purpose of Issue
S2 - Issued for Information

Classification
Commercial in Confidence

Client
Greater Cambridgeshire Partnership

Project
Cambridge South East Transport (CSET) Phase 2

Drawing
CSET Buildings PRA

Plan 2 of 4

Scale @ A3	Drawn	Checked	Approved
1:1,500	AC	MJ	JJ

Project No: ED000553
Date: 12/01/2023

Drawing Identifier
Project Reference-Author-Volume-Location-Type-Role-File Number: STND-WSP-EBD-XX-GS-LE-1068
Revision: P01

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WSP Real estate and infrastructure - T:\ED000553 CSET Phase 2 Ecology Mapping\CSET ecology mapping\MXD\CSET Buildings_PRA_Plan_1-4_2022.mxd



KEY

- Red Line Boundary (24/11/2022)
- Route Alignment
- Buildings within 50m from route alignment
- Permanent Land Take



Rev	Drwn	Chk'd	App'd	Description	Date
P01	AC	MJ	JJ	FOR ISSUE	12/01/2022

Purpose of Issue
S2 - Issued for Information

Classification
Commercial in Confidence

Client
Greater Cambridgeshire Partnership

Project
Cambridge South East Transport (CSET) Phase 2

Drawing
CSET Buildings PRA

Plan 3 of 4

Scale @ A3	Drawn	Checked	Approved
1:1,500	AC	MJ	JJ

Project No: ED000553
Date: 12/01/2023

Drawing Identifier
Project Reference-Author-Volume-Location-Type-Role-File Number: STND-WSP-EBD-XX-GS-LE-1069
Revision: P01

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KEY

- Red Line Boundary (24/11/2022)
- Route Alignment
- Buildings within 50m from route alignment
- Permanent Land Take



Rev	Drwn	Chk'd	App'd	Description	Date
P01	AC	MJ	JJ	FOR ISSUE	12/01/2022

Purpose of Issue
S2 - Issued for Information

Classification
Commercial in Confidence

Client
Greater Cambridgeshire Partnership

Project
Cambridge South East Transport (CSET) Phase 2

Drawing
CSET Buildings PRA

Plan 4 of 4

Scale @ A3	Drawn	Checked	Approved
1:1,500	AC	MJ	JJ

Project No: ED000553
Date: 12/01/2023

Drawing Identifier
Project Reference-Author-Volume-Location-Type-Role-File Number: STND-WSP-EBD-XX-GS-LE-1070
Revision: P01

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Appendix F

Building Reference Photographs

Public

Table F-1 – Building Reference Photographs

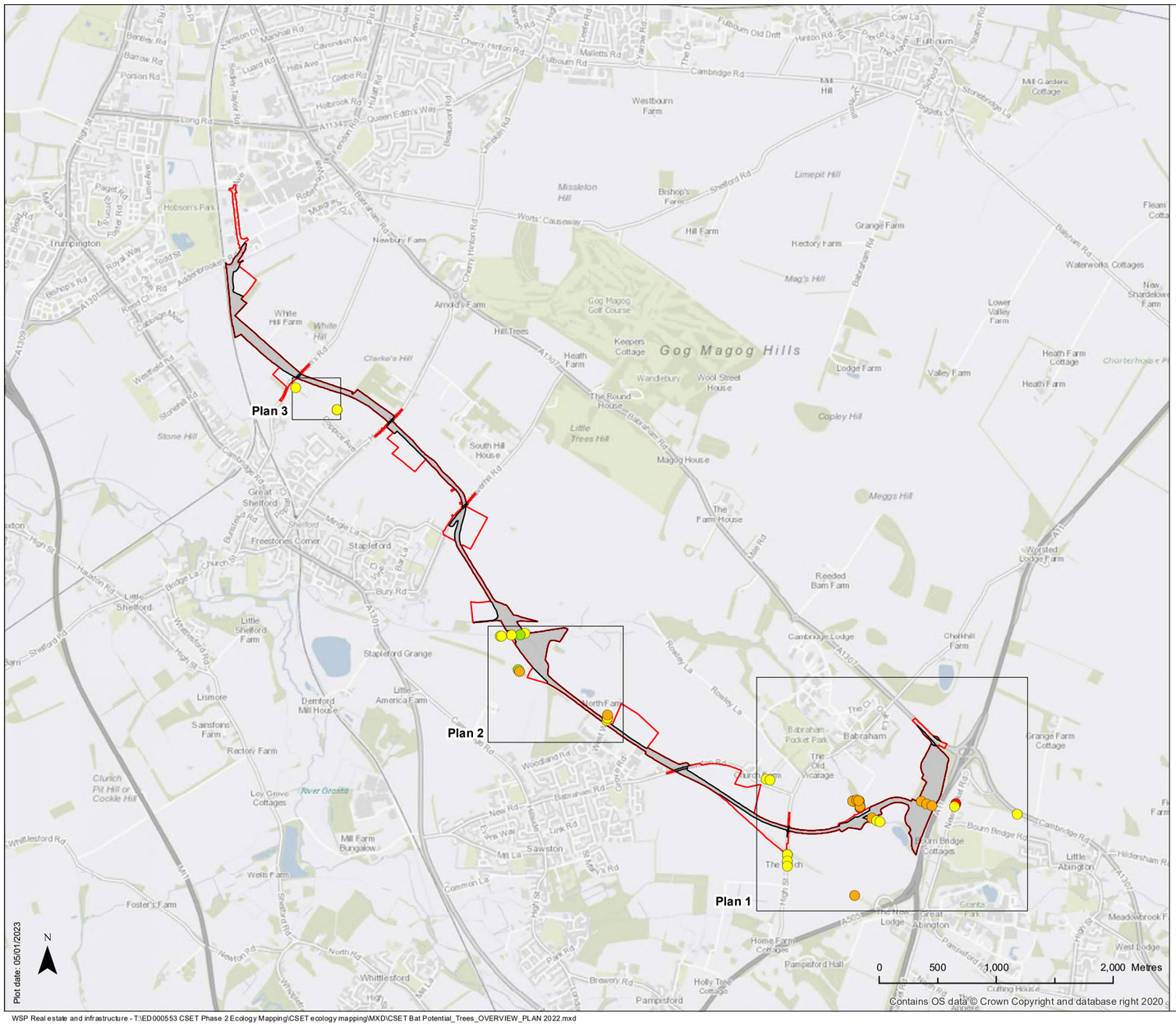
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B7	TL 49448 50253	
B9	TL 50397 50062	
B10	TL 50421 50050	
B11	TL 50460 50032	
B12	TL 51346 49707	

Appendix G

Tree Location Maps

Public



KEY

- Red Line Boundary (24/11/2022)
- Route Alignment (24/11/2022)
- Permanent Land Take (24/11/2022)

Bat Roost Potential

- High Potential
- Moderate Potential
- Low Potential
- Negligible



Rev	Drwn	Chk'd	App'd	Description	Date
P01.2	AC	MJ	JJ	DATA AMENDED	04/01/2022
P01.1	AC	MJ	JJ	FIRST DRAFT	16/12/2022

Purpose of Issue
S2 - Issued for Information

Classification
Commercial in Confidence

Client
Greater Cambridgeshire Partnership

Project
Cambridge South East Transport (CSET) Phase 2

Drawing
CSET Bat Roost Potential - Trees Overview plan

Scale @ A3	Drawn	Checked	Approved
1:30,000	AC	MJ	JJ

Project No: ED000553
Date: 05/01/2023

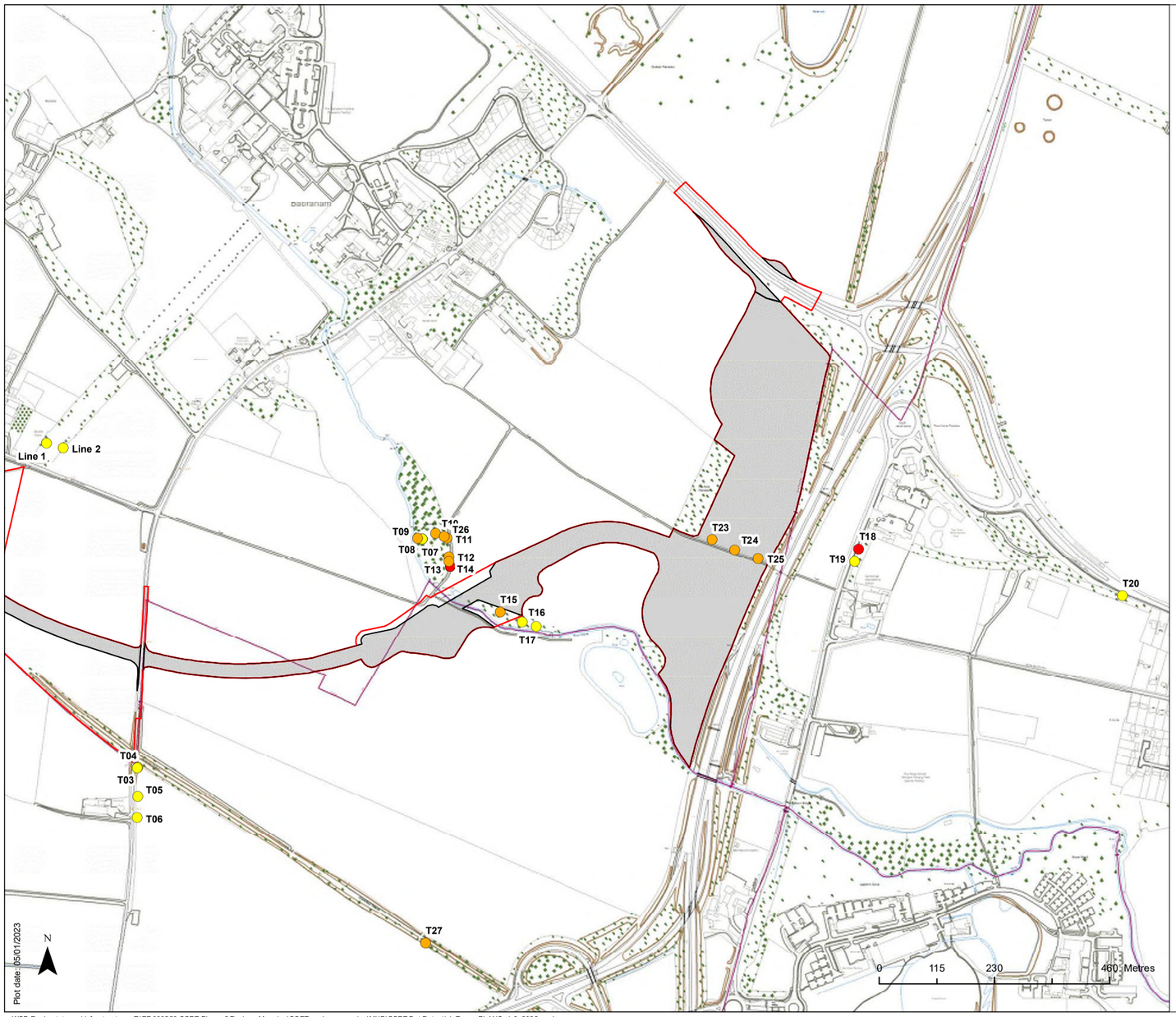
Drawing Identifier
Project Reference-Author-Volume-Location-Type-Role-File Number
Revision: P01.2

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Plot date: 05/01/2023

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KEY

- Red Line Boundary (24/11/2022)
- Route Alignment)24/11/2022)
- Permanent Land Take (24/11/2022)

Bat Roost Potential

- High Potential
- Moderate Potential
- Low Potential



Rev	Drwn	Chk'd	App'd	Description	Date
P01.2	AC	MJ	JJ	DATA AMENDED	04/01/2022
P01.1	AC	MJ	JJ	FIRST DRAFT	16/12/2022

Purpose of Issue
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Drawing
CSET Bat Roost Potential - Trees

Plan 1 of 3

Scale @ A3	Drawn	Checked	Approved
1:7,000	AC	MJ	JJ

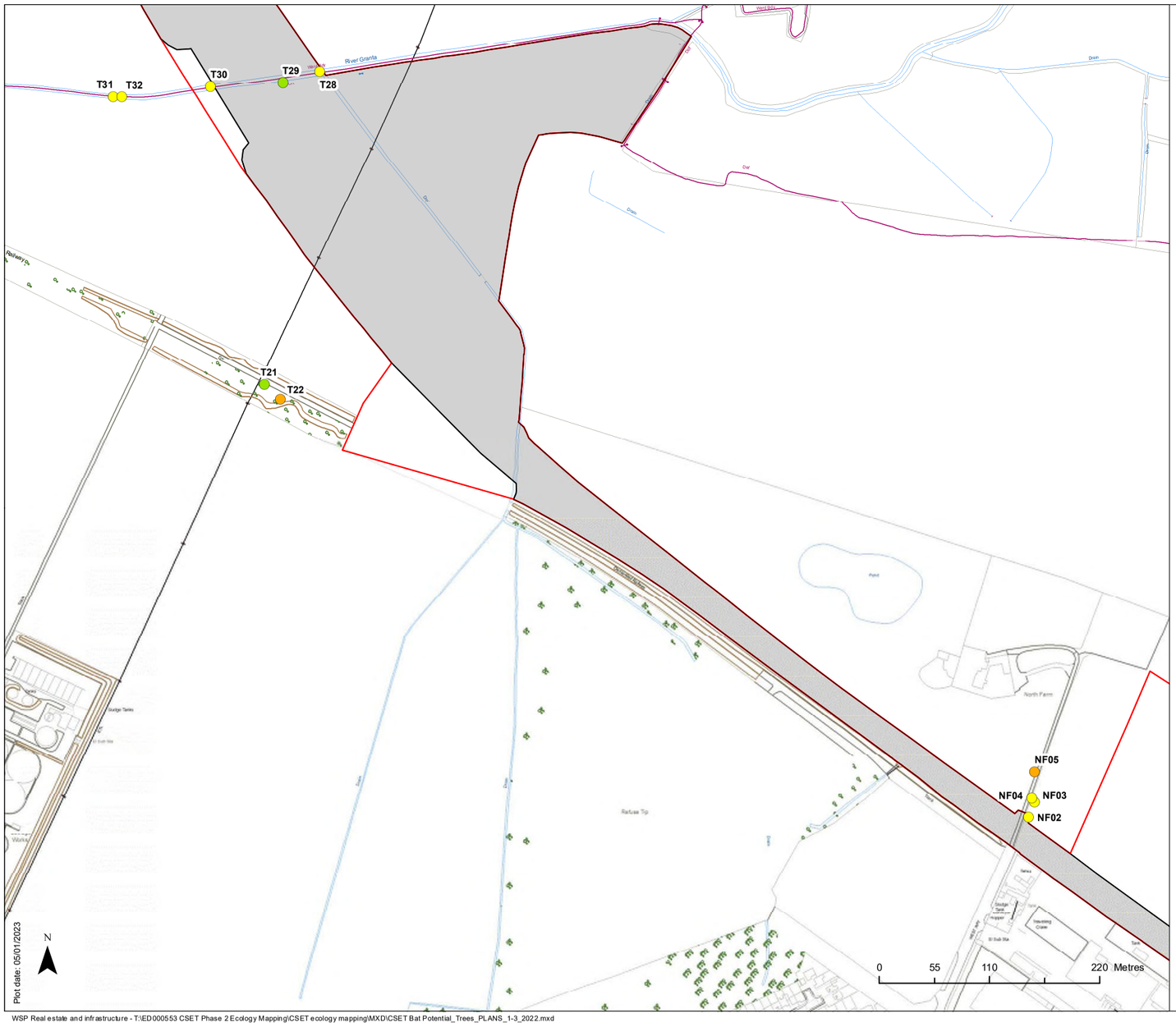
Project No: ED000553
Date: 05/01/2023

Drawing Identifier
Project Reference-Author-Volume-Location-Type-Role-File Number
Revision: N/A P01.2

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Plot date: 05/01/2023

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KEY

- Red Line Boundary (24/11/2022)
- Route Alignment)24/11/2022)
- Permanent Land Take (24/11/2022)

Bat Roost Potential

- Moderate Potential
- Low Potential
- Negligible



Rev	Drwn	Chk'd	App'd	Description	Date
P01.2	AC	MJ	JJ	DATA AMENDED	04/01/2022
P01.1	AC	MJ	JJ	FIRST DRAFT	16/12/2022

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Project
Cambridge South East Transport (CSET) Phase 2

Drawing
CSET Bat Roost Potential - Trees

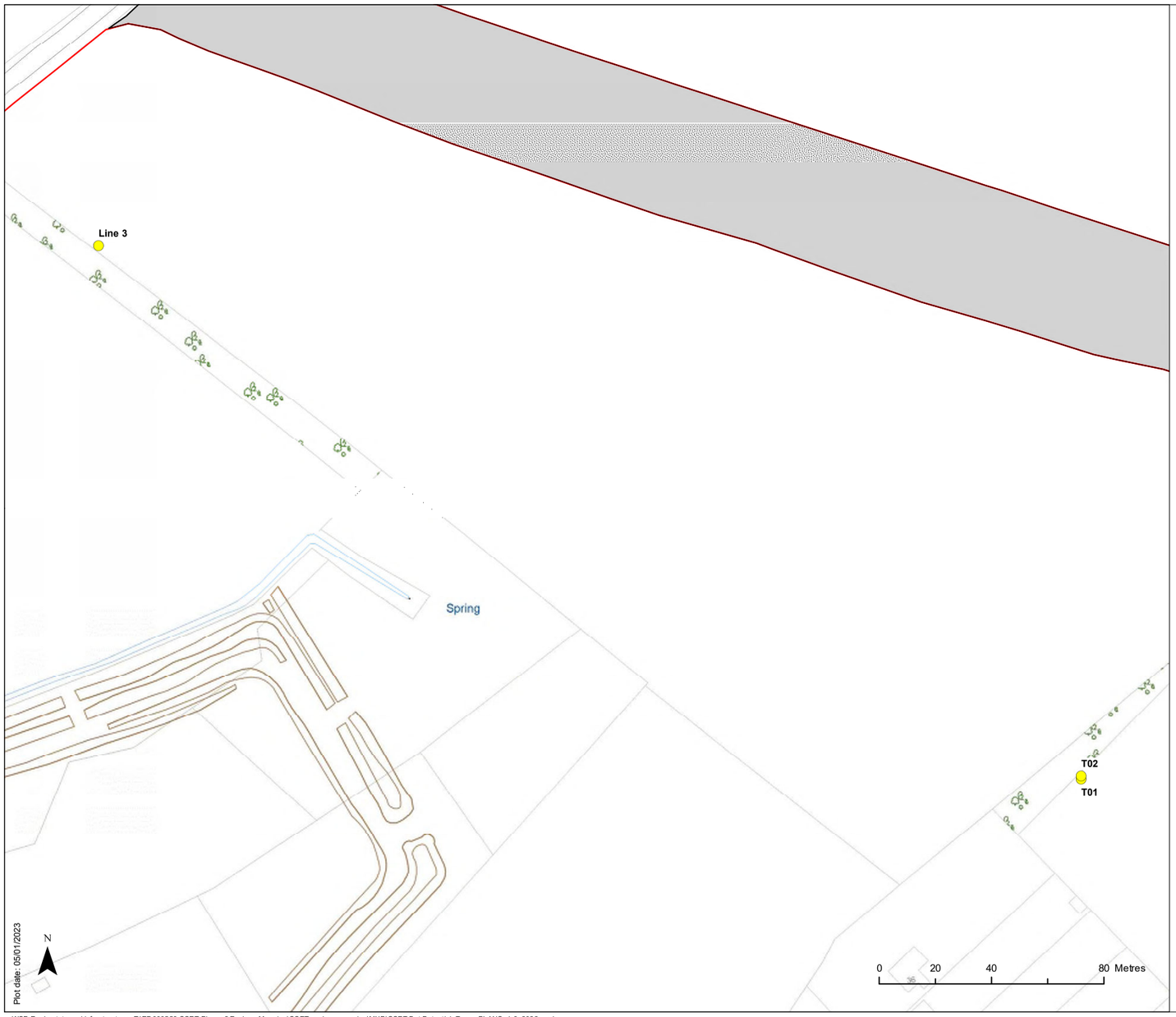
Plan 2 of 3

Scale @ A3	Drawn	Checked	Approved
1:3,500	AC	MJ	JJ

Project No	Date
ED000553	05/01/2023

Drawing Identifier
Project Reference-Author-Volume-Location-Type-Role-File Number: N/A
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KEY

- Red Line Boundary (24/11/2022)
- Route Alignment)24/11/2022)
- Permanent Land Take (24/11/2022)

Bat Roost Potential

- Low Potential



Rev	Drwn	Chk'd	App'd	Description	Date
P01.2	AC	MJ	JJ	DATA AMENDED	04/01/2022
P01.1	AC	MJ	JJ	FIRST DRAFT	16/12/2022

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Drawing
CSET Bat Roost Potential - Trees

Plan 3 of 3

Scale @ A3	Drawn	Checked	Approved
1:1,250	AC	MJ	JJ

Project No	Date
ED000553	05/01/2023

Drawing Identifier
Project Reference-Author-Volume-Location-Type-Role-File Number: N/A
Revision: P01.2

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Appendix H

Ground-Level Tree Assessment Results

Table H-1 - Ground-level Tree Assessment Results

Tree ID	Grid Reference / Tree tag	Species	Description of surrounding habitat and position in the landscape	Age	Potential Roost Features (PRFs)				Overall Level of Suitability
					Description	Approx. height above ground level (m)	Position on tree	Aspect (compass bearing)	
T01	TL 46865 53157 (Tree tag 487)	European ash	Narrow woodland strip north-west of Hinton Way, Great Shelford. Partially separating two arable fields.	Mature	Limb tear	5	Branch	South	Low
					Woodpecker hole	5	Main stem	South	
T02	TL 46865 53158 (Tree tag 488)	Pedunculate oak	Narrow woodland strip north-west of Hinton Way, Great Shelford. Partially separating two arable fields.	Mature	Limb tear	6	Branch	South	Low

Public

T03	TL 50715 49352 (No tree tag)	Sycamore	Planted tree on south-side verge of High Street, south-west of Babraham.	Mature	Wound	5	Main stem	South-east	Low
T04	TL 50714 49351 (No tree tag)	European ash	Planted tree on south-side verge of High Street, south-west of Babraham.	Mature	Branch cavity	-	Branch	East	Low
					Callus roll	7	Main stem	West	
					Callus roll	8	Main stem	West	
T05	TL 50715 49294 (No tree tag)	European ash	Planted tree on south-side verge of High Street, south-west of Babraham.	Mature	Woodpecker hole	9.5	Main stem	South	Low
					Woodpecker hole	10	Main stem	South	
T06	TL 50714 49252 (No tree tag)	European ash	Planted tree on south-side verge of High Street, south-west of Babraham.	Mature	Branch cavity	3.5	Branch	South-west	Low
					Trunk cavity	4	Main stem	West	
T07	TL 51282 49808 (No tag 495)	Sycamore	Small Woodland block at Home Farm (Cheveley Park Farms). Located north of the River Granta, north-west of ford. Used as a rearing area for gamebirds.	Dead	Woodpecker hole	10	Main stem	East	Low

			west of ford. Used as a rearing area for gamebirds.						
T08	TL 51282 49808 (No tree tag)	Sycamore	Small Woodland block at Home Farm (Cheveley Park Farms). Located north of the River Granta, north-west of ford. Used as a rearing area for gamebirds.	Mature	Woodpecker hole	8	Main stem	South-east	Low
T09	TL 51274 49809 (No tree tag)	European ash	Small Woodland block at Home Farm (Cheveley Park Farms). Located north of the River Granta, north-west of ford. Used as a rearing area for gamebirds.	Mature	Knothole / woodpecker hole	6	Main stem	South	Moderate
T10	TL 51309 49819	European ash	Small Woodland block at Home Farm (Cheveley	Mature	Limb tear	10	Branch	South	Moderate

	(Tree tag 492)		Park Farms). Located north of the River Granta, north-west of ford. Used as a rearing area for gamebirds.						
T11	TL 51332 49810 (No tree tag)	European ash	Small Woodland block at Home Farm (Cheveley Park Farms). Located north of the River Granta, north-west of ford. Used as a rearing area for gamebirds.	Mature	Limb tear	7	Branch	South-east	Moderate
					Woodpecker hole	7	Main stem	South	
					Wound	6	Main stem	North-east	

T12	TL 51336 49772 (No tree tag)	European ash	Small Woodland block at Home Farm (Cheveley Park Farms). Located north of the River Granta, north-west of ford. Used as a rearing area for gamebirds.	Mature	Limb tear	5	Branch	South-east	Moderate
					Woodpecker hole	7	Main stem	South	
T13	TL 51339 49753 (No tree tag)	Scot's pine	Small Woodland block at Home Farm (Cheveley Park Farms). Located north of the River Granta, north-west of ford. Used as a rearing area for gamebirds.	Mature	Split	8	Main stem	South	High
					Woodpecker hole	8	Main stem	South	

T14	TL 51336 49763 (No tree tag)	European ash	Small Woodland block at Home Farm (Cheveley Park Farms). Located north of the River Granta, north-west of ford. Used as a rearing area for gamebirds.	Mature	Knothole	7	Main stem	North	Moderate
					Woodpecker hole	6	Main stem	South-east	
					Wound	7	Main stem	South-east	
T15	TL 51439 49662 (No tree tag)	Crack willow	Woodland strip running along northern bank of the River Granta. East of ford, west of reservoir.	Mature	Rot hole	5	Main stem	North-east	Moderate
					Rot hole	5	Main stem	North-east	
					Rot hole	6	Main stem	North-east	
					Knothole	7	Main stem	North	
T16	TL 51482 49642 (No tree tag)	Sycamore	Woodland strip running along northern bank of the River Granta. East of ford, west of reservoir.	Mature	Trunk cavity	5.5	Main stem	South	Low
					Woodpecker hole	5	Main stem	South	

T17	TL 51509 49633 (No tree tag)	Crack willow	Woodland strip running along northern bank of the River Granta. East of ford, west of reservoir.	Mature	Hazard beam	2	Branch	East	Low
					Trunk cavity	3	Main stem	North	
T18	TL 52154 49788 (Tree tag 496)	Pedunculate oak	Small Woodland block on east-side of Newmarket Road, Little Abington.	Mature	Lifted bark	8.5	Branch	North-west	High
					Split branch	7.5	Branch	North	
T19	TL 52146 49763 (Tree tag 497)	Pedunculate oak	Small Woodland block on east-side of Newmarket Road, Little Abington.	Mature	Branch cavity	6	Branch	-	Low
					Limb tear	6	Branch	North	
					Wound	6	Main stem	South	
T20	TL 52679 49695 (Tree tag 491)	European ash	Woodland strip running along southern side of A1307 Cambridge Road; north-west of Little Abington.	Mature	Knothole	8	Main stem	North	Low

T21	TL 48413 50933 (No tree tag)	Crack willow	Woodland strip at Deal Farm, south of River Granta. Partially separating two arable fields.	Mature	N/A	N/A	N/A	N/A	Negligible (Fallen down)
T22	TL 48429 50918 (No tree tag)	Crack willow	Woodland strip at Deal Farm, south of River Granta. Partially separating two arable fields.	Mature	Woodpecker hole	2	Main stem	East	Moderate
					Woodpecker hole	2.5	Main stem	East	
					Woodpecker hole	3.5	Main stem	East	
					Woodpecker hole	4.5	Main stem	East	
T23	TL 51861 49806 (No tree tag)	Pedunculate oak	Tree along hedgerow and Public Right of Way (PRoW), separating two arable fields. Part of Home Farm (Cheveley Park Farms), west of A11.	Mature	Branch collar	9	Branch	South	Moderate
					Knothole	5	Main stem	South	
					Knothole	5	Main stem	North	
					Split	9	Main stem	West	
					Wound	9	Branch	North	
T24	TL 51906 49786	Pedunculate oak	Tree along hedgerow and	Mature	Split / deadwood	8	Main stem	North-west	Moderate

	(No tree tag)		PRoW, separating two arable fields. Part of Home Farm (Cheveley Park Farms), west of A11.						
T25	TL 51953 49769 (No tree tag)	Pedunculate oak	Tree along hedgerow and PRoW, separating two arable fields. Part of Home Farm (Cheveley Park Farms), west of A11.	Mature	Knothole	3	Main stem	South	Moderate
					Lifted bark	6	Main stem	East	
					Split / deadwood	7	Main stem	North-west	
T26	TL 51326 49813 (No tree tag)	European ash	Small Woodland block at Home Farm (Cheveley Park Farms). Located north of the River Granta, north-west of ford. Used as a rearing area for gamebirds.	Mature	Dead limb	5	Branch	South-east	Moderate
					Knothole	7	Main Stem	North	
					Split / tear	8.5	Main Stem	North / south	
					Wound	8	Main Stem	South	

T27	TL 51290 49002 (No tree tag)	Sycamore	Tree along field hedge boundary. Part of Home Farm (Cheveley Park Farms), north of Newmarket Road (A505).	Dead	Split / woodpecker hole	3	Main stem	North-west	Moderate
T28	TL 48468 51245 (No tree tag)	Crack willow	Mature tree along southern bank of River Granta. Part of Deal Farm.	Mature	Split / deadwood	3	Secondary stem	West	Low
T29	TL 48431 51234 (No tree tag)	Crack willow	Mature tree along southern bank of River Granta. Part of Deal Farm, Sawston	Dead	-	-	-	-	Negligible (Fallen down)

T30	TL 48359 51230 (No tree tag)	European ash	Mature tree along southern bank of River Granta. Part of Deal Farm, Sawston	Mature	Ivy-clad	5	Main stem	-	Low
T31	TL 48262 51220 (No tree tag)	Crack willow	Mature tree along southern bank of River Granta. Part of Deal Farm, Sawston.	Mature	Limb tear	2	Branch	West	Low
T32	TL 48271 51220 (No tree tag)	Crack willow	Mature tree along southern bank of River Granta. Part of Deal Farm, Sawston.	Mature	Limb tear	0.5	Branch	West	Low
					Hazard beam	9	Branch	North-west	
					Wound	8	Branch	South-east	
Line 1	TL 50533 49999 (No tree tag)	Common lyme	Line of planted trees, north of Sawston Road. Part of Cheveley Park Farms.	Mature	Dense foliage	-	-	-	Low

Line 2	TL 50566 49990 (No tree tag)	Common lyme	Line of planted trees, north of Sawston Road. Part of Cheveley Park Farms.	Mature	Dense foliage	-	-	-	Low
Line 3	TL 46515 53347 (No tree tag)	Mixed	Woodland strip, south of Granham's Road, Great Shelford. Part of Whitwell's Farm.	Mature	Limb tear	8	Branch	East	Low
NF02	TL 49175 50501 (No tree tag)	Walnut	Planted tree along driveway of North Farm, Sawston. Arable to the north and west, Dales Manor Business Park to the south.	Mature	Broken limb	4	Branch	South	Low
					Knothole	2.5	Main stem	East	

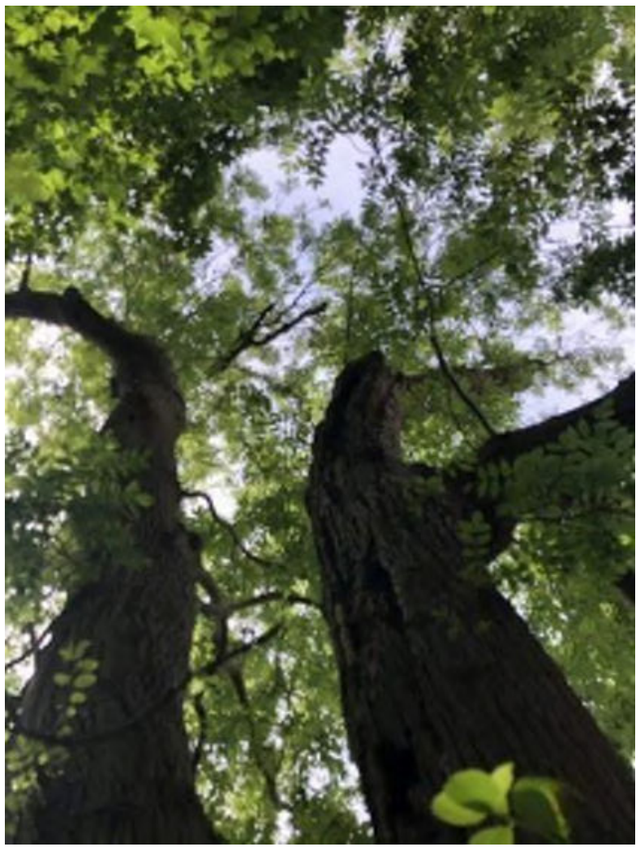
NF03	TL 49181 50516 (No tree tag)	Walnut	Planted tree along driveway of North Farm, Sawston. Arable to the north and west, Dales Manor Business Park to the south.	Mature	Knothole	3.5	Main stem	South-east	Low
NF04	TL 49178 50520 (No tree tag)	Walnut	Planted tree along driveway of North Farm, Sawston. Arable to the north and west, Dales Manor Business Park to the south.	Mature	Ivy-clad	0.5	Main stem	-	Low
NF05	TL 49181 50546 (No tree tag)	Walnut	Planted tree along driveway of North Farm, Sawston. Arable to the north and west, Dales Manor Business Park to the south.	Mature	Woodpecker hole	4.5	Main stem	South	Moderate
					Woodpecker hole	6	Main stem	South-east	

	Wound	5	Branch	South	

Appendix I

Tree Reference Photographs

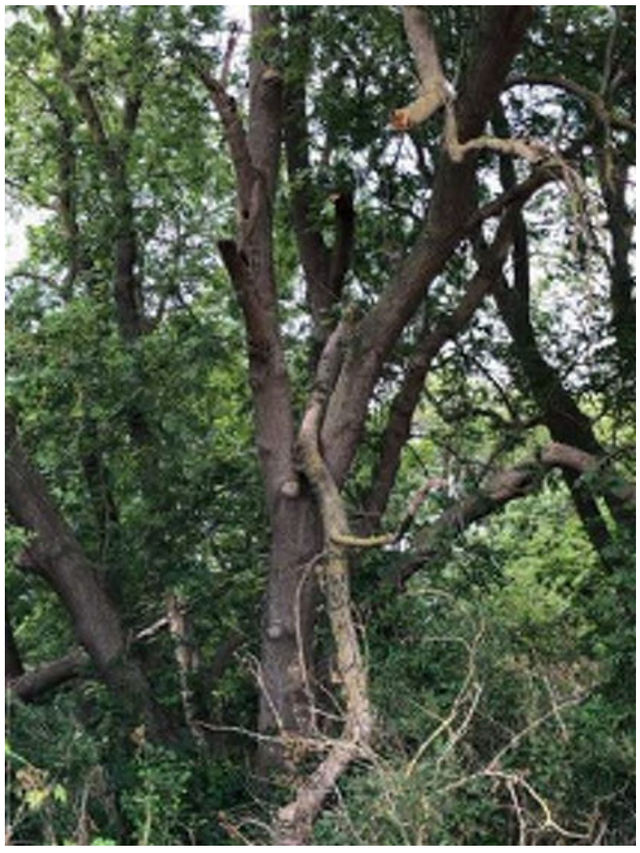
Public



Photograph 1: T09 (Moderate roosting suitability)



Photograph 2: T10 (Moderate roosting suitability)



Photograph 3: T11 (Moderate roosting suitability)



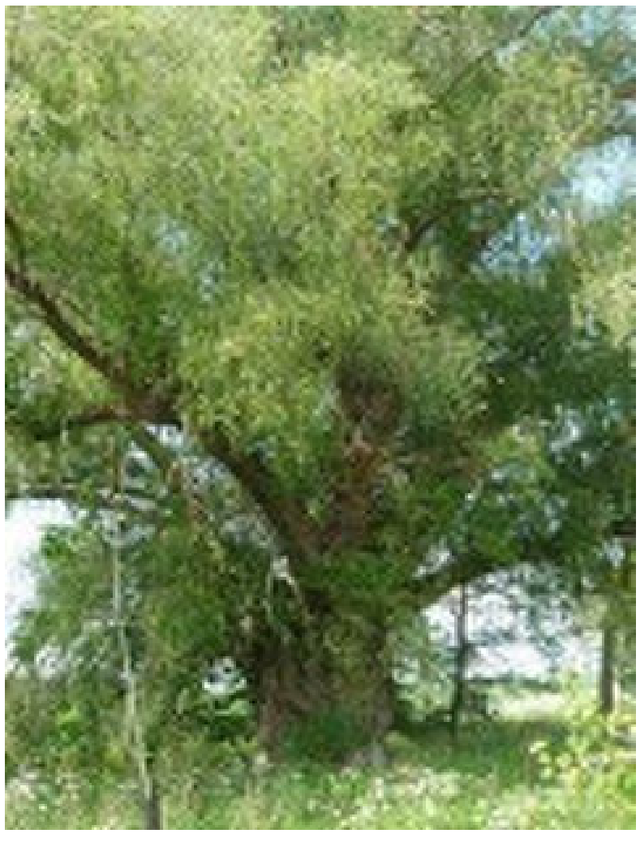
Photograph 4: T12 (Moderate roosting suitability)



Photograph 5: T13 (High roosting suitability)



Photograph 6: T14 (Moderate roosting suitability)



Photograph 7: T15 (Moderate roosting suitability)



Photograph 8: T18 (High roosting suitability)



Photograph 9: T22 (Moderate roosting suitability)



Photograph 10: T23 (Moderate roosting suitability)



Photograph 11: T24 (Moderate roosting suitability)



Photograph 12: T25 (Moderate roosting suitability)



Photograph 13: T26 (Moderate roosting suitability)



Photograph 14: T27 (Moderate roosting suitability)

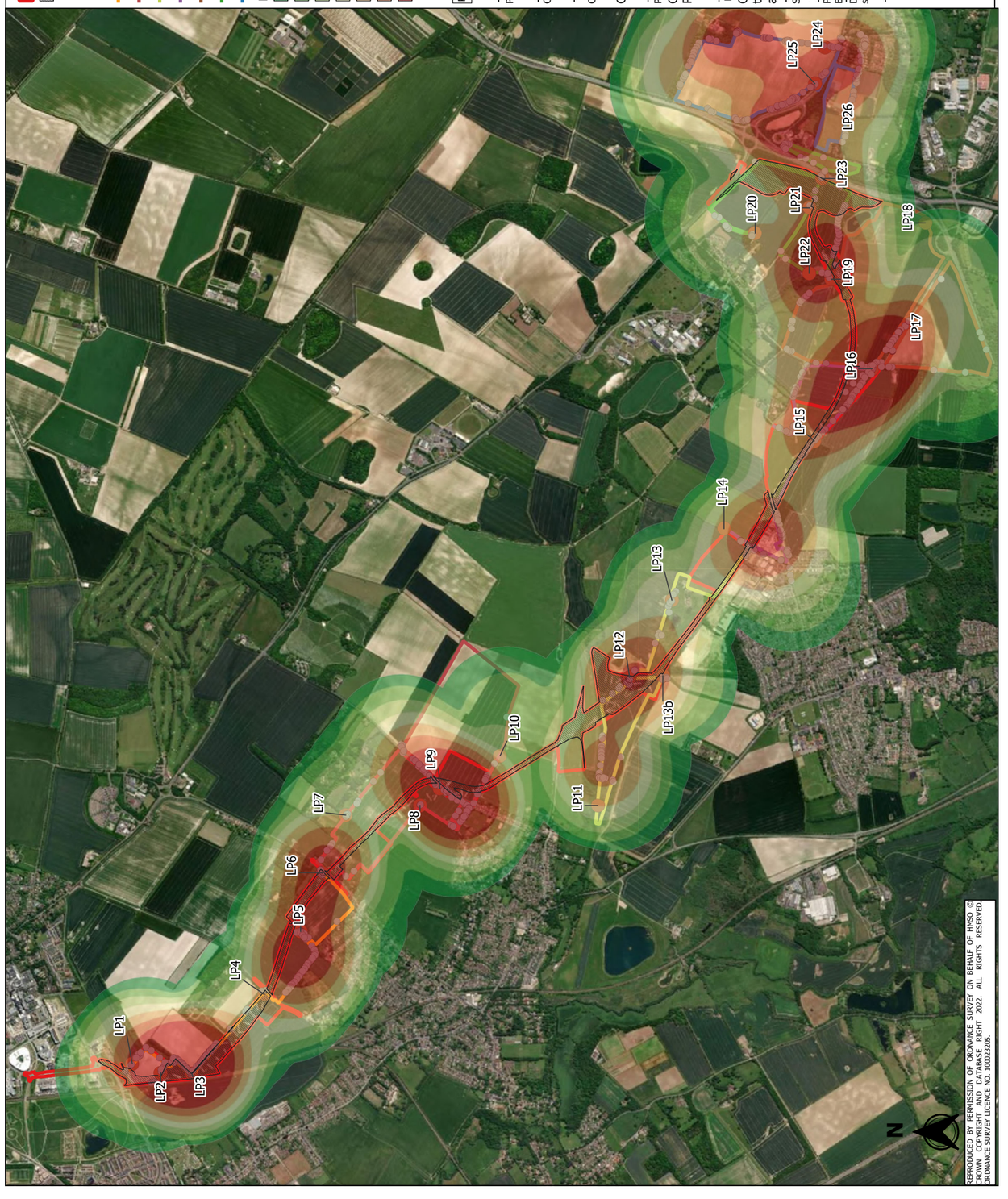


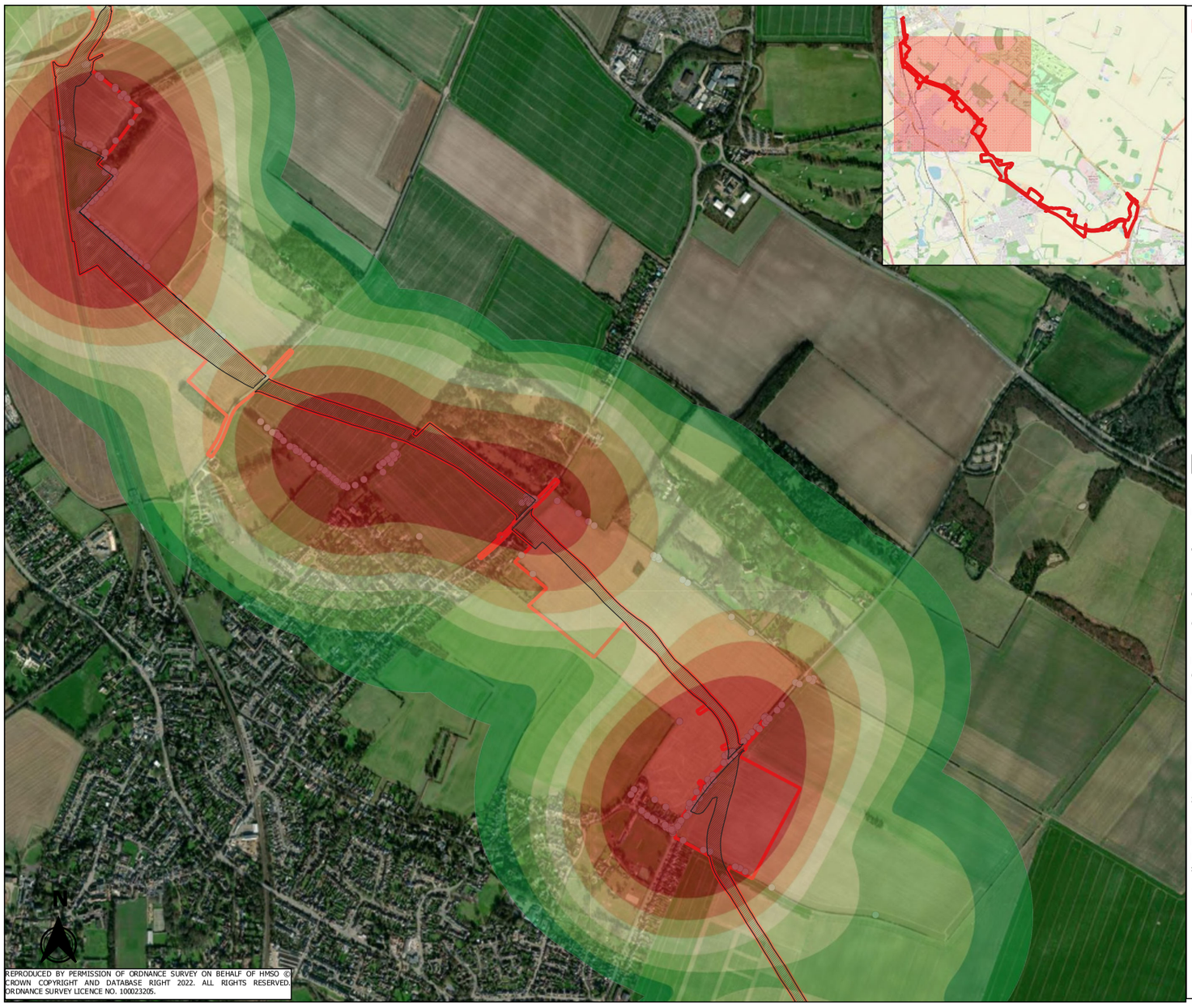
Photograph 15: NF05 (Moderate roosting suitability)

Appendix J

Transect Heat Maps

Public





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P01.1	TR	MJ	TB	5/12/2022

Purpose of Issue
S2 - Issued for Information

Classification
Commercial in Confidence

Client
Greater Cambridgeshire Partnership

Project
Cambridge South East Transport (CSET) Phase 2

Drawing
Heatmap, illustrating relative intensity of bat activity across the scheme
Page 1 of 3

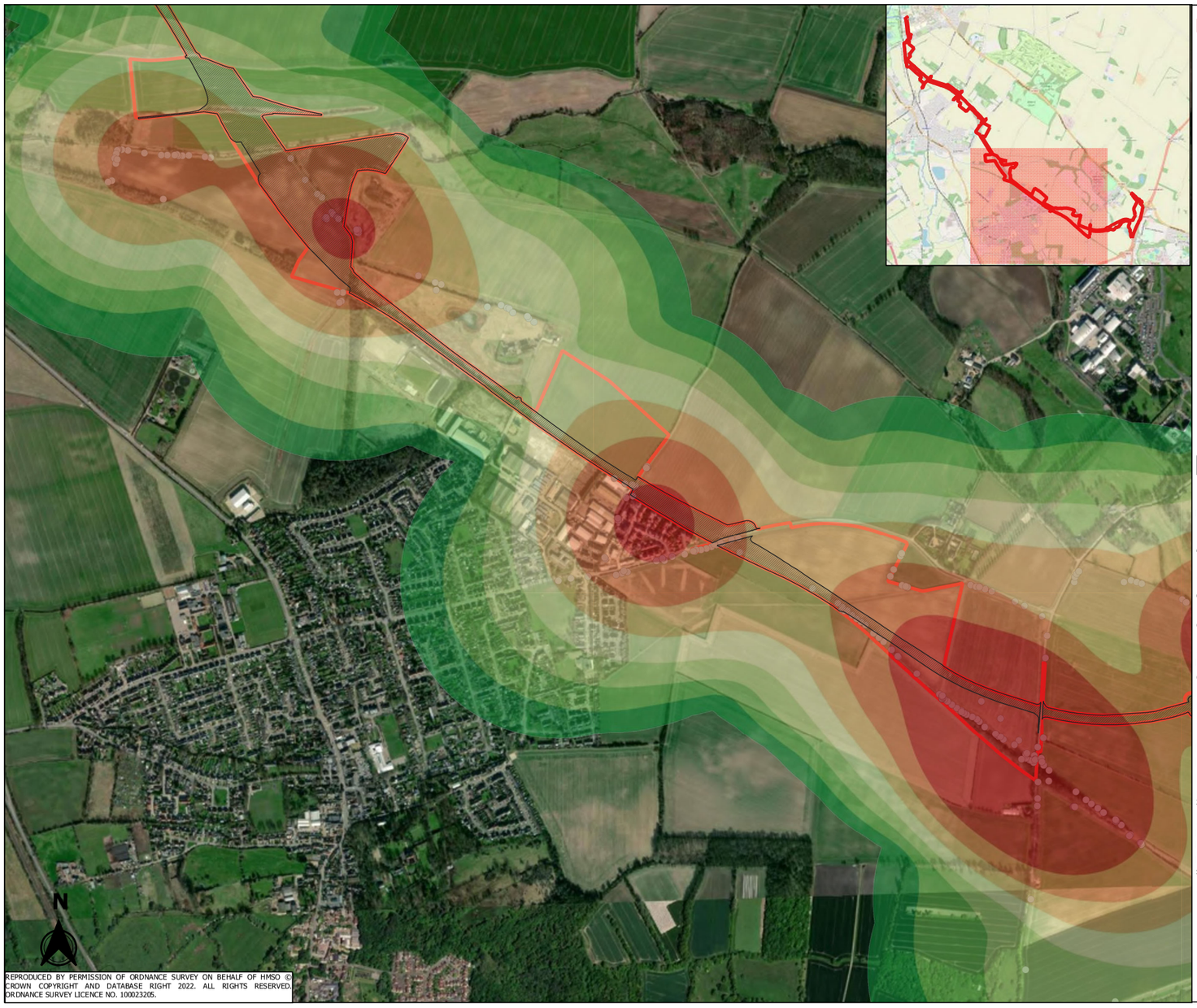
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1:9000	TR	MJ	TB

Project No
ED/000553

Date
13/12/2022

Drawing Identifier
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Classification
Commercial in Confidence

Client
Greater Cambridgeshire Partnership

Project
Cambridge South East Transport (CSET) Phase 2

Drawing
Heatmap, illustrating relative intensity of bat activity across the scheme
Page 2 of 3

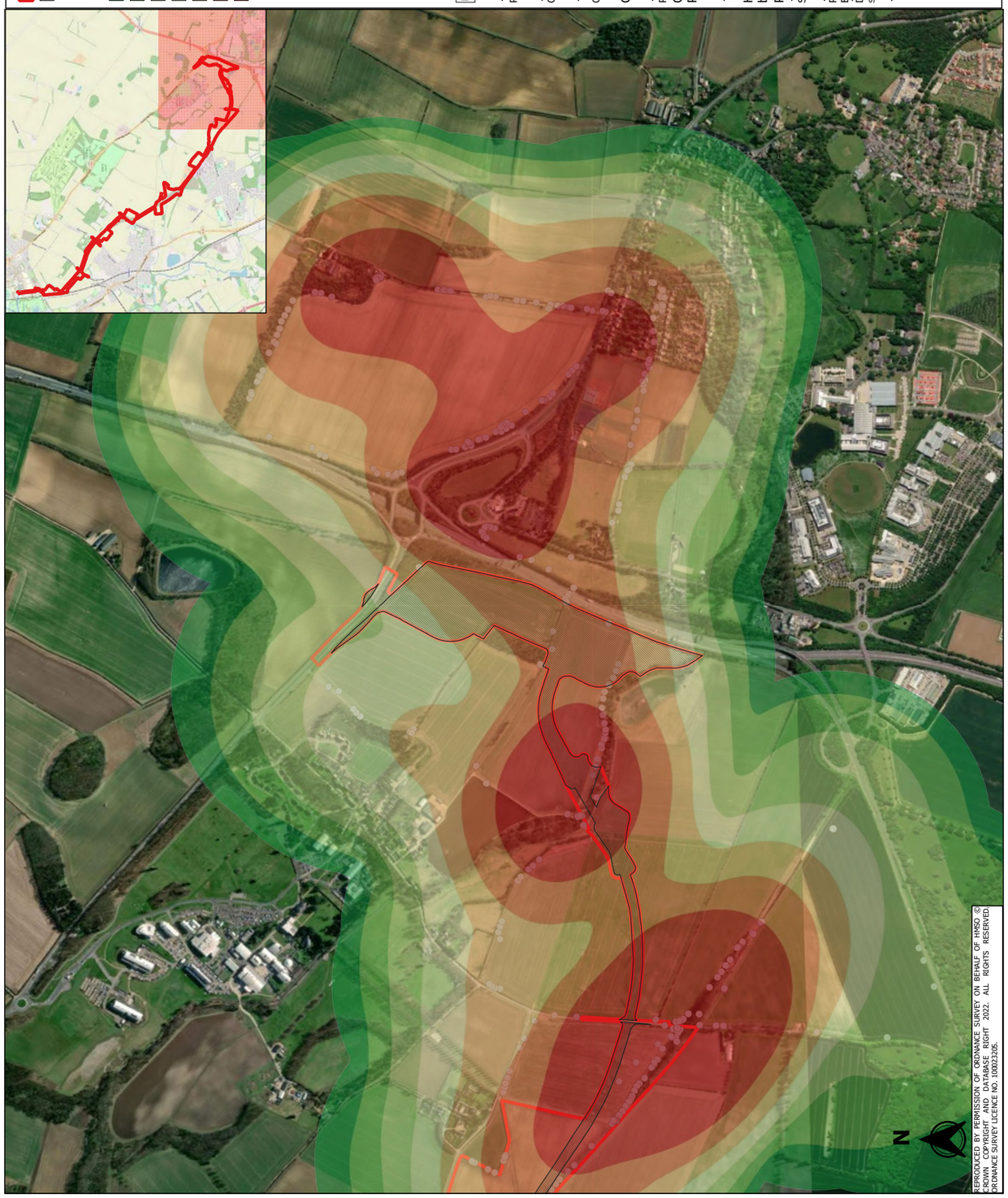
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Project No
ED/000553

Date
13/12/2022

Drawing Identifier
STND-WSP-EBD-XX-GS-LE-1061

Revision
P01.1



Rev	Drwn	Chkd	Appd	Date
P01.1	TR	MJ	TB	5/12/2022

Purpose of Issue
S2 - Issued for Information

Classification
Commercial in Confidence

Client
Greater Cambridgeshire Partnership

Project
Cambridge South East Transport (CSET)
Phase 2

Drawing
Heatmap, illustrating relative intensity of bat activity across the scheme
Page 3 of 3

Scale at A3	Drawn	Checked	Approved
1:9000	TR	MJ	TB

Project No	Date
ED/000553	13/12/2022

Drawing Identifier: STND-WSP-EBD-XX-GS-LE-1062
Revision: P01.1

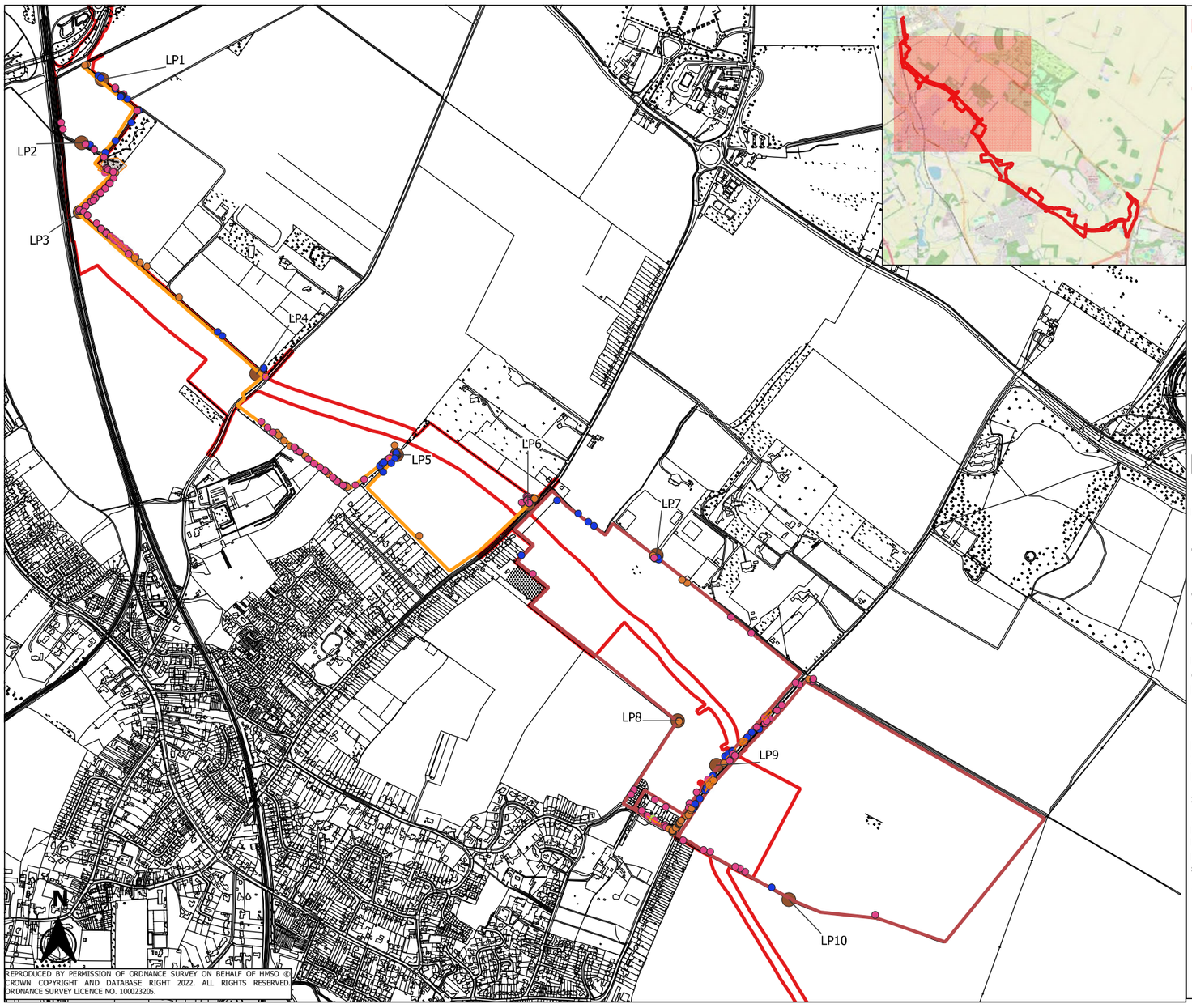
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Appendix K

Species Distribution Maps

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Red line boundary on 24.11.22
Listening points (LPs)
Transect 1 route
Transect 2 route
Foraging area

Bat Species

- Myotis species
- Noctule
- Brown long-eared
- Common pipistrelle
- Soprano pipistrelle
- Pipistrelle species
- Noctule/Serotine/Leisler's
- Barbastelle

Rev	Drwn	Chkd	Appd	Date
P01.1	TR	MJ	TB	5/12/2022

Purpose of Issue: S2 - Issued for Information

Classification: Commercial in Confidence

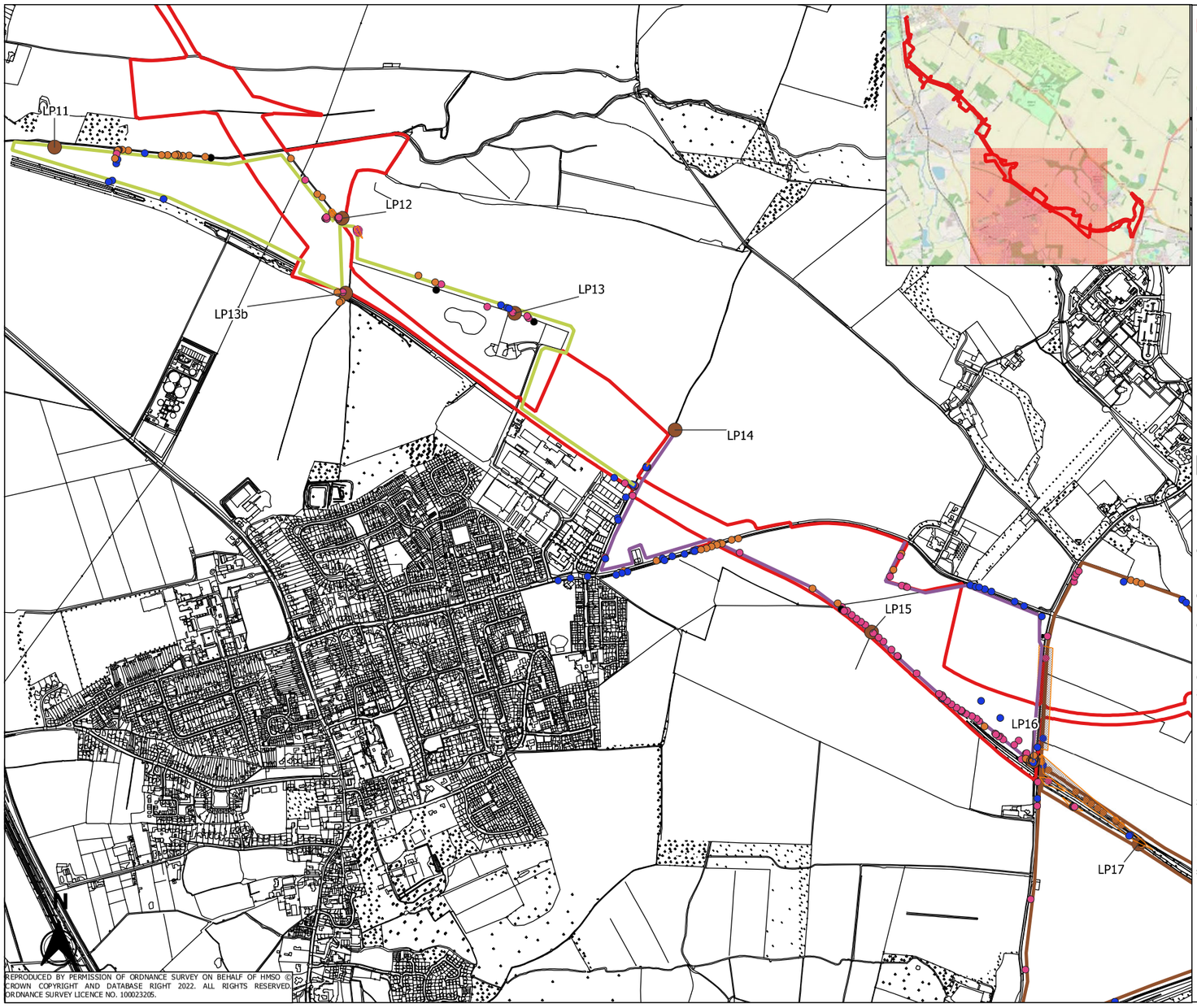
Client: Greater Cambridgeshire Partnership

Project: Cambridge South East Transport (CSET) Phase 2

Drawing: Bat transect routes August to October 2022 with bat species distribution
Page 1 of 3

Scale at A3	Drawn	Checked	Approved
1:9000	TR	MJ	TB

Project No: ED/000553
Date: 13/12/2022
Drawing Identifier: STND-WSP-EBD-XX-GS-LE-1056
Revision: P01.1



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Red line boundary on 24.11.22
Listening points
Foraging area
Transect 3 route
Transect 4 route
Transect 5 route

Bat species

- Myotis species
- Noctule
- Brown long-eared
- Common pipistrelle
- Soprano pipistrelle
- Pipistrelle species
- Noctule/Serotine/Leisler's
- Barbastelle

Rev	Drwn	Chkd	Appd	Date
P01.1	TR	MJ	TB	5/12/2022

Purpose of Issue: S2 - Issued for Information

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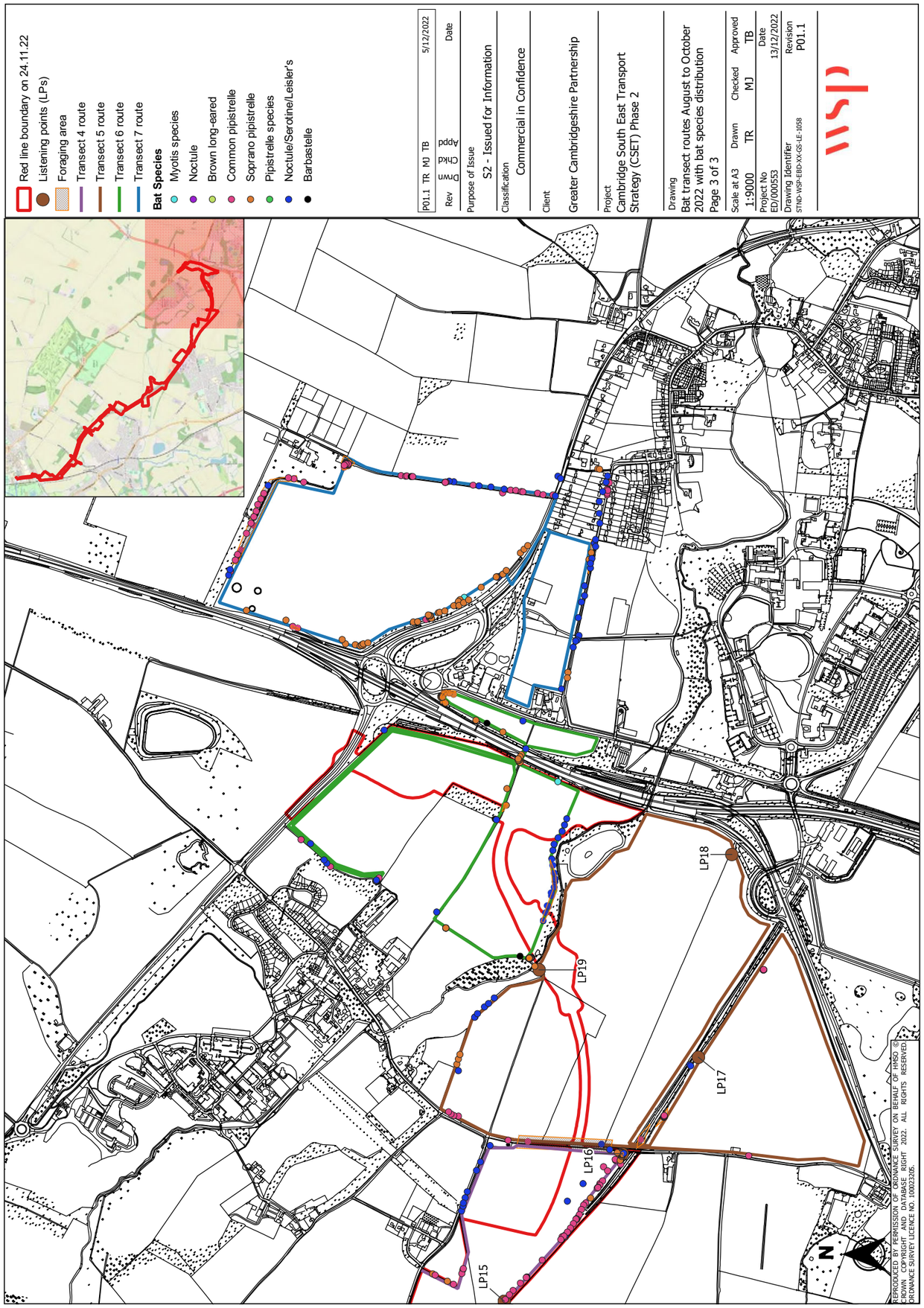
Client: Greater Cambridgeshire Partnership

Project: Cambridge South East Transport Strategy (CSET) Phase 2

Drawing: Bat transect routes August to October 2022 with bat species distribution
Page 2 of 3

Scale at A3	Drawn	Checked	Approved
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Date: 13/12/2022
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Revision: P01.1



Appendix L

Barbastelle Distribution Map

wsp

Public



Rev	Drwn	Chkd	Appd	Date
P01.1	TR	MJ	TB	13/12/2022

Purpose of Issue
S2 - Issued for Information

Classification
Commercial in Confidence

Client
Greater Cambridgeshire Partnership

Project
Cambridge South East Transport (CSET)
Phase 2

Drawing
Barbastelle bat distribution 2022 (static detector and transect data combined)

Scale at A3	Drawn	Checked	Approved
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Project No	Date
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Public

Wimpole

RADIO-TRACKING REPORT

For and on behalf of

East West Railway Company

Revision 2

Date of report	14th December 2020
Date of Revision	5th March 2021
Date of surveys	August 2020
Author	Bea Davies Helen Lucking Paul Spencer
Client name	BSG Ecology Ltd
Corylus reference	20080

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1.0 EXECUTIVE SUMMARY

1.1 A scheme involving the construction of phase 3 of the Cambridge to Oxford railway from Bedford to Cambridge is subject to an Environmental Assessment. This report summarises the radio-tracking study undertaken in 2020.

1.2 The radio-tracking study had the following objectives:

- Trapping and radio-tracking up to 15 barbastelle bats post maternity to locate roosts and roost areas for barbastelle bats;
- Try to determine if there are separate maternity colonies or a single colony with sub-groups to help assess the likely impacts of the proposals in the event that sub-groups are identified which could be fragmented;
- Trapping and radio-tracking up to 5 serotine bats post maternity to determine whether there are any maternity roosts close to the proposed scheme of this species;
- Determine core foraging areas and commuting routes for these two species specifically to assess whether the proposals will result in fragmentation or loss of core foraging habitat for bats from the maternity colony/colonies.

1.3 In the licence application, it was also requested that the licence should include radio-tracking serotine, if trapped. The aim of tracking these species would be to find the maternity roost(s) of these species (thought to be off-site) and determine the extent of their foraging areas within the zone of influence of the proposals.

1.4 A total of 77 bats were caught during four nights of trapping (17th, 18th, 20th and 22nd August 2020). Trapping locations were in two areas, Wimpole Estate including the Belts and Eversden Woods) and woodlands to the west (Hayley Wood and Waresley Wood). Trapping and radio-tracking was disrupted by bad weather (as highlighted in paragraph 3.3.5) conditions including high winds and lightning which resulted in some surveys being cancelled and others to be restricted as woodlands could not be entered in high winds.

1.5 A total of 12 barbastelles were radio-tagged. Two tags either failed or the bats moved out of the survey area as no records were made of these bats after being released (bat 4 and 10). A third bat (bat 3) was heard only sporadically during the day time in woodland to the south of Hayley Wood.

1.6 A total of 21 roost trees and a further three approximate roosts have been recorded. A single building roost has also been found.

1.7 No serotine bats were caught.

2.0 INTRODUCTION

2.1 Project Background and Purpose

2.1.1 East West Rail is a major transport infrastructure project that will establish a strategic railway connecting East Anglia with Central, Southern and Western England. It will link Oxford and Cambridge and eventually on to Norwich and Ipswich.

2.1.2 The railway is being planned and built in three sections; Western, Central and Eastern sections. The first phase of the Western section between Oxford and Bicester has been completed and planning for the next stage of the western section between Bicester and Bedford is well advanced. The next section is the Central section between Bedford and Cambridge which has been through a public consultation process from which a preferred route corridor has been selected.

2.1.3 Work is currently on-going to select the detailed route alignment of the central section within the preferred route corridor. The preferred route corridor passes at it nearest point approximately 3 km to the north of Eversden and Wimpole Woods Special Area of Conservation (SAC) (EU Code: UK0030331), which has been designated for its colony of barbastelle bats, one of the UK's rarest bat species for which site protection is required through the designation of SAC's.

2.1.4 Past radio tracking studies have shown that bats from the SAC are travelling up to 10.5km from the roost across and within the preferred route corridor and thus it is essential to inform the detailed design of the railway, mitigation measures and the environmental impact assessment that up to date information on the use of the preferred route corridor by barbastelle bats is gathered over the 2020 season and also the 2021 season before planning consent is applied for.

2.1.5 Bat surveys at Wimpole have been undertaken over many years, the site is a SAC for its population of barbastelle bats. Bat surveys including trapping and tracking in 2001/2002 by the Cambridgeshire and Bedfordshire Bat Groups and others recorded breeding barbastelle bats in trees within the estate and found bats flying quite widely to a variety of foraging areas to the north and east of Wimpole.

2.1.6 Further radio-tracking in 2004 recorded foraging areas similar to that in 2002 but with another area to the west also used for foraging.

2.1.7 Through discussion with stakeholders, concerns have been raised about impacts of the proposed new railway on serotine bat which are known to roost at Wimpole. Serotine is a rare bat in Cambridgeshire and as with barbastelle it is considered serotine are at risk if they regularly use land within the preferred route corridor.

2.1.8 The proposals for the 2020 radio-tracking surveys included:

- Trapping and radio-tracking up to 15 barbastelle bats post maternity to locate roosts and roost areas for barbastelle bats;
- Try to determine if there are separate maternity colonies or a single colony with sub-groups to help assess the likely impacts of the proposals in the event that sub-groups are identified which could be fragmented;
- Trapping and radio-tracking up to 5 serotine bats post maternity to determine whether there are any maternity roosts close to the proposed scheme of this species;
- Determine core foraging areas and commuting routes for these two species specifically to assess whether the proposals will result in fragmentation or loss of core foraging habitat for bats from the maternity colony/colonies.
- Locate roosts for serotine bats.

2.1.9 There are four key risks to be addressed in relation to barbastelles (and other bat assemblages that might be present and potentially impacted by the Proposed Scheme):

- Severance and/or loss of flight paths;
- Collision risk;
- Loss of roosts; and
- Loss of foraging habitat.

3.0 METHODOLOGY

3.1 Trapping and Tagging

3.1.1 A licence for the trapping and radio-tracking study was granted to Helen Lucking of Corylus Ecology by Natural England [licence number 2020-48225-SCI-SCI]. The project was undertaken following the conditions set out in this project licence.

3.1.2 The licence allowed for the tagging of 15 barbastelle (excluding juveniles) and five serotine bats using Salts Latex Adhesive Solution 833005. The licence also included the ringing of the same number of bats. Ringing followed guidance set out in the Bat Workers Manual (2004).

Trapping

3.1.3 The capture of bats was undertaken by experienced and licensed bat consultants and follows guidance set out by Natural England's guidance (2013) and details set out in the Bat Workers Manual 3rd Edition (2004) and used both harp traps and mist nests. The trapping was undertaken between 17th and 22nd August 2020 in suitable weather conditions (sunset temperate 10°C or above, no rain or strong winds). Five woodland sites were chosen for trapping; Hayley Woods SSSI, Waresley Wood SSSI Northern Belts, Eversden Wood, and Eastern Belts that are located within the Eversden and Wimpole Woods SAC. Repeat trapping was undertaken at Hayley Wood and Eversden Wood. The selection of trapping locations was determined by known presence of barbastelle and successful pas trapping in the Eversden and Wimpole Woods SAC and early barbastelle activity in Hayley Wood and Waresley Wood during woodland transects undertaken in July 2020 by BSG Ecology on behalf of East West Rail Ltd.

3.1.4 Biometric data were recorded from all bats caught including gender, forearm length and weight. Every bat was also examined to ascertain its breeding status, where possible. Only bats which were in healthy condition and of suitable weight were considered for tracking/ringing. Bats were tagged with radio-transmitters provided by Holihill. Tags weighed 0.47g, 0.35g or 0.28g, and the licence granted from Natural England allowed tags to be used on bats up to a maximum of 5% body weight.

3.1.5 To aid in trapping, acoustic lures (Sussex Autobat) were used during the trapping exercise. The lures played either a synthesised barbastelle social call and were used near to harp traps on a number of evenings specifically to attract those subject bats.

Tracking

3.1.6 Night time tracking of bats was undertaken between dusk and dawn or until they were lost by surveyors. Bats were also tracked by surveyors during the day who attempted to find their roosting locations.

3.1.7 Between two and eight surveyors were used to radio-track the bats, using both close-tracking and synchronised triangulation techniques to produce joint bearings. Surveyors used long-range MITEK radio-sets and mobile phones to allow contact to be maintained while synchronised joint bearings were taken. A series of safe observation points for the radio-tracking surveyors were pre-planned to allow for safe working and to provide the best receiver locations for joint bearings to be taken.

3.1.8 Bats were radio-tracked using Australis and Sika radio-tracking scanning receivers with Yagi rigid directional aerials to track bats on foot. Whip omni-directional antennas were employed when searching for bats by vehicle. Hand-held sighting compasses were used to take bearings and both detailed maps and handheld GPS units were used to provide locations for both surveyors and bats. More detail on the specifics of tracking is included in **Appendix 2.**

Personnel

3.1.9 The key night-time radio-tracking surveyors used were experienced in multi-bat tracking studies for development and road schemes, each having a minimum of seven years' experience of similar, sustained trapping and tracking survey. Experienced day-time surveyors were used to track bats back to day roosts. The main accredited agents used were: Paul Spencer and Alex Watkinson of Corylus Ecology; Geoff Billington of Greena Ecology and Alison Johnston of Johnston Ecology and Dr Elizabeth Bradshaw of Helix Ecology. A number of other surveyors employed by Corylus Ecology were used as accredited agents during the trapping and for radio-tracking. All radio-trackers were experienced in such work.

Data Analysis

3.1.10 Detailed description of the analysis used for this tracking project are outlined in **Appendix 3**, however a summary is provided here. For each tagged bat, the triangulation points obtained have allowed habitat areas to be identified. Detailed statistical analysis relating to variation in home ranges (an area over which an animal or group of animals regularly travels in search of food or mates, and which may overlap with those of neighbouring animals or groups of the same species) or core areas (the area where the animal spends the majority of its time) has not been undertaken as the same level of survey effort was not carried out for each bat. Wherever sufficient information has been gathered, analysis of home ranges has been undertaken.

3.1.11 The data presented in this report are based on all available triangulation points. In addition, where a bat was known to be present in a given location at a given time, a data point was also generated. Where a bat was closely radio-tracked (for example, a bat foraging for a sustained period within a specific area), a triangulation point was generated for the approximate centre of the foraging area.

3.1.12 Bat fixes were transferred to digital geo-referenced maps using AutoCAD and coordinates for triangulation points were determined; the extent of bat activity for each bat was plotted independently and the data were carefully scrutinised and any obviously false bearings were discarded. The coordinates of the plotted triangulation points were then transferred into Ranges 7 software (Anatrack) and analysed to produce minimum convex polygons[1] (MCPs), neighbour linkage[2] (or clusters) and kernel contours[3]. These are all methods of showing home ranges. Where roosts were found, the roost sites were included within the home ranges. The analysis was carried out using 95% of the locations closest to the home range centre (for polygons produced by MCP analysis) or the 95% nearest to each other for the contour analysis (the cluster and kernel contours).

3.1.13 Within each data set, the trapping locations were specified as the focal sites and all coordinates from the night-time tracking and roost locations were inputted as location qualifying variables (LQVs) within Ranges (LQV's are time, activity, habitat, values associated with the *x*,*y* coordinates). The activities of the bats were assigned a numerical value for their activity, either roosting, flying or night-roosting for analysis within Ranges. Typically a focal site might consist of a static, repeatedly-used location such as a den or nest, but in the case of bats where roosts change regularly, the trapping location is the most appropriate focal point to use.

3.2 Emergence surveys of barbastelle roost trees

3.2.1 During the surveys, evening emergence surveys of tree roosts R4 in The Belts and R7 in Hayley Woods were undertaken on 19th and 26th August. Emergence surveys commenced at sunset and latest until approximately an hour after sunset or until the roost feature could no longer be seen. Emergence surveys were undertaken by two surveyors who were positioned where they had clear sight of potential roost features in each tree.

3.3 Survey Limitations

Covid-19 Pandemic

3.3.1 The Covid-19 pandemic resulted in a number of issues with respect to radio-tracking bats. These fall into two categories:

1) protecting the surveyors from the potential risks of catching and spreading Covid-19, and
2) protecting bats as it is considered possible that the virus could potentially be passed between humans and bats.

[1] The MCP enables the creation of a boundary around all fixes using the smallest possible convex polygon. This is commonly used but may overestimate the size of home ranges.

[2] A type of multivariate analysis that uses records or measurements of a number of characteristics or features to group individuals into clusters or classes, so that individuals within each cluster/class are as alike each other as possible and as unlike individuals in other clusters/classes as possible.

[3] Kernel methods quantitatively determine areas which are intensively used by animals by converting position coordinates into lines or areas with varying probabilities of use and present these graphically.

3.3.2 As a result a number of precautions were observed following the most up to date Defra advice at the time which was advice provided by Defra on 28th May 2020. Details of the specific precautions are set out in **Appendix 1** but the main constraint was the inability to work in a team and being restricted to having specific bubbles to avoid cross contamination. Prior to the radio-tracking work starting 11 surveyors were tested for Covid-19 and all were negative for the virus. Post radio-tracking the 11 surveyors were again tested for Covid-19 and those that were tested returned negative results. Of the remainder, two had tests but no results were forthcoming and two were unable to get tests due to a national shortage in early September. None of the surveyors have developed Covid 19 symptoms or had positive test results.

3.3.3 Guidance set out by Eurobats (April 2020) on handling of bats during the pandemic was also followed. This resulted in handling of bats being undertaken using nitrile gloves and face masks with regular sanitising of hands and undergloves. Holding bags were only used once for an individual bat any given night and washed at temperatures above 60°C before being used again. Survey equipment and PPE was disinfected after each bat was processed.

3.3.4 The guidance set out by Eurobats and Defra also takes a precautionary approach in relation to handling bats and the decision was made not to trap bats from the tree roosts. Trapping from tree roosts would entail direct and closer contact with roost sites and potentially more bats than necessary to fulfil the objectives of the study and the survey licence.

Trapping and Radio-tracking

3.3.5 During the radio-tracking session, the UK experienced a turbulent spell of weather with a strong jet stream bringing deep areas of low pressure. This resulted in storms Ellen (19th to 21st) and Francis (25th) which brought periods of heavy rain and gusts of 40 to 50Kt (Met Office 2020) across the region. As a result, two evenings of trapping was cancelled due to rain on 19th August and 21st August and one evening tracking session had to be cancelled. For health and safety concerns, searches for tree roosts during the day on the 21st August were also abandoned and curtailed on 25th and 28th August due to winds, rain and lightning.

3.3.6 Access was limited to certain areas around Wimpole and the woodlands of Hayley Wood and Waresley Wood. Only limited access was permitted for the night time tracking which was largely restricted to safe stopping places adjacent to public roads. As a result, it was not possible to access large swathes of land at night which resulted in some bats not being tracked as widely as others. This also meant that in some areas surveyors were often too far apart to stay in radio contact making joint bearings more difficult. Only safe stopping locations, away from houses were used. Consideration had to be given to not disturbing local residents late at night when radio-tracking. This caused difficulties obtaining joint bearings as the radio tag reception would often be lost and on occasion the bat being tracked could not be picked up for some time.

4.0 RESULTS

4.1 Trapping Results

4.1.1 Full details of all bats caught are provided in **Appendix 4**. None of the bats caught had previously been ringed. A summary of the species and the breeding status of caught bats are provided in **Table A1** with trapping location in **Table A2**. Twenty barbastelles were caught and ringed with 12 fitted with radio tags. A summary of bats caught is shown in **Table A3.** Vantage points for taking bearings are shown in **Figure A1.** The trapping and roost locations are shown in **Figure A2**.

Table A1 - Summary of species and breeding status of bats caught during trapping August 2020

Species	Female			Male		Unknown	Grand Total
	Adult breeding	Adult non-breeding	Juvenile	Adult	Juvenile		
Barbastelle	6	4	1	5	4	0	20
Brown long-eared	6	3	0	3	0	0	12
Daubenton's	0	1	0	0	0	0	1
Natterer's	4	2	0	8	0	0	14
Common pipistrelle	0	0	6	2	6	0	14
Soprano pipistrelle	2	1	1	7	4	1 (escaped)	16
Grand Total	**18**	**11**	**8**	**25**	**14**	**1**	**77**

4.2 Trapping Overview

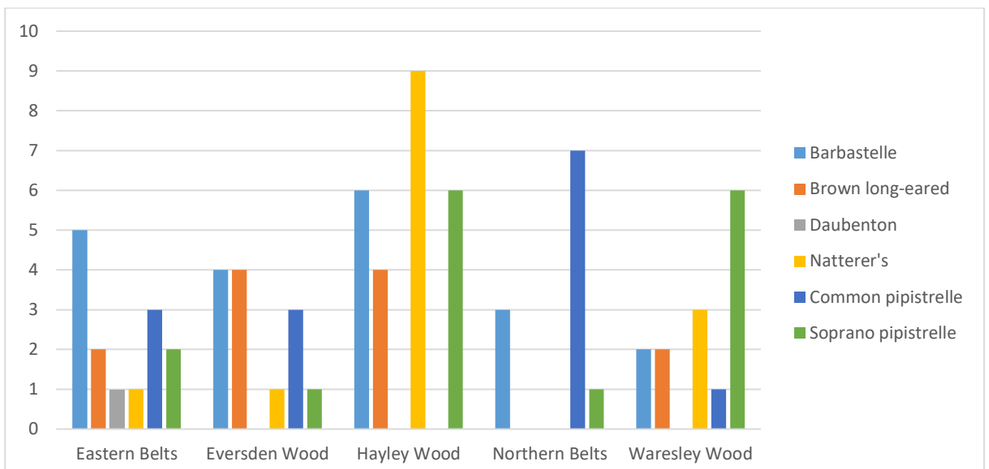
4.2.1 In total, 77 bats were caught during the trapping exercise and this included 20 barbastelles. This includes a single soprano pipistrelle that escaped the nets before it could be processed. Six species were caught across the five trapping areas. Barbastelle were caught at each trapping location with six breeding females caught at the five trapping locations; Eversden Wood, North Belts, Waresley Wood and Hayley Wood. Half of these breeding females were caught in Eversden Wood.

Table A2 - Summary of species of bats caught at each trapping location

Trapping Location	Barbastelle	Brown long-eared	Daubenton	Natterer's	C. pip	S. pip	Grand Total
Eastern Belts	5	2	1	1	3	2	14
Eversden Wood	4	4		1	3	1	13
Hayley Wood	6	4		9		6	25
Northern Belts	3				7	1	11
Waresley Wood	2	2		3	1	6	14
Grand Total	**20**	**12**	**1**	**14**	**14**	**16**	**77**

4.2.2 In addition to breeding barbastelle, post lactating (bred this season) brown long-eared, Natterer's and soprano pipistrelle bats were also caught. Male brown long-eared and soprano pipistrelle bats were found in breeding condition in Eversden Wood, the Eastern Belts and Waresley Wood.

Chart A1 – Numbers of bats caught per species at each trapping location



4.2.3 Twelve of the 20 barbastelle bats were tagged with radio transmitters. These comprised ten female (six post lactating) and two male bats. A summary of barbastelle trapping and tagging are given in **Table A3**.

4.3 Movement of Tagged Barbastelles (see Figures B1-B12)

Wimpole Bats

4.3.1 A total of seven barbastelles were caught and tagged in the woods around the Wimpole Estate: The Belts, The Gloucesters and Eversden Wood. These were bats 5, 6, 7, 8, 10, 11 and 12, and the majority of these bats were subsequently recorded roosting in trees within the Belts with the exception of bat 10 which was not recorded again after the evening it was tagged and bat 11 which roosted south in the Wimpole Estate on the days it was found. A total of 179 joint bearings were taken on this group of bats and 309 single bearings.

4.3.2 With the exception of bat 10 and 11, the remaining five bats followed a similar pattern in their activity during the tracking period. All five bats roosted in The Belts and all used Eversden Wood initially after emergence and before returning to roost. However, their activity pattern took them north and north-eastwards with several joint bearings recorded over the fields, woodland fragments and networks of ditches and brooks between Eversden Wood and the villages of Great Eversden, Toft and Comberton. On occasion, bat 7 and 8 were recorded in fields to the north of Comberton with bat 7 also being recorded further to the east around the River Cam at Grantchester a distance of 10.2km from its tree roost.

Table A3 - Barbastelle Trapping and Tagging Summary

Date	Bat tag no	Trapping Location	Time Caught	Sex	Age	Breeding status	Forearm (mm)	Weight (grms)	Ring number
17.08.20	1	Hayley Wood	20:55	F	A		38.3	8.5	J3516
17.08.20	4	Hayley Wood	23:40	F	A		38.4	9	J3521
17.08.20	3	Hayley Wood	22:20	F	A	Post lactating	39.3	9	J3520
17.08.20	2	Hayley Wood	20:55	M	A		36.7	7.5	J3517
17.08.20		Hayley Wood	20:55	M	Juvenile		37.6	9	J3518
17.08.20		Hayley Wood	01:25	M	Juvenile		38.4	8.5	J3522
17.08.20	6	Northern Belts	01:13	F	A	Post lactating	40.1	10	A2240
17.08.20	5	Northern Belts	00:32	M	A		37.4	9	A2210
17.08.20		Northern Belts	02:16	M	Juvenile		37	9	A2249
18.08.20	7	Eversden Wood	21:05	F	A	Post lactating	39.9	10	A2248
18.08.20	8	Eversden Wood	21:10	F	A	Post lactating	39	8.1	A2247
18.08.20		Eversden Wood	21:10	M	A		38	8	A2246
18.08.20	9	Waresley Wood	20:49	F	A	Post lactating	39.3	9.5	J3523
18.08.20		Waresley Wood	22:00	M	A		37.9	8.5	J3524
20.08.20	10	Eastern Belts	21:00	F	A		37.9	8.0	A2245
20.08.20	11	Eastern Belts	22:05	F	A		39.0	8.0	A2243
20.08.20		Eastern Belts	00:11	F	Juvenile		38.0	7.5	A2241
20.08.20		Eastern Belts	21:00	M	A		38.4	7.5	A2242
20.08.20		Eastern Belts	21:00	M	Juvenile		37.5	8.0	A2244
22.08.20	12	Eversden Wood	01:25	F	A	Post lactating	39.2	10.7	A2219

4.3.3 A cluster of single and joint bearings for bat 7 shows the importance of distinctive habitat features such as Bourn Brook which flows through the centre of its home range from Toft to Grantchester. This is also noted with bats 6 and 8.

4.3.4 The maximum distances recorded by the other bats in this group were less than bat 7 ranging between 3.65km for bat 12 to 6.97km for bat 6 (refer to **Table A4**).

4.3.5 Bat 11 was the only bat in this group with a home range to the south of the Wimpole Estate with several joint bearings recorded in fields around Wimpole Avenue and the River Cam and in fields to the west of the A1198. It was also recorded in woodland to the south of its trapping location, in Nurseries Wood (also known as Cobbs Wood on Ordnance Survey) and Four Acre Wood (also known as Four Acre Covert) where it was recorded roosting, although no roost tree was confirmed due to initial access constraints and then adverse weather constraints.

Hayley Wood Bats

4.3.6 Four bats; 1, 2, 3 and 4 were caught and tagged from Hayley Woods on the 17th August. Bat 2 was an adult male whilst bat 3 was a post-lactating female. Bats 1 and 4 were both non-breeding adult female bats. No

record was made of bat 4 after the night when it was trapped. The tag was working on its release but was it was not picked up again during either the day time roost tracking or the night time activity tracking. Bat 3 was only heard occasionally during the day time tracking with an approximate roosting location found to the south-east of Hayley Wood. No records were taken of this bat during the night tracking, access in the area to the south of Hayley Wood was very limited and there is a large area of open countryside between the road to the north of Hayley Wood and the nearest roads to the south, east and west. It is considered likely that this bat remained in this area during the night time. There were also fairly large areas to the north where there were large areas of countryside with limited locations for access.

4.3.7 A total of 26 joint bearings for bat 1 and 37 for bat 2 were made. Bats 1 and 2 both emerged from roosts in Hayley Wood and after foraging in the wood after emergence would leave the wood and head north. The bats were tracked as best as possible in this area but often only single bearings could be taken of these bats. It is thought they used the ditch and stream network around the Gransden Lodge Airfield (home to the Cambridge Gliding Centre).

4.3.8 Obtaining joint bearings of bats 1 and 2 was made more difficult due to road network in that part of the survey area as well as the local topography. Therefore, the assessment had to focus more on single bearings which were 79 for bat 1 and 110 for bat 2. However, the tracking has shown that both bats roosted in Hayley Wood only and both spent their time during the project predominately to the north of Hayley Wood. No single or joint bearings were recorded to the south of the wood. Bats 1 and 2 were often recorded roosting together and favoured tree roost R7 in the south-west section of the woodland.

4.3.9 Bat 1 was tracked to the south-west of the village of Cambourne with a good number of joint bearings around Caxton. Bat 1 was recorded as far north as Pastures Farm 7.53km north from its roost tree (R7) on that day and as far west as Little Gransden on the same night.

4.3.10 Bat 2 spent more time further to the west with several joint bearings to the south-west of the village of Eltisley. Joint bearings were recorded in Eltisley Wood, Turtlow Plantation and South Lodge Plantations to the south and west of Eltisley with the most northern triangulation recorded on the 25th August 7.12km from its roost tree (R7) on that day. A cluster of single bearings on 20th August suggest it may use Gransden Brook south of Great Gransden and Little Gransden.

Waresley Wood Bats

4.3.11 Bat 9, a post lactating female, was the only bat caught and tagged at Waresley Wood although a second barbastelle (a male was caught) but it was decided not to track it because the focus of the survey was to find breeding roosts and foraging areas used by female bats. The female that was tagged was caught on the 18th August and was recorded foraging within Waresley Wood on the 19th and 20th August. On 21st

August it was recorded more extensively to the north-east of Waresley Wood. It was recorded roosting in Waresley Wood only where it used six tree roosts. Bat 9 stayed very much in the same location on consecutive nights. It was difficult to get many joint bearings on this bat as it foraged along Gransden Brook to the south of Great Gransden and Little Gransden where there are few safe stopping locations or places away from dwellings for the surveyors to be able to get bearings. The majority of the activity has been recorded by single bearings from Great Gransden Mill. It was noted that when it became more blustery the bat appeared to move towards the lane at Great Gransden Mill and would fly up and down the ley side of the hedgerow. It was also recorded to the south on the road towards Hayley Wood west of Gransden Lodge foraging along the road and in the shelter between two tall parallel hedgerows.

4.3.12 Due to the difficulties tracking this bat only five joint bearings and 41 single bearings were taken. This data showed that the fields and ditch network immediately to the south and east of Little Gransden were important. Particularly Gransden Brook. The home range of this bat was fairly small and it is considered that this maybe fairly accurate although not many bearings were recorded as it was not recorded in other areas such as in foraging grounds of bats 1 and 2.

Table A4 - Distance travelled from roost

Bat No	Date	Distance in km	Roost	Joint Bearing number
Breeding Females				
Bat 3	N/A	N/A	N/A	N/A
Bat 6	27/08/2020	4.43	R12	6.26
Bat 7	24/08/2020	10.2	R12	7.20
Bat 8	26/08/2020	5.22	Unknown but likely R12	8.27
Bat 9	22/08/2020	2.34	R10	9.5
Bat 12	27/08/2020	3.65	R12	12.9
Mean distance		**5.17**		
Non-breeding female				
Bat 1	24/08/2020	7.53	R7	1.1
Bat 4	N/A	N/A	N/A	N/A
Bat 10	N/A	N/A	N/A	N/A
Bat 11	27/08/2020	4.76	R12	11.29
Mean distance		**6.15**		
Male				
Bat 2	25/08/2020	7.12	R7	2.29
Bat 5	24/08/2020	6.97	R12	5.25
Mean distance		**7.05**		

Distances travelled

4.3.13 The distances travelled from roosts are presented in **Table A4**. The distances measured are straight-line distances between the furthest recorded location and the roost used during the daytime beforehand. The maximum distance recorded from a roost in this study was by a breeding female (bat 7), travelling 10.2km,

nearly twice as far as the next longest distance by bat 8. The mean maximum distance for breeding females was 5.17km (excluding bats 3 and 4), slightly less to that of non-breeding females of 6.15km. The mean maximum distance for the male bats was 7.05km (range 6.79 to 7.12km).

4.4 Roost Information

4.4.1 The tracking survey confirmed a total of 21 tree roosts and a single barn. Roosts were found in the following locations:

The Belts – 12 tree roosts recorded supporting bats 5, 6, 7, 8 and 12;
Hayley Wood – three tree roosts recorded supporting bats 1 and 2;
Waresley Wood – six tree roosts supporting bat 9 only;
Wimpole Home Farm Barn (grounds of Wimpole House) – single roost used by bat 5 only.

4.4.2 In addition, several unconfirmed roosts were recorded. A roost supporting bat 3 was recorded in a tree belt to the south-east of Hayley Wood; the precise roost location could not be identified due to constraints with landowner consent. Roosts supporting bat 11 were identified in two woodlands in the Wimpole Estate area, Nurseries Wood and Four Acre Wood, for which access was later agreed but the roosts could not be precisely located; the locations of these two roosts are therefore listed as being approximate (denoted by AR). The roosts of bats 4 and 10 were not found during the radio-tracking study.

4.4.3 Of the 21 tree roosts that were confirmed in 2020, 13 were in ash trees, seven in oak and one in beech. Of these, nine were in trees with dense ivy cover, three were behind loose/lifted or flaking bark, and five were in large splits or cavities. A combined list of the tree roosts and their descriptions is provided in **Appendix 5,** whilst information regarding which tree roost was used per day by each bat is given in **Appendix 6 and 7**. Distances of each roost from the woodland edge are provided in **Table A5**.

The Belts

4.4.4 The Belts is a narrow band of planted deciduous woodland on the northern side of the main Wimpole Estate. The woodland is contiguous with The Gloucesters in the east and with woodland on the Wimpole Way to the west. It is understood the woodland was planted as part of the historic landscape design for the Wimpole Estate and as such the trees are mainly large mature specimens.

4.4.5 Twelve trees within The Belts were identified as roosts, comprising ash *Fraxinus excelsior* (10 trees) and oak *Quercus* sp. (2 trees). Five of the 12 tagged barbastelle roosted within this woodland with a peak of four bats (bats 6, 7, 8 and 12) roosting in the same roost (R12) on a single day. The roosts varied in their distance from the edge of the woodland with trees noted between 9m and 81m into the woodland; the mean distance of these trees from the edge of the woodland was 38m.

Hayley Wood

4.4.6 This is an area of ancient woodland and Site of Special Scientific Interest (SSSI) measuring approximately 46ha and located to the west of the Wimpole Estate. The woodland is classified as lowland mixed deciduous and is designated due being one of the largest oxlip *Primula elaitor* woods in Britain. Structurally, the wood is coppice-with-standards of field maple *Acer campestre*, ash, hazel *Corylus avellana* and hawthorn *Crataegus monogyna* with a canopy of oak.

4.4.7 Three tree roosts were identified in the woodland and these were used by bats 1 and 2. The trees were ash and oak, located between 13m and 68m from the woodland edge; the mean distance of these trees from the woodland edge was 47m.

Waresley Wood

4.4.8 This wood is located 2.6km north-west of Hayley Wood and is an area of ancient woodland and SSSI that measures approximately 62ha. It is designated due to its ancient origin and the ash-maple community which has a national distribution restricted to lowland England. The tree species are similar to that of Hayley Wood but sections of the wood are now dominated by invasive species birch *Betula pendula*, aspen *Populus tremula* with regenerating English elm *Ulmus procera*.

4.4.9 Six tree roosts were found within Waresley Wood and all were used by bat 9 only. Tree roosts included oak (three trees), ash (two trees) and a single beech *Fagus sylvatica*. This wood had the most variation in the distance of the roosts from the woodland edge, ranging from R13 located at 0m, on the very edge of the woodland, to R18 located 192m into the wood; the mean distance from the edge was 78m, significantly higher than the other two woodlands.

Wimpole Barn

4.4.10 Bat 5 was the only bat recorded roosting in a barn within the main Wimpole Estate. The barn is a thatched tithe barn and the roosting location was under a lintel above the western double barn doors.

Use of Tree Roosts and Movement Between Roosts

4.4.11 Barbastelles are known to move roost regularly, and one key aim of this study was to establish if there was interaction between bats in the west of the study area, around Hayley Wood and Waresley Wood, and bats from the Wimpole Estate in the east. Of the 21 confirmed tree roosts, 12 were located in The Belts, six in Waresley Wood and three in Hayley Wood. The only non-tree roost recorded during the survey was the tithe barn at Wimpole Home Farm. A summary of bats recorded in each tree per day is shown in **Appendix 7**.

Table A5 - Distance from the nearest woodland edge of known roost trees used in 2020

The Belts		Hayley Wood		Waresley Wood	
Tree roost no.	**Distance from nearest edge (m)**	**Tree roost no.**	**Distance from nearest edge (m)**	**Tree roost no.**	**Distance from nearest edge (m)**
R1	36	R7	13	R9	53
R2	9	R8	68	R10	75
R3	30	R19	60	R11	33
R4	53			R13	0
R6	57			R15	113
R12	41			R18	192
R16	51				
R17	55				
R20	81				
R21	22				
R23	12				
R24	11				
Mean	**38**	**Mean**	**47**	**Mean**	**78**

4.4.12 Roost R12 in The Belts was used by the highest number of tagged bats, with four post lactating females (bats 6, 7, 8 and 12) recorded on 27th August. This is a large oak located 41m from the woodland edge and covered in dense ivy but with signs of die-back from the crown; the precise roosting feature could not be confirmed as there are multiple roosting features. The next highest number of tagged bats were recorded in R12 again (bats 6, 7 and 8) on 23rd August and R17 (bats 6, 7 and 12) on 28th August. Several other trees were used on the same occasion by two bats.

4.4.13 The straight line distances between roost switches between consecutive days was measured. For example, Bat 1, a non-breeding female, roosted in R7 on 19th August but on 20th August it had moved to R19. The straight line distance between these two trees is 72m. The distances between each tree roost switch recorded are given in **Table A6**. There are significant numbers of trees and clusters of trees with potential for supporting barbastelles in these woodland blocks, particularly within The Belts which has a very even age structure due to the history of this woodland which was planted as part of the designed landscape for the Wimpole Estate.

4.4.14 Bats 5, 6, 10 and 11 were caught in The Belts and bats 7, 8 and 12 were caught in Eversden Wood. The roosts of bats 10 and 11 were not confirmed during the survey, but the remaining bats were all recorded using tree roosts within The Belts. No roosts were recorded in Eversden Wood. On numerous occasions the tagged bats from these two woodlands were recorded roosting together in various combinations in different trees: bats 6, 7, 8 and 12 in R12 (27th August); bats 6, 7 and 8 in R12 (23rd August); bats 6, 7 and 12 in R17 (28th August); bats 6 and 7 in R2 (19th August) and in R21 (20th August); bats 6 and 12 in R6 (24th August); bats 7 and 8 in R12 (24th August); and bats 5 and 8 in R3 (19th August). The distance between the roosts in

which bats were recorded on successive nights within The Belts is: 15m (R2 to R21), 187m (R4 to R20), 105m (R23 to R12), 102m (R24 to R12), 156m (R12 to R6), 92m (R12 to R17) and 113m (R1 to R3). Two bats were recorded moving roost during the day: bats 5 and 8 were recorded together in R3 in the afternoon and subsequently moved, bat 5 to R5 and bat 8 to R4 prior to a planned emergence survey of R3.

Table A6 – Distances between barbastelle roost switches between consecutive days in 2020

Roosts	Distance (m)	Location of trees	Status and number of bats
R2 - R21	15	The Belts	Breeding females x2
R4 - R20	187	The Belts	Breeding female
R23 - R12	105	The Belts	Breeding female
R24 - R12	102	The Belts	Breeding female
R12 - R6	156	The Belts	Breeding female
R12 - R17	92	The Belts	Breeding females x2
R1 - R3	113	The Belts	Male
R3 - R5	979	The Belts/Wimpole Barn	Male
R5 - R16	1,069	The Belts/Wimpole Barn	Male
R8 - R7	322	Hayley Wood	Non-breeding female & male
R7 - R19	72	Hayley Wood	Non-breeding female
R10 - R11	133	Waresley Wood	Breeding female
R11 - R13	318	Waresley Wood	Breeding female
R13 - R18	383	Waresley Wood	Breeding female
R18 - R15	301	Waresley Wood	Breeding female
R15 - R13	471	Waresley Wood	Breeding female

4.4.15 Although the roosts of bat 11 could not be confirmed, joint bearings identified approximate roost locations as being within Nurseries Wood (AR25) and Four Acre Wood (AR22) in the Wimpole Estate. Movement between these locations was not recorded on successive evenings so it cannot be confirmed whether the distance between the approximate roosts (1,614m) was travelled on any particular evening.

4.4.16 Bat 5 was the only bat during the survey period to roost in both trees and a structure, being recorded in trees in The Belts (R1, R3 and R16) and in the Wimpole Home Farm barn (R5). This bat was recorded in each of the tree roosts only once and in the barn on nine occasions, seven of which were consecutive from 19th to 25th August inclusive, followed by a further two consecutive evenings on 27th and 28th August. The distance between the roosts in The Belts and the barn in which bat 5 was recorded on successive nights is: 979m (R3 to R5) and 1,069m (R5 to R16); this is the furthest any bat was recorded travelling to a roost. Bat 5 shared a roost on only one occasion, roost R3 which it shared with bat 8 on 19th August, however both bats moved away from this roost during the day before the evening emergence.

4.4.17 Bats 1 and 2 were caught in Hayley Wood and were consistently recorded roosting in the same area; these bats did not venture to any other wood to roost. Bat 1 was recorded roosting in three different trees, whilst bat 2 was found in two. On the majority of evenings bats 1 and 2 were recorded together in R7 and on a

single occasion (18th August) these two bats were recorded together in R8. Roost R19 was only used on one occasion (20th August) and only by bat 2. An emergence survey of R7 was undertaken and a total of five barbastelle emerged including bats 1 and 2. Bat 1 was not found on 20th August, it was not in the same roost as bat 2. The signal within Hayley Wood was often dampened by the dense understorey in the woodland. The distance between the roosts in which these bats were recorded on successive nights is 322m (R8 to R7) for both bats and 72m (R7 to R19) for bat 2 only. Bats 3 and 4 were also caught in Hayley Wood but were not recorded roosting within this woodland: bat 3 was consistently recorded roosting in a tree belt to the south-east of Hayley Wood and the roost of bat 4 was not found during the survey period.

4.4.18 Bat 9 was trapped in Waresley Wood and, as with bats 1 and 2, was only recorded roosting in the same wood. This bat was recorded in six different trees, five of which it was only recorded in on a single occasion. During the period between 19th to 28th August, bat 9 shifted roost on a daily basis with the exception of 27th and 28th August when it remained in roost R13; this was the only roost bat 9 was recorded in more than once. The distance between the roosts in which bat 9 was recorded on successive nights is: 133m (R10 to R11), 318m (R11 to R13), 383m (R13 to R18), 301m (R18 to R15) and 471m (R15 to R13).

4.4.19 Bat 6 from The Belts and bat 9 from Waresley Wood were recorded using the greatest number of roosts of all the tagged bats, each moving between six different roosts within their respective woodlands. Bat 8, caught in Eversden Wood, used the next highest number of roosts and moved between five different roosts in The Belts. The three bats recorded using the greatest number of roosts were all breeding females. In contrast the two male bats and one of the non-breeding females were more faithful to their roosts: bat 5, caught in The Belts, was recorded in R5 on nine out of the 11 evenings it was recorded; and bats 1 and 2, both caught in Hayley Wood, were recorded together in R7 on eight occasions. Regarding confirmed roosts, each of the other bats was recorded using an individual roost on no more than four occasions through the survey period.

4.4.20 The greatest distances between roosts of any bats were by bat 5, one of the two tagged males, which travelled 1,069m and 979m between tree roosts in The Belts and Wimpole Home Farm barn on consecutive nights. The greatest distance between two confirmed roosts used by breeding female bats within the study area was 471m (bat 9). The smallest distance between roost switches of breeding females in 2020 was 15m between R2 and R21 in The Belts. The mean distance between roost switches of breeding females was 176m, although there was a significant difference between the mean distances travelled by breeding females between roosts within The Belts (95m) and Waresley Wood (321m).

4.5 Foraging Areas and Home Ranges of Barbastelle Bats

4.5.1 Bats were recorded over a range of areas during the radio-tracking surveys. The areas used are summarised in **Figures B1** to **B12** which illustrate triangulation points, extent of ranges and the MCP, neighbourhood

linkage (clusters) and kernels for each bat radio-tracked. The total number of bearings achieved (including night and day roosts used) have also been shown. These data are set out in **Table A7**.

4.5.2 Whilst the radio-tracking undertaken followed the bats for only a relatively short period of time, the data collected shows some patterns to barbastelle behaviour. The bats roosting in Eversden and Wimpole Woods SAC demonstrated a similar use of the landscape as shown by the Cambridgeshire Bat Group tracking studies between 2000 and 2002. However, there appears to have been no overlap in bats moving between the Wimpole colony to the east and the Hayley/Waresley Wood area.

Table A7 - 95% Home Range Analysis (areas in ha)

Breeding females					
Bat number	No. bearings achieved	MCP Ha	Cluster		Kernel
			Ha	No of nuclei	
6	117	1439.1	1293.1	2	1720.1
7	70	3474.9	284.7	5	4120.4
8	115	1964.7	1239.6	2	1830.5
9	45	306.2	122.9	3	289.6
12	65	632.3	328.3	2	620.6
Mean	-	1563.44	653.72	2.8	1716.24
Non-breeding females					
Bat number	No. bearings achieved	MCP Ha	Cluster		Kernel Ha
			Ha	No of nuclei	
1	104	1682	490.7	9	1429.1
11	53	347.3	48.9	5	289.2
Mean	-	1014.65	269.8	7	859.15
Males					
Bat number	No. bearings achieved	MCP	Cluster		Kernel
2	67	2400.8	687.99	4	2335.5
5	62	1528.2	331.3	4	1747.8
Mean	-	1964.5	509.645	4	2041.65

4.5.3 Of the Hayley Wood/Waresley Wood bats, no records were made of the bats from these respective woodlands visiting the other woodland, however, there is some overlap in foraging areas/home ranges between these bats. Obviously only a single breeding female bat was tracked from Waresley Wood and one non-breeding female from Hayley Wood. One of the tagged breeding female bats (bat 3) from Halyey Wood was not recorded during night time tracking and no access was possible to the area where an approximate

roost was found. The non-breeding bat 4 was not recorded again once it was released from being tagged.. When looking for the bats, regular checks were made of the woodlands in case any of the bats had returned during the night. Bat 9 was regularly recorded along the Gransden Brook.

4.5.4 Millspaugh and Marzluff (ed 2001) suggests that more than 100 fixes are required to obtain reliable estimates of home range size using minimum convex polygon (MCP) analysis, while the kernel analysis is useful when a smaller sample size is obtained and, along with cluster analysis, are useful at identifying multiple centres of activity, particularly in heterogeneous environments. A 95% MCP analysis was carried out instead of a 100% MCP as this eliminates outliers. **Figure C1** shows the MCPs for adult breeding female barbastelles. The sample size was good for two of the six tagged breeding female bats, 6 and 8 with 117 and 115 bearings achieved respectively: this includes single as well as joint bearings, roosts and night roosts. Of the other three, where the sample size was smaller, bat 9 appeared to have a smaller home range with a restricted area for foraging. Regular checks of the area where it had been found around Gransden were made and whilst it did not appear to move into any of the areas which may be affected by the proposals it was considered that sufficient effort had been made to determine the foraging areas for this bat. A total of 46 bearings was achieved.

4.5.5 Bat 3, the sixth breeding female tagged, which was trapped in Hayley Wood, appeared to remain to the south or south-east of Hayley Wood with only occasional records being made during the day or early in the evening towards an area of woodland to the south-east of Hayley Wood. No joint bearings were possible and therefore no home range analysis could be undertaken. The remaining bats all had over 60 locations, with Bat 7 recording 70 points and 12 recording 65 points.

4.5.6 The MCP areas for bat 12 (breeding female) measured 632.3ha but this does not represent the full home range of this bat. This is because on occasions it was not recorded in the Eversden Woods/Belts area nor in the area of the Bourn Brook south of Toft and it could not be recorded elsewhere.

4.5.7 The average MCP area for all the breeding females was 1,563.44ha. The greatest MCP area was generated by Bat 7 with a home range of 3,474.9ha. Bat 7 was recorded foraging to the south-west of Cambridge around Grantchester some 10.2km from the Belts where it was recorded roosting. It also appeared to show some fidelity to the Bourn Brook. Bats 6 and 8 also roosting in the Belts had home ranges smaller than bat 7 with 1,439.1ha and 1,239.6ha respectively were also found to use the Bourn Brook particularly between Comberton, Great Eversden and Kingston.

4.5.8 Two non-breeding female adult bats were tracked; Bats 1 and 11, a further two non-breeding females (bats 4 and 10) were not recorded after being released and it is thought that their tags failed. However, as bat 4 was not caught until 23:40hrs it is possible that it roosted further away to the south where access was limited.

The average MCP area recorded for the two non-breeding female bats was 1,014.65ha ranging from 347.3ha (bat 11) to 1,682ha (bat 1). Bat 1 was caught shortly after sunset in Hayley Wood and roosted within the wood, it was not found on several nights after it left Hayley Wood despite surveyors searching widely. It was then recorded west of Cambourne on three consecutive nights foraging widely around The Moats and Pastures Farm up as far north as the A428 and east of the A1198 over an area which is a mix of farmland and a construction site. On one of the windier nights it was found around the fishing lakes to the south-west of Cambourne just north of Bourn Road. It also spent some time foraging around Bourn airfield. It is thought that it may have been in Longstowe Park but the stopping points along the Old North Road were constrained by overhead powerlines producing electrical interference.

4.5.9 Bat 11 was caught in The Belts but its actual roosting tree was not located. Access into the wider Wimpole Estate had to be arranged and due to weather constraints the surveyors did not enter woodlands to search for tree roosts. The bat was recorded possibly roosting in Cobb's Wood and then down in Four Acre Covert. The 95% MCP of Bat 11 was 347.3ha and was recorded mainly south of The Belts with one particular period of sustained activity in the southern part of Wimpole around the River Cam.

4.5.10 For the male bats (2 and 5), the mean 95% MCP recorded was 1,964.5ha with bat 2 recording 2,400.8ha and bat 5,1,528.2ha. It is thought that the full extent of the home range of bat 2 was not found as it was not recorded on a number of nights after leaving Hayley Wood. It left the roost woodland heading north and spent some time around Gransden Lodge airfield but could then not be found on several nights despite searches in all directions. It was then found foraging extensively around Eltisley and the southern site of Croxton Park. Given the access restrictions and the large area between the roads around Eltisley and Caxton, it is possible that the bat was in this area but the signal was not strong enough to carry to the surveyors.

4.5.11 Bat 5 was recorded regularly in the woodlands of The Belts and Eversden Wood and regularly along the Bourn Brook to the south-east of Toft. It is likely that the full range of this bat was not fully recorded, it was recorded further north to the east of Comberton and hadn't been recorded in the Bourn Brook area prior to that so is thought to have ranged further north.

4.5.12 The 95% kernel analysis (see **Figure C3**) recorded home range sizes of the breeding female bats of between 4,120.4ha and 122.8ha with a mean of 1,716.22ha. The non-breeding female bats resulted in kernel home range sizes from 289.2ha to 1,429.1ha with a mean of 859.15ha.

4.5.13 The 95% kernel analysis of the adult male barbastelle bats recorded home ranges between 1,747.8ha and 1,747.8ha and a mean of 2,041.65ha.

4.5.14 The core area size (based on a 95% cluster analysis) of the breeding female barbastelles ranged from 122.8ha to 1,293.1ha, with the number of core areas per bat ranging from 2 to 5 **Figure C2**.

Habitat Use

4.5.15 During the 2020 study, barbastelles have been recorded using a variety of habitats for foraging and commuting. The core foraging zones tend to consist of woodland blocks close to or within their roosting areas, but also open fields of mainly arable land which is the main habitat type to the north and north-east of Eversden Woods. These fields do, on occasion, have broad hedgerows with pockets of fragmented woodland. The fields are crossed by a network of ditches and the streams, such as Bourn Brook, seem to be an important feature in the landscape for this maternity colony. The golf course at Toft provides barbastelle with a fairly sheltered foraging environment with lines of mature vegetation but also ponds.

4.5.16 Habitats to the east within the home range of bats 1, 2 and 9 are also similar with open fields of arable with small fragments of woodland. Here too, streams in the local landscape are a key feature as are the ditch networks.

4.6 Interchange Between Eversden and Wimpole SAC and Eastern Woods

4.6.1 During the 2020 surveys, there were no bats that roosted outside of the area where they were caught. Certain bats such as bats 7, 8 and 11 that were trapped in Eversden Wood, roosted fairly close by in The Belts and Nurseries Wood respectively. No bats from the SAC roosted in Hayley or Waresely or other woods to the east and likewise neither did bats from these woodlands roost in Wimpole.

4.6.2 In addition, there was no overlap of activity with bats from Everley/Waresley Wood with bats from The Belts or Eversden Wood. The furthest west a bat from the Wimpole area was recorded was around Kingston Wood located to the east of the A1198 and likewise bats from the east ventured northwards rather than toward the Wimpole colony. A similar distribution of bats was recorded by the Cambridgeshire Bat Group 2004/5, although one bat was recorded west of the A1198 within 1 km of Hayley Wood.

4.7 Emergence Surveys of Barbastelle Roost Trees

4.7.1 Three emergence surveys were undertaken of two trees in The Belts, R4 and R17, and one tree in Hayley Wood, R7, on 19th and 26th August. No simultaneous combined emergence survey of all trees was undertaken as the emphasis was on the radio-tracking to ascertain habitat use. The emergence surveys assisted with determining where bats were roosting for trapping purposes and provided information on whether tagged bats were roosting with untagged barbastelles or other bat species. The results of the three emergence surveys were:

Tree R4 – three barbastelle emerged including bat 8;

Tree R7 – five barbastelle emerged including bats 1 and 2;

Tree R17 – bat 7 emerged and it could not be confirmed if any other barbastelle emerged.

4.7.2 No other bat species were recorded roosting in the same trees with the barbastelles during the emergence surveys.

4.8 Breeding Status

4.8.1 The bats during the 2020 survey were tracked in the post-lactation period. Of the 10 adult female barbastelle caught and tagged, six (60%) had bred in 2020; however, the sample size was too small to be other than indicative. Juvenile barbastelle bats that were caught but not tagged appeared to be well-developed.

4.8.2 Three of the post lactating female bats were caught from trapping locations in Eversden Wood, with one caught in each of the three other trapping woods (The Belts, Hayley Wood and Waresley Wood). The single juvenile female and two of the non-breeding females were caught in The Belts, and the remaining two non-breeding females in Hayley Wood. Of the five adult males, two were caught in The Belts and one from each of the other trapping woods (Eversden Wood, Hayley Wood and Waresley Wood). The four juvenile males were caught in The Belts and Hayley Wood, with two bats caught in each.

4.9 Other Species Trapping Information

4.9.1 In addition to the 20 barbastelles caught, 14 common pipistrelles, 16 soprano pipistrelles, 14 Natterer's bats, 12 brown long-eared bats and a single Daubenton's bat were trapped. Common pipistrelle and Daubenton's were the only species that no breeding females were caught although 11 of the 14 common pipistrelle were juvenile. Of all species, roughly equal numbers of male and females were caught (37 female and 39 male) with a single soprano pipistrelle escaping from the net before sexing.

4.9.2 In total 17 post lactating females were caught; six brown long-eared, four Natterer's, two soprano pipistrelle and the six barbastelle. Juvenile bats were recorded for all species with the exception of brown long-eared and Natterer's.

4.9.3 The largest number of bats was trapped in Hayley Wood with 25 and then fairly equal numbers ranging between 11 at the Northern Belts, 13 at Eversden Wood and 14 at the Eastern Belts and Waresley Wood.

5.0 EVALUATION

5.1 Barbastelle Tracking

5.1.1 The trapping and tagging project has shown that the woods at the Eversden and Wimpole Woods SAC and the SSSIs of Hayley Wood and Waresley Wood support breeding colonies of barbastelle bats. The radiotracking has shown that there was no interchange in roosting between bats from the Wimpole Area and the woods (Hayley and Waresley wood) to the west.

5.1.2 The tracking has shown that the bats caught in the east of the study area, in the Eversden and Wimpole SAC, and the west of the study area, in Hayley or Waresley woods, do not have home ranges that overlap. All bats tagged cover ground rapidly and continuously within foraging areas. The bats that were being tracked were rarely recorded as static, bat 1 was recorded possibly static on two nights for a short period of time. As the bats were not all recorded continuously it cannot be certain whether they used night roosts but only limited amount of night roosting appeared to have been recorded for those bats that were tracked at any given time.

Habitat Use

5.1.3 The main foraging areas for bats from the Wimpole Estate was primarily the areas to the north and east, with the exception of bat 11, which foraged over the Wimpole parkland and habitats to the south to the River Cam. The woodland areas within the SAC are obviously extremely important to the colony and are generally the only substantial broadleaved woodland habitat within their home range. The study has shown that the females use the woodlands in the early evening and prior to returning to roost but also in periods of inclement weather. This correlates to studies undertaken by Zeale *et al* (2012) where their study of barbastelles in Devon and Mottisfont SAC in Hampshire found that all their study bats foraged within woodland roost sites before commuting to core foraging areas. Both studies show the importance of managing woodland roost sites carefully by maintaining the canopy layer to provide cover from predatory birds and allowing bats to emerge and feed earlier (Jones and Rydell 1994; Russo et al. 2007). Similarly, the use of tree lines, such as The Belts, by bats when close to roost sites highlights the importance of preserving canopy connectivity beyond the borders of woodlands (Hillen et al. 2010).

5.1.4 The landscape to the north and north-east of the SAC is far more open than some of the other SAC's designated for barbastelle within the UK: Ebernoe Common SAC and the Exmoor and Quantock Oakwoods SAC which have breeding colonies in large woodland sites surrounded by a network of extensive woodland and other suitable habitat which are widely considered as optimal barbastelle habitat. The habitats surrounding Wimpole and Hayley/Waresley Woods are more agricultural and interspersed with hedgerows of varying degree of structure and small pockets of isolated woodland. Zeale *et al* (2012) found that arable habitats were least selected by their study bats due to the low prey populations over arable fields resulting from pesticide use. However, this 2020 study has shown the reliance on those arable habitats to the north

of the SAC by the colony. Within these areas is a network of hedgerows but also ditches and watercourse which have been confirmed as being used for foraging and also as a commuting link through the landscape.

5.1.5 Bat 11 was the only bat from the Wimpole Estate to forage to the south of its roosting area. It also roosted in different woodlands to the main colony. However, the foraging habitats were not too dissimilar with areas of open arable dominating the landscape. Tracking confirmed the importance of the River Cam/Rhee as a foraging area and commuting route.

5.1.6 A similar pattern emerged from bats from Hayley Wood and Waresley Wood showing the importance of woodland roost sites. The habitats in the home ranges of these bats are similar to the Wimpole colony of arable fields, hedgerows, ditches and watercourses.

Roost Selection

5.1.7 The 2020 study recorded 22 confirmed roosts, of which all but one (R5) were trees, and these were predominantly ash and oak with a single beech. Tree R19 could not be confirmed as the tag signal suggested either an oak or ash that were very close to each other. Some features confirmed as roosting sites included raised bark and large splits which is similar to that found in other radio-tracking research of this species in Italy (Russo *et al.* 2004), Germany (Kerth & Melber, 2009) and England (Billington, 2002; Greenaway 2008; Greenaway & Hill, 2004) where barbastelle nursery roosts tended to be within splits in trees or under loose bark. Russo *et al* 2004 found 20 out of 27 tree roosts of breeding female bats were under raised bark.

5.1.8 Other research has found that breeding roosts are found in quiet locations well away from the woodland edges and surrounded by dense cover (Russo *et al* 2004; Greenaway 2008) but this was not necessarily the case in this radio-tracking survey. In 2020, seven of the 21 confirmed tree roosts were found within 30m of a woodland edge: with 14 recorded beyond this. Roost R12 was found to support the largest number of bats and this was located 41m from the edge of The Belts. It was also noticed that there are a number of well used footpaths through The Belts which is a fairly narrow block of woodland. None of the trees were immediately adjacent to any of the footpaths but several were in view of the footpaths. The roost R3 was one of the closer roosts to a footpath and it was from this roost that bats 5 and 8 moved between after being found during the day and before the emergence survey that night.

Movements Between Roosts

5.1.9 Barbastelle are known to move roosts regularly even during the period when their young cannot fly (Russo *et al*., 2004). The mean distance moved between trees by female bats in central Italy ranged between 31m and 626m, with distances contracting during the main lactating period (Russo *et al*., 2004). This suggests that female barbastelles, in order to continue to move roosts regularly, need a large number of suitable roost trees relatively close to each other during the whole breeding season, but particularly during the main

lactating period. Russo *et al.* also found that barbastelle roosts were most frequently found within unmanaged woodland where the dead trees occurred most frequently, in comparison with managed woodland and pasture woodland, and where clusters of larger trees occurred. Greenaway and Hill (2004) found that the roosts tended to be located within a distinct area which they refer to as a "loyalty area". Loyalty areas will gradually change over time as woodlands develop, and Greenaway and Hill (2004) suggest that management plans for nursery roosting sites should include areas of five to ten times the area that bats are presently using.

5.1.10 The distances between roost-switches (movements between roosts located in the two woodlands in which roosts of breeding females were recorded) in 2020 are summarised in **Table A8**.

5.1.11 Russo *et al.* (2004) found during the late lactation/post lactation phase that the range for distances between roost switches was between 0 (sic) and 352m with a mean of 89m. During this 2020 study 12 of the 14 combinations of roost switches fell within the distance range found by Russo *et al.* (2004) during the late lactation/post lactation phase; the remaining two roost switches, both from Waresley Wood, were greater. The mean distance of switches within The Belts was very similar to that found by Russo *et al.* (2005), whilst the mean distance moved between roosts within Waresley Wood was higher; however, it should be noted that the results from Waresley Wood relate only to one bat. Overall, tracked barbastelles at this site switched roosts on a regular basis, as found in other studies, but over larger distances than reported in some. However, a study in Germany found that female barbastelles could cover much larger distances (up to 9.0km between consecutive day roost locations: Kerth & Melber, 2009), and it seems likely that there is a great deal of variation between colonies, probably reflecting the relative availability of roost sites. The breeding females moved roosts the most. The males travelled furthest on average between roosts but were much more faithful to their roosts.

Table A8 – Summary of distances between roost-switches by breeding females in 2020

	Minimum (m)	Maximum (m)	Mean (m)	Number of switches	Number of bats	Mean switches per bat
Overall	15	471	176	14	5	2.8
The Belts	15	187	95	9	4	2.25
Waresley Wood	133	471	321	5	1	5

5.1.12 The difference between the mean distances moved by breeding females in The Belts and Waresley Wood could be for a number of reasons which have not yet been determined. The shape and size of Waresley Wood is very different to that of the Belts. Both are well used woods by walkers but due to the shape of the two woods the effect of disturbance by walkers is likely to be greater in The Belts than at Waresley. However,

at this stage an assessment of number of trees within the two woodlands has not been made and the distances moved within the two woodlands may be related to the distribution of trees within the woodland.

5.1.13 There was no overlap in bats roosting together from the different trapping locations. The study shows that the colony located in the Eversden and Wimpole SAC are separate to those colonies found in woodlands to the west. In addition, home ranges of bats in the eastern colony do not overlap with those of bats in the western colonies and there is a clear distinction in areas of the main foraging and commuting habitats. There was some overlap in home ranges between the Hayley Wood and Waresley Wood colonies but that is not considered significant due to the close proximity of those woodlands.

Colony Structure and Size

5.1.14 Barbastelle maternity colony sizes are difficult to estimate (as discussed in Greenaway, 2008), largely due to the numerous roost changes. Although simultaneous emergence surveys of all known tree roosts were not undertaken in 2020, as data on bat activity took priority, the results of the emergence surveys carried out recorded the tagged bats roosting with other barbastelles in both woodlands. A peak of five barbastelles were recorded emerging from tree R7 in Hayley Wood on 19th August, including bats 1 (a non-breeding female) and 2 (a male). However, on the days during which more than half of the tagged bats were tracked to a day roost in 2020 at least four, and up to seven, different day roosts were being used on any one day. All of these counts are therefore likely to have represented only a proportion of the population in the wider area.

5.1.15 Russo *et al. (*2004) found the number of bats in a maternity colony over seven different counts throughout July and August was 16.7 bats ± 4.2 (range 12-23 bats). Billington (pers. comm.) counted 26 bats within a single tree roost in Somerset. Greenaway (2008) studied two maternity colonies in Sussex, and estimated counts of at least 64 breeding females in one maternity colony and at least 80 breeding females in the other. Counts of a single tree near Norwich in August 2009 (BSG 2010) recorded between 55 and 59 bats from a single tree (these would be a mixture of female and juvenile bats). These colonies were further divided into sub-groups of 16-25 breeding females (Greenaway, 2008, Greenaway & Hill, 2004). Bats have been recorded changing sub-groups between different years, but never changing nursery colonies (Greenaway, 2004; Greenaway, 2008; Greenaway & Hill, 2004). It is not known whether the colonies in this study support the sub-group theory; those papers discussing sub-groups generally are of high-quality habitats covering larger areas such as the Ahringsbachtal Special Area of Conservation (SAC) in Germany and the Mens and Ebernoe Common SACs in England.

5.1.16 During the 2020 radio-tracking surveys, one non-breeding female bat (bat 1) was recorded within the same roost trees as one of the two male bats (bat 2) and appeared to move with this bat into different tree roosts. These two bats were recorded emerging from one of their roost trees with three other barbastelles, however,

the breeding status of the additional bats could not be confirmed and it is not possible to know the movements of the untagged bats. Three other non-breeding female barbastelles were tagged, one of which (bat 11) was recorded roosting within two woodlands to the south of the wood in which it was caught but it was not possible to ascertain the precise roost trees or whether this bat was roosting with other barbastelles. This bat did not appear to move with any of the other tagged bats that were roosting in this area. The roost locations of the final two non-breeding female bats were not recorded during the study period. Non-breeding females have been recorded roosting within maternity colonies (Greenaway, 2008), but have also been recorded roosting with small groups of males (Parsons *et al*., 2003).

5.2 Foraging Areas and Home Ranges

Foraging Areas

5.2.1 As described above, the main foraging areas for the breeding females appear to extend out from the woodland areas of Wimpole and Hayley/Waresley Wood and extend over the habitats particularly to the north which is criss-crossed with streams and ditches. The landscape is dominated by arable farmland, which grassland restricted to small fields associated with the edge of the settlements and along watercourses or in larger blocks in golf courses, Gransden Lodge airfield, parkland (old and new) or institutional grounds. Fragments of ancient woodlands are present as are more recent blocks of plantation woodland. The field boundaries support a wide variety of hedgerow habitat or linear woodland/scrub often associated with watercourses.

5.2.2 Radio-tracking has been carried out at Wimpole in the past with an initial survey between 2000 and 2002 (Cambridgeshire Bat Group). This previous study recorded bats foraging to 6.5km from Wimpole with one bat foraging 11km to the west of Cambridge. This bat was found south of High Cross on one night, which is approximately 3km north of the Grantchester area where bat 7 was recorded in 2020. Some information provided by Cambridgeshire Bat Group of radio tracking studies in 2000, 2002, 2004 and 2005 showed home ranges of bats from the Wimpole Estate which largely covers the same areas as found during this 2020 survey including a bat foraging in the Grantchester area. The sex or breeding status of these bats is not known.

Home Ranges: Breeding Females MCP and Kernel Analyses

5.2.3 Home Range Analysis was undertaken for all bats where sufficient bearings were collected. These can be compared with data from other radio-tracking studies. The other studies typically used 100% MCPs, rather than (as here) 95% MCPs to eliminate outliers. The data for this tracking survey are similar to the ranges recorded for adult female barbastelles in the Mens (range 260-2,928ha; mean: 1,236ha); and are greater than the mean recorded in Germany (222ha; Kerth & Melber, 2009) and at Ebernoe Common (range: 45 - 2,521ha; mean: 779.5ha; [4]Greenaway, 2008). Previous radio-tracking studies by Corylus Ecology have

[4] Note the MCP% analysis is not given in Greenaway 2008 but given as 100% MCP in Kerth and Melber 2009)

recorded a lower mean home range area for other sites in East Anglia although with similar range for the 95% MCP and kernels recorded from radio-tracking at this same time of year (mid-August).

5.2.4 The home range kernel analysis results are greater than the home ranges recorded for 12 female barbastelle bats at the site in Germany, although a wider range of values were recorded (kernel 95%: range: 125-2551ha; median: 403ha; Hillen *et al*., 2009). Another site in Germany recorded a smaller mean home range (90% kernel mean: 108.6ha) (Kerth & Melber, 2009)

Table A9 – Mean Home Ranges for breeding females (all areas in ha)

Status	Year	2020
Breeding females	95% MCP Mean (range)	1563.44 (306.2-3474.9)
	95% Kernel Mean (range)	1716.22 (289.5 – 4120.4)
	95% Cluster mean (range) No. of nuclei/cluster	653.7 (122.8 – 1293.1) 1 - 4

Home Ranges recorded in other studies							
Status	**Analysis Type**	**Mens**	**Ebernoe**	**Hillen *et al.***	**Kerth *et al.***	**Norwich NDR**	**Suffolk**
Breeding females	100% MCP Mean (range)	1,236 (260 – 2928)	779.5 (45 – 2521)	-	222		
	95% MCP Mean (range)					904 (393 – 1637)	714 (329-2020)
	95% Kernel Mean (range)			403 (125 – 2551)	108.6 (90% Kernel)	884 (460 – 2119)	582 (309 - 1275

Core Areas Defined Through Kernel Analyses

5.2.5 Core areas are those where an animal spends the majority of its time. Hillen's radio-tracking study of barbastelle (Hillen *et al*., 2009) looked at core areas used within each bat's home range. In that study, the core area was defined as 50% and home range was defined as 95% of the kernel density estimate. On that basis, the median number of core areas per bat was two with a range of one to five core areas per bat tracked per year. The core area size ranged from 5ha to 285ha. They found that all the home ranges of radio-tracked females (breeding and non-breeding) overlapped with at least one other home range but that only 41% of the core areas overlapped with another female's core area, suggesting a degree of partitioning.

Although the sample size for the study was small (19 data sets from 12 female bats), Hillen *et al.* 2009 determined that female barbastelles partition foraging areas and keep individual hunting areas constant over time.

5.2.6 The same analysis was undertaken of the 2020 Wimpole data (the Waresley Wood bat has been excluded), using the 50% kernel area of five breeding female barbastelle bats. This resulted in 66% of core areas having no overlap and therefore 34% being overlapped by at least one other core area, a very similar result to the Hillen study. **Figure C7** shows the 50% kernel areas of the breeding female barbastelle bats.

5.2.7 It should be noted that for both studies it is not known how many untagged bats were foraging in these core areas. Therefore it is possible that there is a greater degree of overlap in individual foraging areas than is otherwise indicated by the data presented here. The Hillen and East West Rail studies differ because at EWR the bats were radio-tracked over the same time period with multiple surveyors allowing the bats to be tracked simultaneously, whilst the Hillen study tracked either single bats or pairs of bats at any one time. The Hillen study did, however, track the same bat over different years with one bat tracked in each of the four years of the study, one during three of the four years and three during two of the four years. The researchers concluded that fidelity between years appeared to be more important in determining home range than intraspecific competition. None of the bats at EWR have been knowingly caught and tracked over different years as ringing has not previously taken place.

Cluster Analyses: Breeding Females

5.2.8 Cluster analysis creates a number of nuclei or clusters for each bat. The cluster area size defined by a 95% cluster analysis of breeding female barbastelle ranged from 122.8 to 1293.1ha with the number of nuclei ranging from 2 to 5 (as shown on **Figure C2)**. Whilst a number of these cluster core areas overlap, there may be some partitioning of foraging habitat. It should be noted that only a subset of the population of barbastelle bats is tracked at any given time and it is not known how many other non-tagged bats may have been foraging in these areas. The main clusters for bats 6 and 8 largely overlap, both covering a wide area from Kingston to Toft and Comberton. Two smaller clusters to the east are close to each other either side of Wimpole Road south of Barton. Two of the five clusters of bats 7 overlap with the clusters recorded for bat 12. Three of bat 7's clusters overlap with the large areas of bats 6 and 8 whilst the fifth cluster towards Grantchester does not overlap with any of the others.

Non-breeding Female Barbastelles (MCP, Kernel and Cluster Analysis)

5.2.9 Two non-breeding female bats were successfully radio-tracked in 2020: Bat 1 from Hayley Wood and Bat 11 from Wimpole. Given the small sample size (two bats) comparisons on the average sizes of home ranges cannot be made. The 95% MCP home ranges for the non-breeding females ranged from 347.3 to 1,682ha (bat 1), the range of bat 1 being within the range of those recorded by the breeding female bats. The home

range of bat 1 is considered to potentially be an underestimate as it could not be found on several nights during the tracking, similarly bat 11 was not tracked as extensively as it tended to fly south and away from any potential areas of impact with the proposals. The 95% cluster analysis for bat 1 as 490.7ha compared to the mean size for breeding females of 653.7ha although the number of nuclei recorded was highest for this bat (9) compared to all other bats tracked. Bat 11 had five nuclei whilst all bar one of the breeding females had either two or three nuclei. One possible theory for this is the non-breeding female bats use a greater number of foraging areas than the breeding female bats. Bat 7 a breeding female had 5 nuclei with a small cluster size of 284.7ha which suggests this specific breeding bat used a greater number of nuclei.

5.2.10 The kernel analysis recorded a smaller overall kernel size for the non-breeding females compared to the breeding females. Bat 1 for example with an MCP of 1,682ha has a kernel of 1,429.1ha compared to bats 6 and 8 which had kernels of 1,720.1 and 1,830.5ha respectively despite the MCP being smaller than that of bat 1.

5.2.11 Greenaway (2008) found that there was greater variability in MCP size for non-breeding barbastelles (both male and female). The lower metabolic demands of non-breeding bats mean that they do not require such large foraging areas; conversely a tendency to 'wander' in the late summer to find mating opportunities means they can also have quite large ranges as defined by MCP. For example, it was determined that non-lactating female noctules used more marginal and less preferred habitats significantly more than lactating bats (Mackie & Racey, 2007), although there was little difference in timing of foraging activity or distances travelled.

Male Barbastelles (MCP)

5.2.12 Two male barbastelle bats were tracked in 2020, one from Hayley Woods and one from the Wimpole Estate. As with the non-breeding females the sample size is too small to assess differences based on average home ranges. The two bats had 95% MCPs ranging between 1528.2ha and 2400.8ha. These are the second and fifth largest out of the nine bats tracked with usable data. The breeding female bats recorded the largest and third largest MCPs. Male bats tend to range over much greater distance and tend not to be associated with the core breeding habitat monopolised by the females. Greenaway (2004) proposed that the foraging areas used by the male may more frequently be in sub-optimal habitats when compared to those used by the females; however, in this instance, there appears to be a greater degree of overlap for the male bats at this site than occurs in the Sussex sites. During the 2020 surveys, five adult male barbastelles were caught, compared to 10 adult female bats and in both instances the male bats were recorded roosting in the woodland where the breeding female bats were roosting. The male barbastelles were recorded flying in the areas of habitat used by the female tracked bats: male bat 2, for example, roosted in Hayley Wood often with bat 1 (a non-breeding female) and was recorded regularly in around the Great Gransden Mill area. Male bat 5 was caught in Wimpole and was regularly recorded foraging in Eversden Wood and over the Bourn

Brook. Its usual roost was the barn at Wimpole but it was recorded roosting with bat 12 (a breeding female) on one occasion and in tree roosts in The Belts on two other occasions.

Distances Travelled

5.2.13 Barbastelle bats radio-tracked from The Mens Woodland SAC ranged widely (range: 2.64-11.98km; mean: 7.1km), as did those from Ebernoe Common SAC (range: 1.17-10.46; mean: 5.1) (Greenaway, 2008). The average flight distances for pregnant or lactating females at the same locations were 7.67km and 5.09km respectively (Greenaway, 2008). From Paston Barn near Cromer (Norfolk), female barbastelles flew a maximum of 2.75km to their foraging site, while males were tracked 4.75km (Parsons *et al*., undated). At two sites in southern England, the home ranges varied considerably with bats travelling between 1 and 20km to reach foraging areas with the average range span being 6.8km (Zeale *et al.,* 2012). In Norfolk, the maximum distance travelled by a breeding female bat was 9.4km (average 5.84km), whilst for a male it was 13km (BSG 2010). During this survey, the maximum distance recorded from a roost was 10.2km for bat 7 (a breeding female) whilst the mean maximum distance from a roost for breeding females was 5.17km. The mean maximum distance for the non-breeding female bats in 2020 was 6.15km whilst the mean maximum distance for the male bats was 7.05km

5.2.14 The 2020 distances recorded are consistent with the results of previous studies (Greenaway, 2004; 2008 and Zeale *et al.*, 2012) despite the differences in the extent of woodland habitat found at the subject site compared to the habitat availability at the other study sites.

5.2.15 Research in Sussex suggested that breeding females dispersed from the roost area along established flight lines to foraging areas often several kilometres away; the female repeatedly using the same flight line, and juveniles following the mothers out along the flight lines to become familiarised with the routes and foraging zones (Greenaway 2004). Whilst the flight lines may be shared, they were generally found to end in a section used by a single bat to access the most distant foraging area (Greenaway 2004). The radio-tracking surveys to date have not found this, with bats flying widely within the landscape: that is, the tracked barbastelle did not tend to follow singular linear features rather they used the ditch, stream and hedgerow features within the landscape extensively. They appeared to be less reliant on linear features to commute to foraging areas than has been suggested for other studies. As stated above, the habitats at Ebernoe and the Mens are more extensive than at Wimpole or Hayley Wood/Waresley Wood. In Suffolk (Arcadis 2020) and in Norfolk (BSG, 2010), foraging over less high-quality foraging habitat has been recorded, with foraging over arable land being recorded in both instances. The prevalence of arable habitat surrounding the roost woodlands does not restrict the movement of the bats, and they do not appear to use singular linear corridors to move between the areas of higher quality habitat. However, certain water courses appear to be of significant importance, specifically the Bourn Brook which was used extensively for foraging and commuting, the Gransden Brook and associated water courses and ditches around the Gransdens and the water courses and ditches around the Cambridge Gliding Club and north around Caxton and Cambourne.

5.2.16 During the summer season, Greenaway (2004) records that male barbastelle tend to be active for fairly short periods of the night, and appeared to forage entirely in woodlands within 1km of their roost site. In the present study, although the male bats were not continuously followed, they were regularly recorded throughout the night, and were clearly foraging further from their roost than the Greenaway study. Bat 5, which roosted in The Belts/tithe barn, was recorded at least 6.97km from its roost whilst bat 2 was recorded 7.12km from its roost areas, and in all cases appeared to be spending considerable periods of time foraging. It is likely that there are a number of factors affecting the distances the male bats move including breeding. The trapping and tracking was undertaken in the latter part of August when mating may be starting. However, neither of the male bats were noted as being in breeding condition (with enlarged testes), although both were recorded roosting with female bats.

5.2.17 There could be some seasonal variations to habitat use for foraging due to temperature/food availability. Seasonal diet changes in barbastelle have been researched and it has been found that they selectively predate larger moth species even during periods when smaller moth species are more abundant (Andreas *et al.,* 2012). It was found that, whilst there were generally no abrupt seasonal changes in their diet within season, the exception is in autumn, when the larger moths are replaced by smaller moths. It is considered that this is due to prey availability as most moth species cease to fly and only the smaller species are still flying during this time. Larger moths are still present but display limited flying activities. This autumn period is reported as being into November in the study area within the Czech Republic. The radio-tracking of barbastelles particularly at Hayley Wood/Waresley Wood has only been undertaken in summer, and it is likely that there will be seasonal and weather-related changes to key foraging areas throughout the year.

6.0 CONCLUSION

Barbastelle Bats

6.1 The radio-tracking undertaken in 2020 largely achieved the four objectives set out in para 1.2, for barbastelle bats. No serotine bats were caught and therefore no information relating to their foraging areas or commuting routes has been gathered.

6.2 Bats were caught post maternity with roosts and roost areas for barbastelle bats recorded in Wimpole, at Hayley Woods and Waresley Wood. A total of 12 barbastelle bats were tagged, two of the tagged bats were not recorded after the evening they were caught. One of these (bat 4) from Hayley Wood was caught late at night and it is possible that this bat did not roost within Hayley Wood but used habitat to the south over which there was little access. Bat 3 was also caught in Hayley Wood was rarely recorded and usually only during the daytime in the direction of a small section of woodland to the south-east of Hayley Wood. It could not be recorded during the night time flying period and it is thought it remained within this area between Hayley Wood, Hatley St George and Croydon. Foraging areas and home ranges were tracked for the remaining nine bats.

6.3 No cross-over between bats from Wimpole and bats from the western woodlands of Hayley Wood and Waresley Wood was recorded. No interchange of roosts between Hayley Wood and Waresley Wood was recorded although there was some overlap in home ranges and foraging areas between bats from these two woodlands.

6.4 The main foraging areas for the breeding females appear to extend out from the woodland areas of Wimpole and Hayley/Waresley Wood and extend over the habitats particularly to the north which is criss-crossed with brook's streams and ditches. The habitats are a mixture of arable, golf courses, and an air field. Of most significance for foraging was the Bourn Brook through to Grantchester east of Cambridge and the various ditch and water courses around Gransden (Gransden Brook and Mandean Brook) and water courses in the north around Caxton and Cambourne including Eastern Brook, Haydean and Gascote Dean. If the proposed railway passes through these areas there is an increased risk of loss of a proportion of foraging habitat, severance of flight lines and interaction between bats and trains than areas away from the Bourn Brook corridor and the water courses and mixed landscapes around Great and Little Gransden.

Other Bat Species Caught

6.5 Over four nights of trapping, 77 bats of six species were caught. Barbastelle was the most frequently caught species with 20 with soprano pipistrelle being the second most numerous species caught (16). Fourteen common pipistrelle and Natterer's bats were caught and 12 brown long-eared bats. A single adult non-breeding female Daubenton's bats was caught in the eastern belts.

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Appendix 1 – COVID-19 Survey Protocols

The Covid-19 pandemic resulted in a number of precautions the following guidance set out by Defra dated 28th May 2020 which includes the following:

1) For each trapping location three surveyors will work together, there will be one experienced tagger capable of tagging and ringing the target bats, a second licenced bat handler capable of removing bats from harp traps and mist nets, the third will be the recorder. This will prevent the potential cross-contamination of several handlers/surveyors using equipment whilst also ensuring the safety of bats caught in the traps and being tagged. It will also limit the number of people coming into close proximity/handling bats.

2) The following PPE and precautions will be used:
    a. Face masks – these will be worn at all times when handling bats and for any occasions where a 2m social distance between surveyors cannot be maintained;
    b. Gloves will be used as matter of course for handling bats and prior to handling any bats the gloves will be sanitised using hand sanitiser and then dried. They will be washed between trapping nights.
    c. Animals will be kept separate from other individuals as much as reasonably possible with adequate trapping bags taken to site to ensure 1 bat per bag and if at all possible re-use of bags kept to a minimum.

3) All equipment will be cleaned and disinfected before and after use.

4) Water and soap will be carried in all cars to allow proper handwashing as well as using hand sanitiser between washes.

Appendix 2 –Detailed Radio Tracking Methodology

If a bat was recorded, then attempts were made to take synchronised, also referred to as 'joint', bearings, with another surveyor. This meant that surveyors frequently had to change locations in order to get joint bearings. It is recognised that gathering regular, accurate and triangulated fixes for foraging bats is difficult. This is because bats forage in flight and at speed, continually twisting and turning, causing fluctuations in transmitter pulse amplitude which can impede interpretation of distance and direction (Mackie & Racey, 2007). In addition, the barbastelle is a wide-ranging, fast-flying species which switches roosts frequently. Care also had to be taken to ensure that the surveyors were positioned away from overhead cables and electric fences to avoid disturbance to the compasses and radio-signals.

All surveyors were mobile, with each surveyor able to drive to new locations and were in contact with each other with long-range radios. Due to access arrangements with private landowners, not all areas of the landscape could be fully surveyed. Surveyors were allowed access to land within Wimpole Estate, Eversden Woods, Hayley Wood and Waresley Wood for trapping and tracking. However, access for vantage points (VPs) in order to take bearings were restricted to public highways and footpaths. As a result, varying numbers of triangulation points were taken for each bat, and not all bats were followed as closely as others. However, omni-directional aerials on cars allowed the presence of bats in certain areas to be determined even if there were no public road laybys to allow a bearing to be taken.

Collecting tracking data on female bats was prioritised over data collection from male bats when male bats were not present within the areas where most bats were being recorded. The receivers used allowed easy scrolling between the frequencies of the different tags/bats and the surveyors were constantly checking for the presence of all bats including the male tagged bats. As well as recording bats that were within range, surveyors also noted which bats were not recorded.

Appendix 3 – Data Analysis Methodology

The aim was to obtain a fix for at least every ten-minute interval. However, in real terms, this has not been possible for every radio-tracked bat. This is because barbastelles have a tendency to move through the landscape quickly, resulting in the transmitter not being detected by the receiver. In addition, survey constraints outlined in paragraph 3.3 meant that it was often difficult to get joint bearings

Therefore, once a radio-tagged barbastelle had been re-located it was imperative to obtain as much data as possible to establish a pattern of range use. If during the night time active tracking a number of similar fixes were achieved within a short period time, i.e. 10 minutes, then multiple fixes were discarded to correct for autocorrelation. Millspaugh and Marzluff (2001) conclude that for home range analysis adequate sampling of animal locations throughout the duration of the study is more important than determining a time interval between sampling that is statistically independent.

It is important therefore that the study incorporates biological traits of the animal into the sampling schedule: for example, studying nocturnal animals in both day and night locations to prevent bias towards a particular behaviour or activity. The data was checked to make sure there were no duplicates/clumping of fixes at the roosts during the night-time tracking to eliminate overestimate of habitat use around roosts due to swarming. Selection of a sampling interval less than that required for "time to independence" (TTI – the time at which autocorrelation is non-existent in successive observations) will not invalidate kernel or minimum convex polygons[1] (MCP) analysis, provided that the time frame of the study is adequate (Swihart and Slade 1997; Millspaugh and Marzluff, 2001).

Bat fixes were transferred to digital geo-referenced maps using AutoCAD and coordinates for triangulation points were determined; the extent of bat activity for each bat was plotted independently and the data were carefully scrutinised and any obviously false bearings were discarded. The coordinates of the plotted triangulation points were then transferred into Ranges 7 software (Anatrack) and analysed to produce MCPs, neighbour linkage[2] (or clusters) and kernel contours[3]. These are all methods of showing home ranges. Where roosts were found, the roost sites were included within the home ranges. The analysis was carried out using 95% of the locations closest to the home range centre (for polygons produced by MCP analysis) or the 95% nearest to each other for the contour analysis (the cluster and kernel contours).

Within each data set, the trapping locations were specified as the focal sites and all coordinates from the night-time tracking and roost locations were inputted as location qualifying variables (LQVs) within Ranges (LQV's are time, activity, habitat, values associated with the *x*,*y* coordinates). The activities of the bats were assigned a numerical value for their activity, either roosting, flying or night-roosting for analysis within Ranges. Typically a focal site might consist of a static, repeatedly-used location such as a den or nest, but in the case of bats where roosts change regularly, the trapping location is the most appropriate focal point to use.

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1 The MCP enables the creation of a boundary around all fixes using the smallest possible convex polygon. This is commonly used but may overestimate the size of home ranges.

2 A type of multivariate analysis that uses records or measurements of a number of characteristics or features to group individuals into clusters or classes, so that individuals within each cluster/class are as alike each other as possible and as unlike individuals in other clusters/classes as possible.

3 Kernel methods quantitatively determine areas which are intensively used by animals by converting position coordinates into lines or areas with varying probabilities of use and present these graphically.

Appendix 4 – Full Trapping Results

Date	Trapping Location	Number	Time Caught	Species	Sex	Age	Breeding status	Forearm (mm)	Weight (grms)	Bat tag no	Ring number	Comments
17.08.20	Hayley Wood	1	20:55	Barbastelle	M	Juvenile		37.6	9		J3518	
17.08.20	Hayley Wood	2	20:55	Barbastelle	F	A		38.3	8.5	1	J3516	
17.08.20	Hayley Wood	3	20:55	Soprano pipistrelle	M	Juvenile		29.2	4			
17.08.20	Hayley Wood	4	20:55	Barbastelle	M	A		36.7	7.5	2	J3517	
17.08.20	Hayley Wood	5	21:06	Brown long-eared	F	A		39.1	9			
17.08.20	Hayley Wood	6	21:13	Soprano pipistrelle	M	A		30.9	4.5			
17.08.20	Hayley Wood	7	22:00	Natterer's	M	A		38.2	7			
17.08.20	Hayley Wood	8	22:00	Natterer's	M	A		38.6	7.5			
17.08.20	Hayley Wood	9	22:20	Barbastelle	F	A	Post lactating	39.3	9	3	J3520	
17.08.20	Hayley Wood	10	22:30	Brown long-eared	F	A		40	10.9			
17.08.20	Hayley Wood	11	23:40	Barbastelle	F	A		38.4	9	4	J3521	
18.08.20	Hayley Wood	12	01:10	Natterer's	F	A		40.8	7.5			
18.08.20	Hayley Wood	13	01:25	Barbastelle	M	Juvenile		38.4	8.5		J3522	
17.08.20	Northern Belts	14	21:18	Common pipistrelle	M	Juvenile		32.8	4.76			
17.08.20	Northern Belts	15	22:00	Common pipistrelle	F	Juvenile		31.2	4.7			
17.08.20	Northern Belts	16	22:20	Common pipistrelle	F	Juvenile		32.1	4.9			
17.08.20	Northern Belts	17	22:41	Common pipistrelle	F	Juvenile		32.8	5			
17.08.20	Northern Belts	18	22:55	Common pipistrelle	M	Juvenile		30.9	4.7			
17.08.20	Northern Belts	19	23:35	Common pipistrelle	F	Juvenile		32	4			
17.08.20	Northern Belts	20	23:38	Soprano pipistrelle	M	Juvenile		31.1	4.7			
18.08.20	Northern Belts	21	00:30	Common pipistrelle	M	Juvenile		32.4	4.9			
18.08.20	Northern Belts	22	00:32	Barbastelle	M	A		37.4	9	5	A2210	eartag on each side
18.08.20	Northern Belts	23	01:13	Barbastelle	F	A	Post lactating	40.1	10	6	A2240	eartag on each side
18.08.20	Northern Belts	24	02:16	Barbastelle	M	Juvenile		37	9		A2249	
18.08.20	Eversden Wood	25	21:05	Barbastelle	F	A	Post lactating	39.9	10	7	A2248	eartag on each side
18.08.20	Eversden Wood	26	21:10	Barbastelle	M	A		38	8		A2246	eartag on each side
18.08.20	Eversden Wood	27	21:10	Barbastelle	F	A	Post lactating	39	8.1	8	A2247	
18.08.20	Eversden Wood	28	21:34	Common pipistrelle	F	Juvenile		30.5	4.8			
18.08.20	Eversden Wood	29	22:05	Common pipistrelle	M	Juvenile		30.5	4.3			
19.08.20	Eversden Wood	30	00:25	Soprano pipistrelle	M	A		31.2	4.7			
18.08.20	Waresley Wood	31	20:35	Brown long-eared	F	A	Post lactating	38.4	7.5			
18.08.20	Waresley Wood	32	20:49	Barbastelle	F	A	Post lactating	39.3	9.5	9	J3523	
18.08.20	Waresley Wood	33	21:35	Natterer's	M	A		40.0				
18.08.20	Waresley Wood	34	22:00	Brown long-eared	F	A		38.8	7.5			
18.08.20	Waresley Wood	35	22:00	Soprano pipistrelle	M	A	large testes	30.3	5.0			
18.08.20	Waresley Wood	36	22:00	Barbastelle	M	A		37.9	8.5		J3524	
18.08.20	Waresley Wood	37	22:30	Soprano pipistrelle	M	A		30.7	4.5			
18.08.20	Waresley Wood	38	22:30	Natterer's	M	A		39.7	8.0			
18.08.20	Waresley Wood	39	23:05	Common pipistrelle	F	Juvenile		32.5	5.5			
18.08.20	Waresley Wood	40	23:05	Soprano pipistrelle	N/A			N/A				Escaped
18.08.20	Waresley Wood	41	23:40	Soprano pipistrelle	M	Juvenile		30.3	4.5			
19.08.20	Waresley Wood	42	00:15	Soprano pipistrelle	F	Juvenile		31.2	4.5			
19.08.20	Waresley Wood	43	01:00	Natterer's	F	A	Post lactating	38.2	7.5			
19.08.20	Waresley Wood	44	01:35	Soprano pipistrelle	M	A	large testes, black epids	30.8	5.5			
20.08.20	Eastern Belts	45	21:00	Barbastelle	M	Juvenile		37.5	8.0		A2244	
20.08.20	Eastern Belts	46	21:00	Daubenton	F	A		37.8	6.8			
20.08.20	Eastern Belts	47	21:00	Barbastelle	F	A		37.9	8.0	10	A2245	eartag on each side
20.08.20	Eastern Belts	48	21:00	Barbastelle	M	A		38.4	7.5		A2242	eartag on each side
20.08.20	Eastern Belts	49	21:05	Common pipistrelle	M	Juvenile		30.5	4.3			
20.08.20	Eastern Belts	50	21:35	Common pipistrelle	M	A		32.3	5.0			
20.08.20	Eastern Belts	51	22:05	Soprano pipistrelle	F	A	Post lactating	32.7	5.5			
20.08.20	Eastern Belts	52	22:05	Barbastelle	F	A		39.0	8.0	11	A2243	eartag on each side
20.08.20	Eastern Belts	53	22:08	Common pipistrelle	M	Juvenile		29.1	4.0			
20.08.20	Eastern Belts	54	23:25	Brown long-eared	M	A	large testes	37.3	5.0			
20.08.20	Eastern Belts	55	23:35	Soprano pipistrelle	M	A	large testes	32.4	5.1			
20.08.20	Eastern Belts	56	23:56	Brown long-eared	F	A	Post lactating	40.8	8.4			
21.08.20	Eastern Belts	57	00:11	Barbastelle	F	Juvenile		38.0	7.5		A2241	
21.08.20	Eastern Belts	58	01:26	Natterer's	M	A		40.1	8.2			
20.08.20	Hayley Wood	59	20:30	Soprano pipistrelle	M	A		30.8	4.0			
20.08.20	Hayley Wood	60	21:15	Natterer's	M	A		37.2	7.5			
20.08.20	Hayley Wood	61	21:40	Brown long-eared	F	A	Post lactating	39.3	-			
20.08.20	Hayley Wood	62	21:40	Natterer's	M	A		39.8	7.0			
20.08.20	Hayley Wood	63	22:00	Natterer's	F	A	Post lactating	38.1	8.0			

20.08.20	Hayley Wood	64	22:00	Natterer's	F	NB		39.5	8.0			
20.08.20	Hayley Wood	65	23:10	Natterer's	F	A	Post lactating	39.3	8.0			
20.08.20	Hayley Wood	66	23:10	Soprano pipistrelle	M	Juvenile		30.0	4.5			
20.08.20	Hayley Wood	67	23:40	Natterer's	F	A	Post lactating	4.2	8.5			
21.08.20	Hayley Wood	68	00:05	Soprano pipistrelle	F	NB		31.1	5.0			
21.08.20	Hayley Wood	69	00:15	Soprano pipistrelle	F	A	Post lactating	31.1	5.0			
21.08.20	Hayley Wood	70	00:55	Brown long-eared	F	A	Post lactating	39.1	8.5			
22.08.20	Eversden Wood	71	21:05	Common pipistrelle	M	A	large testes	29.0	4.7			
22.08.20	Eversden Wood	72	21:35	Brown long-eared	M	A	early breeding condition	36.8	7.0			
22.08.20	Eversden Wood	73	21:35	Brown long-eared	M	A	large testes, black epids	37.1	8.0			
22.08.20	Eversden Wood	74	22:36	Brown long-eared	F	A	Post lactating	40.1	8.5			Mole on nipple
22.08.20	Eversden Wood	75	23:29	Brown long-eared	F	A	Post lactating					Recapture - recognised by mole on nipple
22.08.20	Eversden Wood	76	23:58	Natterer's	M	A		39.3	6.5			
23.08.20	Eversden Wood	77	01:25	Barbastelle	F	A	Post lactating	39.2	10.7	12	A2219	

Appendix 5 - Description of Roosts

Roost Number	Bat Number	Area	Tree/Building	Species of Tree	dbh (cm)	Description of Roost Feature	Distance from Woodland Edge (m)	Count Information	Grid Reference
1	5	The Belts	Tree	Ash	50-100	Ash tree or possibly in sycamore leaning into the ash tree - trees covered in ivy.	36	-	TL 34068 52484
2	6, 7	The Belts	Tree	Ash	80-100	Difficult to see due to canopy but on E side there is a fungus and splits and cavities. On S side larger cavity just below fork in tree high up.	9	-	TL34185 52484
3	5, 8	The Belts	Tree	Oak	1m+	Large split low down to 3m. Several dead branches higher up and dense ivy	30	-	TL34124 52386
4	8	The Belts	Tree	Ash	40	Dense ivy cover and splits	53	3 bats including bat 8 emerged	TL 33935 52510
5	5	Wimpole Barn	Barn	-	-	Above lintel of door	-	-	TL 34062 51408
6	6, 12	The Belts	Tree	Ash	100	Ivy covered tree with snags at the top but no specific feature visible	57	-	TL 33926 52504
7	1, 2	Hayley Wood	Tree	Ash	50	Trunk cavity, large WP hole and split down stem	13	5 bats incl. bat 1 and 2 emerged	TL 28746 52697
8	1,2	Hayley Wood	Tree	Oak	50	Dying, stag headed tree with raised bark and a large section is missing revealing heartwood beneath	68	-	TL 28767 53018
9	9	Waresley Wood	Tree	Ash	200+	Twin stemmed ash, loose bark	53	-	TL 26491 55173
10	9	Waresley Wood	Tree	Beech	100	No obvious features visible however is a mature tree of substantial size and suitable to support a bat roost higher up	75	-	TL 26403 55051
11	9	Waresley Wood	Tree	Oak	50-100	1m vertical split in main limb and rotten branch	33	-	TL 26362 54924
12	6, 7, 8	The Belts	Tree	Oak	100	Dense ivy cover but stag headed tree with likely numerous features	41	-	TL 34080 52478
13	9	Waresley Wood	Tree	Oak	50	Numerous features - tree covered with lifted, cracked and raised bark	0	-	TL 26569 55166

Roost Number	Bat Number	Area	Tree/Building	Species of Tree	dbh (cm)	Description of Roost Feature	Distance From Woodland Edge (m)	Count Information	Grid Reference
AR14	3	Unnamed wood	Unknown		Unknown	Unknown	Unknown	-	Approximate direction of roost based on joint bearings
15	9	Waresley Wood	Tree	Oak	50 - 99	Trunk cavity, twin stemmed tree and trunk interview to create cavity	113	-	TL 26293 54784
16	5	The Belts	Tree	Ash	50 - 99	Group of ivy covered trees - actual tree could not be determined	51		TL 33954 52472
17	7	The Belts	Tree	Ash	50 - 99	Dense ivy cover with WP hole and broken limb on northern elevation	55	Bat 7 emerged	TL 34006 52533
18	9	Waresley Wood	Tree	Ash	30	Can't confirm - survey aborted due to high winds	192		TL 26198 55070
19	2	Hayley Wood	Tree	Oak (or ash adjacent)	80	Not sure which feature. If oak it has a lost top and has splits and snagged ends. Ash has wounds and holes. Probably in oak	60	-	TL 28768 52766
20	8	The Belts	Tree	Ash	50 - 100	Dense ivy cover	81	-	TL 34111 52446
21	6, 7	The Belts	Tree	Ash	50 - 100	Dense ivy cover	22	-	TL 34173 52475
AR22	11	Four Acre Wood	Unknown	Unknown	Unknown	Unknown	Unknown	-	Approximate direction of roost based on 2 single bearings
23	6	The Belts	Tree	Ash	-	-	12	-	TL 34182 52482
24	8	The Belts	Tree	Ash	-	Large ivy stem on east side and ivy growth halfway up	11	-	TL 34183 52476
AR25	11	Nurseries Wood	Unknown	Unknown	Unknown	Unknown	Unknown	-	Approximate direction of roost based on 2 single bearings

Appendix 6 - Roosts by Day

Bat no	Species	Sex	Breeding or Non-breeding	17/08/2020	18/08/2020	19/08/2020	20/08/2020	21/08/2020	22/08/2020	23/08/2020	24/08/2020	25/08/2020	26/08/2020	27/08/2020	28/08/2020
1	Barb	F	Non-breeding	Caught Hayley Wood	8	7	-	high winds	7	7	7	7	7	7	7
2	Barb	M	-	Caught Hayley Wood	8	7	19	high winds	7	7	7	7	7	7	7
3	Barb	F	Breeding	Caught Hayley Wood	-	-	-	high winds	-	AR14 Tree belt to south-east of Hayley woods	AR14 Tree belt to south-east of Hayley woods	AR14 Tree belt to south-east of Hayley woods	AR14 Tree belt to south-east of Hayley woods	AR14 Tree belt to south-east of Hayley woods	-
4	Barb	F	Non-breeding	Caught Hayley Wood	-	-	-	high winds	-	-	-	-	-	-	
5	Barb	M	-	Caught The Belts	1	Roost R3 in day and roost R5 in evening	5	5	5	5	5	5	16	5	5
6	Barb	F	Breeding	Caught The Belts	-	2	21	The Belts	23	12	6	The Belts	-	12	17
7	Barb	F	Breeding	-	Caught Eversden	2	21	The Belts	12	12	12	The Belts	17	12	17
8	Barb	F	Breeding	-	Caught Eversden	Roost R3 in day and roost R4 in evening	20	The Belts	24	12	12	The Belts	-	12	-
9	Barb	F	Breeding	-	Caught Waresley	9	-	high winds	10	11	13	18	15	13	13
10	Barb	F	Non-breeding	-	Caught The Belts	-	-	high winds	-	-	-	high winds	-	-	-
11	Barb	F	Non-breeding	-	Caught The Belts	-	-	AR25	Tree not found	-	-	high winds	AR22	AR22	-
12	Barb	F	Breeding	-	-	-	-	-	Caught in Eversden Wood	-	6	The Belts	12	12	17

Appendix 7 – Summary of Roost Occupancy by Day in August 2020

Bat Number	Roost Number																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1							19,22-28	18																
2							19,22-28	18											20					
3														19,20,23-27										
4	Roost not found																							
5	18		19		19-25,27,28											26								
6		19				24						23,27					28				20		22	
7		19										22-24,27					26,28				20			
8			19	19								23,24,27								20				22
9									19	22	23		24,27,28		26			25						
10	Roost not found																							
11	Roost not found																							
12						24						26,27					28							

The Belts Wimpole Barn Hayley Wood Waresely Wood Unamed wood

Key

32 Vantage Point Location - Position 32

revision	description	date	checked by

Corylus Ecology Ltd, Unit A3, Speldhurst Business Park, Went Farm, Langton Road, Speldhurst, Kent TN3 0NR Corylus Ecology is the trading name of Corylus Ecology Ltd registered in England, No 5005553, Registered Office: Henwood House, Henwood, Ashford, Kent TN24 8DH

Project:

20080 East West Rail Project

Title:

Vantage Point Location Plan

status		drawing no.		
		Figure A1		
scale	size	date	drawn	checked
NTS	A3	05.03.2021	AW	HL

CAD filename

Figure_1.dwg

Appendix I.2 CSET-073

Great Gransden
Little Gransden
Waresley Wood
Hayley Wood
Kingston
Everseden and Wimpole Wood SAC
Everseden Wood
The Belts
Cobbs Wood
National Trust Wimpole

R18 R9 R13 R10 R11 R15 T5
T3 T4 R8 R19 R7
AR14
T2 T5 R16 R17 R6 R2 T1 T3 T4
R5
AR25
AR22

Key

- R10 Roost Location 1
- R10 Approximate Roost Location
- T1 Trapping Area
- Eversden and Wimpole Woods SAC

revision	description	date	checked by

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Project:
20080 East West Rail Project

Title:
Trapping and Roost Location Plan

status		drawing no.		
		Figure A2		
scale	size	date	drawn	checked
NTS	A3	05.03.2021	AW	HL

CAD filename
Figure_1.dwg

Appendix I.2 CSET-073

Key

- Roost 9
- Approximate Location of Roost 9
- Roost used by Bat
- Trapping Location - Bat caught here
- Bat 1 joint bearing point 21
- Bat 1 single bearing point 21
- 95% kernel analysis
- 95% cluster analysis
- 95% MCP analysis

revision	description	date	checked by

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Project:
20080 East West Rail Project

Title:
Bat 1 NB Female Barbastelle - Triangulation Points

status		drawing no.		
		Figure B1		
scale	size	date	drawn	checked
NTS	A3	08.12.2020	AW	HL

CAD filename
Figure_1.dwg

Appendix I.2 CSET-073

Key

- Roost 9
- Approximate Location of Roost 9
- Roost used by Bat
- Trapping Location - Bat caught here
- Bat 2 joint bearing point 21
- Bat 2 single bearing point 21
- 95% kernel analysis
- 95% cluster analysis
- 95% MCP analysis

revision	description	date	checked by

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Project:
20080 East West Rail Project

Title:
Bat 2 Male Barbastelle - Triangulation Points

status		drawing no.		
		Figure B2		
scale	size	date	drawn	checked
NTS	A3	08.12.2020	AW	HL

CAD filename
Figure_1.dwg

Appendix I.2 CSET-073

Key

- R9 — Roost 9
- R9 — Approximate Location of Roost 9
- R1 — Roost used by Bat
- T1 — Trapping Location - Bat caught here

Little Gransden

Little Gransden

Waresley Wood

Hayley Wood

H12 RL1 H11 H13 H14 H17 H18 H16 72

RD3 R13 R9 R18 R10 R11 R15 T5

RL2 2 1 36 4

T3 T4 R8 R19 R7 AR14

revision	description	date	checked by

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Project:

20080 East West Rail Project

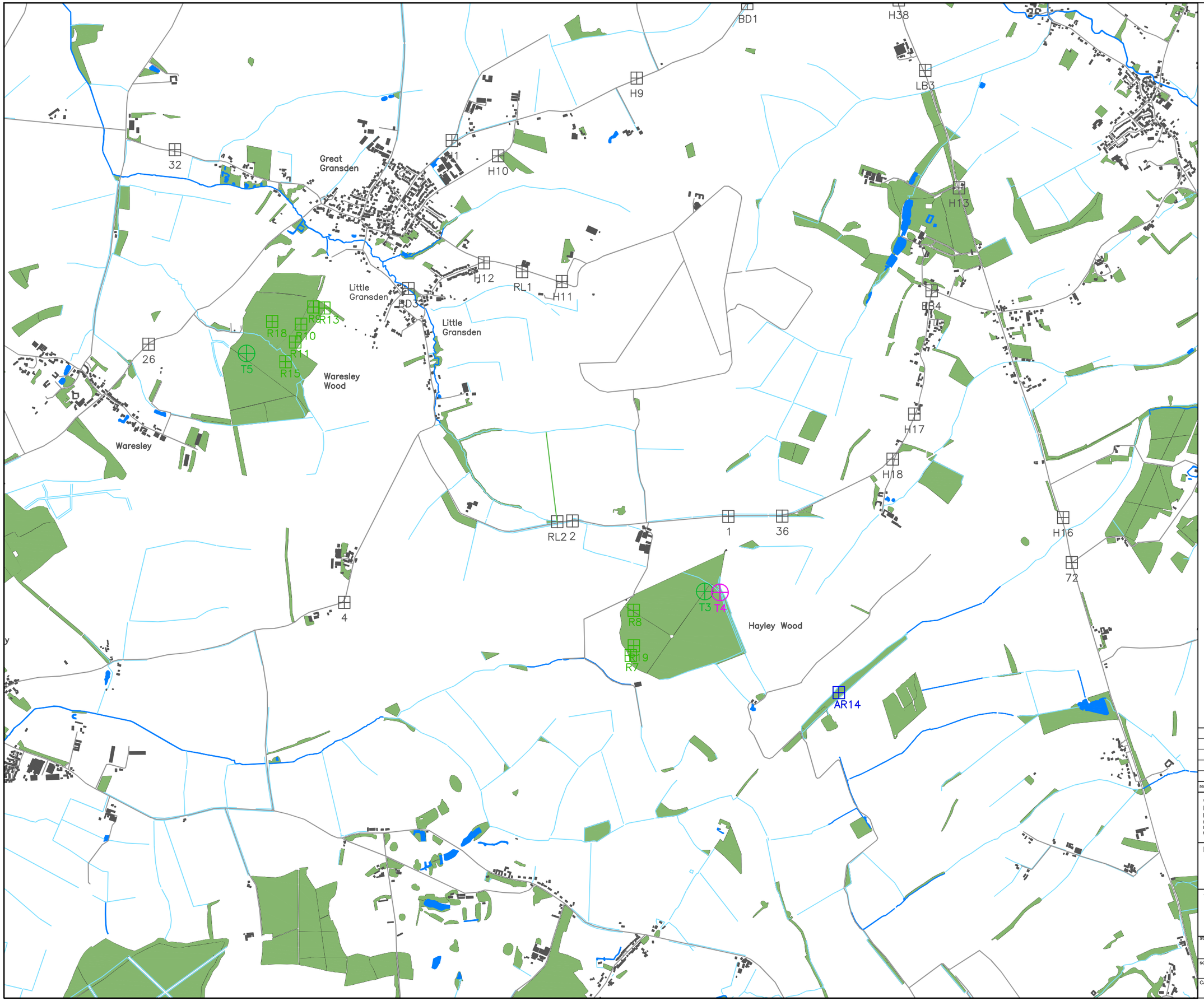
Title:

Bat 3 breeding Female Barbastelle - Triangulation Points

status		drawing no.		
		Figure B3		
scale	size	date	drawn	checked
NTS	A3	08.12.2020	AW	HL

CAD filename

Figure_1.dwg



Key

- R9 — Roost 9
- R9 — Approximate Location of Roost 9
- R1 — Roost used by Bat
- T1 — Trapping Location - Bat caught here

revision	description	date	checked by

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Project: 20080 East West Rail Project

Title: Bat 4 NB Female Barbastelle - Triangulation Points

status		drawing no.		
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scale	size	date	drawn	checked
NTS	A3	08.12.2020	AW	HL

CAD filename: Figure_1.dwg

Appendix I.2 CSET-073

Key

- Roost 9
- Approximate Location of Roost 9
- Roost used by Bat
- Trapping Location - Bat caught here
- Bat 5 joint bearing point 21
- Bat 5 single bearing point 21
- 95% kernel analysis
- 95% cluster analysis
- 95% MCP analysis

revision	description	date	checked by

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Project:
20080 East West Rail Project

Title:
Bat 5 NB female Barbastelle - Triangulation Points

status	drawing no.			
	Figure B5			
scale	size	date	drawn	checked
NTS	A3	08.12.2020	AW	HL

CAD filename
Figure_1.dwg

Appendix I.2 CSET-073

Key

- Roost 9
- Approximate Location of Roost 9
- Roost used by Bat
- Trapping Location - Bat caught here
- Bat 6 joint bearing point 21
- Bat 6 single bearing point 21
- 95% kernel analysis
- 95% cluster analysis
- 95% MCP analysis

revision	description	date	checked by

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Project:
20080 East West Rail Project

Title:
Bat 6 Breeding female Barbastelle - Triangulation Points

status	drawing no.			
	Figure B6			
scale	size	date	drawn	checked
NTS	A3	08.12.2020	AW	HL

CAD filename
Figure_1.dwg

Appendix I.2 CSET-073

Key

- R9 — Roost 9
- R9 — Approximate Location of Roost 9
- R1 — Roost used by Bat
- T1 — Trapping Location - Bat caught here
- 7.21 — Bat 7 joint bearing point 21
- 7.21 — Bat 7 single bearing point 21
- 95% kernel analysis
- 95% cluster analysis
- 95% MCP analysis

revision	description	date	checked by

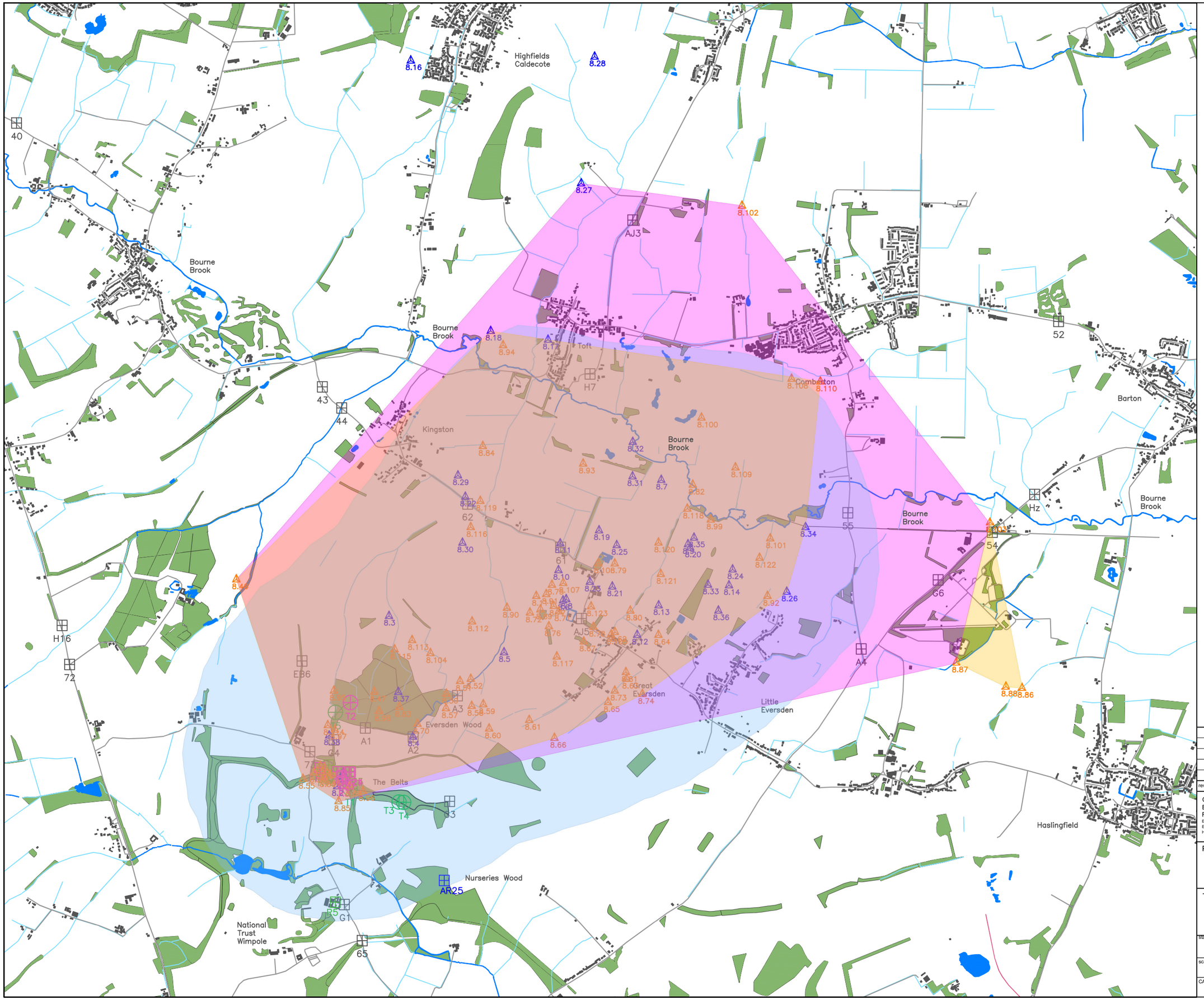
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Project:
20080 East West Rail Project

Title:
Bat 7 Breeding female Barbastelle - Triangulation Points

status	drawing no.			
	Figure B7			
scale	size	date	drawn	checked
NTS	A3	11.12.2020	AW	HL

CAD filename
Figure_1.dwg



Key

- Roost 9 (R9)
- Approximate Location of Roost 9 (R9)
- Roost used by Bat (R1)
- Trapping Location - Bat caught here (T1)
- Bat 8 joint bearing point 21 (8.21)
- Bat 8 single bearing point 21 (8.21)
- 95% kernel analysis
- 95% cluster analysis
- 95% MCP analysis

revision	description	date	checked by

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Project:
20080 East West Rail Project

Title:
Bat 8 breeding female Barbastelle - Triangulation Points

status		drawing no.		
		Figure 1		
scale	size	date	drawn	checked
NTS	A3	08.12.2020	AW	HL

CAD filename
Figure_1.dwg

Appendix I.2 CSET-073

Key

- Roost 9
- Approximate Location of Roost 9
- Roost used by Bat
- Trapping Location - Bat caught here
- Bat 9 joint bearing point 21
- Bat 9 single bearing point 21
- 95% kernel analysis
- 95% cluster analysis
- 95% MCP analysis

Great Gransden
Little Gransden
Waresley Wood
Waresley
Hayley Wood

revision	description	date	checked by

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Project:
20080 East West Rail Project

Title:
Bat 9 breeding female Barbastelle - Triangulation Points

status		drawing no.	
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scale	size	date	drawn	checked
NTS	A3	08.12.2020	AW	HL

CAD filename
Figure_1.dwg

Key

- Roost 9
- Approximate Location of Roost 9
- Roost used by Bat
- Trapping Location - Bat caught here

Everseden Wood

The Belts

Cobbs Wood

National Trust Wimpole

EB6

A1

A2

A3

AJ5

AR25

G1

G3

G4

T1

T2

T3

T4

T5

R3

R5

65

revision	description	date	checked by

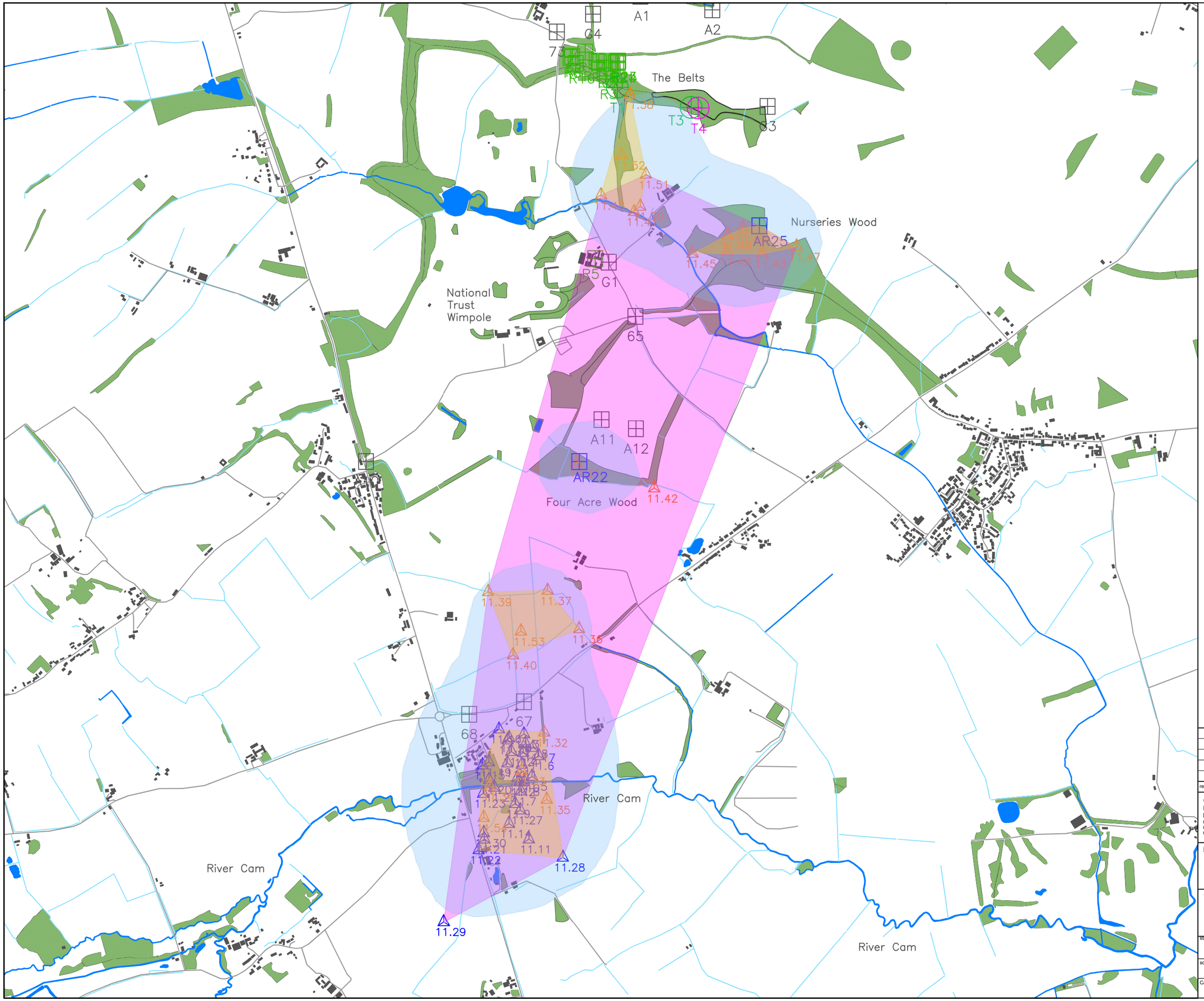
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Project:
20080 East West Rail Project

Title:
Bat 10 NB Female Barbastelle - Triangulation Points

status		drawing no.		
		Figure B10		
scale	size	date	drawn	checked
NTS	A3	08.12.2020	AW	HL

CAD filename
Figure_1.dwg



Key

- Roost 9 (R9)
- Approximate Location of Roost 9 (R9)
- Roost used by Bat (R1)
- Trapping Location - Bat caught here (T1)
- Bat 11 joint bearing point 21 (11.21)
- Bat 11 single bearing point 21 (11.21)
- 95% kernel analysis
- 95% cluster analysis
- 95% MCP analysis

revision	description	date	checked by

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Project:
20080 East West Rail Project

Title:
Bat 11 NB female Barbastelle - Triangulation Points

status		drawing no.		
		Figure B11		
scale	size	date	drawn	checked
NTS	A3	08.12.2020	AW	HL

CAD filename
Figure_1.dwg

Key

- Roost 9
- Approximate Location of Roost 9
- Roost used by Bat
- Trapping Location - Bat caught here
- Bat 12 joint bearing point 21
- Bat 12 single bearing point 21
- 95% kernel analysis
- 95% cluster analysis
- 95% MCP analysis

revision	description	date	checked by

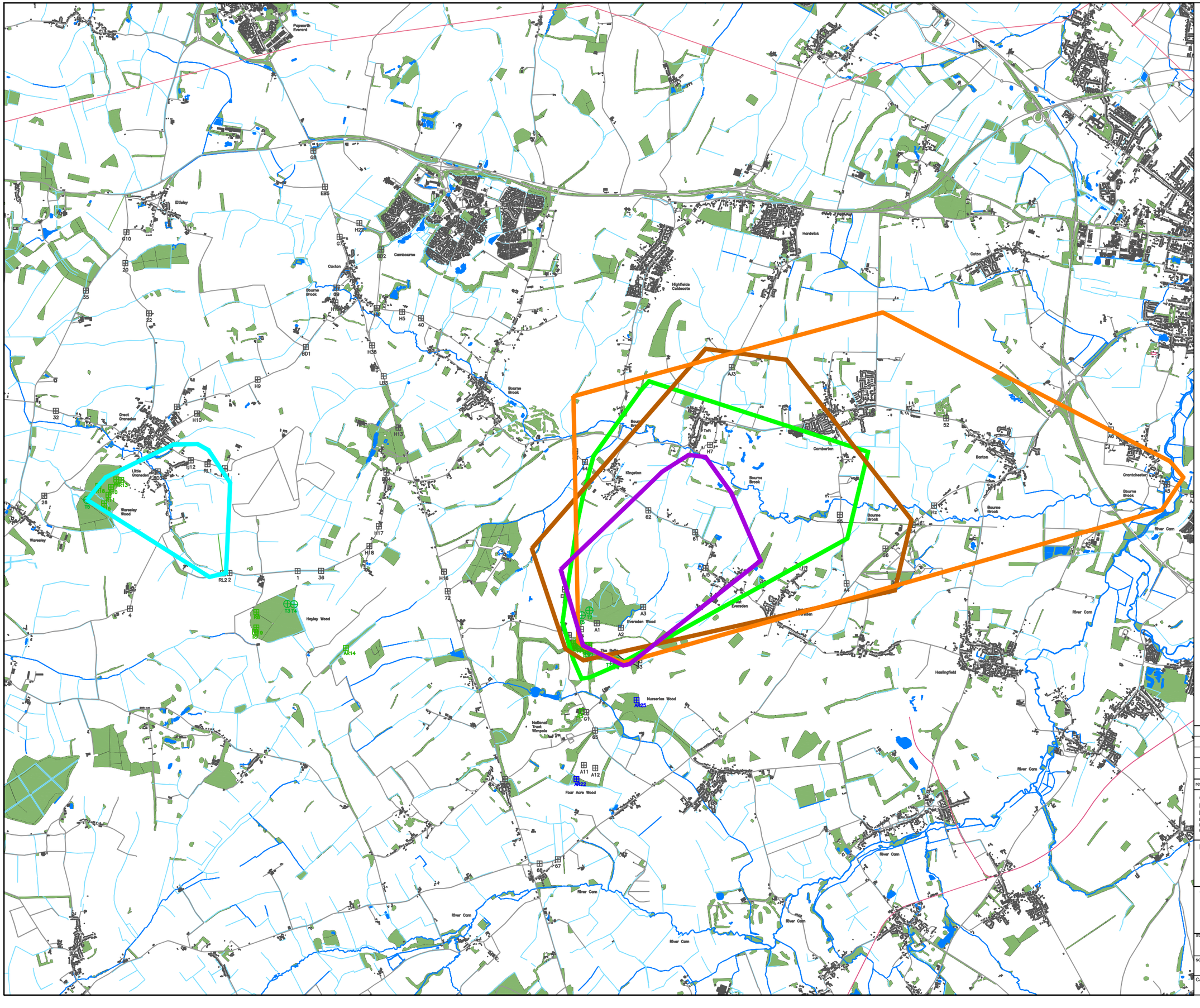
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Project:
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Title:
Bat 12 breeding female Barbastelle - Triangulation Points

status	drawing no.			
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NTS	A3	08.12.2020	AW	HL

CAD filename
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Project:
20080 East West Rail Project

Title:
Adult breeding female Barbastelle MCP 95% analysis

status		drawing no.		
		Figure C1		
scale	size	date	drawn	checked
NTS	A3	11.12.2020	AW	HL

CAD filename
Figure_1.dwg

Appendix I.2 CSET-073

Key

- Bat 6 95% Cluster analysis
- Bat 7 95% Cluster analysis
- Bat 8 95% Cluster analysis
- Bat 9 95% Cluster analysis
- Bat 12 95% Cluster analysis

revision	description	date	checked by

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Project:

20080 East West Rail Project

Title:

Adult breeding female barbastelle Cluster 95% analysis

status		drawing no.		
		Figure C2		
scale	size	date	drawn	checked
NTS	A3	08.12.2020	AW	HL

CAD filename

Figure_1.dwg

Appendix I.2 CSET-073

Key

- Bat 6 95% Kernel analysis
- Bat 7 95% Kernel analysis
- Bat 8 95% Kernel analysis
- Bat 9 95% Kernel analysis
- Bat 12 95% Kernal analysis

revision	description	date	checked by

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Project:

20080 East West Rail Project

Title:

Adult breeding female barbastelle Kernel 95% analysis

status		drawing no.		
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scale	size	date	drawn	checked
NTS	A3	08.12.2020	AW	HL

CAD filename

Figure_1.dwg

Appendix I.2 CSET-073

Key

Bat 1 95% MCP analysis

Bat 11 95% MCP analysis

revision	description	date	checked by

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Project:

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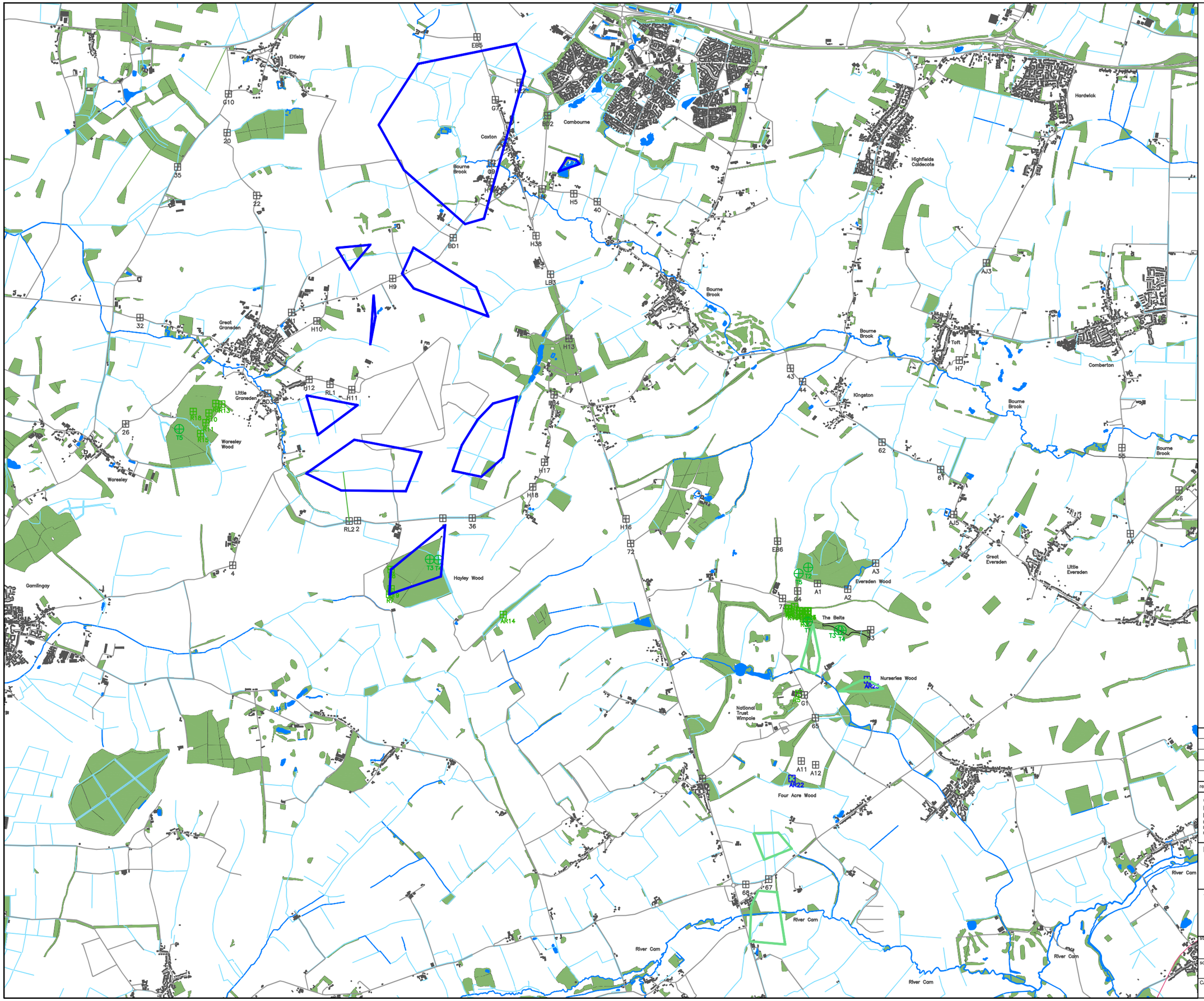
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Non-breeding female barbastelle MCP 95% analysis

status		drawing no.		
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CAD filename

Figure_1.dwg



Appendix I.2 CSET-073

revision	description	date	checked by

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Project:
20080 East West Rail Project

Title:
Non-breeding female barbastelle Cluster 95% analysis

status		drawing no.		
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scale	size	date	drawn	checked
NTS	A3	08.12.2020	AW	HL

CAD filename
Figure_1.dwg

Key

Bat 1 95% Kernel analysis

Bat 11 95% Kernel analysis

revision	description	date	checked by

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Project:

20080 East West Rail Project

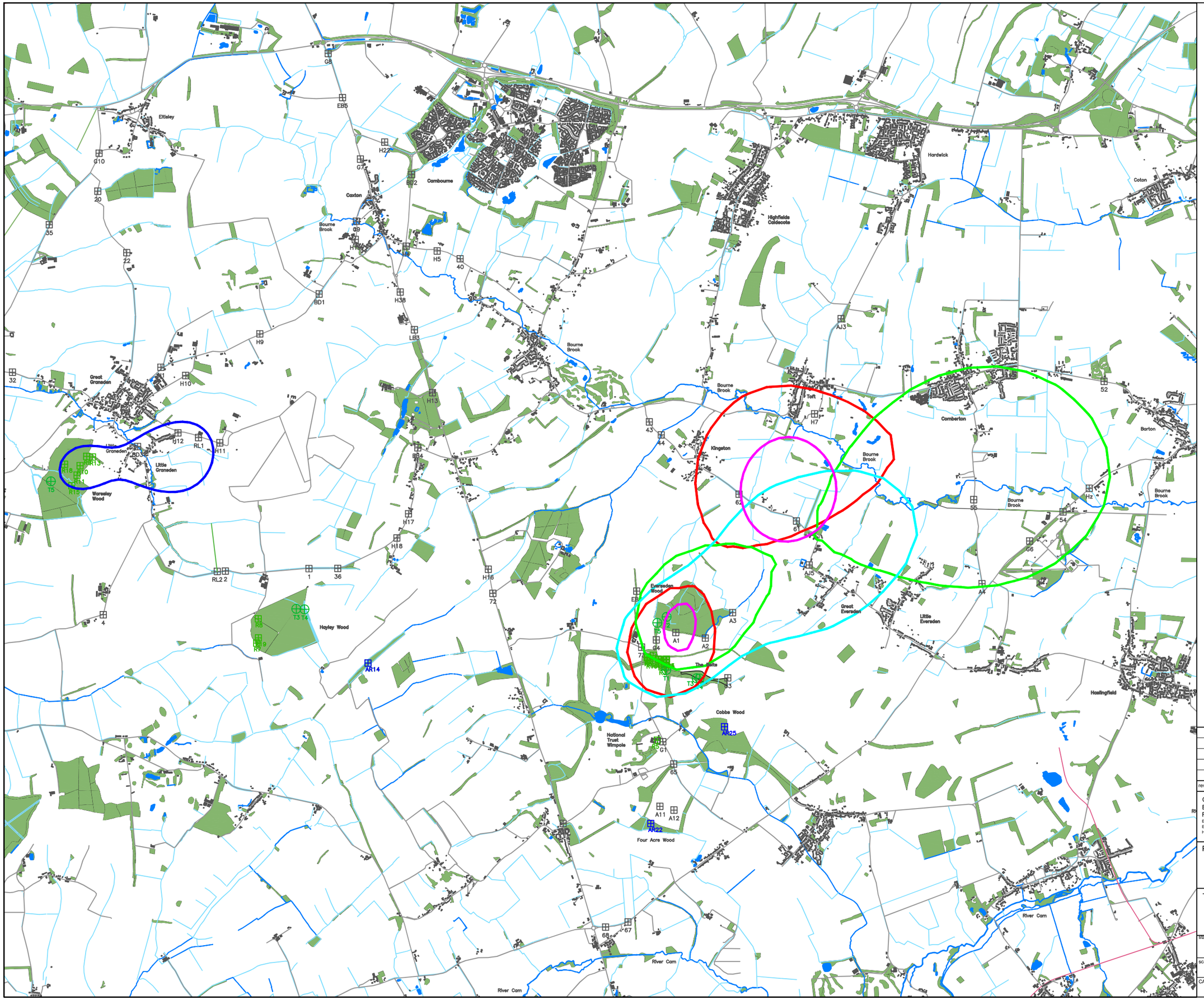
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Non-breeding female barbastelle Kernel 95% analysis

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scale	size	date	drawn	checked
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CAD filename

Figure_1.dwg



revision	description	date	checked by

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Project:
20080 East West Rail Project

Title:
Breeding Female Barbastelle 50% Kernel analysis

status		drawing no.		
		Figure C7		
scale	size	date	drawn	checked
NTS	A3	08.12.2020	AW	HL

CAD filename
Figure_1.dwg

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Appendix A – Report Conditions

Cambridgeshire South East Transport Strategy (CSET): Bat Activity Survey

Executive Summary

Contents	Summary
Site Location	The site comprises a linear route which extends from the Cambridge Biomedical Campus in Cambridge, through to the A11 beyond the village of Babraham. The site is centred at OSNGR TL 48499 51169. The most north-western point is OSNGR TL 45829 55102. The most easterly point is OSNGR TL 53005 49788.
Proposals	Phase 2 of the Cambridge South East Transport (CSET) project proposes a new off-road public transport route linking the Cambridge Biomedical Campus via Great Shelford, Stapleford and Sawston to a new travel hub near the A11/A1307/A505 junction with connections to Babraham, the Babraham Research Campus and Granta Park.
Scope of this Survey(s)	Bat activity surveys to assess the usage of the site by foraging and commuting bats.
Results	Records of six bat species were returned from the desk study, with seven European Protected Species Licences (EPSL) granted for bats within 2km of the site boundary. At least eight bat species were recorded on site and the site has been valued at Regional level for commuting bat and District - Regional level for foraging bats. The majority of activity was by common pipistrelle bats; with soprano pipistrelle being the next most frequently recorded bat species. All other species recorded were under ten passes per transect or were recorded during the listening point surveys. Barbastelle bats were recorded during the walked transect surveys of Transect 7 in August, and Transect 4 in October. They were also recorded on Transect 4 in August, on Transect 3 and Transect 7 in October.

Glossary

ACIEEM	Associate Member of Chartered Institute of Ecology & Environmental Management
BCT	Bat Conservation Trust
CPER	Cambridgeshire & Peterborough Environmental Records Centre
CIEEM	Chartered Institute of Ecology & Environmental Management
CWS	County Wildlife Site
DEFRA	Department for the Environment, Food and Rural Affairs
EPSL	European Protected Species Licence
EWT	Essex Wildlife Trust
MCIEEM	Full Member of Chartered Institute of Ecology & Environmental Management
PEA	Preliminary Ecological Appraisal
SAC	Special Area of Conservation
SSSI	Site(s) of Special Scientific Interest

1.0 Introduction

1.1 Background

WYG was commissioned by Greater Cambridgeshire Partnership on 18th July 2019 to complete bat activity surveys to inform the proposed Cambridgeshire South East Transport Strategy (CSET) (hereafter referred to as 'the site').

This report has been prepared by WYG Senior Ecologist Tim Lees MCIEEM and WYG Assistant Ecologist Jo Sykes and the conditions pertinent to it are provided in Appendix A.

1.2 Site Location

The site comprises a linear route which extends from the Cambridge Biomedical Campus in Cambridge, through to the A11 beyond the town of Babraham. The site is centred at TL 48499 51169. The most north-western point is TL 45829 55102. The most easterly point is TL 53005 49788.

The survey area generally falls across a predominately arable landscape, interspersed with residential and commercial land, with areas of semi-natural habitat including woodland and grassland. It also partially incorporates a total of five sites designated for nature conservation, comprising a single statutory site and four non-statutory sites. There were a total of 56 waterbodies within 500 m of the proposed development. The wider landscape consists of agricultural land and the villages of Stapleford, Sawston and Babraham.

1.3 Development Proposals

Phase 2 of CSET is a project to create a segregated public transport route from the A11 (near Babraham) to the Cambridge Biomedical Campus (CBC). There are three potential route corridors, but only one is being considered for additional surveys at present. This route corridor is called Strategy 1 and is largely across open arable land.

1.4 Previous Ecology Reports

A PEA was undertaken in 2018 (Plowman Craven, 2018) to provide baseline ecological information about the survey area and identify ecological constraints associated with the proposals and recommendations relating to further survey. The PEA assessed the site as providing high suitability for foraging and commuting bats.

1.5 Purpose of the Report

The purpose of this report is to complete:

- An assessment of bat activity to gain an understanding of usage of the site by bats; and
- An assessment of the potential ecological constraints to the proposed works at the site relating to bat species.

Note that scientific names are provided at the first mention of each species and common names (where appropriate) are then used throughout the rest of the report for ease of reading.

2.0 Methodology

2.1 Desk Study

2.1.1 Data Search

Extracts from the data search requested as part of the 2018 PEA from CPER and EWT are referred to in this report, Section 3.1 (Plowman Craven, 2018).

2.1.2 Online Resources

A search for relevant information was made on MAGIC www.magic.gov.uk - DEFRA's interactive, web-based database for information on any EPSL applications that have been granted for bats. Details of EPSLs granted within 2km of the red line boundary can be found in Table 8 in Section 3.1.

2.2 Field Surveys

All survey methods were carried out in-line with the Bat Conservation Trust (BCT) *Bat Surveys for Professional Ecologists: Good Practice Guidelines* (3rd ed, 2016) – hereafter referred to as the 'BCT Guidelines'.

2.2.1 Roosting Bats – Trees / Woodland

Within the red line boundary of the site individual trees (19 in total) and woodland blocks on site were assessed from the ground for their suitability to support breeding, resting and hibernating bats using survey methods based on the BCT Guidelines. Trees located outside of the red line boundary were not surveyed as the proposed routes are considered unlikely to impact upon these trees.

The woodland blocks were assessed as a group. Woodland blocks were categorised based on the highest bat roost suitability found for an individual tree within the block, where suitable features including the trees age, the condition of the tree i.e. sound or with broken limbs, cracks, rot holes etc., tree type e.g. broadleaved or coniferous.

The following system has therefore been used to categorise the bat roost suitability of any features found:

Table 1: Categories of bat roost suitability (BCT Guidelines)

Suitability	Typical Roosting Features
Negligible	Negligible habitat feature on site likely to be used by roosting bats.
Low	A structure 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, 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). A tree of sufficient size and age to contain potential roost features but with none seen from the ground or features seen with only very limited roosting potential.
Moderate	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 of high conservation status (with respect to roost type only – the

Suitability	Typical Roosting Features
	assessments in this table are made irrespective of species conservation status, which is established after presence is confirmed).
High	A structure or tree with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis & potentially for longer periods of time due to their size, shelter, protection, conditions and surrounding habitat.

2.2.2 Commuting / Foraging Bats

The site was assessed as providing high suitability for commuting and foraging bats (Plowman Craven, 2018).

Table 2: Categories of bat commuting and foraging habitat suitability (BCT Guidelines)

Suitability	Typical commuting and foraging habitat features
Negligible	Negligible habitat feature on site likely to be used by commuting and foraging bats.
Low	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	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.
High	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, streams, hedgerows, lines of trees and woodland edge. High-quality habitat that is well connected to the wider landscape that is likely to be used regularly by foraging bats such as broadleaved woodland, tree-lined watercourses and grazed parkland. Site is close to and connected to known roosts.

The proposed route was divided into seven individual transects due to the size of the site and to avoid surveys exceeding 3.5 hours. As per the BTC Guidelines, each transect route was to be undertaken every month (April - October) with one of these surveys comprising a dusk and dawn transect within the same 24 hour period. However, surveys only began in August; for further information see Section 2.4: Limitations.

The PEA recommended the deployment of three automated static detectors per transect route each month in line with BCT Guidelines for high suitability sites. However, so that data collected was proportionate to the expected impact, a single static was deployed in conjunction with each transect route, where the most likely point of impact would occur e.g. hedgerows that are likely to be severed by the proposed transport link, rather than deploying three static detectors per route. In this way the amount of data collected would be where the impacts are likely to occur and minimise data collection and analysis which would have limited bearing upon the proposed development The expected impact

on bats is low due to limited number of vehicles using the route during bat active hours, making the collision risk and potential light disturbance low. A total of seven routes were walked across the survey area each month. This was deemed sufficient given the linear nature of each transect and the proposed development.

2.2.3 Bat Activity – Walked Transects

In line with the BCT Guidelines, each walked transect surveys began at sunset and continued until at least two hours after sunset or began at least two hours prior to dawn and finished at sunrise in suitable weather conditions. Table 2 summarises the survey times and weather conditions of the walked transect surveys.

Surveys were undertaken by WYG ecologists with prior experience of undertaking similar surveys.

Table 2: Date, timings and weather conditions for walked transect surveys

Date of Survey	Transect number	Sunset/ Sunrise	Temp (°C)		Precipitation	Wind (Beaufort scale)	Cloud (%)
			Max	Min			
20/08/19	4, 7	20:14	21	16	None	1-1	20-10
25/09/19	1, 2, 3, 4, 7	18:52	18	18	None	1-2	50-75
16/10/19	2, 3, 4	18:04	14	12	None	2-1	40-15
28/10/19	1, 7	16:39	8	7	None	1-1	90-70

The survey routes (see Figure 1b) were designed to cover the suitable features for foraging and commuting bats, mainly comprising hedgerows and woodland (Figures 3a-6b). The surveyors walked at a steady pace and completed one lap of the transect on each survey. On the return journey of each transect, 10 minute listening points were completed at locations which will be directly impacted as a result of the development e.g. severance of hedgerows, with between 3 and 6 listening points per transect, totalling 25 listening points across the site. The transect routes were reversed upon each subsequent survey visit, with the listening points being completed prior to/after the walked element of the survey accordingly. This approach meant that the habitats within each transect route were sampled at different times following sunset.

The nature of any bat activity heard or seen was recorded along with the direction in which the bat was travelling if it was seen.

The bat calls were recorded on Elekon Batlogger M detectors and all calls were then analysed using 'Bat Explorer' version 2.0 software to allow identification to species or genus level.

2.2.4 Bat Activity – Static Detectors

On each of the site visits, Anabat Express static bat detectors were used to sample bat activity levels and bat species on the site. Anabat Express detectors have omni-directional microphones and record in zero crossing for later analysis using Analook W software to allow identification to genus or species level. The static detector(s) were placed at the location before dusk and retrieved during the daytime after at least five nights of consecutive recording in suitable weather conditions.

Prior to deploying the static detectors, a five day weather forecast was consulted to check that it would sample during suitable weather conditions. Table 3 presents the static detector survey details obtained, and locations are shown in Figures 3a-6b. The minimum overnight temperatures given in Table 3 are above the minimum 5 °C required.

Table 3: Summary of static bat detector survey deployment periods in 2019

Month	Transect number	Start date	End date	Overnight weather conditions
August	1, 2, 3, 4, 7	28/08/19	01/09/19	Mostly dry; minimum temps 8-13°C
September	1, 2, 3, 4, 7	12/09/19	16/09/19	Dry; minimum temps 5-11°C
October	1, 2, 3, 4, 7	09/10/19	13/10/19	Periods of rainfall on the final two nights; with minimum temps 8-14°C

2.3 Value of the Bat Populations on Site

The assessment of the value of the bat population on site is based on the article by Wray *et al.* (2010). Where bats (species and number) are found using certain habitats (to roost, commute or forage) their population is assigned a relative ecological value. The value to the species is partly based upon how well used a habitat is and also upon how rare the bat species is. In the case of commuting routes or foraging areas the number of roosts nearby is also a factor. Once the value of the bat population has been calculated, robust mitigation for any impact on the bats can be determined.

British bat species have been subdivided into groups, dependant on how common they are: common, rarer and rarest. These have been further subdivided based upon the location surveyed. Table 4 presents the rarity categorisation of bats in England. The tables in the following sections have been adapted from Wray *et al.* (2010).

Table 4: Categorising bats by distribution and rarity in England

Rarity	Species
Rarest	Greater horseshoe *Rhinolophus ferrumequinum* Bechstein's *Myotis bechsteinii* Alcathoe *Myotis alcathoe* Greater mouse-eared *Myotis myotis* Barbastelle *Barbastellus barbastella* Grey long-eared *Plecotus austriacus*
Rarer	Lesser horseshoe *Rhinolophus hipposideros* Whiskered *Myotis mystacinus* Brandt's *Myotis brandti* Daubenton's *Myotis daubentonii* Natterer's *Myotis nattereri* Leisler's *Nyctalus leisleri* Noctule *Nyctalus noctula* Nathusius' pipistrelle *Pipistrellus nathusii* Serotine *Eptesicus serotinus*

Rarity	Species
Common	Common pipistrelle *Pipistrellus pipistrellus* Soprano pipistrelle *Pipistrellus pygmaeus* Brown long-eared *Plecotus auritus*

To calculate the score for either commuting routes or foraging areas the numerical values from each column below are added together. These are detailed in Table 5 and Table 6.

Table 5: Valuing commuting routes

Species	No. of bats	Roosts/potential roosts nearby	Type and complexity of linear features
Common (2)	Individual bats (5)	None (1)	Absence of (other) linear features (1)
		Small number (3)	Unvegetated fences and large field sizes (2)
Rarer (5)	Small number of bats (10)	Moderate number/Not known (4)	Walls, gappy or flailed hedgerows, isolated well grown hedgerows, and moderate field sizes (3)
		Large number of roosts or close to a SSSI (5)	Well grown and well connected hedgerows, small field sizes (4)
Rarest (20)	Large number of bats (20)	Close to or within a SAC for the species (20)	Complex network of mature well-established hedgerows, small fields and rivers/streams (5)

Table 6: Valuing foraging areas

Species	Number of bats	Roosts/potential roosts nearby	Foraging habitat characteristics
Common (2)	Individual bats (5)	None (1)	Industrial or other site without established vegetation (1)
		Small number (3)	Suburban areas or intensive arable land (2)
Rarer (5)	Small number of bats (10)	Moderate number/Not known (4)	Isolated woodland patches less intensive arable and/or small towns and villages (3)
		Large number of roosts or close to a SSSI (5)	Larger or connected woodland blocks, mixed agriculture and small villages/hamlets (4)
Rarest (20)	Large number of bats (20)	Close to or within a SAC for the species (20)	Mosaic of pasture, woodlands and wetland areas (5)

For commuting routes and foraging areas, the ecological value of the site is based on the scoring system shown in Table 7.

Table 7: Scoring system for valuing commuting and foraging bats

Geographic frame of reference	Score
International	>50
National	41-50
Regional	31-40
County	21-30
District, local or parish	11-20
Not important	1-10

2.4 Limitations

The static bat detector provides no indication as to the number of bats present on a site as recorded bat calls could be from one bat making repeated passes or multiple bats making fewer passes. Therefore it can only be used as an indicative assessment of the bat species that are present on site, but gives a longer snapshot of time than the walked transect surveys.

Due to the timings of instruction, and access constraints, it was not possible to begin the surveys in April, as advised in the BCT Guidelines. Surveys were only undertaken in August, September and October, which does not give a full representation of activity on site for bats. However, further surveys will be undertaken between April and July 2020, including one dawn survey per transect, to complete the data set to input into the ecology chapter for this project. As such, this assessment is considered incomplete.

Woodland blocks W34 and W35 could not be accessed and assessed due to health and safety, as the woodland blocks were located within a very busy A11 roundabout. However, this is considered to be a minor limitation as the trees are of a relatively young age and thus are likely to have minimal bat roots features.

The October surveys at Transect 1 and Transect 7 were completed late in the month (28th October) and in temperatures below 10ºC at the start of the survey. This may have resulted in fewer bats being recorded, as higher levels of activity were recorded during the early October surveys (16th October). This has been taken into consideration when reviewing the data.

Transects 1, 2 and 3 did not have surveys completed in August due to access not being provided until September. Transects 5 and 6 did not have any surveys completed during the survey period as no access was available due to potential disturbance of game birds and shooting. It is considered that access to transect 5 and 6 areas during the rearing and shooting season will be the same as in 2019.

Any bats recorded were identified to species (where possible) and recorded on a field map. Many of the calls were heard without bats being seen due to the position of the bat and the lack of light.

Listening points and walked transect were alternated to allow for data to be collected at sunset for each survey type. However, this therefore does not allow for direct comparison of results between the months. This has been taken into consideration when interpreting the data.

During the August surveys the static detector on Transect 4 did not record any calls due, to a malfunction. This has been taken into consideration when interpreting the data.

The surveys were completed with the assistance of bat detectors. All survey techniques are subject to bias, and bat detector surveys may under-record species with weak echolocation calls, such as long-eared bats *Plecotus* spp. However, these biases were considered when interpreting the results (it is also of note that Batloggers are very effective at picking up quiet calls for brown long-eared bats). Therefore this is not considered to be a significant limitation. Some bat calls are variable and extremely similar between species. Where identification to species level was not possible (for example in the *Myotis* bat group), bats were identified to family level (e.g. *Myotis* sp.).

The details of this report are considered to remain valid for a period of **one survey season** (until April 2021, providing the remaining surveys are completed within the 2020 survey season and subject to no significant changes in the development proposals. Beyond this period, if works have not yet been undertaken, it is recommended that a review of the ecological conditions is undertaken.

Cambridgeshire South East Transport Strategy (CSET): Bat Activity Survey

3.0 Results

3.1 Desk Study

The data search returned a large number of records for bats within a 5km radius of the survey area. Species included barbastelle, serotine, noctule, Daubenton's bat, brown long-eared bat and soprano pipistrelle. The closest known roost was for an unidentified bat species, from a residential dwelling in Sawston, approximately 850m south-west of the survey area in 2009. The most recent record was of a brown long-eared bat and *Pipistrellus* species roost recorded approximately 1.5km north-east of the survey area at Wandlebury CWS in 2015 (Plowman Craven 2018).

There were seven EPSLs returned for bats within 2km of the site boundary (Table 8).

Table 8: Summary of granted EPSLs for bats within 2km of the site

Species	Year Granted	Distance & Direction	Reason Granted
Common pipistrelle	2015	1.3km N	Destruction of a breeding site
Common pipistrelle	2016	1.5km E	Destruction of a resting place
Common pipistrelle, serotine, brown long-eared	n/a	1.6km W	Destruction of a resting place
Common pipistrelle, brown long-eared	2015	1.7km W	Destruction of a resting place
Common pipistrelle, soprano pipistrelle, brown long-eared	2015	1.7km W	Destruction of a resting place and breeding site
Barbastelle, brown long-eared, common pipistrelle, Natterers', serotine, soprano pipistrelle	2014	1.8km SW	Damage and destruction of a resting place
Brown long-eared, common pipistrelle, Natterers', soprano pipistrelle	2016	1.8km SW	Damage to a resting place and breeding site

3.2 Ground-Level Roost Assessment

The site consists of multiple areas of scattered trees or small woodland blocks with potential to support roosting bats. Two trees were assessed as providing high suitability, three as moderate suitability, one as low suitability and 13 as negligible suitability to support roosting bats. Seven woodland blocks were assessed as providing high suitability, five as moderate suitability, one as low suitability and 13 as negligible suitability.

Table 9 and Figures 2a-2f show the locations of trees/woodland and levels of suitability for roosting bats.

Table 9: Summary of bat roosting suitability for trees and woodland

Tree / Woodland Reference	Grid Reference	Level of Bat Roost Suitability	Tree / Woodland Reference	Grid Reference	Level of Suitability
T1	TL4593754535	Negligible	W9	TL4882950686	Moderate
T2	TL4594254538	Negligible	W10	TL5055749362	High
T3	TL4594554541	Negligible	W11	TL5090249263	High
T4	TL4596454548	Negligible	W12	TL5133149767	High
T5	TL4597054549	Negligible	W13	TL5158449599	High
T6	TL4598154551	Negligible	W14	TL5149948825	Low
T7	TL4719953240	Low	W15	TL5154548946	Negligible
T8	TL4859951087	Negligible	W16	TL5167749038	Negligible
T9	TL4857351112	Negligible	W17	TL5177549046	Negligible
T10	TL4855951143	Negligible	W18	TL5179748973	Negligible
T11	TL4861251252	Negligible	W19	TL5184848976	Negligible
T12	TL4852251183	Negligible	W20	TL5190648931	Negligible
T13	TL4826851207	Negligible	W21	TL5164048791	Negligible
T14	TL4827851206	Negligible	W22	TL5178148792	Negligible
T15	TL4829651210	High	W23	TL5185648821	Negligible
T16	TL4830351217	High	W24	TL5190248774	Negligible
T17	TL4831051220	Moderate	W25	TL5206949120	Negligible
T18	TL4832851212	Moderate	W26	TL5191249877	Low
T19	TL4841751231	Moderate	W27	TL5198249522	High
W1	TL4655354700	Negligible	W28	TL5215949800	High
W2	TL4605754110	Moderate	W29	TL5213050152	Low
W3	TL4658353523	Low	W30	TL5211850283	Low
W4	TL4691753098	High	W31	TL5249149944	Low
W5	TL4704453276	Moderate	W32	TL5249649766	Moderate
W6	TL4725553108	Moderate	W33	TL5224250042	Negligible
W7	TL4769352793	Low	W34	TL5220150230	Not assessed
W8	TL4858350833	Low	W35	TL5225750198	Not assessed

3.3 Walked Transect Survey Results

Results of the walked transect surveys are detailed below and should be read with reference to Figures 3a-6b, which show the location of all recorded bat passes per transect.

3.3.1 Transect 1

25th September

Only common pipistrelle bats were recorded during the survey, with a total of 51 passes. Passes were predominantly recorded along the southern section of the transect, adjacent to Hinton Way, and along the central western boundary, a tree line bordering arable fields (Figure 4a), with occasional foraging and commuting passes recorded along the northern section of the transect. Activity was consistent between 20:27 (1 hour 35 minutes after sunset) and 20:50 (1 hour 58 minutes after sunset), with few calls recorded after 20:50.

28th October

No bats were recorded during the survey.

3.3.2 Transect 2

25th September

Four species of bat were recorded during the survey, common pipistrelle, soprano pipistrelle, serotine and brown long-eared bats, with common pipistrelle being the most frequently recorded species. Activity was spread across the transect, with a high number of common pipistrelle passes along the north-western transect boundary, adjacent to Hinton Way, and the junction of Haverhill Road and Gog Magog Way. The majority of the soprano pipistrelle passes were recorded on the south-eastern boundary between 20:02 (1 hour 10 minutes after sunset) and 20:12 (1 hour 20 minutes after sunset). A serotine was recorded in the same area at 20:09 (1 hour 17 minutes after sunset). A brown long-eared bat was recorded at 21:04 (2 hours 12 minutes after sunset) along a species-poor hedgerow on the northern boundary between an arable field and a residential estate (Figure 4b).

16th October

Two species of bat were recorded during the survey: common pipistrelle and soprano pipistrelle, with the most frequent species recorded being common pipistrelle with 63 passes. There was very low activity on the northern section of the transect; most activity was recorded on the western section, behind the residential buildings on Gog Magog Way, and southern transect boundary between two arable fields (Figure 5a).

3.3.3 Transect 3

25th September

Only common pipistrelle bats were recorded during the survey between 20:53 (2 hours 1 minute after sunset) and 21:06 (2 hours 14 minutes after sunset). These bats were only recorded along the north-west transect boundary which borders a small parcel of woodland (Figure 4c).

16th October

Two species of bat were recorded during the survey, common pipistrelle and soprano pipistrelle. Soprano pipistrelle were the most frequently recorded bat, with 14 passes; the first pass was recorded at 18:27 (23 minutes after sunset). Activity levels were low and scattered across the transect route (Figure 5b).

3.3.4 Transect 4

20th August

Two species were recorded during the survey, common pipistrelle and soprano pipistrelle. Activity was very low, with a total of six common pipistrelle passes being recorded between 20:37 (23 minutes after sunset) and 21:29 (1 hour 15 minutes after sunset) and one soprano pipistrelle pass. These passes were spread across the transect (Figure 3a), with more passes recorded at the north-western end of the route.

25th September

Only common pipistrelle bats were recorded during the survey. The passes were only recorded at two points of the transect, at the north-western end point, a fenced boundary with scattered trees, and along the hedgerow boundary of two arable fields south of Sawston Road (Figure 4d).

16th October

Three species of bat were recorded during the survey, common pipistrelle, soprano pipistrelle and *Nyctalus* species bat. The *Nyctalus* sp. bat was recorded at 18:49 (45 minutes after sunset) commuting along the tree lined, fenced boundary between an arable field and the industrial site north of Babraham Road. The common pipistrelle bats were all recorded along the same fenced boundary with scattered trees between 18:49 (45 minutes after sunset) and 18:56 (52 minutes after sunset). The single soprano pipistrelle was recorded along the boundary of two arable fields south of Sawston Road (Figure 5c).

3.3.5 Transect 7

20th August

At least three species of bat were recorded during the survey, common pipistrelle, soprano pipistrelle and *Myotis* species bats. Common pipistrelle was the most frequently recorded species, with 26 passes recorded in total. The majority of the common pipistrelle passes were recorded along the northern section of the transect between an arable field and a parcel of semi-natural broadleaved woodland (Figure 3b). A total of five passes were recorded for soprano pipistrelle between 20:45 (31 minutes after sunset) and 20:46 (32 minutes after sunset). The *Myotis* sp. were recorded along the western and southern sections of the transect; two passes were recorded along the broadleaved woodland plantation along the A1307 and a pass was recorded in the southern arable field at 21:38 (1 hour 24 minutes after sunset).

25th September

Only common pipistrelle bats were recorded during the survey, between 20:24 (1 hour 32 minutes after sunset) and 21:15 (2 hours 23 minutes after sunset). Activity was mostly recorded along the species rich hedgerow on the eastern boundary (Figure 4e).

28th October

Three species of bat were recorded during the survey, common pipistrelle, brown long-eared and barbastelle. All passes were recorded in the southern field, south of the A1307. The two common pipistrelle passes were recorded commuting at the boundary between the woodland and the A1307. The brown long-eared (recorded at 18:45) (2 hours 6 minutes after sunset) and barbastelle (recorded at 18:43) (2 hours 4 minutes after sunset) bats were both recorded on the boundary of the arable field and broadleaved woodland in the south-western section of the transect (Figure 6b).

3.3.6 Summary of Walked Transect Surveys

At least six species of bat were recorded across the proposed route during the walked transect surveys: common pipistrelle, soprano pipistrelle, *Nyctalus* sp., brown long-eared, *Myotis* species and serotine. The most frequently recorded species throughout the survey period was common pipistrelle. One barbastelle bat was recorded in October on Transect 7. See Figure 11 for an overarching heat map for all transects.

3.4 Listening Point Survey

Results of the listening point surveys are detailed below and should be read with reference to Figures 7a-10b, which show the location of all recorded bat passes.

3.4.1 Transect 1

25th September

Three species of bat were recorded during the survey, common pipistrelle, soprano pipistrelle and noctule with common pipistrelle being the most frequently recorded species with 29 passes in total. Two passes of noctule were recorded at Listening Point (LP) 2 at 19:09 (17 minutes after sunset) , one pass at LP 3 at 19:23 (31 minutes after sunset) and one pass at LP 5 at 20:02 (1 hour 10 minutes after sunset) (Figure 8a). Several soprano pipistrelles were recorded and observed foraging, with occasional social calling, at LP 3 between 19:20 (28 minutes after sunset) and 19:29 (37 minutes after sunset). LP 6 had the highest number of passes, with 24 in total. At least three bats were observed at any one time foraging along the hedgerow for the duration of the 10 minute stop.

28th October

Two species of bat were recorded during the survey, brown long-eared bat and a *Myotis* species bat. These were all recorded at LP 2 and 3 along the western boundary (Figure 10a).

3.4.2 Transect 2

25th September

Four species of bat were recorded during the survey, common pipistrelle, soprano pipistrelle, noctule and *Myotis* species. Common pipistrelle were the most frequently recorded species, with seven passes recorded at three different listening points. A commuting noctule was recorded at LP 8 at 19:24 (32 minutes after sunset). A *Myotis* sp. bat was recorded at LP 9 at 19:37 (45 minutes after sunset). No bats were recorded at LPs 6 or 7 (Figure 8b).

16th October

No bats were recorded during the survey.

3.4.3 Transect 3

25th September

No bats were recorded during the survey.

16th October

At least three species of bat were recorded during the survey, common pipistrelle, barbastelle and *Myotis* species bats. The *Myotis* sp. bats were recorded at LP 13b at 20:03 (1 hour 59 minutes after sunset). Two barbastelle passes were recorded at 20:30 (2 hours 26 minutes after sunset) at LP 11 (Figure 9b).

3.4.4 Transect 4

20th August

Four species of bat were recorded during the survey, common pipistrelle, soprano pipistrelle, barbastelle and serotine. Soprano pipistrelle were recorded at LP 16 between 21:31 (1 hour 17 minutes after sunset) and 21:38 (1 hour 24 minutes after sunset) (Figure 7a). The barbastelle bats were recorded at two locations, LP 14 and 16. The majority of the passes were recorded at LP 16 between 21:31 (1 hour 17 minutes after sunset) and 21:35 (1 hour 21 minutes after sunset) with a single recording at LP 14 at 22:06 (1 hour 52 minutes after sunset). The serotine was also recorded at LP 14, at 22:08 (1 hour 54 minutes after sunset).

25th September

No bats were recorded during the survey.

16th October

At least three species of bat were recorded during the survey; common pipistrelle, soprano pipistrelle and *Myotis* species. The *Myotis* sp. bats were recorded at LP 16 at 20:04 (2 hours after sunset), with two soprano pipistrelle bats recorded foraging, with intermittent social calling at 20:01 (1 hour 57 minutes after sunset) (Figure 9c). All other foraging and commuting passes, from common pipistrelle, were recorded at LP 14 between 19:00 (56 minutes after sunset) and 19:06 (1 hour 2 minutes after sunset).

3.4.5 Transect 7

20th August

Only common pipistrelles were recorded during this survey at LP 25 (Figure 7b). A single commuting pass was recorded at 22:16 (2 hours 2 minutes after sunset).

25th September

No bats were recording during the survey.

28th October

Two species of bat were recorded during the survey, *Myotis* species and barbastelle. The two barbastelle passes were heard at LP 24 at 19:00 (2 hours 21 minutes after sunset) and the two *Myotis* sp. passes were heard at LP 25 at 19:15 (2 hours 36 minutes after sunset) (Figure 10b).

3.4.6 Summary of Listening Point Surveys

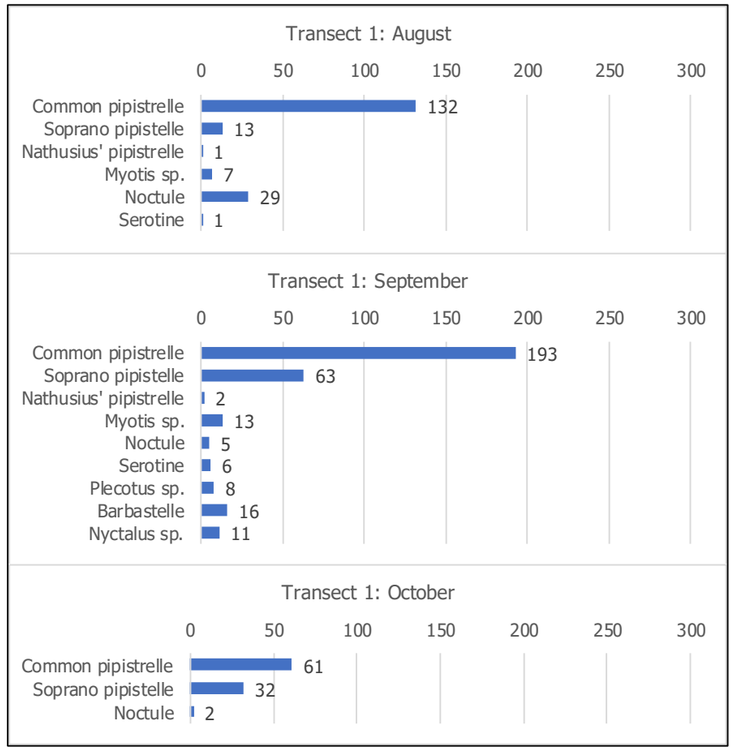
At least six species of bat were recorded across the proposed route during the listening point surveys: common pipistrelle, soprano pipistrelle, noctule, brown long-eared, *Myotis* species, and barbastelle. The barbastelle bats were recorded on 20th August on Transect 4, 16th October on Transect 3 and 28th October on Transect 7. The most frequently recorded species was common pipistrelle.

3.5 Static Detector Results

3.5.1 Static 1

Common pipistrelle was the most frequently recorded species during each survey occasion with a peak of 193 passes in September. September provided the greatest species diversity with at least eight species of bat recorded, albeit with only common pipistrelle and soprano pipistrelle registering 20 passes of more (Graph 1). October recorded lower levels of activity registering only 95 times compared with 183 and 317 in September.

Graph 1: Static 1 Detector Registrations

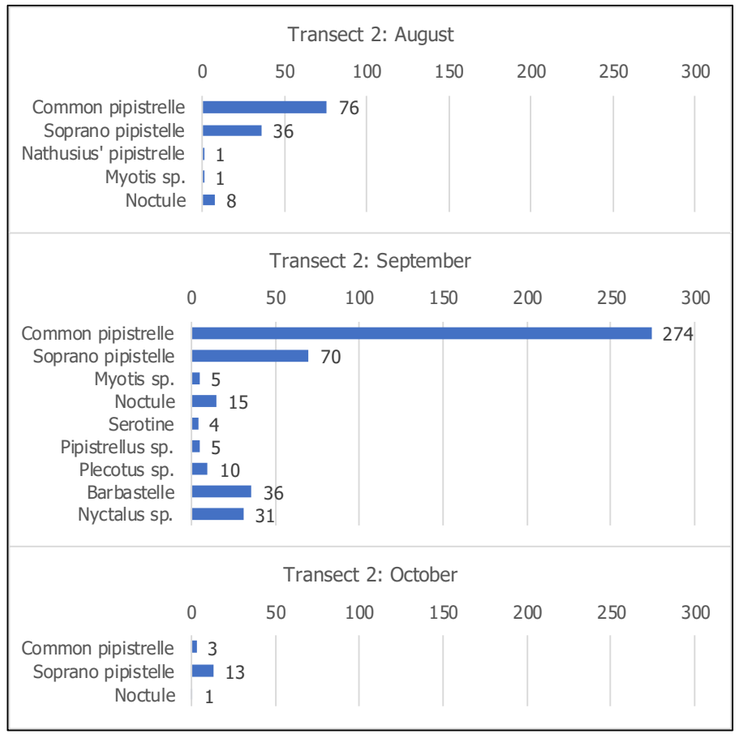


3.5.2 Static 2

Common pipistrelle was the most frequently recorded species during each survey occasion with a peak of 274 passes in September. September provided the greatest species diversity with at least seven species of bat recorded, with common pipistrelle, soprano pipistrelle, barbastelle and *Nyctalus*

sp. all registering more than 30 passes (Graph 2). September recorded significantly more activity than other months recording 450 registrations compared with 122 in August and 17 in October.

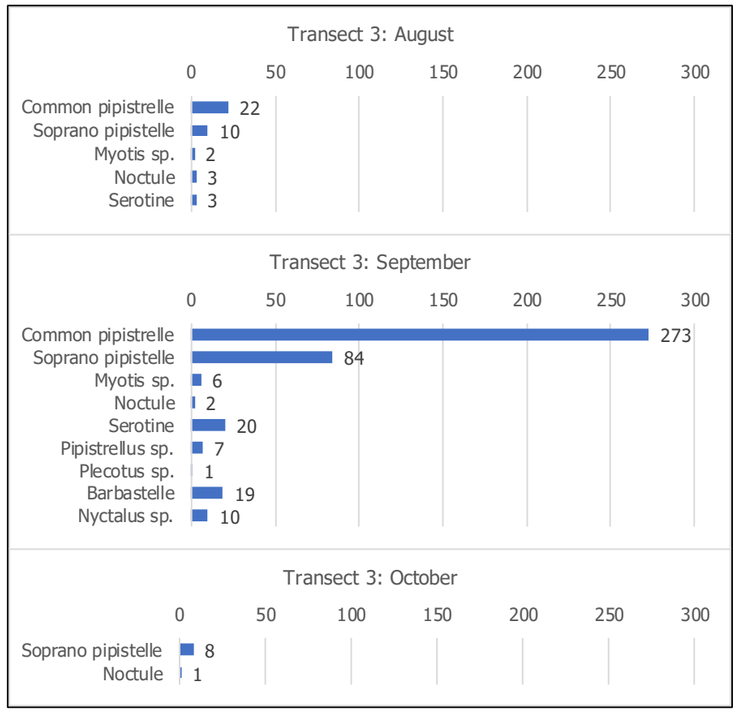
Graph 2: Static 2 Detector Registrations



3.5.3 Static 3

Common pipistrelle was the most frequently recorded species during each survey occasion with a peak of 273 passes in September. September provided the greatest species diversity with at least seven species of bat recorded, albeit with only common pipistrelle and soprano pipistrelle registering more than 20 passes (Graph 3). September recorded significantly more activity than other months registering 422 times compared with 40 in August and 9 in October.

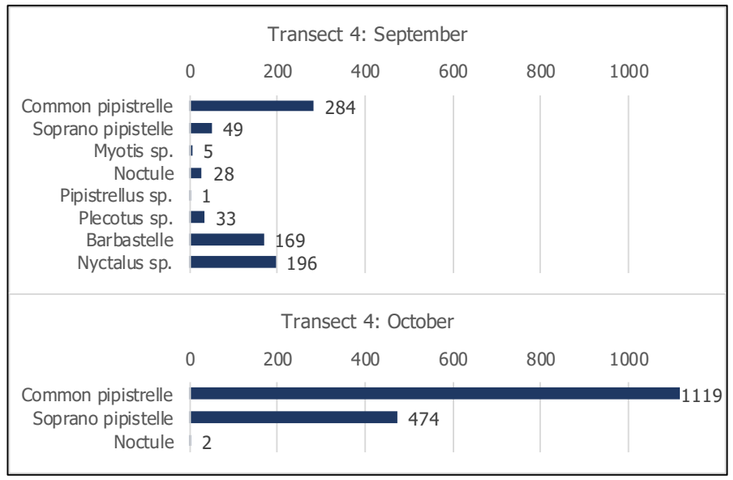
Graph 3: Static 3 Detector Registrations



3.5.4 Static 4

Common pipistrelle was most frequently recorded species during each survey occasion with a peak of 1,119 passes in October indicating a potential swarming location. September provided the greatest species diversity with at least six species of bat recorded, with three species registering more than 150 times: common pipistrelle, *Nyctalus* sp. and barbastelle (Graph 4). Despite the greater diversity, the September deployment recorded less than half (765) the number of registrations recorded during the October deployment (1,595). Due to a malfunction with the detector no recordings were gathered from the August deployment at Transect 4.

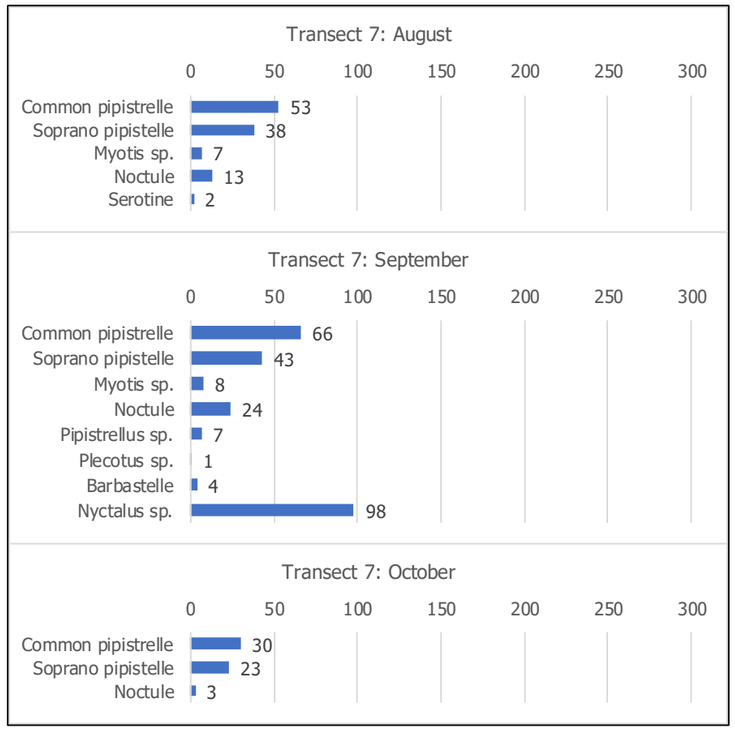
Graph 4: Static 4 Detector Registrations



3.5.5 Static 7

Common pipistrelle was the most frequently recorded species during the surveys; however, *Nyctalus* sp. recorded the peak count in September with 98 registrations. September provided the greatest species diversity with at least six species of bat recorded, with *Nyctalus* sp., common pipistrelle, soprano pipistrelle and noctule registering more than 20 times (Graph 5). The levels of activity were consistent with trends on Transects 1-3 whereby the most calls were recorded in September (251), followed by August (113) and then October (56).

Graph 5: Static 7 Detector Registrations



3.5.6 Summary of Static Detector Surveys

At least eight species of bat were recorded across the site during automated static detector surveys: common pipistrelle, soprano pipistrelle, barbastelle, noctule, *Plecotus* species, *Myotis* species, serotine and Nathusius' pipistrelle. Overall common pipistrelle was the most frequently recorded species during the surveys (2,592 registrations), followed by soprano pipistrelle (974 registrations) and *Nyctalus* sp. (346 registrations). Barbastelle was recorded within each transect surveyed with all registrations recorded in September. The peak count for barbastelle was 169 registrations on Transect 4. The closest known barbastelle roost is a maternity roost located in Eversden and Wimpole Woods, 18.5km west of the site (JNCC website), which could explain the high number of calls in September.

3.6 Value of Habitats

Each transect has been attributed a value based upon the scoring system in Wray *et al.* (2010). For the purposes of the assessment all static detector data has been assumed as commuting.

3.6.1 Transect 1

- The commuting value of the Transect is of **Regional** level.
  Rarest bats such as barbastelle (20) + Individual bats (5) + Moderate number/Not known (4) + Walls, gappy or flailed hedgerows, isolated well grown hedgerows, and moderate field sizes (3) = 32.

- The foraging value of the Transect is of **District** level (at most).
  Common bats such as common pipistrelle (2) + Small numbers of bats (10) + Moderate / unknown numbers of nearby roost sites (4) + Isolated woodland patches, less intensive arable and/or small towns and villages (3) = 19.

3.6.2 Transect 2

- The commuting value of the Transect is of **Regional** level.
  Rarest bats such as barbastelle (20) + Individual bats (5) + Moderate / unknown numbers of nearby roost sites (4) + Walls, gappy or flailed hedgerows, isolated well grown hedgerows, and moderate field sizes (3) = 32.
- The foraging value of the Transect is of **District** level (at most).
  Common bats such as common pipistrelle (2) + Small numbers of bats (10) + Moderate / unknown numbers of nearby roost sites (4) + Isolated woodland patches, less intensive arable and/or small towns and villages (3) = 19.

3.6.3 Transect 3

- The commuting value of the Transect is of **Regional** level.
  Rarest bats such as barbastelle (20) + Individual bats (5) + Moderate / unknown numbers of nearby roost sites (4) + Walls, gappy or flailed hedgerows, isolated well grown hedgerows, and moderate field sizes (3) = 32.
- The foraging value of the Transect is of **District** level (at most).
  Common bats such as common pipistrelle (2) + Small numbers of bats (10) + Moderate / unknown numbers of nearby roost sites (4) + Isolated woodland patches, less intensive arable and/or small towns and villages (3) = 19.

3.6.4 Transect 4

- The commuting value of the Transect is of **Regional** level.
  Rarest bats such as barbastelle (20) + Small number of bats (10) + Moderate / unknown numbers of nearby roost sites (4) + Walls, gappy or flailed hedgerows, isolated well grown hedgerows, and moderate field sizes (3) = 37.
- The foraging value of the Transect is of **Regional** level.
  Rarest bats such as barbastelle (20) + Small number of bats (10) + Moderate / unknown numbers of nearby roost sites (4) Larger or connected woodland blocks, mixed agriculture, and small villages/hamlets (4) = 38.

3.6.5 Transect 7

- The commuting value of the Transect is of **Regional** level.
  Rarest bats such as barbastelle (20) + Individual bats (5) + Moderate / unknown numbers of nearby roost sites (4) + Walls, gappy or flailed hedgerows, isolated well grown hedgerows, and moderate field sizes (3) = 32.
- The foraging value of the Transect is of **Regional** level.
  Rarest bats such as barbastelle (20) + Individual bats (5) + Moderate / unknown numbers of nearby roost sites (4) Larger or connected woodland blocks, mixed agriculture, and small villages/hamlets (4) = 33.

3.7 Results Summary

At least eight bat species were recorded on site and the survey are has been valued at **Regional** level for commuting bats. Transects 4 and 7 have been valued at **Regional** level for foraging bats and Transects 1, 2 and 3 at **District** level. Transects 4 and 7 have been valued at regional level due to the presence of barbastelle bats, with the highest number of foraging and commuting passes recorded in September on Transect 4.

The walked survey results indicated that bats are present across the site, with common pipistrelle being the most frequently recorded species to be commuting and foraging on this site. Soprano pipistrelle were the next most frequently recorded bat species, although the frequency was significantly lower than that of common pipistrelle. Other bat species were recorded fewer than ten times on each survey. Barbastelle bats were recorded on one occasion during the walked transects, in October on Transect 7, a single pass was recorded in the southern arable field.

The listening point surveys allowed for a broader data set to be collected at the pre-determined points. Common pipistrelle was the most frequently recorded species, however, more barbastelle bats were recorded during the listening point surveys. Four passes of barbastelle were recorded at Transect 4 in August, two passes were recorded at Transect 3 in October and two passes were recorded at Transect 7 in October. There were also a higher number of *Myotis* species recorded during at the listening points.

The static detector surveys also confirmed that common pipistrelle are present in the highest numbers, with this species being the most frequently recorded. September recorded the highest number of passes collectively across all transects, however, 1119 common pipistrelle passes recorded on Transect 4 in October. September also had the highest number of barbastelle passes recorded, with 169 passes recorded on Transect 4.

Data collected from each survey technique supports each other, identifying that common pipistrelle are the most frequently recorded species across on the site. High numbers of barbastelle bats were recorded over the three month period, 248 passes recorded in total, indicate the area is regularly used by foraging and commuting barbastelle bats. There is a key foraging and commuting hotspot for bats on the southern section of Transect 1, which is a species rich hedgerow between an arable field and semi-improved natural grassland. Overall, the areas with the highest levels of activity are the boundary features, such as hedgerows and boundaries of woodland parcels (Figure 11).

3.7.1 Further Survey Requirements

When the further surveys have been completed in 2020, a further understanding of the most important features and habitats can be inferred.

Transects 5 and 6 are considered likely to have bats along the River Granta and along the woodland block at the junction of Transect 4 with Transect 5. The River Granta and the woodland block offer suitable features along which bats would commute and forage. The neighbouring Transect 4 results show that bats are utilising the woodland block within that Transect and are thus considered likely to move into the connected woodland block within Transect 5. Also of note is that barbastelle bats have been recorded on Transects 4 and 7 which are located either side of Transects 5 and 6 thus indicating that they are potentially using the habitats within Transects 5 and 6.

Cheveley Park Farms Limited confirmed (Pers. Comm.) that the rearing and shooting of game birds is likely to take place from the end of August 2020 until February 2021 and thus similar site access restrictions are likely to be in place, therefore early communication with Mark is advised so that the appropriate level of survey data can be gathered to inform the proposed development.

Further surveys to be completed in 2020 include walked transects and static surveys of all transect routes between the months of April to July, while transects 5 and 6 will also be completed in August, September and October, if access can be arranged due to the rearing and shooting of game birds which is likely to be undertaken again in 2020.

As barbastelle bats have been recorded within transects 3, 4 and 7 it likely that additional information will need to be gathered for this species including the direction they are flying from and to within the site and at what height etc. so that the appropriate level mitigation can be provided.

Cambridgeshire South East Transport Strategy (CSET): Bat Activity Survey

4.0 References

- Collins, J. (ed.), (2016), *Bat Surveys for Professional Ecologists: Good Practice Guidelines*, 3rd Edition, The Bat Conservation Trust: London.
- JNCC, 1308 Barbastelle *Barbastella barbastellus*, [Online] https://sac.jncc.gov.uk/species/S1308/ - Accessed December 2019
- Plowman Craven, (2018), *Cambridge South East Transport Study*
- *Phase 2: Strategy 1: Preliminary Ecological Appraisal*.
- Wray. S, Wells. D, Long. E & Mitchell-Jones. T. (2010). *Valuing Bats in Ecological Impact Assessment*, In Practice Magazine December 2010, pp. 23-25.

FIGURES

Figure 1a – Site Location Plan
Figure 1b – Transect Routes
Figures 2a-2f – Bat Roost Potential Survey
Figures 3a-3b Bat Survey Results – Walked Transect 20/08/2019
Figures 4a-4e Bat Survey Results – Walked Transect 25/09/2019
Figures 5a-5c Bat Survey Results – Walked Transect 16/10/2019
Figures 6a-6b Bat Survey Results – Walked Transect 28/10/2019
Figures 7a-7b Bat Survey Results – Listening Points 20/08/2019
Figures 8a-8e Bat Survey Results – Listening Points 25/09/2019
Figures 9a-9c Bat Survey Results – Listening Points 16/10/2019
Figures 10a-10b Bat Survey Results – Listening Points 28/10/2019
Figure 11 – Bat Heat Map – Summary

Rev	Date	Notes
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Legend

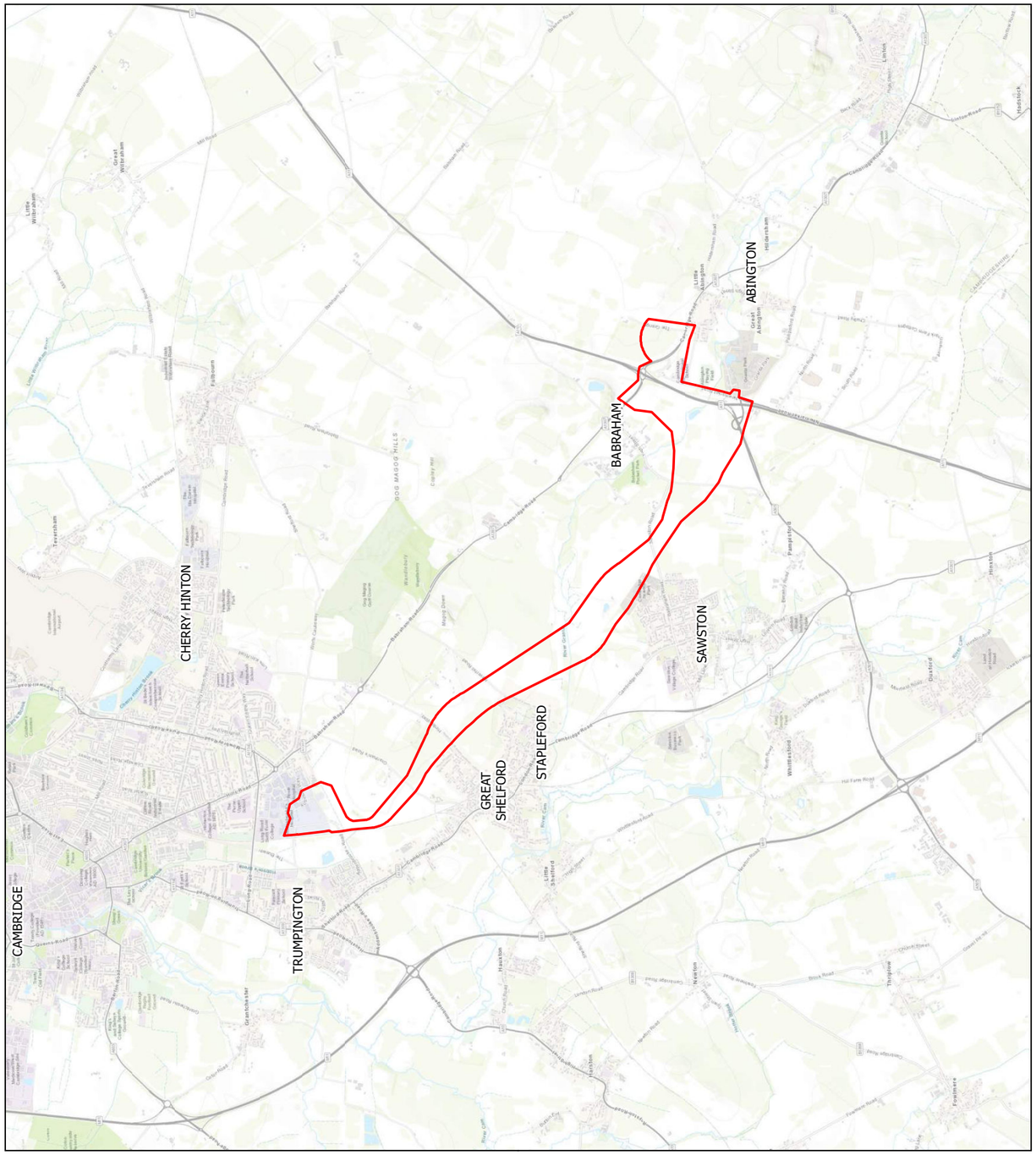
Site boundary

0 500 1,000 2,000 Metres

Site Location Plan

CSET
Greater Cambridge Partnership

Scale at A3: 1:50,000	Project No: A113521	Drawing No: Figure 1a	Revision: A
Drawn by: Ben Blowers	Drawn date: 05/02/2020	Approved by: Rachel Sore	



Rev	Date	Notes
A	04/06/20	Initial map production

Legend

- Site boundary
- Transect route 1
- Transect route 2
- Transect route 3
- Transect route 4
- Transect route 5
- Transect route 6
- Transect route 7
- Static detector location

Static detectors 5 and 6 were not done due to access issues.

0 250 500 1,000 Metres

Transect Routes and Static Locations

CSET
Greater Cambridge Partnership

Scale at A3:	Project No:	Drawing No:	Revision:
1:25,138	A113521	Figure 1b	A
Drawn by:	**Drawn date:**	**Approved by:**	
Ben Blowers	04/06/2020	David Goddard	

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Rev	Date	Notes
A	06/11/19	Initial map production

Legend

- Site boundary

Woodland blocks bat roost potential

- Moderate bat roost potential
- Low bat roost potential
- Negligible bat roost potential

Scattered tree bat roost potential

- Negligible bat roost potential

0 62.5 125 250 Metres

Bat Roost Potential Survey Map

CSET
Greater Cambridge Partnership

Scale at A3:	Project No:	Drawing No:	Revision:
1:6,400	A113521	Figure 2a	A
Drawn by:	**Drawn date:**	**Approved by:**	
Ben Blowers	06/11/2019	Tim Lees	

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Rev	Date	Notes
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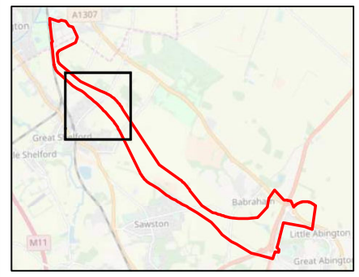
- Site boundary

Woodland blocks bat roost potential

- High bat roost potential
- Moderate bat roost potential
- Low bat roost potential

Scattered tree bat roost potential

- Low bat roost potential



0 62.5 125 250 Metres

Bat Roost Potential Survey Map

CSET
Greater Cambridge Partnership

Scale at A3:	Project No:	Drawing No:	Revision:
1:6,400	A113521	Figure 2b	A

Drawn by:	Drawn date:	Approved by:
Ben Blowers	06/11/2019	Tim Lees

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Rev	Date	Notes
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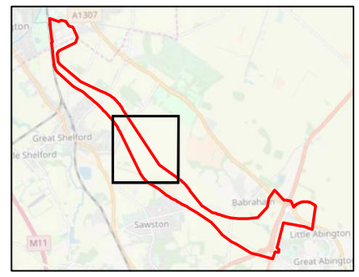
- Site boundary

Woodland blocks bat roost potential

- Moderate bat roost potential
- Low bat roost potential

Scattered tree bat roost potential

- High bat roost potential
- Moderate bat roost potential
- Negligible bat roost potential



0 62.5 125 250 Metres

Bat Roost Potential Survey Map

CSET
Greater Cambridge Partnership

Scale at A3:	Project No:	Drawing No:	Revision:
1:6,400	A113521	Figure 2c	A

Drawn by:	Drawn date:	Approved by:
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Rev	Date	Notes
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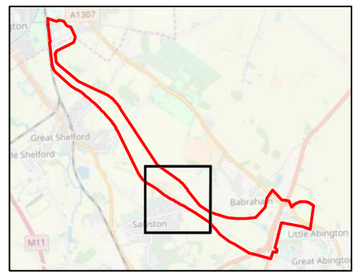
- Site boundary

Woodland blocks bat roost potential

- Moderate bat roost potential
- Low bat roost potential

Scattered tree bat roost potential

- Moderate bat roost potential
- Negligible bat roost potential



0 62.5 125 250 Metres

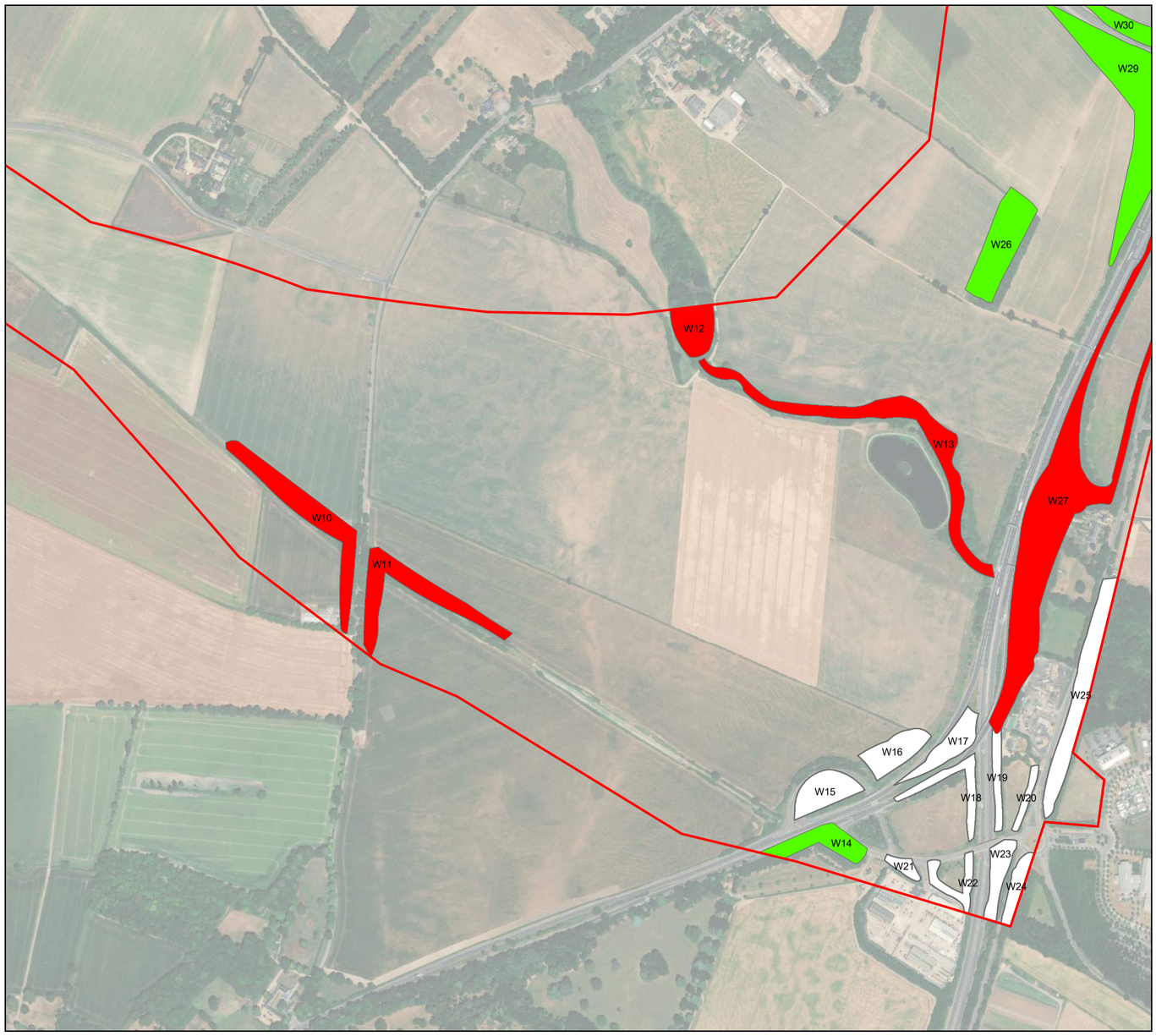
Bat Roost Potential Survey Map

CSET
Greater Cambridge Partnership

Scale at A3:	Project No:	Drawing No:	Revision:
1:6,400	A113521	Figure 2d	A

Drawn by:	Drawn date:	Approved by:
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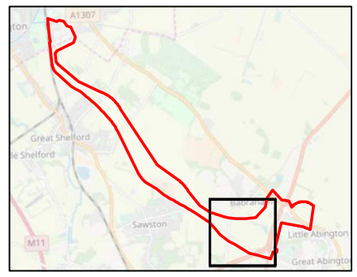
Rev	Date	Notes
A	06/11/19	Initial map production

Legend

- Site boundary

Woodland blocks bat roost potential

- High bat roost potential
- Low bat roost potential
- Negligible bat roost potential



0 62.5 125 250 Metres

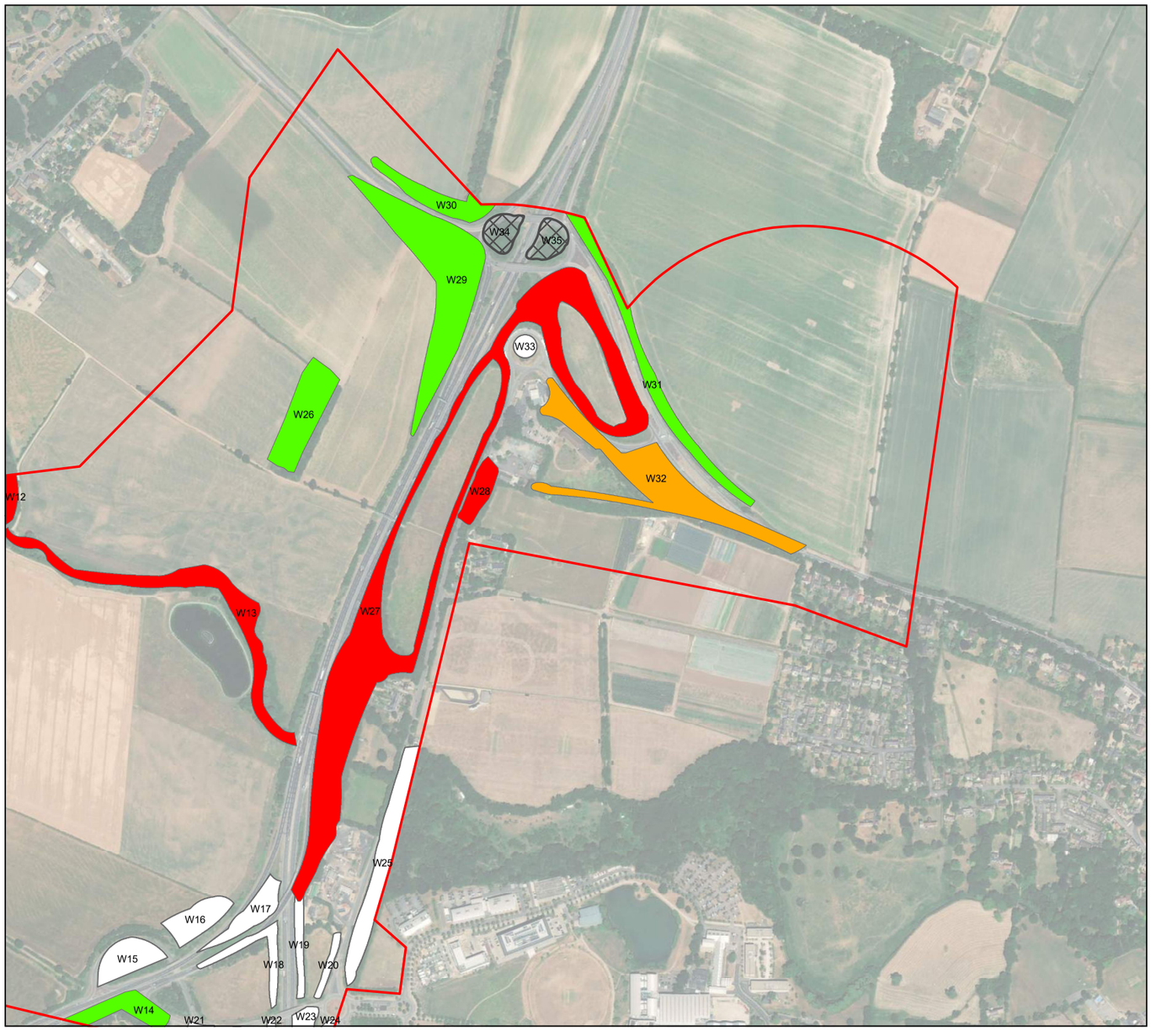
Bat Roost Potential Survey Map

CSET
Greater Cambridge Partnership

Scale at A3:	Project No:	Drawing No:	Revision:
1:6,400	A113521	Figure 2e	A

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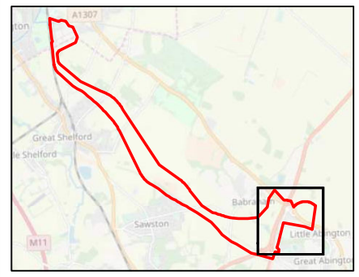
Rev	Date	Notes
A	06/11/19	Initial map production

Legend

- Site boundary

Woodland blocks bat roost potential

- High bat roost potential
- Moderate bat roost potential
- Low bat roost potential
- Negligible bat roost potential
- Not assessed for bat roost potential



0 62.5 125 250 Metres

Bat Roost Potential Survey Map

CSET
Greater Cambridge Partnership

Scale at A3:	Project No:	Drawing No:	Revision:
1:6,400	A113521	Figure 2f	A

Drawn by:	Drawn date:	Approved by:
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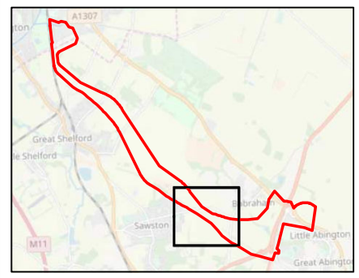
Rev	Date	Notes
A	29/11/19	Initial map production

Legend

- Site boundary
- Transect route 4
- Static detector location

Number of calls

- 0
- 1 - 35



0 62.5 125 250 Metres

Bat Survey Results - Walked Transect 4 20/08/2019

CSET
Greater Cambridge Partnership

Scale at A3:	Project No:	Drawing No:	Revision:
1:5,500	A113521	Figure 3a	A

Drawn by:	Drawn date:	Approved by:
Maddie Errington	29/11/2019	Jo Sykes

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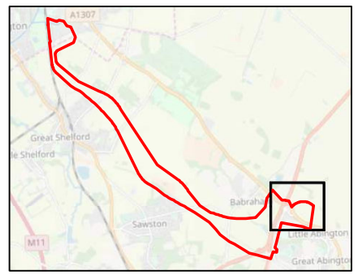
Rev	Date	Notes
A	29/11/19	Initial map production

Legend

- Site boundary
- Transect route 7
- Static detector location

Number of calls

- 0
- 1 - 35
- 36 - 85
- 86 - 135



0 50 100 200 Metres

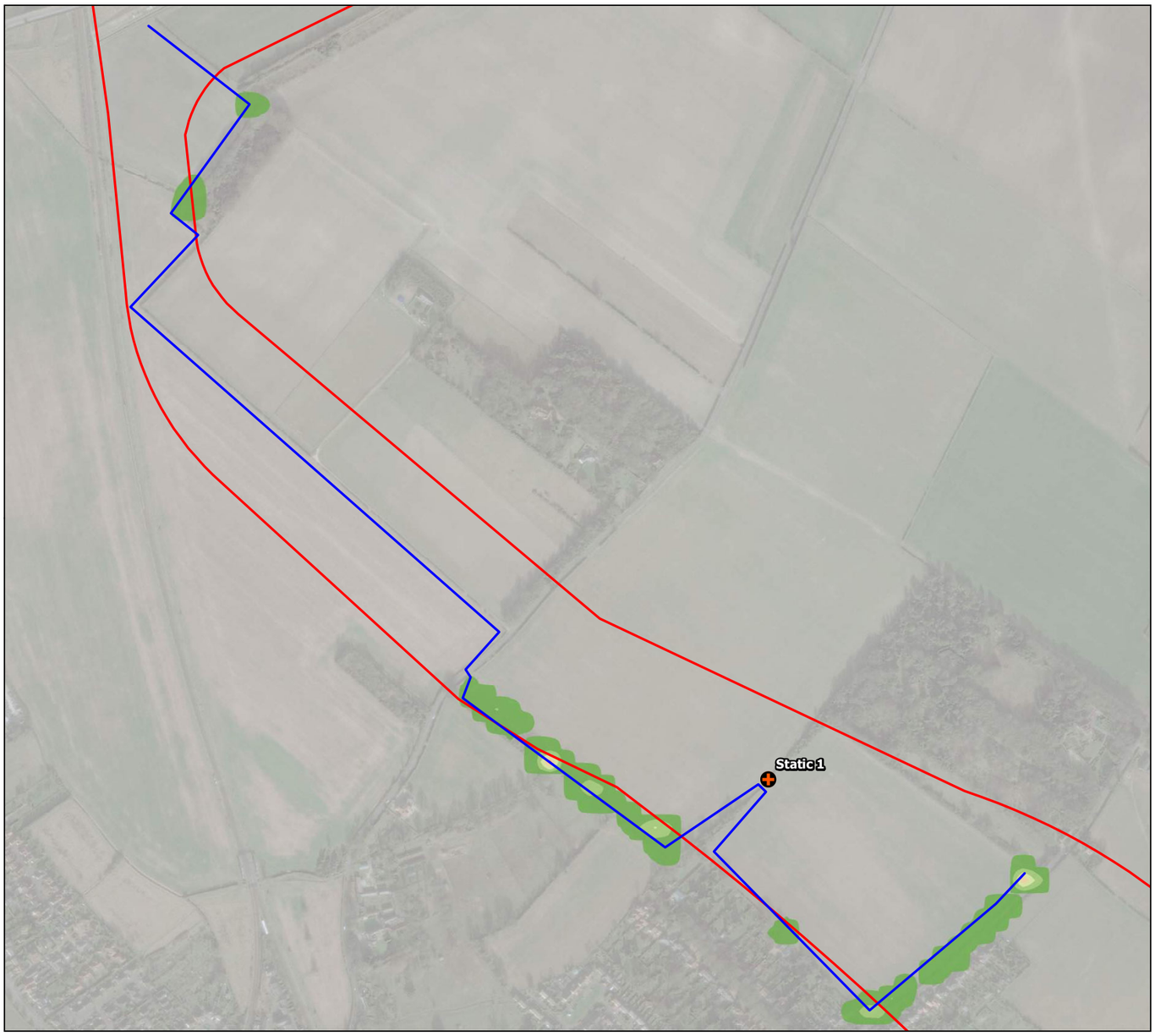
Bat Survey Results - Walked Transect 7 20/08/2019

CSET
Greater Cambridge Partnership

Scale at A3:	Project No:	Drawing No:	Revision:
1:4,500	A113521	Figure 3b	A

Drawn by:	Drawn date:	Approved by:
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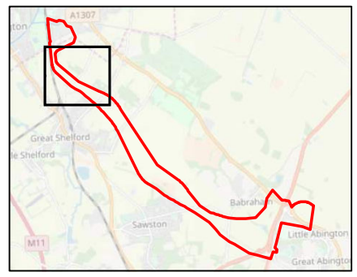
Rev	Date	Notes
A	29/11/19	Initial map production

Legend

- Site boundary
- Transect route 1
- Static detector location

Number of calls

- 0
- 1 - 35
- 36 - 85
- 86 - 135
- 136 - 185
- 186 - 235



0 62.5 125 250 Metres

Bat Survey Results - Walked Transect 1 25/09/2019

CSET
Greater Cambridge Partnership

Scale at A3:	Project No:	Drawing No:	Revision:
1:5,500	A113521	Figure 4a	A

Drawn by:	Drawn date:	Approved by:
Maddie Errington	29/11/2019	Jo Sykes

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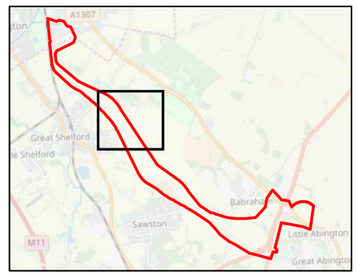
Rev	Date	Notes
A	29/11/19	Initial map production

Legend

- Site boundary
- Transect route 2
- Static detector location

Number of calls

- 0
- 1 - 35
- 36 - 85
- 86 - 135



0 62.5 125 250 Metres

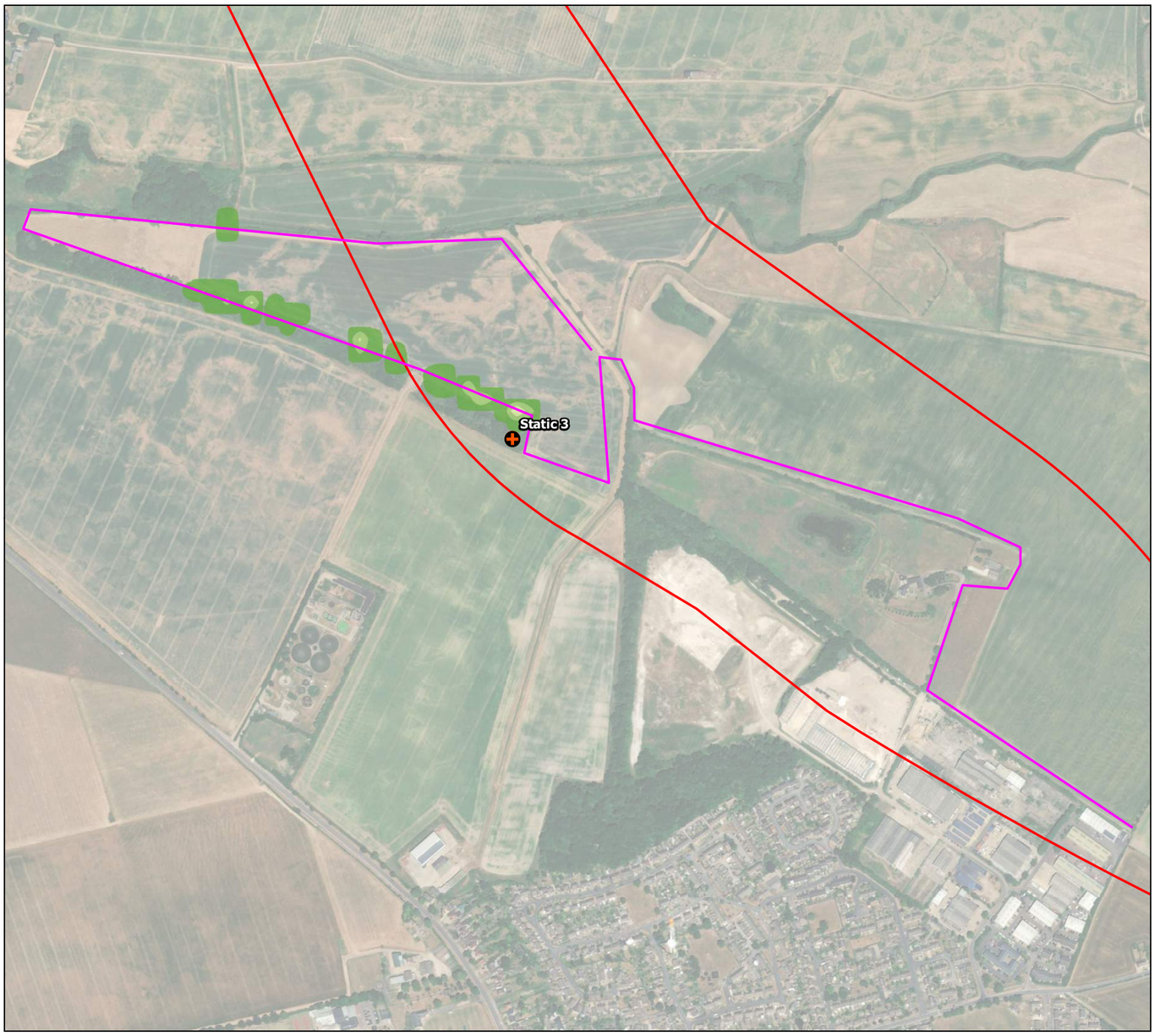
Bat Survey Results - Walked Transect 2 25/09/2019

CSET
Greater Cambridge Partnership

Scale at A3:	Project No:	Drawing No:	Revision:
1:5,500	A113521	Figure 4b	A

Drawn by:	Drawn date:	Approved by:
Maddie Errington	29/11/2019	Jo Sykes

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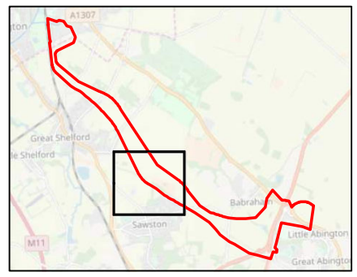
Rev	Date	Notes
A	29/11/19	Initial map production

Legend

- Site boundary
- Transect route 3
- Static detector location

Number of calls

- 0
- 1 - 35
- 36 - 85
- 86 - 135
- 136 - 185



0 62.5 125 250 Metres

Bat Survey Results - Walked Transect 3 25/09/2019

CSET
Greater Cambridge Partnership

Scale at A3:	Project No:	Drawing No:	Revision:
1:6,000	A113521	Figure 4c	A

Drawn by:	Drawn date:	Approved by:
Maddie Errington	29/11/2019	Jo Sykes

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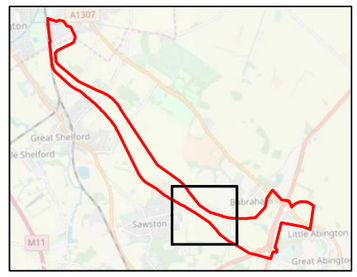
Rev	Date	Notes
A	29/11/19	Initial map production

Legend

- Site boundary
- Transect route 4
- Static detector location

Number of calls

- 0
- 1 - 35
- 36 - 85
- 86 - 135
- 136 - 185



0 62.5 125 250 Metres

Bat Survey Results - Walked Transect 4 25/09/2019

CSET
Greater Cambridge Partnership

Scale at A3:	Project No:	Drawing No:	Revision:
1:5,500	A113521	Figure 4d	A

Drawn by:	Drawn date:	Approved by:
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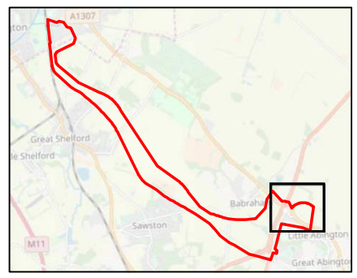
Rev	Date	Notes
A	29/11/19	Initial map production

Legend

- Site boundary
- Transect route 7
- Static detector location

Number of calls

- 0
- 1 - 35
- 36 - 85



0 50 100 200 Metres

Bat Survey Results - Walked Transect 7 25/09/2019

CSET
Greater Cambridge Partnership

Scale at A3:	Project No:	Drawing No:	Revision:
1:4,500	A113521	Figure 4e	A

Drawn by:	Drawn date:	Approved by:
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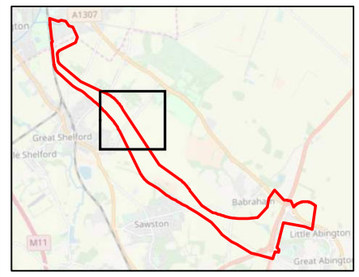
Rev	Date	Notes
A	29/11/19	Initial map production

Legend

- Site boundary
- Transect route 2
- Static detector location

Number of calls

- 0
- 1 - 35
- 36 - 85
- 86 - 135
- 136 - 185
- 186 - 235
- 236 - 285



0 62.5 125 250 Metres

Bat Survey Results - Walked Transect 2 16/10/2019

CSET
Greater Cambridge Partnership

Scale at A3:	Project No:	Drawing No:	Revision:
1:5,500	A113521	Figure 5a	A

Drawn by:	Drawn date:	Approved by:
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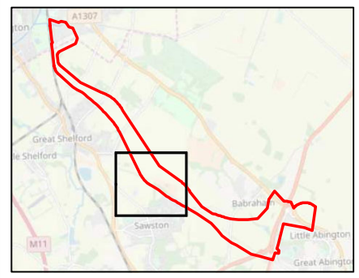
Rev	Date	Notes
A	29/11/19	Initial map production

Legend

- Site boundary
- Transect route 3
- Static detector location

Number of calls

- 0
- 1 - 35
- 36 - 85



0 62.5 125 250 Metres

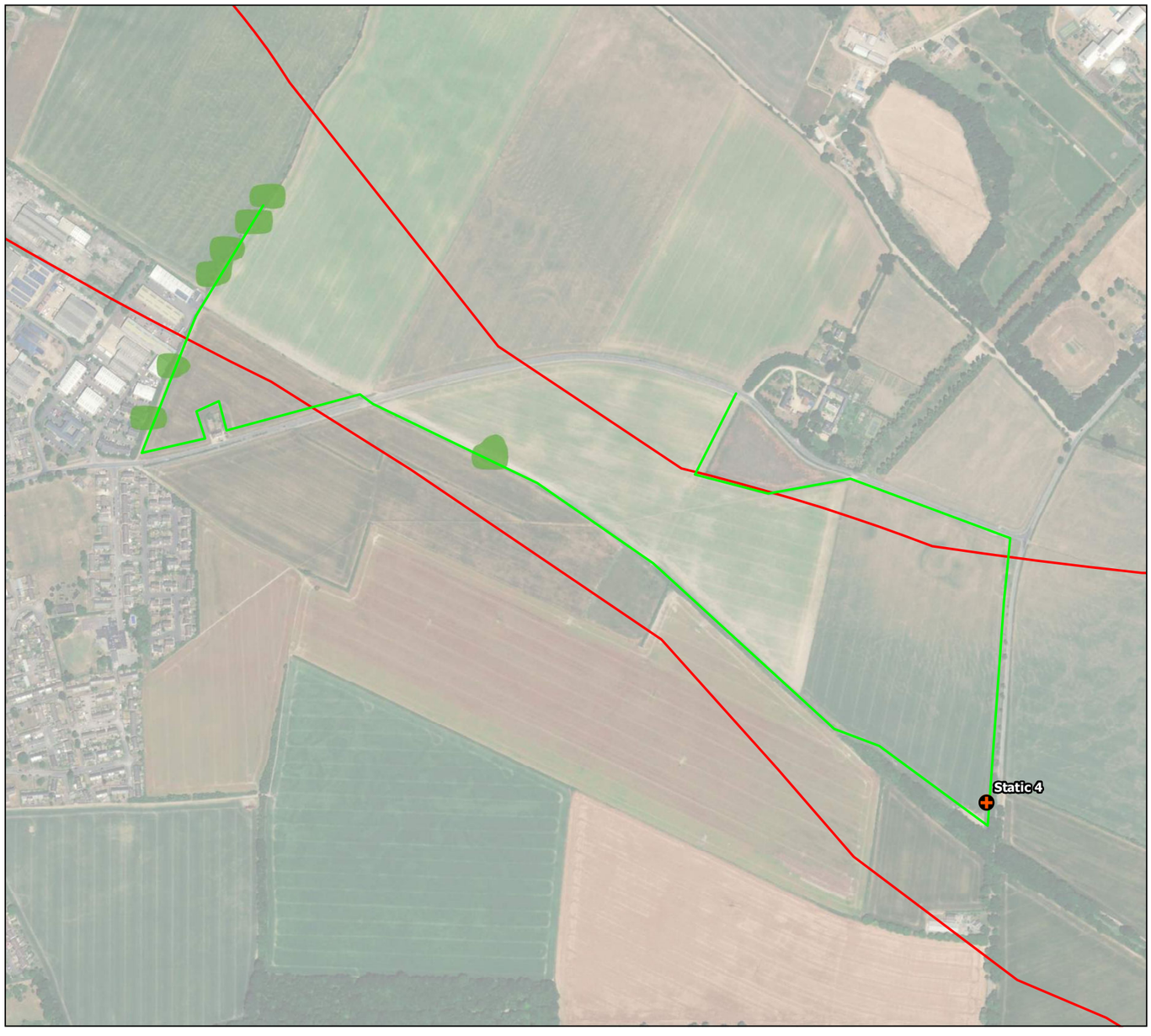
Bat Survey Results - Walked Transect 3 16/10/2019

CSET
Greater Cambridge Partnership

Scale at A3:	Project No:	Drawing No:	Revision:
1:6,000	A113521	Figure 5b	A

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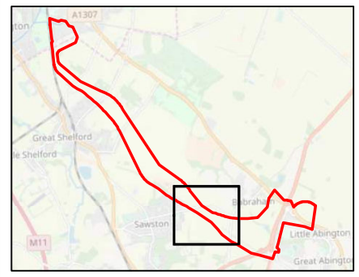
Rev	Date	Notes
A	29/11/19	Initial map production

Legend

- Site boundary
- Transect route 4
- Static detector location

Number of calls

- 0
- 1 - 35



0 62.5 125 250 Metres

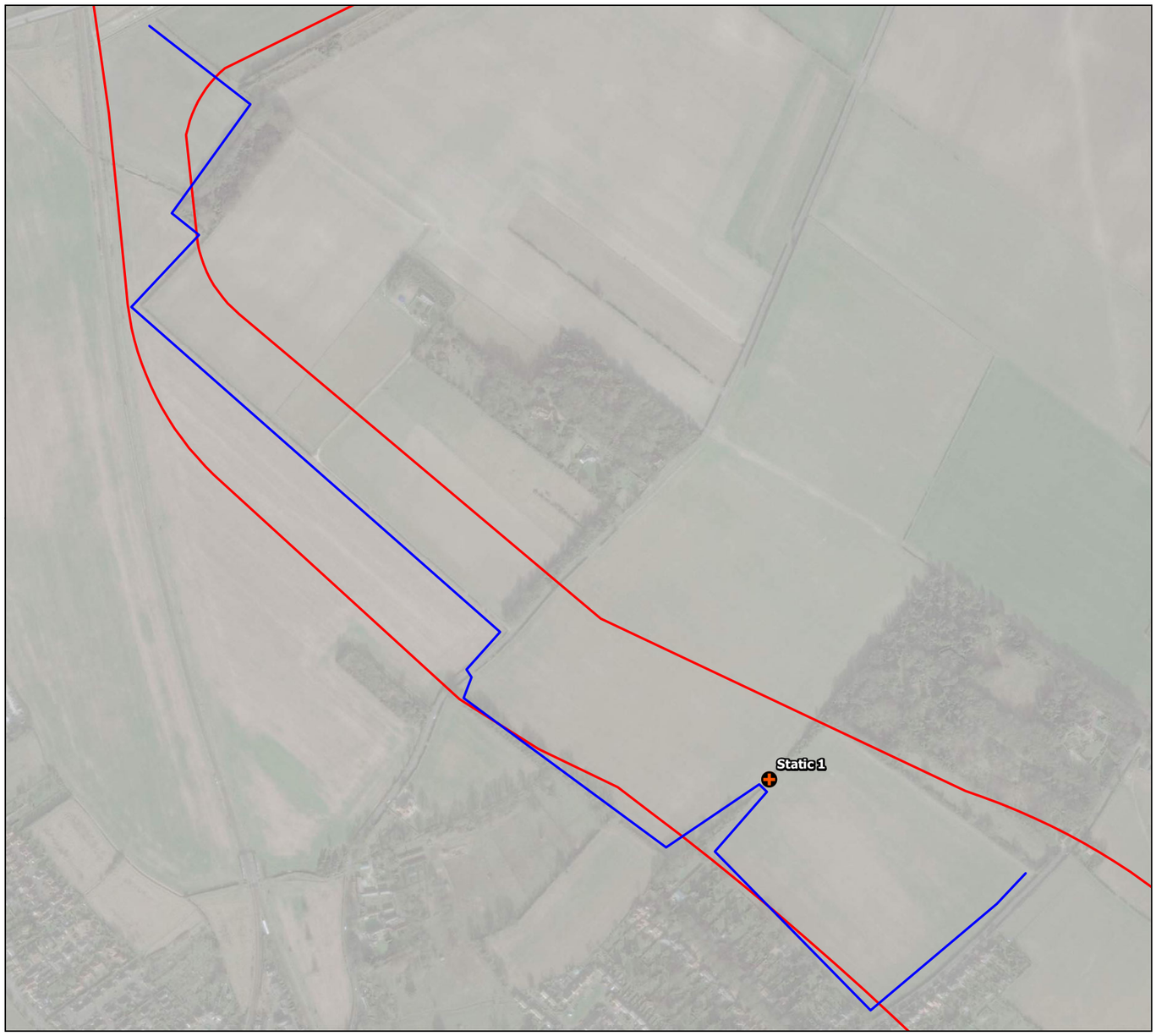
Bat Survey Results - Walked
Transect 4 16/10/2019

CSET
Greater Cambridge Partnership

Scale at A3:	Project No:	Drawing No:	Revision:
1:5,500	A113521	Figure 5c	A

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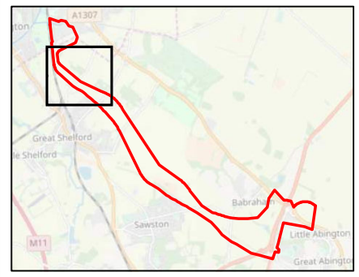


Rev	Date	Notes
A	29/11/19	Initial map production

Legend

- Site boundary
- Transect route 1
- Static detector location

No bat data was recorded
15:36 and before



0 62.5 125 250 Metres

Bat Survey Results - Walked
Transect 1 28/10/2019

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Greater Cambridge Partnership

Scale at A3:	Project No:	Drawing No:	Revision:
1:5,500	A113521	Figure 6a	A

Drawn by:	Drawn date:	Approved by:
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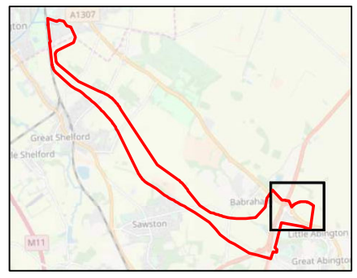
Rev	Date	Notes
A	29/11/19	Initial map production

Legend

- Site boundary
- Transect route 7
- Static detector location

Number of calls

- 0
- 1 - 35



0 50 100 200 Metres

Bat Survey Results - Walked Transect 7 28/10/2019

CSET
Greater Cambridge Partnership

Scale at A3:	Project No:	Drawing No:	Revision:
1:4,500	A113521	Figure 6b	A

Drawn by:	Drawn date:	Approved by:
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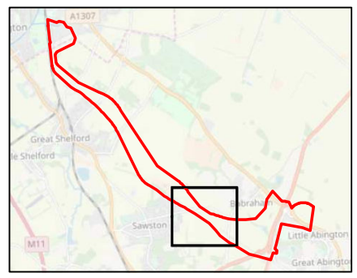
Rev	Date	Notes
A	29/11/19	Initial map production

Legend

- Site boundary
- Transect route 4
- Static detector location
- Listening points

Number of calls

- 0
- 1 - 35
- 36 - 85
- 86 - 135



0 62.5 125 250 Metres

Bat Survey Results - Listening Points Transect 4 20/08/2019

CSET
Greater Cambridge Partnership

Scale at A3:	Project No:	Drawing No:	Revision:
1:5,500	A113521	Figure 7a	A

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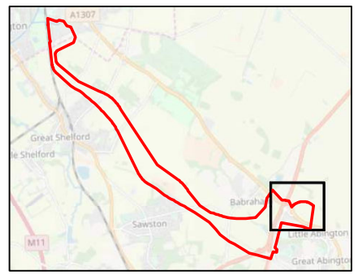
Rev	Date	Notes
A	29/11/19	Initial map production

Legend

- Site boundary
- Transect route 7
- Static detector location
- Listening points

Number of calls

- 0
- 1 - 35



0 50 100 200 Metres

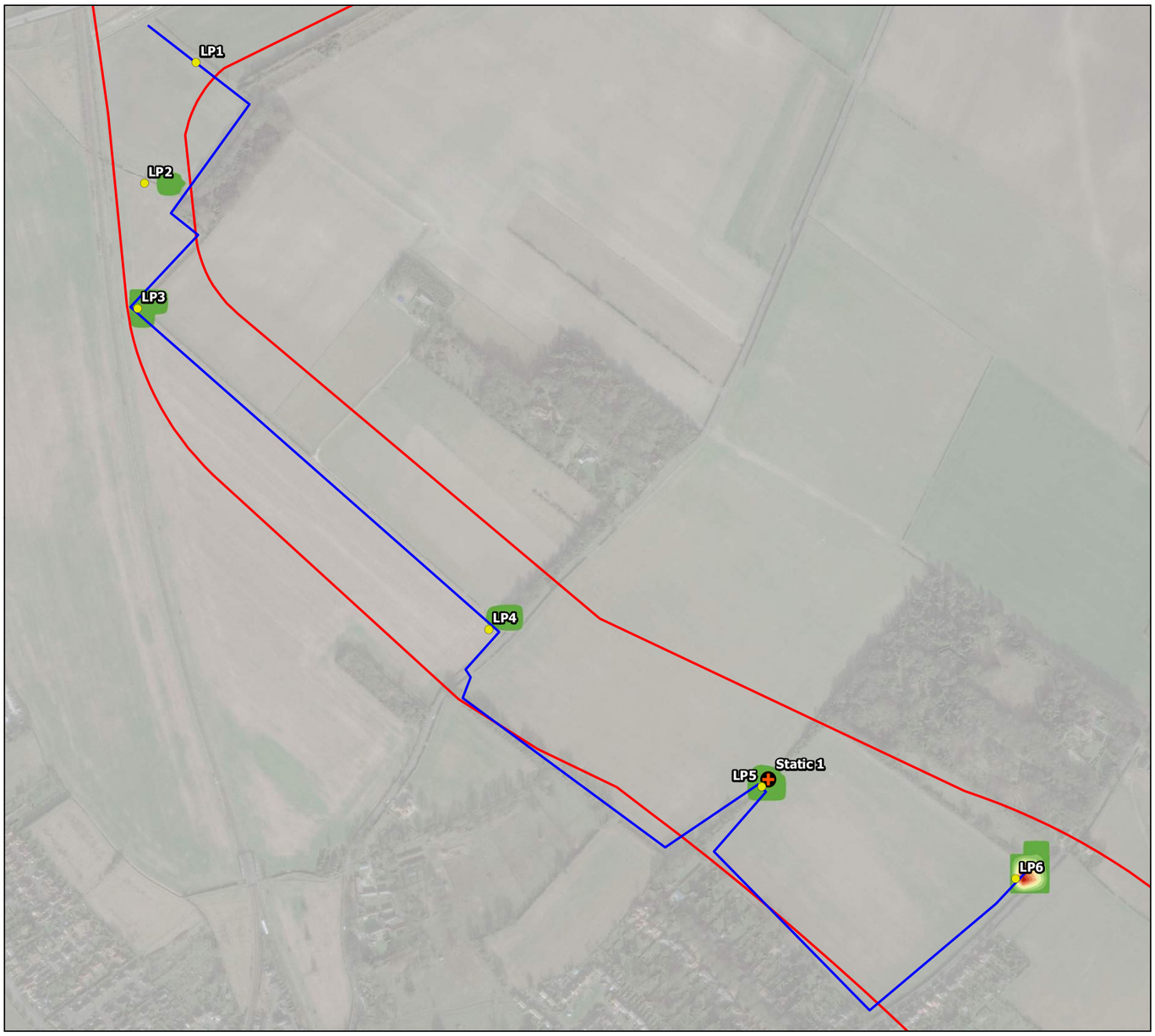
Bat Survey Results - Listening Points
Transect 7 20/08/2019

CSET
Greater Cambridge Partnership

Scale at A3:	Project No:	Drawing No:	Revision:
1:4,500	A113521	Figure 7b	A

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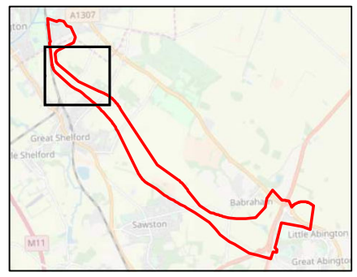
Rev	Date	Notes
A	29/11/19	Initial map production

Legend

- Site boundary
- Transect route 1
- Static detector location
- Listening points

Number of calls

- 0 - 1
- 1 - 179
- 180 - 357
- 358 - 536
- 537 - 714
- 715 - 893
- 894 - 1,071
- 1,072 - 1,250
- 1,251 - 1,428
- 1,429 - 1,607



0 62.5 125 250 Metres

Bat Survey Results - Listening Points
Transect 1 25/09/2019

CSET
Greater Cambridge Partnership

Scale at A3:	Project No:	Drawing No:	Revision:
1:5,500	A113521	Figure 8a	A

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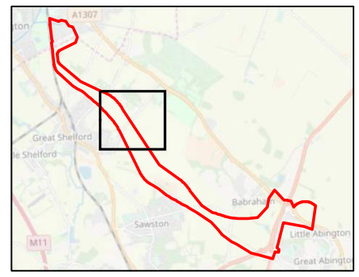
Rev	Date	Notes
A	29/11/19	Initial map production

Legend

- Site boundary
- Transect route 2
- Static detector location
- Listening points

Number of calls

- 0
- 1 - 35
- 36 - 85



0 62.5 125 250 Metres

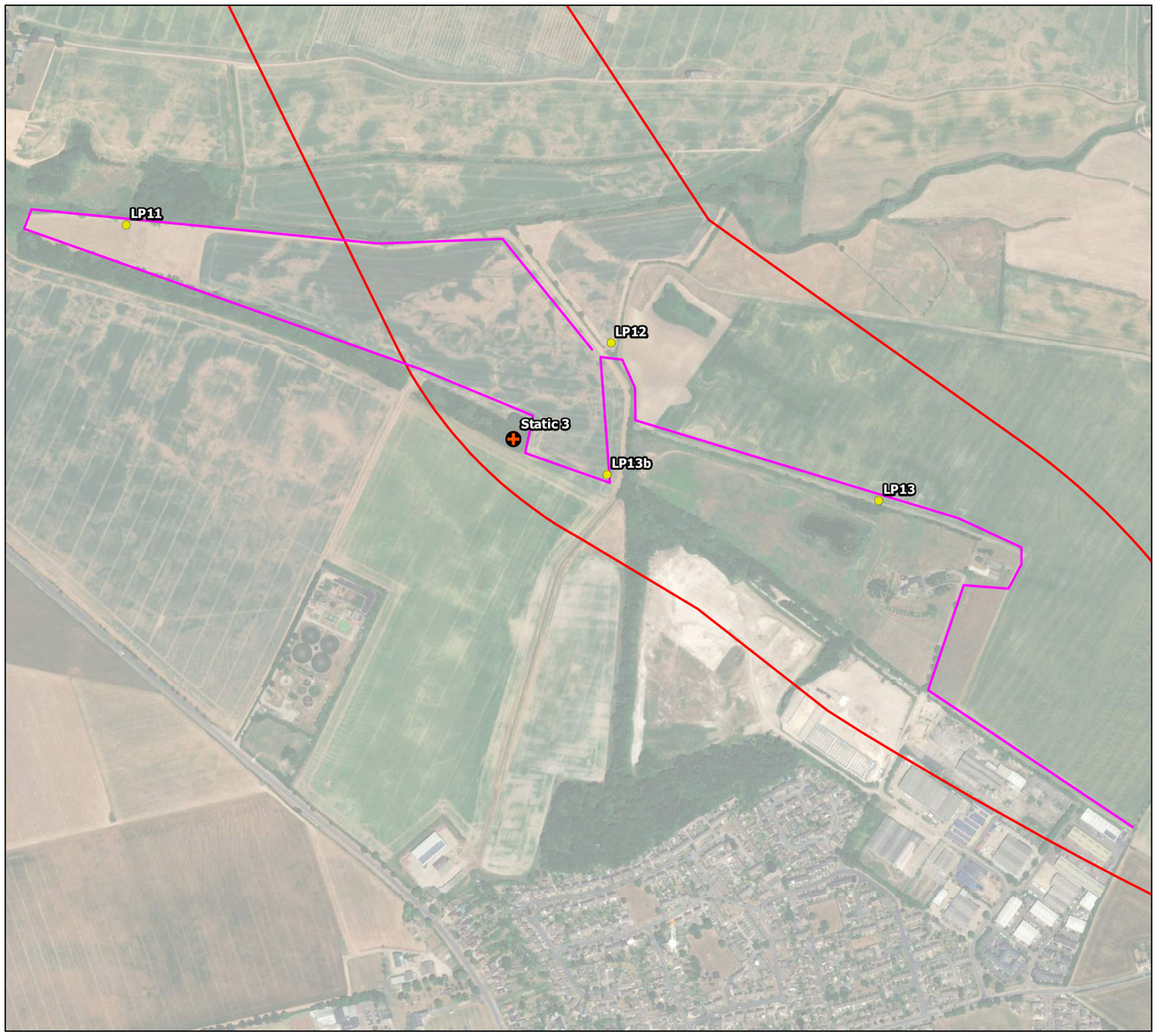
Bat Survey Results - Listening Points Transect 2 25/09/2019

CSET
Greater Cambridge Partnership

Scale at A3:	Project No:	Drawing No:	Revision:
1:5,500	A113521	Figure 8b	A

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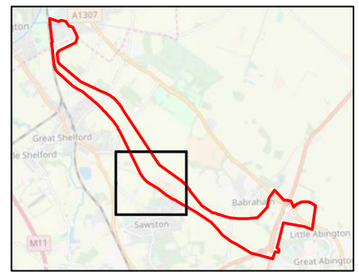


Rev	Date	Notes
A	29/11/19	Initial map production

Legend

- Site boundary
- Transect route 3
- Static detector location
- Listening points

No bat data was recorded
20:22 and before



0 62.5 125 250 Metres

Bat Survey Results - Listening Points Transect 3 25/09/2019

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Greater Cambridge Partnership

Scale at A3:	Project No:	Drawing No:	Revision:
1:6,000	A113521	Figure 8c	A

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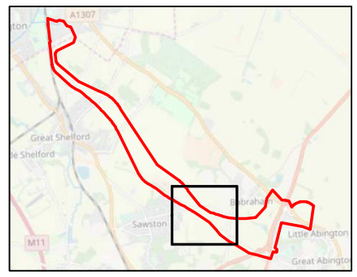


Rev	Date	Notes
A	29/11/19	Initial map production

Legend

- Site boundary
- Transect route 4
- Static detector location
- Listening points

No bat data was recorded
18:45 and before



0 62.5 125 250 Metres

Bat Survey Results - Listening Points
Transect 4 25/09/2019

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Scale at A3:	Project No:	Drawing No:	Revision:
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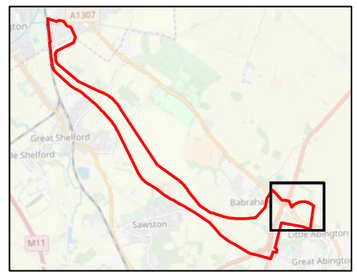


Rev	Date	Notes
A	29/11/19	Initial map production

Legend

- Site boundary
- Transect route 7
- Static detector location
- Listening points

No bat data was recorded
20:24 and before



0 50 100 200 Metres

Bat Survey Results - Listening Points
Transect 7 25/09/2019

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Scale at A3:	Project No:	Drawing No:	Revision:
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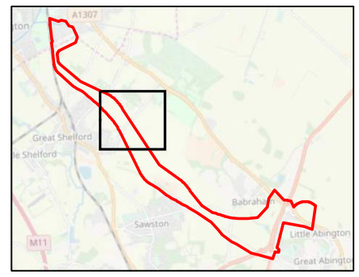


Rev	Date	Notes
A	29/11/19	Initial map production

Legend

- Site boundary
- Transect route 2
- Static detector location
- Listening points

No bat data was recorded
20:10 and after



0 62.5 125 250 Metres

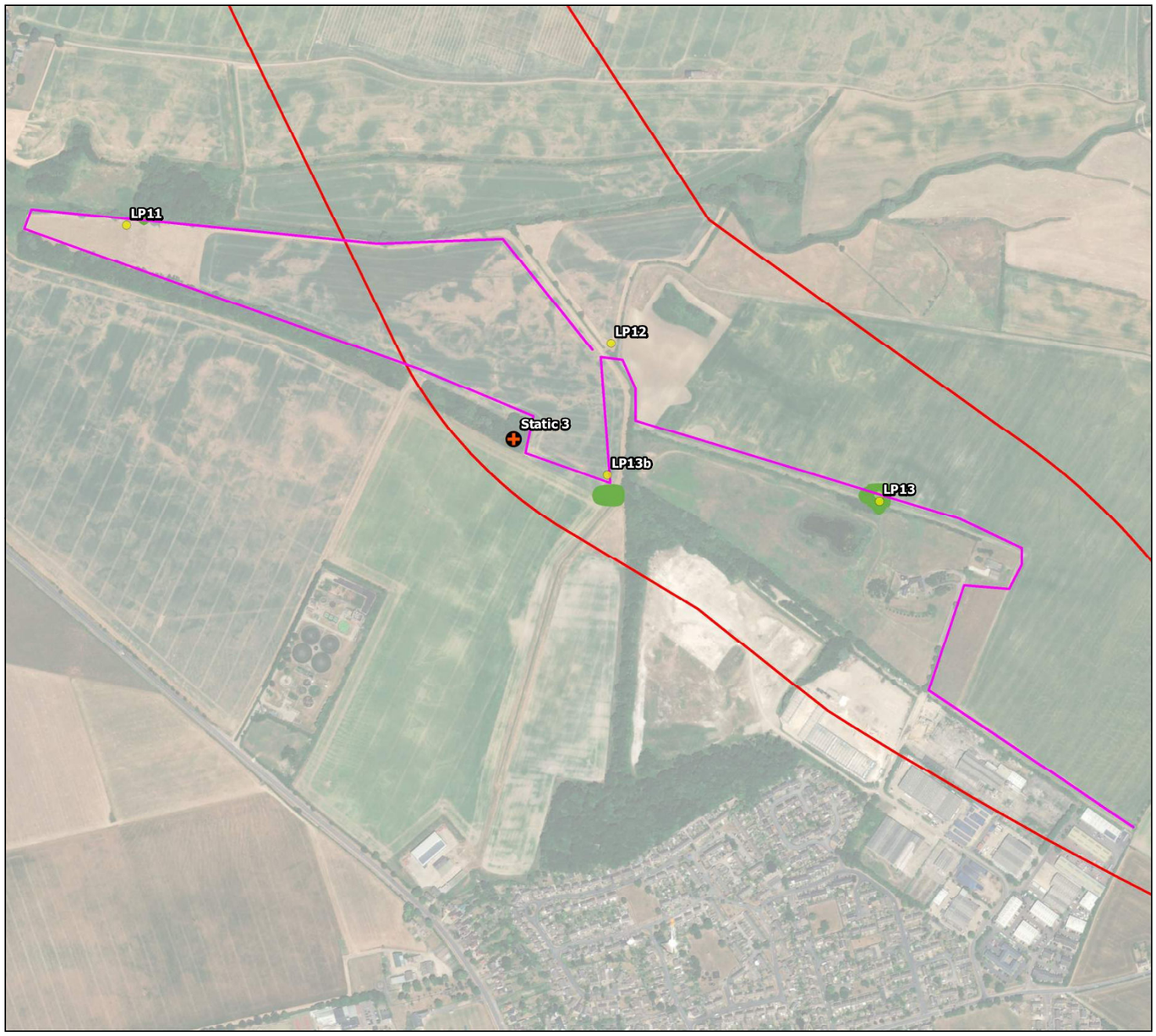
Bat Survey Results - Listening Points
Transect 2 16/10/2019

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Greater Cambridge Partnership

Scale at A3:	Project No:	Drawing No:	Revision:
1:5,500	A113521	Figure 9a	A

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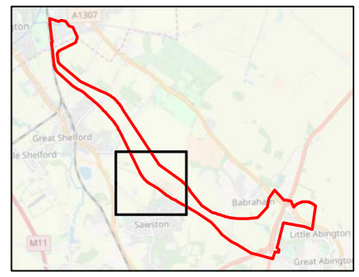
Rev	Date	Notes
A	29/11/19	Initial map production

Legend

- Site boundary
- Transect route 3
- Static detector location
- Listening points

Number of calls

- 0
- 1 - 35
- 36 - 85



0 62.5 125 250 Metres

Bat Survey Results - Listening Points
Transect 3 16/10/2019

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Greater Cambridge Partnership

Scale at A3:	Project No:	Drawing No:	Revision:
1:6,000	A113521	Figure 9b	A

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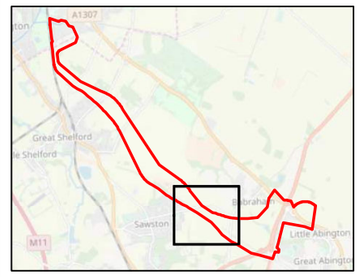
Rev	Date	Notes
A	09/12/19	Initial map production

Legend

- Site boundary
- Transect route 4
- Static detector location
- Listening points

Number of calls

- 0
- 1 - 35
- 36 - 85



0 62.5 125 250 Metres

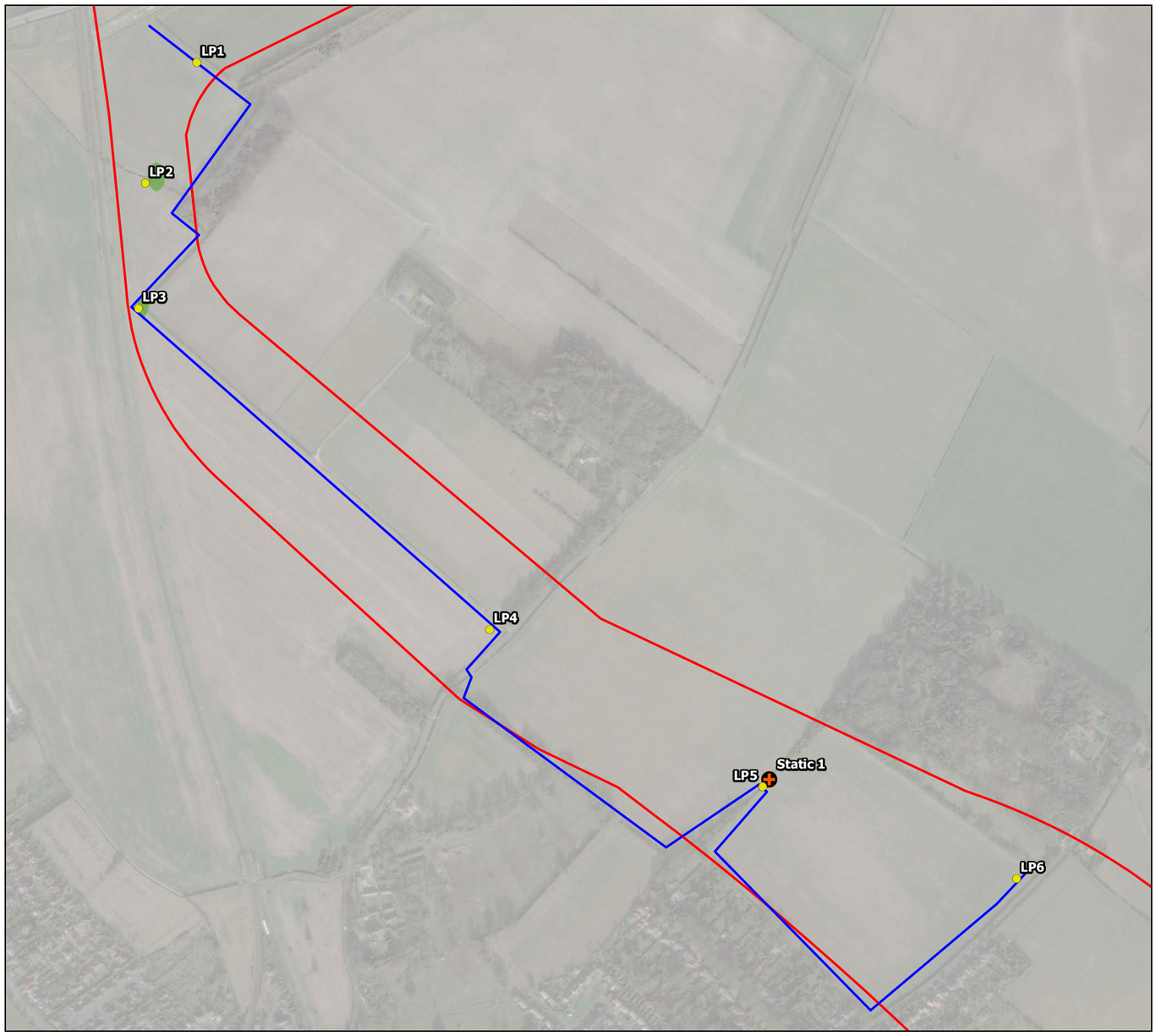
Bat Survey Results - Listening Points
Transect 4 16/10/2019

CSET
Greater Cambridge Partnership

Scale at A3:	Project No:	Drawing No:	Revision:
1:5,500	A113521	Figure 9c	A

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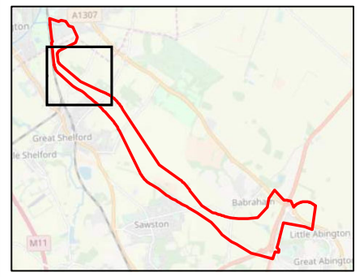
Rev	Date	Notes
A	29/11/19	Initial map production

Legend

- Site boundary
- Transect route 1
- Static detector location
- Listening points

Number of calls

- 0
- 1 - 35



0 62.5 125 250 Metres

Bat Survey Results - Listening Points
Transect 1 28/10/2019

CSET
Greater Cambridge Partnership

Scale at A3:	Project No:	Drawing No:	Revision:
1:5,500	A113521	Figure 10a	A

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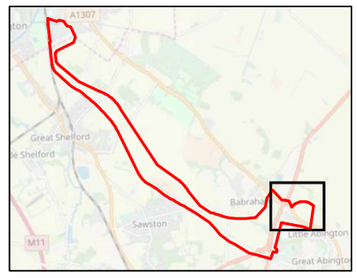
Rev	Date	Notes
A	29/11/19	Initial map production

Legend

- Site boundary
- Transect route 7
- Static detector location
- Listening points

Number of calls

- 0
- 1 - 35



0 50 100 200 Metres

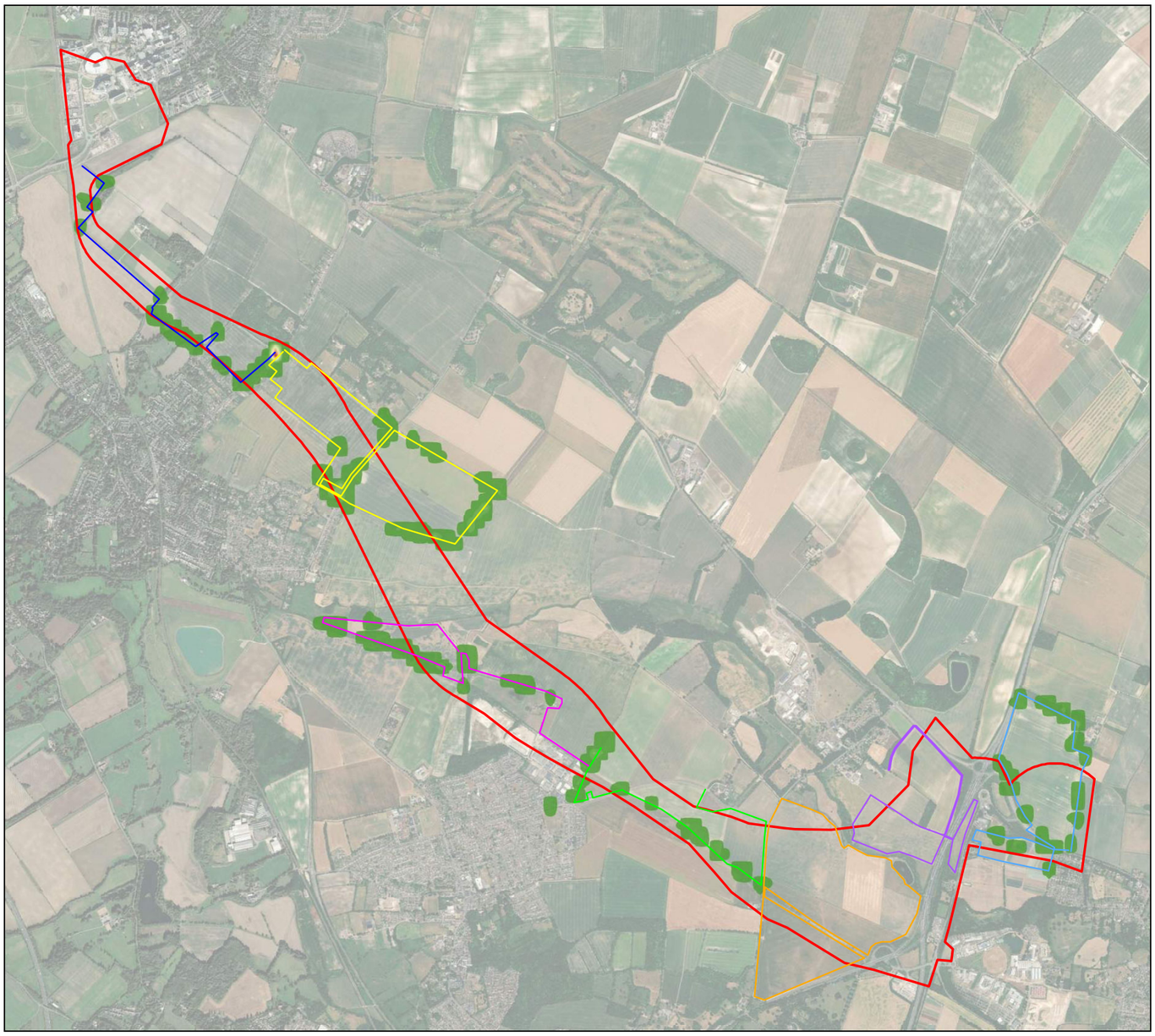
Bat Survey Results - Listening Points Transect 7 28/10/2019

CSET
Greater Cambridge Partnership

Scale at A3:	Project No:	Drawing No:	Revision:
1:4,500	A113521	Figure 10b	A

Drawn by:	Drawn date:	Approved by:
Maddie Errington	29/11/2019	Jo Sykes

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Rev	Date	Notes
A	09/12/19	Initial map production
B	05/02/20	Added transects & no access

Legend

- Site boundary
- Transect route 1
- Transect route 2
- Transect route 3
- Transect route 4
- Transect route 5 (no access during survey)
- Transect route 6 (no access during survey)
- Transect route 7

Number of calls

- 0
- 1 - 99
- 100 - 199
- 200 - 299
- 300 - 399
- 400 - 499
- 500 - 599
- 600 - 699
- 700 - 799
- 800 - 899
- 900 - 999
- 1,000 - 1,099
- 1,100 - 1,199
- 1,200 - 1,299
- 1,300 - 1,399
- 1,400 - 1,499
- 1,500 - 1,599
- 1,600 - 1,671

0 250 500 1,000 Metres

Bat Heat Map - Summary

CSET
Greater Cambridge Partnership

Scale at A3:	Project No:	Drawing No:	Revision:
1:25,000	A113521	Figure 11	B

Drawn by:	Drawn date:	Approved by:
Maddie Errington	05/02/2020	Jo Sykes

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Appendix A – Report Conditions

Cambridgeshire South East Transport Strategy (CSET): Bat Activity Survey

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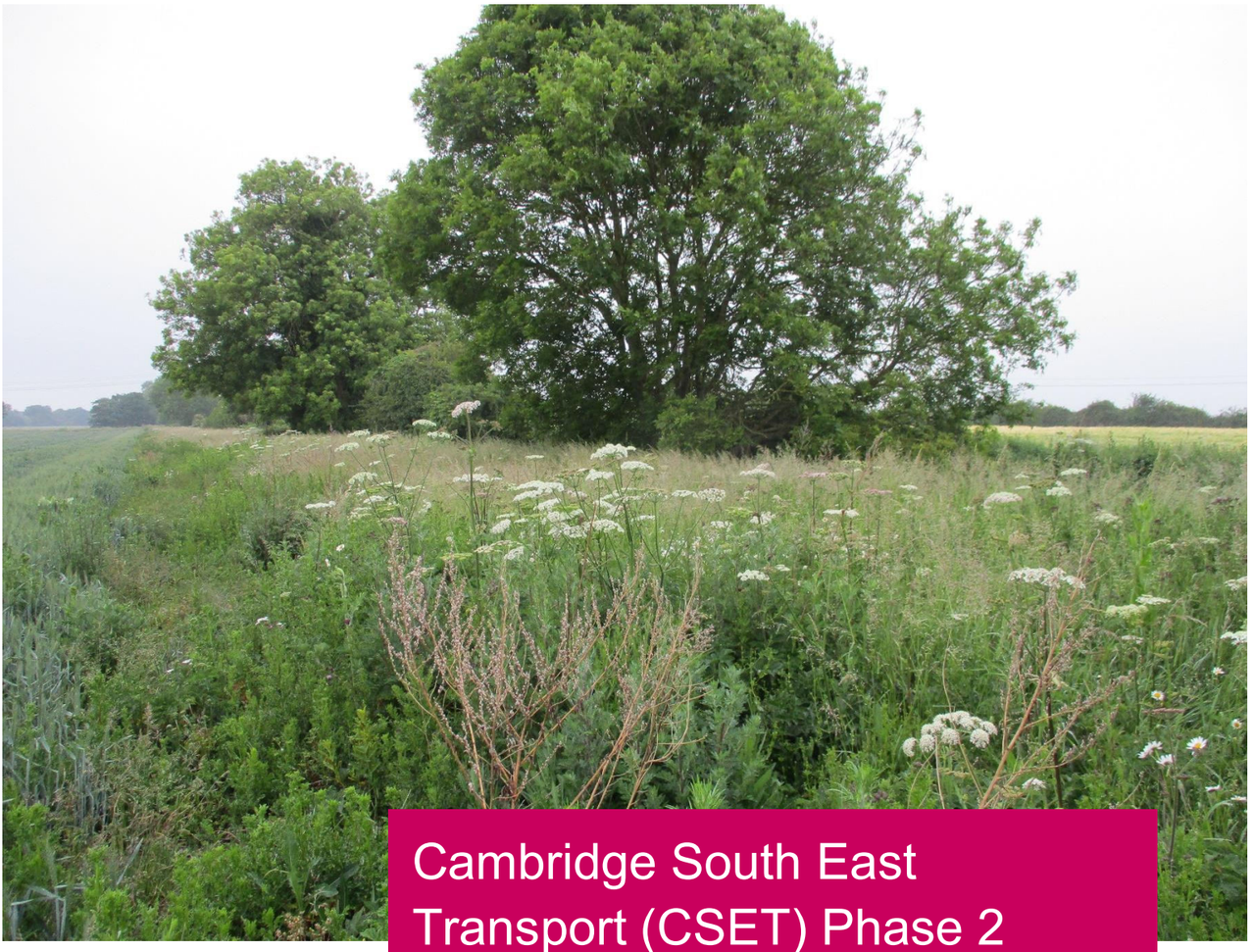
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Greater Cambridgeshire Partnership June 2020
A113521

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Cambridge South East Transport (CSET) Phase 2 Bat Survey Report

March 2021

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Quality Management

Job No	CS/099797-02		
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Title	Cambridgeshire South East Transport (CSET) Phase 2 Bat Survey Report		
Document Ref	Bat Survey Report	**Issue / Revision**	04
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Date	March 2021		
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1. Summary

Capita Real Estate & Infrastructure's Ecologists was commissioned by the Greater Cambridgeshire Partnership to undertake a series of surveys for bats across the route of Phase 2 of the Cambridge South East Transport (CSET) Project between Great Shelford to Sawston and to Babraham, Cambridgeshire (henceforth referred to as the Site).

The surveys have been carried out to provide baseline ecological information for the CSET Phase 2 Project to inform the design and environmental assessment of the proposals

Surveys were carried out between April and October 2020, focussing on the proposed areas of land to be affected by the CSET Phase 2 scheme.

This report details the bat surveys which have been carried out to provide baseline ecological information to inform the impact avoidance and mitigation measures and ultimately the design of the scheme.

The results are summarised as follows. A total of:

- None of the buildings surveyed within close proximity to the scheme were suitable for roosting bats.
- Common pipistrelle, soprano pipistrelle, noctule/serotine/Leisler's (NSL[1]), brown long eared (BLE) bats and, *Myotis* species Bat species were recorded during the activity surveys.
- Five species of bat were recorded during the static detector deployment consisting of common pipistrelle, soprano pipistrelle, NSL, *Myotis* species and barbastelle.
- Daubenton's (TL 51313 49713) and brown long eared bats (TL 51594 49021) identified in the field.
- Two confirmed roosts were recorded in T18 and T23.
- Droppings found in T13 no emergence/re-re-entry recorded.

Transects were undertaken between May and October.

Static detectors were deployed over six months May to October.

[1] A widely used grouping of bat calls for large bats whose calls can overlap in sound analysis

The range of farmland, riparian, woodland, and suburban habitats across the survey area provides a range of foraging, commuting and roosting opportunities for bat species.

2. Introduction

2.1 Background

2.1.1. Capita Real Estate & Infrastructure's Ecologists were commissioned by the Greater Cambridgeshire Partnership (GCP) in March 2020 to undertake a series of bat surveys. These surveys were undertaken in relation to the development of Phase 2 of the Cambridge South East Transport (CSET) Project, (the 'Scheme').

2.1.2. The aim of the bat survey report is to summarise the results of the baseline surveys conducted between April and October 2020 to inform the design of the Scheme, and in conjunction with the Environmental Statement, provide sufficient information to allow the Local Planning Authority (LPA) when deciding whether to grant planning permission for the Scheme, to do so in full knowledge of the likely significant effects on bat species, and any avoidance or mitigation measures that will be required to address any likely significant effects.

2.1.3. It includes the results of all preliminary roost assessments, bat emergence/re-entry and bat activity surveys.

2.2 Project Description and Purpose of the Scheme

2.2.1. The Cambridge South East Transport (CSET) Phase 2 project aims to create a new public transport route which would link the Cambridge Biomedical Campus via Great Shelford, Stapleford and Sawston to a new travel hub near the A11/A1307 with connections to Babraham and Granta Park.

2.2.2. The route would be entirely off-road, only interacting with other traffic at junctions. Junctions between existing roads and the new public transport route would be controlled by traffic lights. Alongside this new public transport route would be a new path for active travel. The section between Babraham and Sawston has been reviewed in terms of its detailed alignment, to reduce the impact on farm operations and reduce impacts on landscape character in the area

2.3 Legislation and Policy

2.3.1. Bats receive protection in the UK as a result of both legislation and planning policies. This section outlines the primary legislation protecting bats. All the information below is relevant to this report and to the work proposed at the development site.

Legislation

2.3.2. Bats are protected under Annex II of the EC Council Directive 92/43/EEC 1992 “Conservation of Natural Habitats and Wild Fauna and Flora” (the Habitats Directive) as a European Protected Species (EPS). This legislation has been transposed into UK legislation through the Conservation of Habitats and Species Regulations 2018.

2.3.3. Regulation 41 of the Conservation of Habitats and Species Regulations 2018 makes it an offence to:

- Deliberately capture, injure, or kill bats
- Deliberately disturb bats, or
- Damage or destroy a breeding site or resting place of a bat; this applies whether bats are present or not. NB - breeding sites and resting places are generally referred to as roosts.

2.3.4. In addition to the above protection, all bat species in the UK are protected under Schedule 5 of the Wildlife & Countryside Act 1981 (as amended). In addition to the above, it lists the following as additional offences:

- Disturbance of an animal whilst it is occupying a place which it uses for shelter or protection. NB - places of shelter or protection are generally referred to as roosts
- Obstruct access to any structure or place which an animal uses for shelter or protection.

2.3.5. In order to permit a development where the above offences are likely to be committed a European Protected Species Licence can be obtained from Natural England where appropriate mitigation is offered to offset the negative impacts to local bat populations.

Natural Environment and Rural Communities (NERC) Act 2006

2.3.6. Section 40 of NERC Act 2006 places a statutory duty on public bodies, such as local authorities, that “every public body must, in exercising its functions have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity”.

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Purpose of the Legislation

2.3.7. The purpose of the legislation is to maintain and restore bat populations within their natural range. This implies that the habitats on which they rely, and the ecology of their life cycles should not be compromised by human activities. Where activities have the potential to compromise bat populations, measures are required to be put in place to avoid impacts or compensate and mitigate for those impacts.

Planning Policy

2.3.8. National Planning Policy is set out by the National Planning Policy Framework (NPPF February 2019) combined with the guidance document Planning for Biodiversity and Geological Conservation: A Guide to Good Practice” (ODPM 2005).

2.3.9. Biodiversity net gains are referenced strongly in terms of developing local planning policy and decision-making for development applications. The environmental test of sustainable development requires planning policy and planning decisions to help to ‘improve biodiversity’ (paragraph 8c).

2.3.10. References to biodiversity net gain elsewhere in the new NPPF (such as paragraph 175d) support the delivery of biodiversity net gain through sustainable development. Net gain for biodiversity is far more prominent than in the previous NPPF and considers a holistic landscape approach to protect, and enhance biodiversity promoting conservation, restoration and enhancement of Priority Habitats (also listed as Habitats of Principal Importance) identified under the NERC Act 2006), ecological networks and the protection and recovery of Priority Species (also listed as Species of Principal Importance) identified under the NERC Act 2006). The NPPF includes requirements for planning authorities to identifying and pursuing opportunities for securing measurable net gains for biodiversity (paragraph 174b).

2.3.11. Protected sites and species are a material consideration in determining planning applications and therefore all information relating to protected sites and species must be submitted with planning submissions for determination of the whole application. The NPPF (paragraph 175) which promotes Local Planning Authorities to assess if significant harm would occur to biodiversity and decide accordingly.

Biodiversity Policy

2.3.12. Section 41 of the NERC Act requires the Secretary of State to draw up a list of Habitats and Species of Principal Importance which should be used to guide decision-makers (which include local authorities) in implementing their duty under Section 40. Several species of bat (listed below) are considered Species of Principal Importance, an important factor when considering proposed developments, in accordance with the NERC Act 2006.

- Soprano pipistrelle *Pipistrellus pygmaeus*
- Brown long-eared *Plecotus auritus*
- Barbastelle *Barbastella barbastellus*
- Bechstein's *Myotis bechsteinii*
- Noctule *Nyctalus noctula*
- Greater horseshoe *Rhinolophus ferrumequinum*
- Lesser horseshoe *Rhinolophus hipposideros.*

2.3.13. Additionally, four species of bat are recognised as local Priority Species in the Cambridgeshire and Peterborough Biodiversity Group LBAP:

- Soprano pipistrelle
- Brown long-eared
- Barbastelle
- Noctule.

2.4 Personnel and Quality Assurance

2.4.1. The surveys were led by experienced ecologists and carried out in accordance with Bat Surveys for Professional Ecologists: Good Practice Guidelines, (3rd ed) (Collins, 2016). Surveys were carried out under the supervision of Capita senior staff and bat licensed ecologists Suzannah Spencer (Licence ref: 2015-15891-CLS-CLS), James Johnston (2017-30517-CLS-CLS).

2.4.2. Capita surveyors present for the surveys and referred by their initials in this report are: Suzannah Spencer ACIEEM, James Johnson ACIEEM, Andrea Sarkissian ACIEEM, Neil Page MCIEEM, Thomas Fawley GradCIEEM, Caroline Smallthwaite GradCIEEM, Ann Sherwood MCIEEM, Mark Johnson and Michael Underwood.

2.4.3. The surveyors present for the tree climbing inspection surveys were Jon Durward (2015-11967-CLS-CLS) and William O'Connor. All are fully trained in tree climbing and aerial rescue.

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3. Methods

3.1 Survey and Report Objectives

3.1.1. The surveys and report were carried out to fulfil the following objectives.

1. To identify any features on site with the potential to support bats
2. To identify any evidence of usage of the site by bats
3. To provide data to inform an assessment of the importance of the site for bats and bat conservation

3.2 Desk-Based Study

3.2.1. Local ecological records were obtained from Cambridgeshire and Peterborough Environmental Records Centre in July 2020 from within 2km of the scheme.

3.3 Field Survey

Building Preliminary Roost Assessment Surveys

3.3.1. The Preliminary Roost Assessment (PRA) for buildings was undertaken during August 2020.

3.3.2. Buildings within a 50m buffer of the scheme requiring PRA were provided by Mott Macdonald and locations detailed in **Appendix H.**

3.3.3. The buildings were inspected to enable an assessment of their suitability to support roosting bats and to search for evidence indicating the current or historical use of the structure by bats.

3.3.4. Buildings which were accessible were inspected externally. External observations we made from ground level. No internal inspections were to be undertaken in-line with Covid-19 risk assessments.

3.3.5. Following an initial preliminary roost assessment, the buildings in **Table 6** were excluded from further assessment due to the lack of suitable roosting features within the structures.

3.3.6. Three buildings couldn't be accessed. These buildings are approx. 50m from the scheme boundary but are separated by an existing highway and it is considered unlikely that any roosting bats in these structures would be affected by the proposed scheme.

Tree Preliminary Roost Assessment Surveys

3.3.7. The Preliminary Roost Assessment for trees was undertaken during May - August 2020.

3.3.8. All accessible trees within 80m meter buffer from the scheme boundary were subject to a preliminary roost assessment.

3.3.9. Tree assessments were undertaken from ground level, using a high-powered torches and binoculars, where necessary for the inspection of any Potential Roost Features (PRFs), an endoscope was on hand for use by Ecologists with a Level 2 bat licence.

3.3.10. Trees were assessed for the presence of suitable roosting features including holes in the trunk and lifted bark and signs of bat presence including droppings, staining and scratch marks. All trees with low, moderate, or high potential were number tagged with a small metal disc where landowner permission allowed, and their location and species detail recorded to inform further surveys.

3.3.11. Trees that were scoped in for further assessment were those assessed as having moderate or high potential for roosting features based on the Bat Conservation Trust (BCT) guidance outlined in **Table 1**.

Tree Climbing Inspection Surveys

3.3.12. Trees that were assessed as having moderate or high suitability to support bat roosts and were likely to be affected by the scheme (within 80m of the scheme footprint) through loss damage or other direct impacts, were subject to a tree climbing inspection survey.

3.3.13. The tree climbing inspections were carried out on the 31st July and 14th August 2020.

3.3.14. The survey consisted of each tree being climbed using a harness, ropes, and ladder, where appropriate. The PRFs identified during the ground level assessment were inspected using torches and/or an endoscope to look for evidence of use by bats and collect information on the PRF. Whilst in the tree, climbers checked for additional features not visible from the ground and inspected using the endoscope and torch. The size, both internal and external, of the PRF was noted, as well as the condition within the PRF. The potential for each PRF to host bats was graded either high, moderate, low, or negligible. PRFs were either downgraded where no feature with the potential for roosting was found, retained at original assessed potential, upgraded to high potential or a confirmed roost if a bat or evidence of bats (droppings, scratch marks) were found.

3.3.15. The overall assessment of roosting suitability of each tree was updated based on the highest potential feature identified during the aerial inspections.

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Table 1: Bat Roost Potential Categories

Roost Potential Category	Description of Roosting Habitat	Commuting and Foraging Habitats
Negligible	Negligible habitat features on site unlikely to be used by roosting bats.	Negligible habitat features on site likely to be used by commuting or foraging bats only.
Low	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, shelter, appropriate conditions and / or suitable surrounding habitat to be used on a regular basis.	Habitat that could be used by small numbers of commuting bats such as gappy hedgerows or a vegetated stream, but isolated, e.g. not very connected habitat to the surrounding landscape by other habitats such as trees, hedges, or water courses. 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	A structure or tree with one or more potential roost features that could be used by bats due to their size, shelter, protection, conditions and surrounding habitat but unlikely to support a roost of high conservation status (with respect to roost type only- the assessments in this table are made irrespective of species conservation status, which is established after presence is confirmed).	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.
High	A structure or tree with one or more potential roost feature that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions, and surrounding habitat.	Continuous, high quality habitat that is well connected to the wider landscape that it is likely to be used regularly by commuting bats such as river valleys, streams, hedgerows, lines or trees and woodland edge. High quality habitat that is well connected to the wider landscape that is likely to be used regularly by foraging bats such as broadleaved woodland, tree-lined water courses and grazed parkland. Site is close to and connected to known roosts.

Bat Activity Transect Surveys

3.3.16. Seven transect routes were selected based on habitat types, quality, likely impacts and known species records, and to give good coverage of bat activity across the scheme. A description of the transects and associated habitats can be found in **Table 2**.

Table 2: Transect route descriptions

Transect Route ID	Transect Description
Transect 1	The transect covers the hedgerows bordering arable fields to the north and south of Granham's Road. To the north of Granham's road the transect follows a public right of way, adjacent to a farmhouse track with a hedgerow to the south-west and grassland fields to the east, the farmhouse is set back to the north-east. at the northern most end of this transect the route crosses over a large pond and enters part of Nine Wells Nature reserve. To the south of Granham's Road the transect follows the tree lined hedgerow which is adjacent to residential housing to the south-west. There is a woodland strip/hedgerow that bisects the two arable fields along the route. The southernmost section runs along Hinton Way with a mature hedgerow bordering the road.
Transect 2	The transect is located within agricultural surroundings consisting of two large arable land parcels surrounded by hedgerows and bisected by Haverhill Road.
Transect 3	Transect covers the land lying to the north of Dales Manor Business Park, Grove Road, Sawston as well as that lying west at Deal Farm, south of the River Granta. Habitats are generally agricultural with two woodland blocks on the south side and the River Granta to the north.
Transect 4	The transect covers the tree lined PRoW to the east of the Cambridge Science Park, to the north of Babraham Road. However, the area is now under construction for a housing estate which may reduce the suitability for bats. Part of the transect is unable to be accessed due to the construction site and the transect must be walked at the south of Brabham Road/Sawston Road, along the cycleway. Sawston Road is a minor, relatively quiet road that is unlit with the exception of illuminated 'cats eyes' along the cycle path. The transect follows the mature hedgerow through agricultural fields at the south of Sawston Road until the hedgerow meets a small woodland patch towards High Street. The transect continues along High Street following a gappy hedgerow and scattered trees until it meets back with the cycle path on Sawston Road.
Transect 5	Transect covers the land in Babraham at Cheveley Park Farms, lying south of the River Granta. Habitat is mostly agricultural with a reservoir on the north-east edge and the A505/ A11 roads running along the eastern and southern boundaries.
Transect 6	Transect covers the land in Babraham at Cheveley Park Farms, lying north of the River Granta. The transect consists of arable fields surrounded by hedgerows with woodlands located to the east and south. The River Granta and a pond is located within the southern aspect of the transect.
Transect 7	This transect includes the agricultural fields and greenhouses to the north of Bourn Bridge Road, crossing Cambridge Road and up towards The Grange farmhouse. The habitats are generally agricultural with woodland pockets, particularly to the north of The Grange. Cambridge Road is a main road and is a duel carriageway for part of the section close to the transect.

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3.3.17. The transects were carried out once per month and undertaken from May[2] - October 2020. **Table 3** below details the dates the transects were undertaken.

Table 3: Transect survey dates

Transect ID	May	June	July	August	September	October
1	01/06/2020	16/06/2020	21/07/2020	18/08/2020	25/09/2019	28/10/2019
2	21/05/2020	15/06/2020	14/07/2020	19/08/2020	25/09/2019	16/10/2019
3	19/05/2020	16/06/2020	15/07/2020	20/08/2020	25/09/2019	16/10/2019
4	18/05/2020	25/06/2020	16/07/2020	20/8/2019	25/09/2019	16/10/2019
5	18/05/2020	18/06/2020	16/07/2020	18/08/2020	15/09/2020	01/10/2020
6	20/05/2020	18/06/2020	15/07/2020	17/08/2020	16/09/2020	06/10/2020
7	19/05/2020	23/06/2020	14/07/2020	20/8/2019	25/09/2019	28/10/2019

3.3.18. Transect routes were walked at a slow, consistent pace by two surveyors carrying Anabat Walkabout bat detectors. Any bat activity was recorded with time, species of bat and type of activity (commuting, foraging, emerging). Each transect had at least five listening stops where surveyors remained stationary and recorded activity in that area for three to five minutes (dependant on route length). The transects were walked once in each direction on each evening to detect early and late emerging bats along the transect, the transects were then reversed the following month (e.g. Month one X-Y-X, Month two Y-X-Y and month three X-Y-X and so on). The transects began at sunset and continued for at least two hours after sunset.

[2] See Limitations section for constraints to the start of surveys in 2020

3.3.19. Surveys were undertaken in accordance to BCT guidelines and a low/moderate suitability for bat activity. April surveys were missed due to the pandemic and its restrictions at the time. No dawn surveys were conducted due to unsuitable weather on the planned survey days.

3.3.20. **Appendix D** provides heat maps from the data produced during the transect surveys. Bat data points, defined as bats seen or heard during transects, were used to generate heatmaps, which illustrate the intensity of bat activity. The kernel density algorithm in QGIS 3.16.3 was used to generate the heatmaps, with the number of bat data points (kernels) within a 50m radius defining the intensity of bat activity. This was illustrated using 9 colour categories, ranging from red (most intense) to green (least intense).

Static Detector Surveys

3.3.21. Static bat detectors (Anabat swift) were deployed in May- October 2020 in the locations associated with the transect routes. Seven detectors were deployed over five consecutive nights each month from May to July 2020. Following the identification of barbastelle bats, a total of 17 detectors were deployed in August - September 2020 and 15 in October 2020 due to landowner permissions. The number of detectors deployed was increased due to the recording of barbastelle bats and a subsequent request by Natural England to gain information relating to the distribution of barbastelle across the route. Static detector deployment dates are detailed in **Appendix B**.

3.3.22. As with the transect surveys, the statics were not deployed until May due to the pandemic.

3.3.23. Winter static surveys are being undertaken from November to March 2021.

3.3.24. Detectors were placed in locations in order to provide additional data to support the information collected during transect surveys. Data was recorded from half an hour before sunset to half an hour after sunrise. The detector sound files were then analysed using Anabat Insight software to assess the level of bat activity within each location.

3.3.25. The detector sound files were analysed in Anabat Insight using the Bat-Classify Auto ID program. 10% of data was manually checked, including noise files, with 100% of files identified through auto-ID as noctule/serotine/Leisler's and brown long-eared bat manually checked. Species from the *Myotis* genus of bats produce frequency modulated calls with overlapping call parameters and cannot be reliably distinguished to species level alone on call alone. As such, *Myotis* calls are identified as *Myotis* sp. Bats of the *Nyctalus* genus produce calls with overlapping call parameters, except in open environments. The two *Nyctalus* species found in this region, noctule and Leisler's, were therefore grouped together, with most bats being noted as noctule and a small number with overlapping parameters.

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Validating the data through manual checks follows the BCT best practice guidelines (2016). Bat calls was averaged over seven nights to provide a bat call/hour index, with night length calculated as sunset to sunrise. The exception for this was Static A in August, where only two nights data was recorded, due to the SD cards being full within this time; in this instance, the data was averaged over two nights.

3.3.26. All barbastelle calls were manually checked.

3.3.27. The locations of these static detectors shown is in **Appendix A** and a description in **Table 4**.

Table 4: Static detector locations

Static detector ID	Static Detector Description	Approximate Grid Reference
Transect 1 - static 1	Narrow hedge line with mature trees heading south west to north east. between two arable fields. Static detector pointing north westerly.	TL 46924 53227
Transect 1 - static 2	Narrow hedge line with trees heading south west to north east between two arable fields adjacent to nine wells nature reserve, within 50m of a ditch feed by a spring within nine wells woodland. Static detector pointing north westerly.	TL 46092 54075
Transect 1 - static 3	Narrow hedge line with mature trees heading North west to south east between two arable fields. Static detector pointing north easterly.	TL 46515 53347
Transect 2 - static 1	Attached to a tree within a line of trees heading north east to south west beside a B road in between two arable fields with a hedge line on the opposite side of the road. Static detector points easterly.	TL 48049 52433
Transect 2 - static 2	Positioned to the bottom of a hedge line north west to south east dissecting two arable fields. Detector point westerly	TL 47449 53095
Transect 2 - static 3	Positioned to the bottom of a hedge line north west to south east dissecting two arable fields. Detector points easterly.	TL 47999 51972
Transect 3 - static 1	Positioned within a small section of unmanaged arable land, bordered by woodland and open arable fields with a ditch running north to south. Static detector points south easterly.	TL 48660 50798
Transect 3 - static 2	Positioned on the edge of as strip of woodland heading east to west bordering an arable field. Static facing northerly.	TL 47994 51132
Transect 3 - static 3	Positioned on the edge of a narrow strip of hedge line with trees heading east to west bordering an arable field to the north. A Medium sized waterbody is in the adjacent land parcel to the south. Detector facing north.	TL 49074 50790
Transect 4 - static 1	Within the corner of a field, with tree lines heading south to north, and west to east. Detector facing north easterly.	TL 50708 49418

Transect 4 - static 2	Unable to deploy securely due to high use public footpath. Alternative locations too close to existing detectors or unsecure.	TL 49429 49951
Transect 4 - static 3	Unable to deploy securely due to high use public footpath. Alternative locations too close to existing detectors or unsecure.	TL 50406 49996
Transect 5 - static 1	Positioned on an ash tree on a tree line heading east to west. Bordered to the south by arable fields, with a ford and river adjacent to the north of the woodland strip. A mature ash and pine woodland are immediately to the north west. Detector pointing south.	TL 51318 49707
Transect 5 - static 2	Unable to deploy securely	TL 50757 49840
Transect 5 - static 3	Positioned on a tree within a small section of young plantation trees. Detector facing south with a small man-made reservoir to the north west and arable fields to the south.	TL 51759 49400
Transect 6 - static 1	Positioned on a beech tree, in a short line of 4 trees within a hedge line heading east to west. Arable fields border the hedge line to the north and south. Detector pointing north.	TL 51852 49807
Transect 6 - static 2	Unable to deploy securely	TL 52039 50232
Transect 6 - static 3	Positioned on a tree within a hedge line with trees heading north east to south west. An arable field is to the east and west with a farm track running adjacent to the east. Detector facing east.	TL 51453 50017
Transect 7 - static 1	Positioned on a tree within a woodland strip heading south east to north west, between an arable field and an A Road. Detector facing north easterly	TL 52570 49824
Transect 7 - static 2	Positioned on a tree beside a farm track. Farm track heading north to south. Arable fields are adjacent to the east and west. Detector facing west.	TL 52899 50014
Transect 7 - static 3	Positioned on a tree on the edge of a woodland beside a farm track. Farm track heading east to west. An arable field is adjacent to the south. Detector facing south.	TL 52787 50613

Emergence and Re-Entry Surveys

3.3.28. Trees were selected for emergence/re-entry surveys based on their suitability assessed during the Preliminary Roost Assessment and tree climbing surveys, the location of the tree in relation to the scheme and if they had been identified as being affected directly or indirectly by the proposed scheme. Trees with low potential were not surveyed further except T8 as this was visible close to another tree so was monitored during a survey. Trees with moderate potential required two surveys (dusk and a dawn), unless a roost was confirmed then a third survey was undertaken. Trees with high potential had three surveys (at least one dusk and one dawn).

3.3.29. T18 was identified as being of high potential but due to access issues, it was only surveyed once.

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3.3.30. Emergence and re-entry surveys were undertaken within the months of July, August, and September 2020. Dates are shown in **Table 5.**

Table 5: Tree emergence/re-entry survey dates

Tree Reference - potential	Survey 1	Survey 2	Survey 3
T8 – Low	12/08/2020 – Dusk	N/A	N/A
T9 - Moderate	12/08/2020 – Dusk	04/09/2020 - Dawn	N/A
T10 - Moderate	12/08/2020 – Dusk	04/09/2020 - Dawn	N/A
T11 - Moderate	12/08/2020 – Dusk	04/09/2020 - Dawn	N/A
T12 - Moderate	12/08/2020 – Dusk	04/09/2020 - Dawn	N/A
T13- High	11/08/2020 – Dusk	18/08/2020 – Dusk	01/09/2020 - Dawn
T14 - Moderate	18/08/2020 – Dusk	04/09/2020 - Dawn	N/A
T15 - Moderate	17/08/2020 – Dusk	04/09/2020 - Dawn	N/A
T18 - High	10/09/2020 – Dusk	N/A	N/A
T21 - Moderate	26/08/2020 – Dusk	09/09/2020 - Dawn	N/A
T22 - Moderate	26/08/2020 – Dusk	09/09/2020 – Dawn	N/A
T23 - Moderate	17/08/2020 – Dusk	19/09/2020 - Dawn	29/09/2020 - Dawn
T24 - Moderate	20/08/2020 – Dusk	23/09/2020 - Dawn	N/A
T25 - Moderate	20/08/2020 – Dusk	30/09/2020 - Dawn	N/A
Line 1 - Moderate	10/08/2020 – Dusk	24/09/2020 - Dusk	N/A
Line 2 - Moderate	10/08/2020 – Dusk	29/09/2020 - Dusk	N/A
Line 3 - Moderate	20/08/2020 – Dusk	29/09/2020 - Dusk	N/A

3.3.31. The number of surveys required on each tree were determined by the suitability of the tree. Those with moderate suitability were subject to an emergence and a re-entry survey and those with high suitability had three surveys consisting of both an emergence and a re-entry survey. Where roosts were identified, three surveys were carried out (T13 and T23) except T18 where only one was undertaken due to access constraints.

3.3.32. Surveyors were strategically positioned around the tree focusing on areas where potential access points had been identified during the Preliminary Roost Assessment, to be able to observe any bats leaving or entering roosts.

3.3.33. All observed bat passes were recorded on a plan, noting the time, the location and, where possible, the direction of flight, species, and behaviour of the bat (i.e. commuting, foraging, social calling). Importance was placed on noting the location of any points where bats were observed leaving or entering the tree. The weather details were also noted.

3.3.34. Capita Surveyors were equipped with Anabat Walkabout detectors.

3.3.35. After completion of each survey session, digital bat recordings were analysed using Anabat Insight analysis software to confirm species identification.

3.3.36. The emergence surveys commenced 15 minutes prior to sunset and continued for 1.5-2 hours after sunset.

3.3.37. The re-entry surveys commenced 1.5 hours before sunrise and continued for 15 minutes past sunrise.

3.4 Limitations and Assumptions

3.4.1. At the point of commencement of the surveys in April 2020 measures relating to the management of the coronavirus pandemic came into force which caused a delay to the start of surveys. This occurred as it was determined between the client and Capita how work could be carried out safely. This led to a delay in starting the surveys until May 2020 and the usual methodology of conducting bat surveys from April not being achieved. However, surveys were carried out from April 2020 and this constraint is not considered to have affected the reliability of the results outlined in this report.

Transects

3.4.2. Access to some land was restricted by the landowner due to farming practices, causing some deviation to the guidelines to allow landowners to continue as normal.

3.4.3. The routes of transect 5 and 6 had to be modified during September and October to accommodate specific landowner's restrictions. The transect 5 alteration was to walk the central section in a northerly direction against the old rail line at TL 51161 49109, due to game bird pens within the centre. This meant during the return walk of the transect we were not going in an opposite direction. The alteration on Transect 6 was to avoid the river due to game birds being released, a stretch of 300m was to be avoided. The alterations are unlikely to negatively impact the results due to the data available from previous surveys, substantial data from trees and static detectors located close to the transects providing sufficient evidence on the use of the areas by bats. The alterations account for <10% of transect 5 and 6.

3.4.4. The transect 5 October survey was undertaken on the 30 September due to landowner permissions. However, enough time had passed between the September survey and the October survey to provide a good range of data. This does not affect the validity of this report.

3.4.5. April surveys were missed due to the pandemic and the delays this caused in commencing field survey work. No dawn surveys were conducted due to unsuitable weather on the planned survey days.

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Static detectors

3.4.6. Due to the presence of barbastelles during August and September the surveys were split into two groups. Transect 1, 2, 3 were deployed together, followed by Transects 4, 5, 6 and 7 deployed the following week. As five nights deployment would cause them to fall on a weekend, it was determined to deploy for seven nights to ensure consistency.

3.4.7. A static detector was not deployed on Transect 1 in May as landowner permission had not yet been granted.

3.4.8. Transect 5 static detectors were not deployed in October due to landowner permissions being restricted in relation to the location of their game birds and possible disturbance.

3.4.9. It was not possible to deploy four static detectors due to security and lack of suitable locations as described in **Table 4.** Due to the number and distribution of the remaining static detectors the impact of this is negligible and the validity and assumptions of this report are not negatively impacted.

3.4.10. The number of detectors deployed was increased in August due to the recording of barbastelle bats and a subsequent request by Natural England to gain information relating to the distribution of barbastelle across the route.

3.4.11. The following static deviations occurred:

- May Static 6 - no recordings of bat species occurred– no obvious device malfunction
- June Static 2 - recorded for the first four nights only due to noise files filling the memory cards
- July Static 2 - recorded for the first four nights only due to noise files filling the memory cards
- August Transect 1 Static 3 - recorded for the first three nights only due to noise files filling the memory cards
- August Transect 2 Static 1 - recorded for the first two nights only due to noise files filling the memory cards
- August Transect 6 Static 1 - recorded for the first five nights only due to noise files filling the memory cards
- August Transect 6 Static 3 - recorded for the first five nights only due to noise files filling the memory cards

- September Transect 1 Static 3 - recorded for the first three nights only due to noise files filling the memory cards
- September Transect 2 Static 3 - recorded for the first three nights only due to noise files filling the memory cards
- September Transect 3 Static 3 - recorded for the first three nights only due to noise files filling the memory cards
- September Transect 6 Static 3 - recorded for the first four nights only due to noise files filling the memory cards

3.4.12. These deviations whilst not providing fully comparative data, do not impact the validity and accuracy of the data. Sufficient data has been collected to provide a sufficient bat assessment of the site. A cause for excess noise files is possibly increased by wind and rain during the dates of deployment. Analysis of some of the noise files indicate rainfall. However, this possible unsuitable weather does not appear to have affected the number of bat calls recorded during these months when compared to other months. The site is very open and even light breeze through vegetation may increase the noise files significantly. Reducing the sensitivity of the detectors was discussed but this may have led to a decrease in bat calls being recording.

Trees

3.4.13. Access to T18 was subject to landowner changes after the first survey, which restricted confirmed access to one survey initially despite it being a high potential tree. When access was permitted weather impacted further surveys. However, the first survey provided positive roost data, so the impact of the limited survey effort does not impact the validity of this report.

3.4.14. Lines 1-3 of trees had the PRA undertaken at inopportune timing and the full extent of the tree wasn't visible due to canopy and leaf cover and negligible to low suitability was assessed to be present, however as a precaution it was decided to survey them as a whole to provide further data to back-up the low suitability for roosting bats. This limitation does not impact the validity and assumptions of this report.

3.4.15. T23 was initially surveyed in the core season, however weather constraints caused the second and third survey to be delayed resulting in them being outside of core season and only 10 days apart. However, a roost was confirmed in the initial survey, so this limitation will not negatively impact the results for T23.

Buildings

3.4.16. No access was possible to the internal of buildings and external assessments were made only.

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3.4.17. Three buildings (9,10,11) had no access due to timing and being unable to contact owners due to COVID-19 restrictions. Limited external survey was undertaken, and they are not to be directly affected by the proposals.

4. Results

4.1 Desk Study

4.1.1 The 2km local ecological records search included the following notable bat records.

1. Brown Long-eared Bat *Plecotus auritus*
2. Common Pipistrelle *Pipistrellus*
3. Daubenton's Bat *Myotis daubentonii*
4. Nathusius's Pipistrelle *Pipistrellus nathusii*
5. Natterer's Bat *Myotis nattereri*
6. Noctule Bat *Nyctalus noctula*
7. Serotine *Eptesicus serotinus*
8. Soprano Pipistrelle *Pipistrellus pygmaeus*
9. Western Barbastelle *Barbastella barbastellus*

4.2 Building Preliminary Roost Assessment Survey

4.2.1. **Table 6** details the results of the preliminary roost assessment of all buildings surveyed. The suitability and photos of the structures is also shown on the plan at **Appendix I**.

4.2.2. None of the buildings surveyed have any suitability for roosting bats.

4.2.3. Access to Buildings 9, 10 and 11 was not possible. However, the buildings are 50m distance from the current proposed scheme and separated by an existing road. Therefore, no further surveys are required on these buildings with the current design.

Table 6: Preliminary roost assessment building survey results.

Building Number	Grid Reference	Building Type and description	Roosting Potential (Negligible, Low, Moderate, High, or confirmed)
1	TL 46144 54556	Brand new scientific/office building. No access to internals,	Negligible

Building Number	Grid Reference	Building Type and description	Roosting Potential (Negligible, Low, Moderate, High, or confirmed)
		external done from public highway. New modern building built recently. Well-sealed and of metal/glass construction.	
2	TL 49167 50418	Cement factory – made of steel structure, very dusty, well used, and dangerous to inspect or approach.	Negligible
3	TL 49282 50329	Demolished	N/A
4	TL 49283 50358	Demolished	N/A
5	TL 49318 50311	Demolished	N/A
6	TL 49318 50311	Demolished	N/A
7	TL 49448 50253	Steel structure commercial units, external is well maintained, some shutters were open and internally the roof was a single sheet with sections of clear plastic. Building appeared to be single sheet steel structure.	Negligible
8	TL 49432 50226	Steel structure commercial units, external is well maintained, some shutters were open and internally the roof was a single sheet with sections of clear plastic. Building appeared to be single sheet steel structure.	Negligible
9	TL 50397 50062	Residential dwelling – No access and covered from public view by tall trees and fences/gates.	N/A
10	TL 50421 50050	Residential dwelling – No access and covered from public	N/A

Building Number	Grid Reference	Building Type and description	Roosting Potential (Negligible, Low, Moderate, High, or confirmed)
		view by tall trees and fences/gates.	
11	TL 50460 50032	Residential dwelling – No access and covered from public view by tall trees and fences/gates.	N/A
12	TL 51346 49707	Wooden Shed/pump house. Felt covered roof, internals housed pumping machinery. No suitable spots for bats to roost	Negligible

4.3 Tree Roost Assessment Survey

Results

4.3.1. Thirteen woodland locations were surveyed from ground-level in order to assess the individual trees suitability to support roosting bats. Of this, 25 trees were identified as having moderate to high suitability to support roosting bats. The location of trees with low to high suitability are shown in **Appendix E**; these trees were then climbed, where safe to do so, to determine the category of the tree. Photographs of these trees are shown in **Appendix F.**

4.3.2. Tree climbing was undertaken in July and August 2020. Pipistrelle droppings were found in T13 increasing the assessment to high/confirmed roost. T18 was also increased to high after a tree climbing exercise. No other trees requiring further survey had the assessment criteria increased. **Appendix G.** provides full survey results.

4.3.3. **Table 7** details the results of the preliminary roost assessment of all trees surveyed with moderate or above suitability.

Table 7: Preliminary roost assessment tree survey results (subsequently confirmed roosts in bold)

Tree ID	Grid Reference	Tree species and condition	Assessment prior to tree climb	Tree climb assessment	Overall assessment of roosting potential
1	TL 46865 53157	Ash	Not Climbed	N/A	Low
2	TL 46865 53158	Oak	Not Climbed	N/A	Low
3	TL 50715 49352	*Sycamore*	Not Climbed	N/A	Low
4	TL 50714 49351	Ash	Not Climbed	N/A	Low
5	TL 50715 49294	Ash	Not Climbed	N/A	Low
6	TL 50714 49252	Ash	Not Climbed	N/A	Low
7	TL 51308 49848	Oak	Not Climbed	N/A	Low
8	TL 51300 49847	Standing dead	Not Climbed	N/A	Low
9	TL 51279 49775	Ash	Moderate	Moderate	Moderate
10	TL 51310 49844	Ash	Moderate	Moderate	Moderate
11	TL 51332 49818	Ash	Moderate	N/A	Moderate
12	TL 51333 49812	Ash	Moderate	Moderate	Moderate
13	TL 51333 49809	Pine	Moderate	**High**	High
14	TL 51334 49807	Ash	Moderate	Moderate	Moderate
15	TL 51439 49662	*Crack willow*	Moderate	Moderate	Moderate
16	TL 51482 49642	*Sycamore*	Low	Low	Low
17	TL 51509 49633	*Crack willow*	Low	Low	Low
18	TL 52154 49788	*Oak*	Moderate	**High**	High
19	TL 52146 49763	*Oak*	Low	Low	Low
20	TL 52679 49695	*Ash*	Low	Low	Low
21	TL 48413 50933	*Willow*	Moderate	Moderate	Moderate
22	TL 48429 50918	*Willow*	Moderate	Moderate	Moderate
23	TL 51861 49806	*Oak*	Moderate	**Low**	Low
24	TL 51906 49786	*Oak*	Moderate	Moderate	Moderate
25	TL 51953 49769	*Oak*	Moderate	Moderate	Moderate

Line 1	TL 50566 49990	*Lyme*	Not Climbed	N/A	Low
Line 2	TL 50533 49999	*Lyme*	Not Climbed	N/A	Low
Line 3	TL 46515 53347	*Mixed*	Not Climbed	N/A	Low

4.4 Tree Emergence/Re-entry Survey Results

4.4.1. During the emergence/re-entry surveys, roosts were recorded in T18 and T23. The species of bat in T23 was unknown as no sound was recorded, but two separate bats were seen to emerge during the survey. The behaviour of the bats emerging were similar to a single common pipistrelle and a single noctule. Inspection of the tree during daylight indicated the bats may have emerged from a hidden feature at the upper extremities of the tree. T18 roost was of a three soprano pipistrelle bats which emerged from the upper canopy from dead dieback on the main stem.

4.4.2. No other recordings of importance were made during the tree surveys.

4.4.3. Daubenton's were found to be foraging over the stream located at TL 51313 49713. Common and soprano pipistrelle were recorded foraging and commuting during emergencies and re-entry surveys in areas similar to those picked up during the transects. Noctules were occasionally recorded but not seen, commuting high above the survey site.

4.5 Bat Activity Transect Survey Results

4.5.1. Table 8 details bat activity transect survey timings and weather, and Table 9 summarises bat activity recorded along each route per month. Transect plans displaying bat activity are shown in **Appendix C.**

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Table 8: Bat Activity Transect Survey Timings and Weather Conditions

Transect ID	Sunset	Date	Start/End Time	Temperature (°C)	Rain	Cloud Cover (%)	Wind Speed (m/s)	Humidity (RH)
	May							
1	21:11	01/06/2020	21:11	17	0	10	1	91
			23:11	16	0	10	1	91
2	20:56	21/05/2020	20:56	20	0	0	1	44
			23:00	16	0	0	0	60
3	20:49	19/05/2020	20:49	22	0	10	1	62
			22:49	19	0	0	0	60
4	20:52	18/05/2020	20:52	18	0	10	2	52
			22:52	18	0	0	0	52
5	20:52	18/05/2020	20:52	18	0	20	1	58
			22:52	15	0	0	1	57
6	20:55	20/05/2020	20:55	23	0	0	2	44
			22:55	21	0	0	1	43
7	20:49	19/05/2020	20:49	21	0	0	0	62
			22:53	19	0	0	0	59
	June							
1	21:22	16/06/2020	21:22	16c	0	50	0	80
			23:22	14c	0	0	0	79
2	21:21	15/06/2020	21:21	19c	0	60	0	55
			23:21	16c	0	100	0	55
3	21:22	16/06/2020	21:22	20	0	10	0	60
			23:22	16	0	0	0	51
4	21:24	25/06/2020	21:24	24	0	10	1	36
			23:24	20	0	10	2	68
5	21:24	18/06/2020	21:23	17	0	10	1	69
			23:23	14	0	0	2	84
6	21:23	24/06/2020	21:20	26	0	10	1	47
			23:20	22	0	10	1	40
7	21:22	23/06/2020	21:24	20	0	25	4	55
			23:24	18	0	0	3	50
	July							
1a	21:14	13/07/2020	21:14	14	0	40	0	60
			22:30	13	0	90	0	72
1b	21:05	21/07/2020	21:05	17	0	90	0	45
			23:05	15	0	20	0	41
2	21:13	14/07/2020	21:14	16	0	90	3	66
			23:14	14	0	100	1	55
3	21:12	15/07/2020	21:12	21	0	100	0	60
			23:12	18	0	100	1	72
4	21:11	16/07/2020	21:11	21	0	100	0	52
			23:11	19	0	100	0	60
5	21:11	16/07/2020	*21:11*	18	0	95	1	57
			23:11	17	0	95	1	57

6	21:12	15/07/2020	*21:12*	16	0	100	1	58
			23:12	15	0	100	1	65
7	21:13	14/07/2020	*21:13*	18	0	95	2	58
			23:13	15	0	20	3	66
	August							
1	20:16	18/08/2020	20:16	20	0	70	2	61
			22:16	17	0	80	3	68
2	20:14	19/08/2020	20:14	18	0	100	7	81
			22:14	18	0	100	7	81
3	20:12	20/08/2020	20:12	18	0	30	4	62
			22:12	15	0	50	1	70
4	*N/A*	*N/A*	N/A	N/A	N/A	N/A	N/A	N/A
			N/A	N/A	N/A	N/A	N/A	N/A
5	20:16	18/08/2020	20:16	19	0	75	3	82
			22:16	17	0	20	3	88
6	20:18	17/08/2020	20:18	18	0	30	3	75
			22:18	16	0	30	4	72
7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			N/A	N/A	N/A	N/A	N/A	N/A
	September							
1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			N/A	N/A	N/A	N/A	N/A	N/A
2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			N/A	N/A	N/A	N/A	N/A	N/A
3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			N/A	N/A	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			N/A	N/A	N/A	N/A	N/A	N/A
5	19:13	15/09/2020	19:13	23	0	10	2	75
			21:13	21	0	10	2	80
6	19:10	16/09/2020	19:10	16	0	100	6	55
			21:10	15	0	90	5	63
7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			N/A	N/A	N/A	N/A	N/A	N/A
	October							
1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			N/A	N/A	N/A	N/A	N/A	N/A
2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			N/A	N/A	N/A	N/A	N/A	N/A
3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			N/A	N/A	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			N/A	N/A	N/A	N/A	N/A	N/A
5	18:36	01/10/2020	18:36	11	0	10	2	75
			20:36	9	0	60	2	74
6	18:24	06/10/2020	18:24	12	0	100	5	85
			20:24	11	0	80	5	85
7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			N/A	N/A	N/A	N/A	N/A	N/A

Note – N/A is due to the results of these surveys being completed in 2019 (WYG Dec 2019)

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Table 9: Activity Survey Results Summary

Transect ID	May	June
1	Undertaken on the 1st June, this transect started from the centre point, heading south initially, reaching the end point, returning on the same route, and completing the northern section, before looping back and returning to the centre point. Activity was low-moderate, with a common noctule foraging at the southernmost point, common pipistrelles heard but not seen along linear features, and a single common pipistrelle seen commuting on the northern point. A single serotine was heard not seen along a linear feature on the southern section, consisting of a trees and hedge line. Weather was mild at 17°C. First bat recorded was a common pipistrelle at 21:42 and last bat recorded was a serotine at 22:56.	Common pipistrelles and noctules were recorded during this survey, with bats recorded along all areas of the transects. Noctules were recorded at the northern end of the transect. Passes followed the hedgerows bordering arable fields. Passes were noted around the waterbody to the north of the transect. The first bat was a noctule recorded at 21:42 commuting over the arable fields at the north of the transect. The last bat was a common pipistrelle recorded at 23:45, commuting along the tree line adjacent to the residential houses at the south of Granham's Road.
	July	**August**
	This transect was undertaken twice, initially on the 13th and started from the centre point, heading south initially, reaching the end point, returning on the same route. Halfway through the survey heavy rain started and the survey was aborted. However low to moderate levels of bat activity had been recorded on the southern section. Common pipistrelles were recorded foraging and commuting along the linear features. The first bat was recorded a 21:40 and the final recorded at 22:20 with the survey aborted at 22:30 after 20 minutes of persistent moderate increasing to heavy rain. It was then undertaken again on the 21st in suitable weather conditions, repeating the direction above. The first bat detected was a common pipistrelle at 22:13 and the final bat was a common pipistrelle at 22:41. Low to moderate levels of bat activity was detected.	Moderate levels of foraging and commuting bat activity along the hedgerow and woodland. A total of 13 common pipistrelle registrations and four soprano pipistrelle registrations, foraging and commuting were recorded (but often multiple passes/continuous foraging activity associated with each registration), with nine noctule and one NSL[3] registration and two *Myotis* species bat commuting passes towards the end of the survey. Most bats seen at one time was two. First bat heard was a soprano pipistrelle at 20:41 and the last was a noctule at 22:21.
	September	**October**
	N/A	N/A

[3] A grouping of large bats (noctule/serotine/Leisler's) where calls can overlap and be difficult to separate

2	**May**	**June**
	The transect started from a central point circling clockwise on the northern section, before crossing the main road, circling the southern section anti-clockwise. Low activity was recorded around the field margins, species present were foraging common pipistrelle, soprano pipistrelle and *Myotis* species. A noctule and common pipistrelle were also heard but not seen. The first bat was recorded at 21:37 a common pipistrelle and the last bat at 22:53 a noctule.	This transect started from a central point, circling anti-clockwise on the southern section, before anti-clockwise on the northern section. No bats were recorded on the southern section of the transect. Common pipistrelle, soprano pipistrelle and noctule bats were recorded on the northern section foraging and commuting. Overall activity was low. The first recording was at 22:06 2 x common pipistrelle and the last recording at 23:10 a single common pipistrelle.
	July	**August**
	The transect started from a central point circling clockwise on the northern section, before crossing the main road, circling the southern section clockwise. A single foraging noctule and a single common pipistrelle pass was recorded on the southern section. Two noctules and a single common pipistrelle recorded on the northern section. Activity was low. The first recording was at 21:19 a foraging noctule and the last recording at 23:00 a common pipistrelle.	Light rain between 21:00 and 21:20, bats still present considering the weather and largely open arable landscape. Three noctule commuting passes overhead, one NSL (most likely Leisler's/Serotine 21:19:19), with eight common pipistrelles commuting and foraging, multiple registrations where foraging. Total of six soprano pipistrelle registrations, again largely along hedgerows, commuting and foraging. One BLE commuting pass at the northern end of the route near an area of dense tree over/hedgerow/scattered parkland trees. The first recording was a noctule at 20:41 and the last recording a common pipistrelle at 22:10.
	September	**October**
	N/A	N/A
3	**May**	**June**
	Low level of activity of which most was recorded in north-western corner of transect, adjacent to River Granta. A noctule was the first bat recorded at 21:26 and the last bat a soprano pipistrelle recorded at 22:54. Suspected serotines were evidenced but noted as NSL. A total of 6 bats were recorded.	The transect was run east to west. No bats were recorded on the eastern section with common pipistrelle, soprano pipistrelle and noctules recorded near the wooded western end, close to the river. Activity levels were low with foraging and commuting activity witnessed. The first bat was noctule recorded at 21:53 and the last recorded at pipistrelle 22.24.
	July	**August**
	Transect walked clockwise. Only two noctules were recorded during the survey. One was continuously foraging at 21:36 and another was heard not seen at 21:51.	No bats recorded. Weather was suitable for the survey and no obvious reasons for not recordings or sightings. Device checked and confirmed to be working fine. No bats recorded.
	September	**October**
	N/A	N/A

4	**May**	**June**
	Only common pipistrelles were recorded during this survey. Most bat activity was recorded at the south eastern section of the transect and along High Street and south of Sawston Road. The first bat was a common pipistrelle recorded at 21:25 along the hedgerow that bisects the arable fields to the south of Sawston Road. The last bat was a common pipistrelle recorded at 22:28, which was not seen but recorded in the same location. Constant foraging pipistrelle passes were recorded along High Street throughout the survey. Overall, a low level of bat activity was recorded during this survey.	Only pipistrelles were recorded during this survey. No bats were recorded at the south east section of this transect. Most bat activity was recorded at the south eastern section of the transect and along High Street and south of Sawston Road. Constant foraging pipistrelle passes were recorded along the public footpath, a low level of bat activity was recorded during this survey. The first bat was recorded at 22:20 and the final at 23:04. Only common pipistrelle were recorded.
	July	**August**
	Transect walked anti-clockwise, then again clockwise. No bats recorded in north-western section of transect. *P.pip* was seen commuting at 21:55 south along tree line next to High Street at listening stop 16. Another was also recorded foraging north-west along woodland edge/hedgerow at 22:36. Soprano pipistrelle heard not seen along Sawston Road at 22:07. Low levels of activity recorded during survey.	N/A
	September	**October**
	N/A	N/A
5	**May**	**June**
	Moderate levels of activity concentrated along the hedgerows where the A505 merges to the A11. Constant foraging by two soprano pipistrelles in this area. The first bat was a common pipistrelle recorded at 21:21 and the last a common pipistrelle at 22:56. The majority of recordings were made up of pipistrelle species with a suspected serotine, which is noted as an NSL.	Only pipistrelles were recorded during this survey. Most bat activity was recorded at the north of the Transect along Babraham Road section of the transect. Constant foraging pipistrelle passes were recorded along this section, a low level of bat activity was recorded during this survey. The first bat was a common pipistrelle recorded at 22:10 and the last a myotis sp. at 23:12. Pipistrelle species, *Myotis* species, noctules and a suspected serotine were recorded during this transect,
	July	**August**
	Only common pipistrelle foraging and commuting. Five commuting passes and one registration of foraging activity, all along the western boundary of the transect along the tree lined High Street that leads into Babraham. Low levels of activity overall. The first recording was at 21:43 and the final at 22:45.	The transect had low activity levels, common pipistrelles were witnessed foraging and commuting along linear features, and a myotis species detected close to a wooded section on the eastern boundary. The detection was quiet and not picked up by the recording device and it's suspected they are brown long eared bat. The first recording of a bat was at 21:31 a common pipistrelle and the last a common pipistrelle at 22:10.

	September	**October**
	This survey was extremely low activity. Only two bats were registered at the centre of the transect. A single noctule was registered at 19:21 then another at the same point on the return journey at 20:11. No obvious reasons for low bat activity. Weather suitable and device working.	Extremely low level of bat activity recorded here. Only a single common pipistrelle was recorded foraging along the field margin at 19:39. Weather was suitable for bat activity but did drop to 9 °C by survey conclusion.
6	**May**	**June**
	Low levels of activity concentrated along the hedgerows where the A505 merges to the A11. Occasional pipistrelle passes. The first recording was a soprano pipistrelle at 21:31 and the last at a common pipistrelle at 22:51. In total four recordings of soprano pipistrelle and 2 common pipistrelles.	Low levels of bat activity were registered, 4 separate registrations of Common pipistrelle were registered one heard not seen, 3 foraging along a linear hedgerow. First recording at 22:24 and the last at 22:45. Weather was suitable for bat activity.
	July	**August**
	Mild, still night after rain earlier in the day. Moderate - high levels for first 60-90 minutes in particular - regular foraging and commuting activity, particularly by common and soprano pipistrelles along hedgerow and woodland edges with some activity from noctule and occasionally serotine and one Myotis (possible natterer's) species. A total of 15 common pipistrelle and 10 soprano pipistrelle registrations (but often multiple passes/continuous foraging activity associated with each registration), five noctule and two NSL, with three serotine passes along hedgerow and woodland edge habitat and one *Myotis* pass along the River Granta corridor. The highest number of bats seen at any one time was four, comprising common and soprano pipistrelle foraging along the hedgerows. The first bat heard was a soprano pipistrelle, 10 minutes after sunset at 21:23, with the last also being a soprano pipistrelle at 23:13.	Moderate levels of foraging from 20:48 until the end of the survey, largely associated with dense hedgerows and mature tree lined hedgerows with some noctules flying high overhead across open arable land. A total of 12 common pipistrelle and 11 soprano pipistrelle registrations (but often multiple passes/continuous foraging activity associated with each registration) and two noctule passes. The greatest number of bats seen at any one time was four, comprising common and soprano pipistrelle foraging along the hedgerows. The first bat heard was a soprano pipistrelle at 20:48, 30 minutes after sunset. The last bat was a soprano pipistrelle at 22:12.
	September	**October**
	Breezy night with occasional gusts of wind, with some sheltered and stiller areas. Transect route altered due to game keeper request to keep away from woodland around the Ford. See survey map for route. Very little activity (may be in part due to windy conditions). Three bats in total - two soprano pipistrelle (one heard, not seen, the other foraging along the tree line - see map)	Low level of bat activity recorded. Transect route again altered at game keeper's request. Four bats recorded in total. Two common pipistrelles heard, not seen and, two soprano pipistrelle – one heard, not seen, the other continuously foraging along woodland edge at 19:00. Breezy conditions may have contributed to low activity levels. the first recording was a soprano

	and one common pipistrelle foraging. The first recording was a soprano pipistrelle at 19:35 and the last a common pipistrelle at 20:20	pipistrelle at 19:00 and the last recording a soprano pipistrelle at 19:58.
7	**May**	**June**
	Common pipistrelle, soprano pipistrelle, *Myotis sp*. and barbastelle were recorded during this survey, with a total of 40 bat passes recorded. All activity was recorded in the northern section of the transect surrounding The Grange farmhouse, woodlands, and arable field with a mixture of foraging and commuting passes. A total of 19 barbastelle passes were recorded. The barbastelle and pipistrelle passes were concentrated around The Grange Road, following the hedgerow and mature trees to the east of the road. Activity was recorded consistently through throughout the transect but limited to the northern areas. The first bats recorded was three common pipistrelles at 21:31 foraging along the hedgerow and mature trees towards the southern end of The Grange Road. The last bat pass recorded at 22:51 was also a common pipistrelle, heard at the western area of the larger northern agricultural field, along Cambridge Road. Overall a moderate level of bat activity was recorded for this survey.	This transect was relatively quiet. Low numbers of bat recorded in suitable conditions. The first bat recorded was a common pipistrelle heard not seen at 22:24 and the final at 22:45 foraging along a hedge. A total of 4 detections of common pipistrelles were made between 22:24 and 22:45.
	July	**August**
	Moderate levels of activity, largely from common and soprano pipistrelle (commuting and some foraging, 20 registrations), with two noctule and two serotines overall. Activity was clustered at the woodland edge north of Bourn Bridge Road near the start of the survey - with noctule, soprano pipistrelle and serotine recorded in quick succession commuting along the woodland edge. Frequent activity was thereafter recorded in the northern and western edges of the large tree lined arable field to the north of the A1307, with noctule, soprano and common pipistrelle and serotine species present. The first recording of a bat was at 21:53 a noctule and the last at 22:40 of a common pipistrelle	N/A
	September	**October**
	N/A	N/A

4.6 Static detector survey results

4.6.1. Static detector maps showing the locations of the static detectors are provided in **Appendix A** and are described in **Table 4**. The results of the data collected from the static detectors is detailed in the sections below with percentage of bat sound recordings per species noted in brackets and illustrated in table 10, results are also illustrated in **Appendix J**.

May

4.6.2. **Transect 1 Static 1** was not deployed during May, so no species data is available.

4.6.3. **Transect 2 Static 1** - A total of four species was detected with the following number of sound recordings: 99 common pipistrelle (70.5%), 24 soprano pipistrelle (17%), 16 (11.5%) *Myotis* species and 1 (1%) barbastelle out of a total of 193 recordings; the remainder were noise.

4.6.4. **Transect 3 Static 1** - A total of four species was detected with the following number of sound recordings: 479 (64%) common pipistrelle, 255 (34%) soprano pipistrelle, 16 (1%) *Myotis* species and 1 (>1%)barbastelle out of a total of 1398 recordings; the remainder were noise.

4.6.5. **Transect 4 Static 1** - A total of two species was detected with the following number of sound recordings: 812 (82.5%) common pipistrelle and 174 (17.5%) soprano pipistrelle out of a total of 4499 recordings; the remainder were noise.

4.6.6. **Transect 5 Static 1** - A total of five species was detected with the following number of sound recordings: 285 (76%) common pipistrelle, 63 (17%) soprano pipistrelle, 19 (5%) *Myotis* species, 7 (2%) NSL (noctule/serotine/leisler's) species and 4 (1%) barbastelle out of a total of 421 recordings; the remainder were noise.

4.6.7. **Transect 6 Static 1** - No recordings were made during its deployment and no equipment malfunction was apparent.

4.6.8. **Transect 7 Static 1** - A total of four species was detected with the following number of sound recordings: 188 (41%) common pipistrelle, 104 (22.5%) soprano pipistrelle, 148 (32%) *Myotis* species and 19 (4.5%) barbastelle out of a total of 1240 recordings; the remainder were noise.

June

4.6.9. **Transect 1 Static 1** - A total of four species was detected with the following number of sound recordings: 749 (68.5%) common pipistrelle, 198 (18%) soprano pipistrelle, 75 (9%) *Myotis* species and 72 (6.5%) barbastelle out of a total of 3786 recordings; the remainder were noise.

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4.6.10. **Transect 2 Static 1** - A total of four species was detected with the following number of sound recordings: 255 (82%) common pipistrelle, 19 (6%) soprano pipistrelle, 35 (11%) *Myotis* species and 2 (1%) barbastelle out of a total of 688 recordings; the remainder were noise.

4.6.11. **Transect 3 Static 1** - A total of three species was detected with the following number of sound recordings: 330 (92%) common pipistrelle, 23 (6%) soprano pipistrelle and 7 (2%) *Myotis* species out of a total of 432 recordings; the remainder were noise.

4.6.12. **Transect 4 Static 1** - A total of five species was detected with the following number of sound recordings: 2178 (96%) common pipistrelle, 57 (2.5%) soprano pipistrelle, 24 (1%) *Myotis*, 1 (>1%) NSL and 3 (>1%) barbastelle species out of a total of 5167 recordings; the remainder were noise.

4.6.13. **Transect 5 Static 1** - A total of four species was detected with the following number of sound recordings: 196 (75%) common pipistrelle, 33 (12%) soprano pipistrelle, 29 (11%) *Myotis* and 3 (1%) barbastelle species out of a total of 518 recordings; the remainder were noise.

4.6.14. **Transect 6 Static 1** - A total of four species was detected with the following number of sound recordings: 1392 (95.2%) common pipistrelle, 52 (1.5%) soprano pipistrelle, 17 (1.1%) *Myotis* and 1 (>1%) barbastelle species out of a total of 3828 recordings; the remainder were noise.

4.6.15. **Transect 7 Static 1** - A total of four species was detected with the following number of sound recordings: 130 (46.5%) common pipistrelle, 101 (36%) soprano pipistrelle, 42 (15%) *Myotis* and 6 (2.5%) barbastelle species out of a total of 4163 recordings; the remainder were noise.

July

4.6.16. **Transect 1 Static 1** - A total of five species was detected with the following number of sound recordings: 730 (80%) common pipistrelle, 91 (11%) soprano pipistrelle, 20 (2%) *Myotis* species, 40 (4.5%) NSL and 28 (2.5%) barbastelle out of a total of 2658 recordings; the remainder were noise.

4.6.17. **Transect 2 Static1** - A total of four species was detected with the following number of sound recordings: 152 (64.5%) common pipistrelle, 55 (23.5%) soprano pipistrelle, 26 (11%) NSL and 3 (1.5%) barbastelle out of a total of 8389 recordings; the remainder were noise.

4.6.18. **Transect 3 Static 1** - A total of three species was detected with the following number of sound recordings: 158 (58.5%) common pipistrelle, 87 (32.5%) soprano pipistrelle and 24 (9%) NSL out of a total of 2670 recordings; the remainder were noise.

4.6.19. **Transect 4 Static 1** -. A total of five species was detected with the following number of sound recordings: 925 (87%) common pipistrelle, 88 (8.5%) soprano pipistrelle, 7 (>1%) *Myotis* species, 25 (2.5%) NSL and 9 (>1%) barbastelles out of a total of 3786 recordings; the remainder were noise.

4.6.20. **Transect 5 Static 1** - A total of five species was detected with the following number of sound recordings: 168 (60%) common pipistrelle, 46 (16.5%) soprano pipistrelle, 31 (11%) *Myotis* species, 27 (9.5%) NSL and 7 (3%) barbastelles out of a total of 312 recordings; the remainder were noise.

4.6.21. **Transect 6 Static 1** - A total of five species was detected with the following number of sound recordings: 171 (66.5%) common pipistrelle, 68 (26.5%) soprano pipistrelle, 3 (1%) *Myotis* species, 13 (5%) NSL and 1 (>1%) barbastelle out of a total of 603 recordings; the remainder were noise.

4.6.22. **Transect 7 Static 1** - A total of five species was detected with the following number of sound recordings: 160 (31.5%) common pipistrelle, 267 (52.5%) soprano pipistrelle, 13 (2.5%) Myotis species, 63 (12.5%) NSL and 3 (>1%) barbastelles out of a total of 3888 recordings; the remainder were noise.

August

Transect 1

4.6.23. **Static 1** - A total of five species was detected with the following number of sound recordings: 628 (76%) common pipistrelle, 88 (10%) soprano pipistrelle, 13 (1.5%) *Myotis* species, 92 (11%) NSL and 7 (0.5%) barbastelles out of a total of 4086; recordings the remainder were noise.

4.6.24. **Static 2** - A total of five species was detected with the following number of sound recordings: 538 (75%) common pipistrelle, 58 (8%) soprano pipistrelle, 2 (>1%) *Myotis* species, 106 (14.5%) NSL and 13 (1.5%) barbastelles out of a total of 13392 recordings; the remainder were noise.

4.6.25. **Static 3** - A total of four species was detected with the following number of sound recordings: 95 (25%) common pipistrelle, 165 (43%) soprano pipistrelle, 2 (>1%) *Myotis* species and 116 (30%) NSL out of a total of 11852 recordings; the remainder were noise.

Transect 2

4.6.26. **Static 1** - No obvious signs of equipment malfunction, but no bat calls were recorded from a total of 3,315. All were noise files.

4.6.27. **Static 2** - A total of five species was detected with the following number of sound recordings: 442 (76%) common pipistrelle, 69 (12%) soprano pipistrelle, 6 (1%) *Myotis* species, 108 (19%) NSL and 10 (2%) barbastelles out of a total of 12446 recordings; the remainder were noise.

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4.6.28. **Static 3** - A total of five species was detected with the following number of sound recordings: 187 (70%) common pipistrelle, 74 (28%) soprano pipistrelle, 1 (>1%) *Myotis* species, 2 (>1%) NSL and 1 (>1%) barbastelle out of a total of 2773 recordings; the remainder were noise.

Transect 3

4.6.29. **Static 1** - A total of five species was detected with the following number of sound recordings: 150 (69%) common pipistrelle, 31 (14%) soprano pipistrelle, 1 (>1%) *Myotis* species, 8 (3.5%) NSL and 28 (12.5%) barbastelles out of a total of 9086 recordings; the remainder were noise.

4.6.30. **Static 2** - A total of five species was detected with the following number of sound recordings: 716 (69%) common pipistrelle, 176 (17%) soprano pipistrelle, 14 (1.5%) *Myotis* species, 126 (12%) NSL and 9 (>1%) barbastelles out of a total of 10204 recordings; the remainder were noise.

4.6.31. **Static 3** - A total of five species was detected with the following number of sound recordings: 62 (38%) common pipistrelle, 35 (21%) soprano pipistrelle, 9 (5%) *Myotis* species and 56 (34%) NSL out of a total of 8157 recordings; the remainder were noise.

Transect 4

4.6.32. **Static 1** - A total of five species was detected with the following number of sound recordings: 488 (68%) common pipistrelle, 103 (14.5%) soprano pipistrelle, 11 (1.5%) *Myotis* species, 71 (10%) NSL and 38 (5.5%) barbastelles out of a total of 14556 recordings; the remainder were noise.

Transect 5

4.6.33. **Static 1** - A total of five species was detected with the following number of sound recordings 220 (63%) common pipistrelle, 93 (26.5%) soprano pipistrelle, 22 (6%) *Myotis* species, 11 (3%) NSL and 4 (1%) barbastelles out of a total of 19249 recordings the remainder were noise.

4.6.34. **Static 3** - A total of five species was detected with the following number of sound recordings: 26 (19.5%) common pipistrelle, 58 (43%) soprano pipistrelle, 14 (10%) *Myotis* species, 34 (25%) NSL and 2 (1.5%) barbastelles out of a total of 7423 recordings; the remainder were noise.

Transect 6

4.6.35. **Static 1** - A total of five species was detected with the following number of sound recordings: 1280 (80%) common pipistrelle, 129 (8%) soprano pipistrelle, 7 (0.5%) *Myotis* species, 167 (10%) NSL and 25 (1.5%)barbastelles out of a total of 14459 recordings; the remainder were noise.

4.6.36. **Static 3** - A total of five species was detected with the following number of sound recordings: 671 (92%) common pipistrelle, 37 (5%) soprano pipistrelle, 12 (1.5%) *Myotis* species, 4 (>1%) NSL and 12 (1.5%) barbastelles out of a total of 12743 recordings; the remainder were noise.

Transect 7

4.6.37. **Static 1** - A total of five species was detected with the following number of sound recordings: 34 (30%) common pipistrelle, 44 (38%) soprano pipistrelle, 7 (6.5%) *Myotis* species, 24 (21%) NSL and 4 (3.5%) barbastelles out of a total of 6952 recordings; the remainder were noise.

4.6.38. **Static 2** - A total of five species was detected with the following number of sound recordings: 241 (64%) common pipistrelle, 51 (13.5%) soprano pipistrelle, 6 (1.5%) *Myotis* species, 3 (>1%) NSL and 74 (19.5%) barbastelles out of a total of 19366 recordings; the remainder were noise.

4.6.39. **Static 3** - A total of three species was detected with the following number of sound recordings 33 (59%) common pipistrelle, 21 (37.5%) soprano pipistrelle and 2 (3.5%) NSL out of a total of 16701 recordings the remainder were noise.

September

Transect 1

4.6.40. **Static 1** - A total of five species was detected with the following number of sound recordings 272 (59%) common pipistrelle, 120 (26%) soprano pipistrelle, 23 (5%) *Myotis* species, 21 (4.5%) NSL and 27 (5%) barbastelles out of a total of 525 recordings the remainder were noise.

4.6.41. **Static 2** - A total of five species was detected with the following number of sound recordings 1159 (85.5%) common pipistrelle, 107 (8%) soprano pipistrelle, 8 (>1%) *Myotis* species, 74 (5.5%) NSL and 3 (>1%) barbastelles out of a total of 2429 recordings the remainder were noise.

4.6.42. **Static 3** - A total of five species was detected with the following number of sound recordings 159 (46.5%) common pipistrelle, 70 (20.5%) soprano pipistrelle, 8 (2.5%) *Myotis* species, 78 (22.5%) NSL and 27 (8%) barbastelle bats out of a total of 1858 recordings the remainder were noise.

Transect 2

4.6.43. **Static 1** - A total of five species was detected with the following number of sound recordings 139 (50%) common pipistrelle, 58 (21%) soprano pipistrelle, 21 (7.5%) *Myotis* species, 21 (7.5%) NSL and 37 (13%) barbastelles out of a total of 1584 recordings; the remainder were noise.

4.6.44. **Static 2** - A total of five species was detected with the following number of sound recordings 374 (64%) common pipistrelle, 73 (12.5%) soprano pipistrelle, 29 (5%) *Myotis* species, 45 (8%) NSL and 57 (10%) barbastelles out of a total of 5179 recordings; the remainder were noise.

4.6.45. **Static 3** - A total of three species was detected with the following number of sound recordings 62 (53%) common pipistrelle, 44 (37%) soprano pipistrelle, and 11 (9.5%) NSL out of a total of 620 recordings the remainder were noise.

Transect 3

4.6.46. **Static 1** - A total of five species was detected with the following number of sound recordings 1067 (65%) Common pipistrelle, 375 (22%) Soprano pipistrelle, 45 (2.5%) Myotis species, 93 (5.5%) NSL and 52 (3%) barbastelles out of a total of 21459 recordings the remainder were noise.

4.6.47. **Static 2** - A total of five species was detected with the following number of sound recordings 51 (36%) common pipistrelle, 46 (33%) soprano pipistrelle, 7 (5%) Myotis species, 29 (20%) NSL and 6 (4%) barbastelles out of a total of 569 recordings the remainder were noise.

4.6.48. **Static 3** - A total of five species was detected with the following number of sound recordings 23 (38%) common pipistrelle, 14 (23%) soprano pipistrelle, 9 (14.5%) Myotis species, 11 (18%) NSL and 4 (6.5%) barbastelle bats out of a total of 688 recordings the remainder were noise.

Transect 4

4.6.49. **Static 1** - A total of two species was detected with the following number of sound recordings 59 (81%) common pipistrelle and 14 (19%) soprano pipistrelles out of a total of 3925 recordings; the remainder were noise.

Transect 5

4.6.50. **Static 1** - A total of five species was detected with the following number of sound recordings 83 (40%) common pipistrelle, 81 (40%) soprano pipistrelle, 25 (12%) *Myotis* species, 4 (2%) NSL and 13 (6%) barbastelles out of a total of 1601 recordings; the remainder were noise.

4.6.51. **Static 3** - A total of four species was detected with the following number of sound recordings 4 (3.5%) common pipistrelle, 64 (59%) soprano pipistrelle, 6 (5.5%) *Myotis* species and 35 (32%) NSL out of a total of 330 recordings; the remainder were noise.

Transect 6

4.6.52. **Static 1** -. A total of five species was detected with the following number of sound recordings: 107 (25.5%) common pipistrelle, 203 (48.5%) soprano pipistrelle, 15

(3.5%) *Myotis* species, 21 (5%) NSL and 73 (17.5%) barbastelles out of a total of 4866 recordings; the remainder were noise.

4.6.53. **Static 3** - A total of five species was detected with the following number of sound recordings: 78 (79%) common pipistrelle, 12 (12%) soprano pipistrelle, 3 (3%) *Myotis* species, 2 (2%) NSL and 4 (4%) barbastelles out of a total of 9832 recordings; the remainder were noise.

Transect 7

4.6.54. **Static 1** - A total of four species was detected with the following number of sound recordings: 5 (22%) common pipistrelle, 4 (18%) soprano pipistrelle, 1 (4.5%) *Myotis* species and 12 (54.5%)NSL out of a total of 2106 recordings; the remainder were noise.

4.6.55. **Static 2** - A total of five species was detected with the following number of sound recordings 41 (19%) common pipistrelle, 55 (26.5%) soprano pipistrelle, 3 (1.5%) *Myotis* species, 1 (0.5%) NSL and 107 (51%) barbastelles out of a total of 5108 recordings; the remainder were noise.

4.6.56. **Static 3** - A total of three species was detected with the following number of sound recordings 706 (56%) common pipistrelle, 392 (31%) soprano pipistrelle, 4 (>1%) *Myotis* species, 6 (>1%) NSL and 147 (11.5%) barbastelle bats out of a total of 12351 recordings; the remainder were noise.

October

Transect 1

4.6.57. **Static 1** - A total of four species was detected with the following number of sound recordings 219 (55%) common pipistrelle, 136 (34%) soprano pipistrelle, 13 (3.5%) *Myotis* species and 25 (6.5%) barbastelles out of a total of 574 recordings the remainder were noise.

4.6.58. **Static 2** - A total of four species was detected with the following number of sound recordings 1854 (97%) common pipistrelle, 51 (2%) soprano pipistrelle, 1 (>1%) *Myotis* species and 3 (>1%) barbastelles out of a total of 3530 recordings the remainder were noise.

4.6.59. **Static 3** - A total of five species was detected with the following number of sound recordings 1771 (77.5%) common pipistrelle, 446 (19.5%) soprano pipistrelle, 5 (0.2%) *Myotis* species, 27 (1.5%) NSL and 28 (1.5%) barbastelle bats out of a total of 3052 recordings the remainder were noise.

Transect 2

4.6.60. **Static 1** - A total of four species was detected with the following number of sound recordings 28 (46.5%) common pipistrelle, 24 (40%) soprano pipistrelle, 3 (5%) NSL and 5 (8.5%) barbastelles out of a total of 894 recordings; the remainder were noise.

4.6.61. **Static 2** - A total of five species was detected with the following number of sound recordings 127 (76%) common pipistrelle, 34 (20%) soprano pipistrelle, 3 (2%) *Myotis* species, 1 (>1%) NSL and 2 (1%) barbastelles out of a total of 9807 recordings; the remainder were noise.

4.6.62. **Static 3** - A total of five species was detected with the following number of sound recordings 105 (88%) common pipistrelle, 11 (9%) soprano pipistrelle, 1 (>1%) *Myotis* species, 1 (>1%) NSL and 1 (>1%) barbastelles out of a total of 316 recordings; the remainder were noise.

Transect 3

4.6.63. **Static 1** - A total of three species was detected with the following number of sound recordings 47 (69%) Common pipistrelle, 20 (30%) Soprano pipistrelle and 1 (1%) NSL out of a total of 3828 recordings the remainder were noise.

4.6.64. **Static 2** - A total of five species was detected with the following number of sound recordings 1497 (60.5%) common pipistrelle, 878 (35.5%) soprano pipistrelle, 63 (2.5%) Myotis species, 23 (>1%) NSL and 20 (>1%) barbastelles out of a total of 3766 recordings the remainder were noise.

4.6.65. **Static 3** - A total of five species was detected with the following number of sound recordings 226 (49%) common pipistrelle, 205 (44%) soprano pipistrelle, 15 (3.5%) Myotis species, 2 (>1%) NSL and 11 (2%) barbastelle bats out of a total of 1795 recordings the remainder were noise.

Transect 4

4.6.66. **Static 1** - A total of three species was detected with the following number of sound recordings 298 (82%) common pipistrelle, 62 (17%) soprano pipistrelles and 3 (>1%) myotis species out of a total of 1775 recordings; the remainder were noise.

Transect 6

4.6.67. **Static 1** -. A total of five species was detected with the following number of sound recordings: 191 (58.5%) common pipistrelle, 121 (37%) soprano pipistrelle, 6 (1.5%) *Myotis* species, 1 (>1%) NSL and 7 (1.5%) barbastelles out of a total of 2587 recordings; the remainder were noise.

4.6.68. **Static 3** - A total of five species was detected with the following number of sound recordings: 90 (27%) common pipistrelle, 207 (65%) soprano pipistrelle, 7 (2.5%) *Myotis* species, 4 (1%) NSL and 14 (4.5%) barbastelles out of a total of 4936 recordings; the remainder were noise.

Transect 7

4.6.69. **Static 1** - A total of five species was detected with the following number of sound recordings: 9 (47%) common pipistrelle, 4 (21.5%) soprano pipistrelle, 2 (10.5%) *Myotis* species, 2 (10.5%) NSL and 2 (10.5%) barbastelles out of a total of 3439 recordings; the remainder were noise.

4.6.70. **Static 2** - A total of four species was detected with the following number of sound recordings 80 (51%) common pipistrelle, 53 (34%) soprano pipistrelle, 3 (1.5%) *Myotis* species and 22 (13.5%) barbastelles out of a total of 320 recordings; the remainder were noise.

4.6.71. **Static 3** - A total of three species was detected with the following number of sound recordings 583 (56%) common pipistrelle, 433 (41.5%) soprano pipistrelle, 8 (>1%) *Myotis* species, 3 (>1%) NSL and 18 (1.5%) barbastelle bats out of a total of 1168 recordings; the remainder were noise.

Table 10 - Percentage of total bat sound recordings per species (not including noise)

Static ID	Ppip	Ppyg	Myotis Sp.	NSL	Barbastelle
Transect 1 Static 1	70%	17%	4%	4%	4%
Transect 1 Static 2	89%	5%	0%	5%	0%
Transect 1 Static 3	68%	23%	1%	7%	2%
Transect 2 Static 1	66%	18%	7%	5%	5%
Transect 2 Static 2	68%	13%	3%	11%	5%
Transect 2 Static 3	71%	26%	0%	3%	0%
Transect 3 Static 1	68%	24%	2%	4%	2%
Transect 3 Static 2	62%	30%	2%	5%	1%
Transect 3 Static 3	46%	37%	5%	10%	2%
Transect 4 Static 1	87%	9%	1%	2%	1%
Transect 5 Static 1	58%	19%	18%	3%	2%
Transect 5 Static 3	12%	50%	8%	28%	1%
Transect 6 Static 1	73%	22%	2%	1%	3%

Transect 6 Static 3	38%	37%	15%	7%	2%
Transect 7 Static 1	49%	21%	2%	1%	27%
Transect 7 Static 2	56%	36%	1%	0%	7%
Transect 7 Static 3	73%	22%	2%	1%	3%
Total across all statics	70%	19%	3%	4%	3%

5. Summary

Evidence of at least five species of bats: common and soprano pipistrelle, *Myotis* species, noctule/serotine/Leisler's and barbastelle bats were recorded during the surveys and found to be present across the seven transect locations through recordings from the static detectors.

Brown long eared bats were also detected during Transect 5 making the total species recorded at least six.

Field surveys have provided confidence that noctule and serotine have both been recorded on transects which would take the total species of bats to seven.

The presence of barbastelle bats is of particular note being an Annex II species and one of the rarer species recorded in the UK, and with Eversden and Wimpole Woods SAC (barbastelle one of the qualifying features) lying approximately over 10 km west of the route. Barbastelle bats were recorded at all static locations except for Transect 1 Static 2, and Transect 2 Static 3, and that the highest number of barbastelle passes were recorded at T1 S1 in June (72), T7 S2 in August (74), T6 S1 in September (73), T7 S2 in September (107), and T7 S3 in September (147).

A soprano pipistrelle day roost was recorded in T18 and a bat roost of a currently unidentified species recorded in T23.

A pipistrelle roost has been confirmed in T13 through the findings of droppings during the tree climbing surveys, however no emergence or re-entry of bats was recorded during surveys.

Building surveys found none of the buildings surveyed provided any suitable roosting potential.

Sufficient survey effort consisting of building and tree PRAs, walked transects, static detector deployment, emergence/re-entry surveys of buildings and trees have been undertaken during 2020 to provide a comprehensive survey data throughout the scheme.

The total number of recordings, species found and roosts confirmed, combined with the presence of habitats suitable of supporting bats including woodlands, open fields, waterbodies and linear habitat features such as rivers, streams and hedge lines show that the survey route provides suitable habitats for roosting, foraging and commuting bats.

Winter static surveys are also being undertaken in 2020-2021 to inform barbastelle activity levels.

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6. References

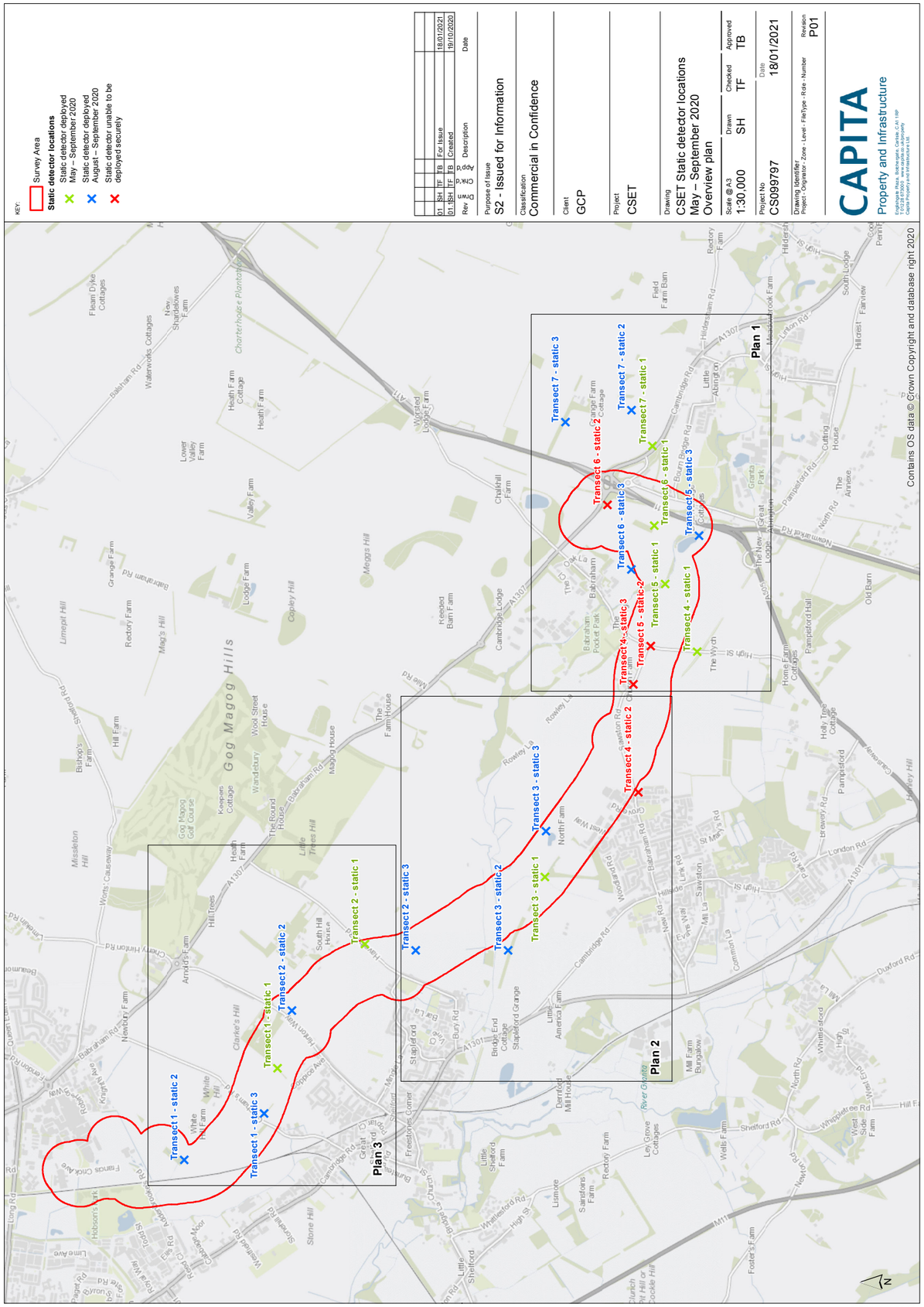
Collins, J. (ed. (2016). Bat Surveys for Professional Ecologists —Good Practice Guidelines, 3rd edition, Bat Conservation Trust, London.

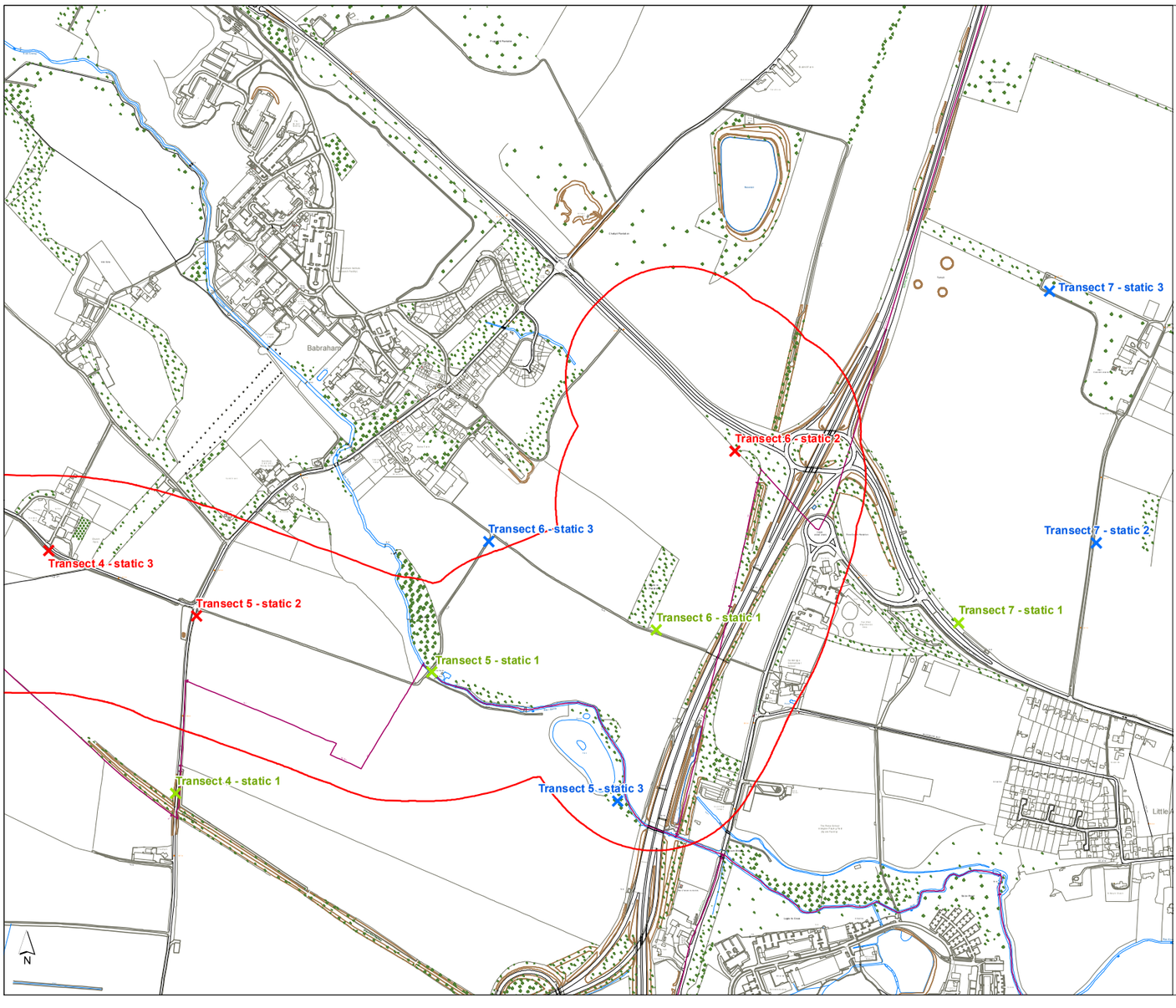
WYG. (Dec 2019). Cambridge South East Transport Strategy (CSET). Bat Activity Report

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Appendices

Appendix A – Static Detector location map





KEY:

Survey Area

Static detector locations

- Static detector deployed May – September 2020
- Static detector deployed August – September 2020
- Static detector unable to be deployed securely

Rev.	Drwn	Chk'd	App'd	Description	Date
01	SH	TF	TB	For Issue	18/01/2021
01.1	SH	TF	TB	Created	19/10/2020

Purpose of Issue
S2 - Issued for Information

Classification
Commercial in Confidence

Client
GCP

Project
CSET

Drawing
CSET Static detector locations
May – September 2020
Plan 1

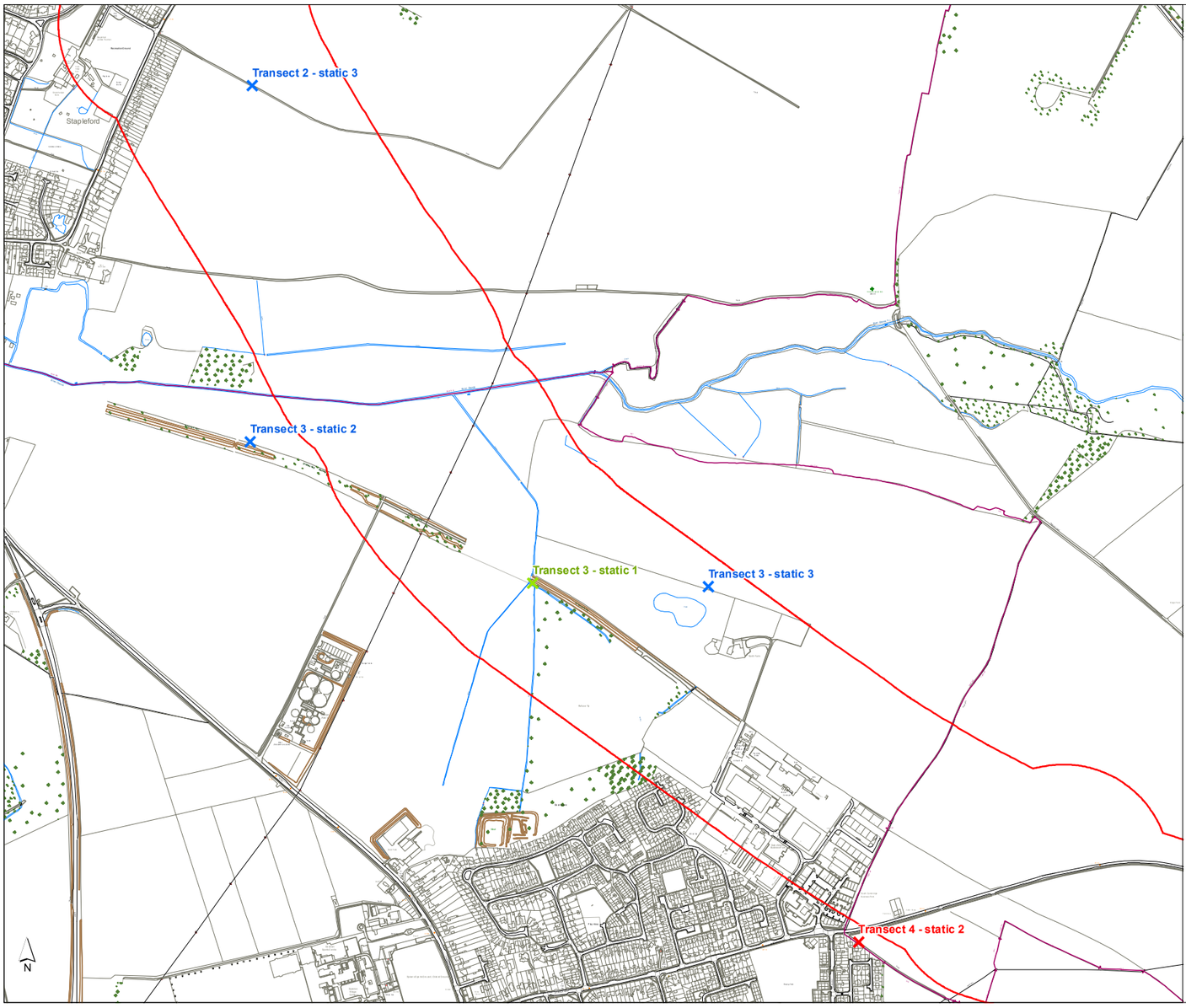
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Project No: CS099797
Date: 18/01/2021

Drawing Identifier
Project - Originator - Zone - Level - FileType - Role - Number
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KEY:

Survey Area

Static detector locations

- Static detector deployed May – September 2020
- Static detector deployed August – September 2020
- Static detector unable to be deployed securely

Rev.	Drwn	Chk'd	App'd	Description	Date
01	SH	TF	TB	For Issue	18/01/2021
01.1	SH	TF	TB	Created	19/10/2020

Purpose of Issue
S2 - Issued for Information

Classification
Commercial in Confidence

Client
GCP

Project
CSET

Drawing
CSET Static detector locations
May – September 2020
Plan 2

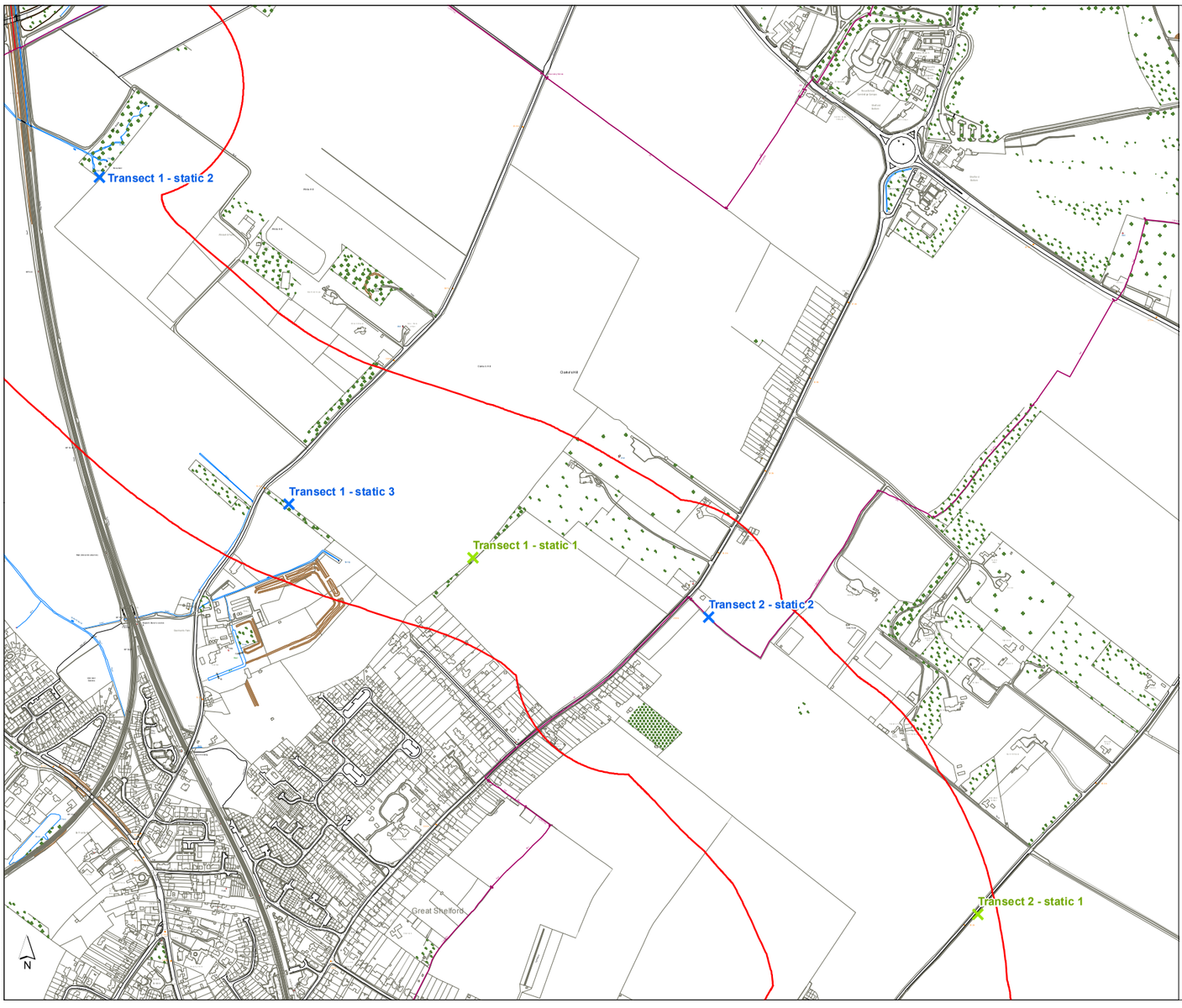
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Project No: CS099797
Date: 18/01/2021

Drawing Identifier
Project - Originator - Zone - Level - FileType - Role - Number
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KEY:

Survey Area

Static detector locations

Static detector deployed May – September 2020

Static detector deployed August – September 2020

Static detector unable to be deployed securely

Rev.	Drwn	Chk'd	App'd	Description	Date
01	SH	TF	TB	For Issue	18/01/2021
01.1	SH	TF	TB	Created	19/10/2020

Purpose of Issue
S2 - Issued for Information

Classification
Commercial in Confidence

Client
GCP

Project
CSET

Drawing
CSET Static detector locations
May – September 2020
Plan 3

Scale @ A3	Drawn	Checked	Approved
1:8,000	SH	TF	TB

Project No: CS099797

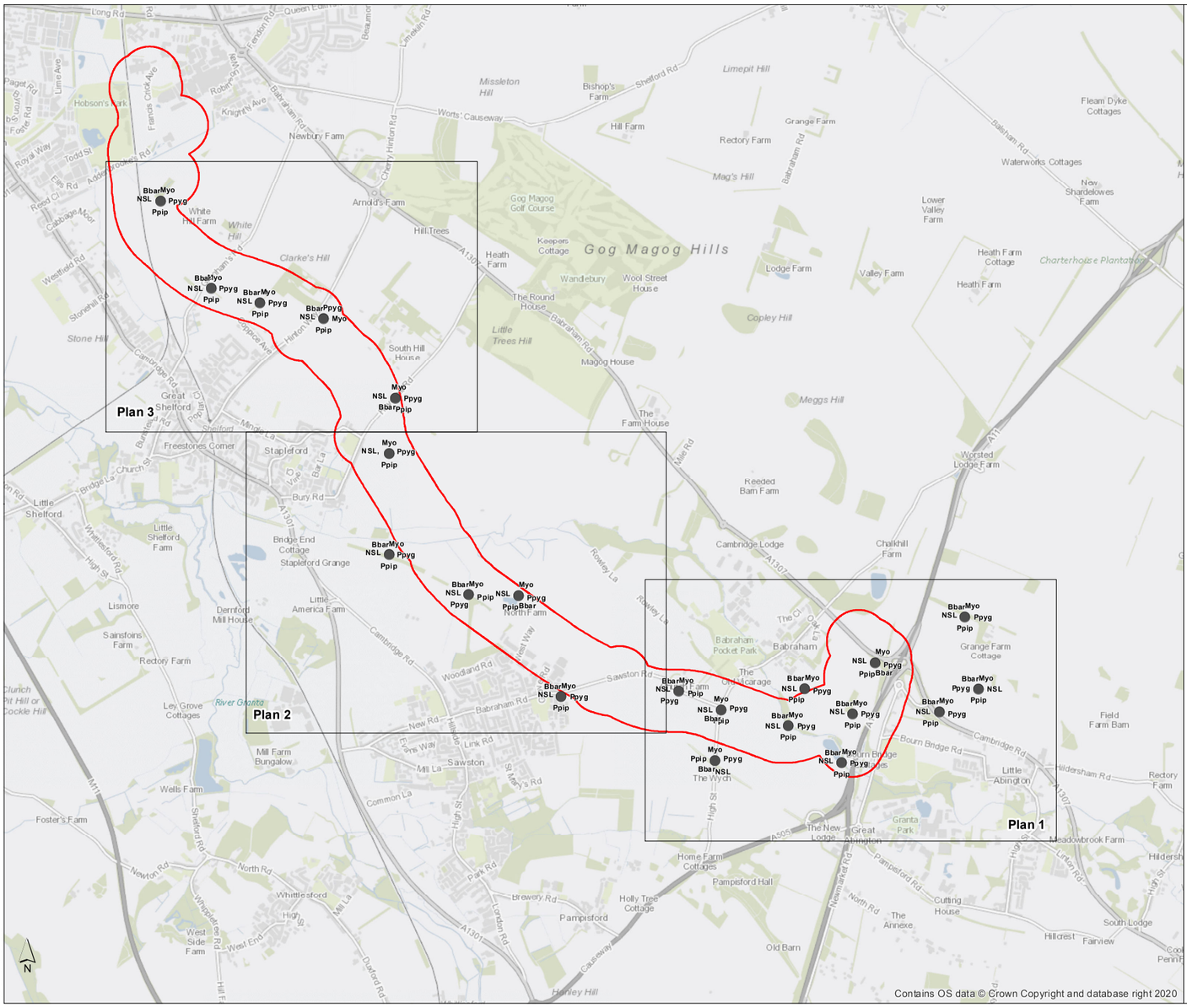
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Drawing Identifier
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KEY:

Survey Area

Static Detector locations

SPECIES
Ppip – Common pipistrelle
Ppyg – Soprano pipistrelle
NSL – Noctule/Serotine/Leislers
Bbar – Barbastelle
Myo – Myotis species

Rev.	Drwn	Chk'd	App'd	Description	Date
01	SH	TF	TB	For Issue	18/01/2021
01.1	SH	TF	TB	Created	19/10/2020

Purpose of Issue
S2 - Issued for Information

Classification
Commercial in Confidence

Client
GCP

Project
CSET

Drawing
CSET Static detector locations
May – September 2020
Overview plan

Scale @ A3	Drawn	Checked	Approved
1:30,000	SH	TF	TB

Project No: CS099797

Date: 18/01/2021

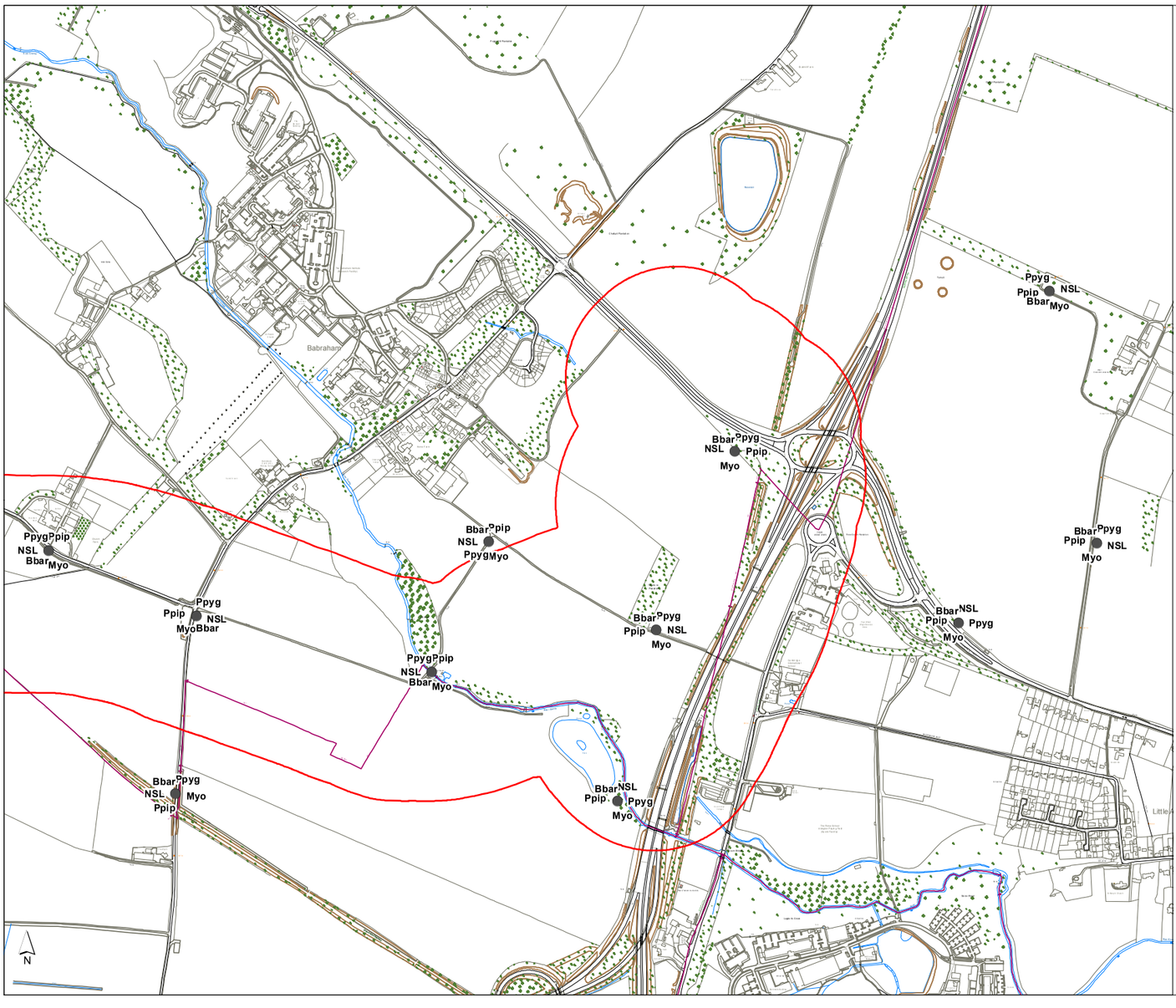
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Revision: P01

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KEY:

Survey Area

Static Detector locations

SPECIES
Ppip – Common pipistrelle
Ppyg – Soprano pipistrelle
NSL – Noctule/Serotine/Leislers
Bbar – Barbastelle
Myo – Myotis species

Rev.	Drawn	Checked	Appd	Description	Date
01	SH	TF	TB	For Issue	18/01/2021
01.1	SH	TF	TB	Created	23/10/2020

Purpose of Issue
S2 - Issued for Information

Classification
Commercial in Confidence

Client
GCP

Project
CSET

Drawing
CSET Static detector locations - Species
Plan 1 of 3

Scale @ A3	Drawn	Checked	Approved
1:8,500	SH	TF	TB

Project No
CS099797

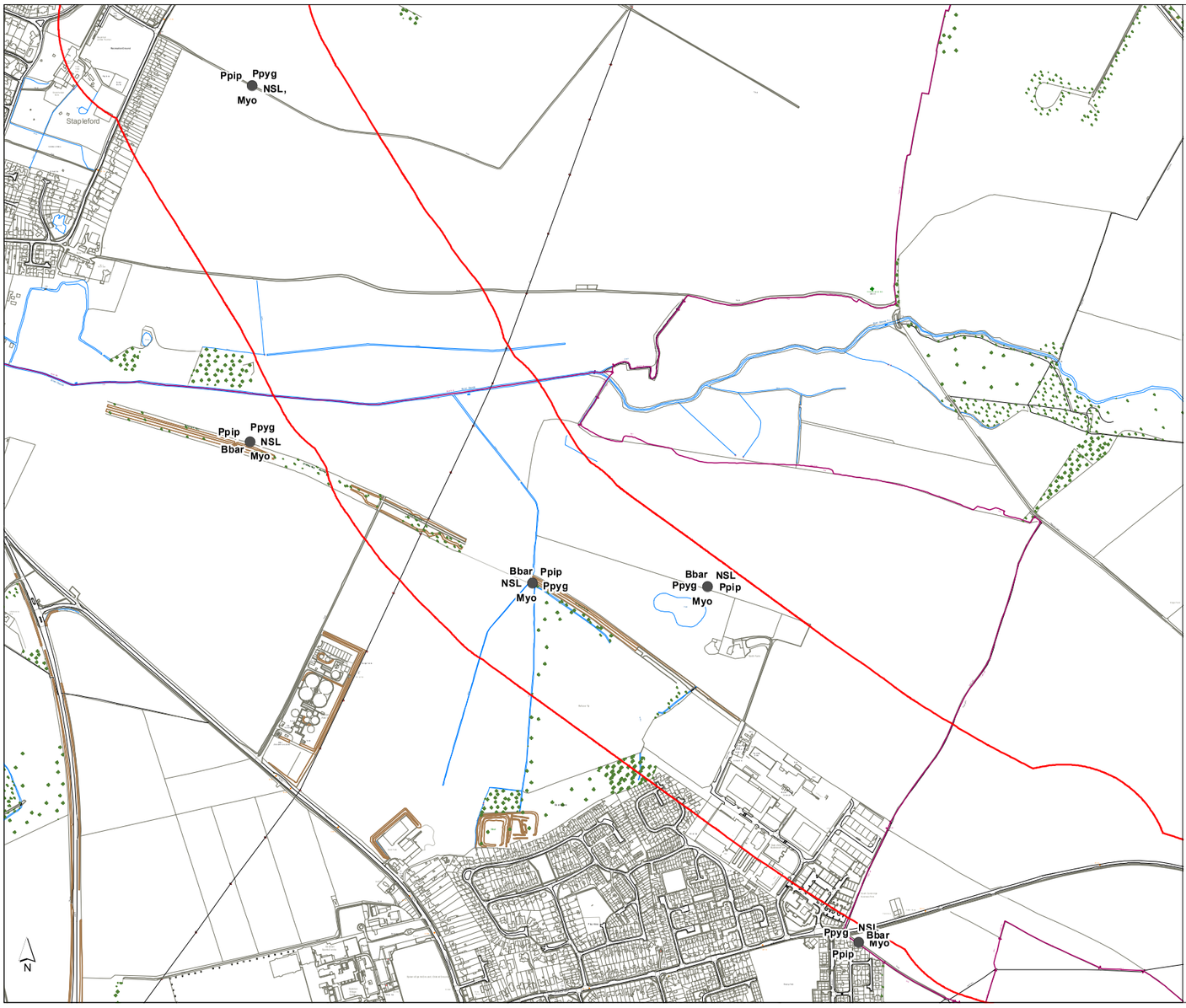
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18/01/2021

Drawing Identifier
Project - Originator - Zone - Level - FileType - Role - Number

Revision
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KEY:

Survey Area

Static Detector locations

SPECIES
Ppip – Common pipistrelle
Ppyg – Soprano pipistrelle
NSL – Noctule/Serotine/Leislers
Bbar – Barbastelle
Myo – Myotis species

Rev.	Drawn	Checked	Appd	Description	Date
01	SH	TF	TB	For Issue	18/01/2021
01.1	SH	TF	TB	Created	23/10/2020

Purpose of Issue
S2 - Issued for Information

Classification
Commercial in Confidence

Client
GCP

Project
CSET

Drawing
CSET Static detector locations - Species
Plan 2 of 3

Scale @ A3	Drawn	Checked	Approved
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Project No
CS099797

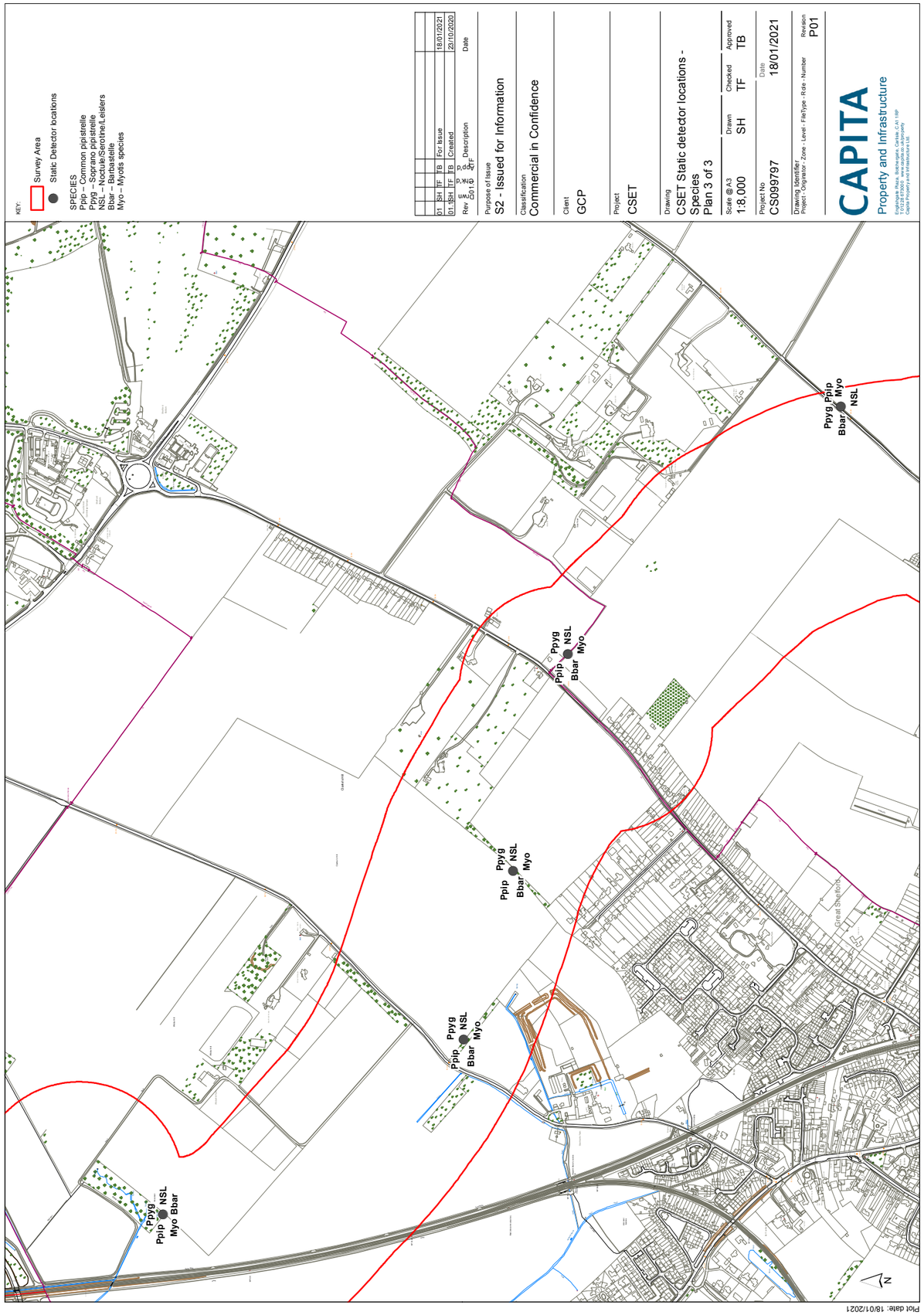
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Project - Originator - Zone - Level - FileType - Role - Number

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Appendix B – Static Deployment Dates

Table 11: May static dates

Static detector ID	Date of deployment	Date of collection
Transect 1 - static 1	Not deployed – no access	Not deployed – no access
Transect 2 - static 1	19/05/2020	04/06/2020
Transect 3 - static 1	19/05/2020	04/06/2020
Transect 4 - static 1	19/05/2020	04/06/2020
Transect 5 - static 1	28/04/2020	19/05/2020
Transect 6 - static 1	19/05/2020	04/06/2020
Transect 7 - static 1	19/05/2020	04/06/2020

Table 12: June static dates

Static detector ID	Date of deployment	Date of collection
Transect 1 - static 1	17/06/2020	30/06/2020
Transect 2 - static 1	17/06/2020	30/06/2020
Transect 3 - static 1	17/06/2020	30/06/2020
Transect 4 - static 1	17/06/2020	30/06/2020
Transect 5 - static 1	17/06/2020	30/06/2020
Transect 6 - static 1	17/06/2020	30/06/2020
Transect 7 - static 1	17/06/2020	30/06/2020

Table 13: July static dates

Static detector ID	Date of deployment	Date of collection
Transect 1 - static 1	14/07/2020	23/07/2020
Transect 2 - static 1	14/07/2020	23/07/2020
Transect 3 - static 1	14/07/2020	23/07/2020
Transect 4 - static 1	14/07/2020	23/07/2020
Transect 5 - static 1	14/07/2020	23/07/2020
Transect 6 - static 1	14/07/2020	23/07/2020
Transect 7 - static 1	14/07/2020	23/07/2020

Table 14: August static dates

Static detector ID	Date of deployment	Date of collection
Transect 1 - static 1	11/08/2020	18/08/2020
Transect 1 - static 2	11/08/2020	18/08/2020
Transect 1 - static 3	11/08/2020	18/08/2020
Transect 2 - static 1	11/08/2020	18/08/2020
Transect 2 - static 2	11/08/2020	18/08/2020
Transect 2 - static 3	11/08/2020	18/08/2020
Transect 3 - static 1	11/08/2020	18/08/2020
Transect 3 - static 2	11/08/2020	18/08/2020
Transect 3 - static 3	11/08/2020	18/08/2020
Transect 4 - static 1	19/08/2020	26/08/2020
Transect 4 - static 2	Not deployed	Not deployed
Transect 4 - static 3	Not deployed	Not deployed
Transect 5 - static 1	19/08/2020	26/08/2020
Transect 5 - static 2	Not deployed	Not deployed
Transect 5 - static 3	19/08/2020	26/08/2020
Transect 6 - static 1	19/08/2020	26/08/2020
Transect 6 - static 2	Not deployed	Not deployed
Transect 6 - static 3	19/08/2020	26/08/2020
Transect 7 - static 1	19/08/2020	26/08/2020
Transect 7 - static 2	19/08/2020	26/08/2020
Transect 7 - static 3	19/08/2020	26/08/2020

Table 15: September static dates

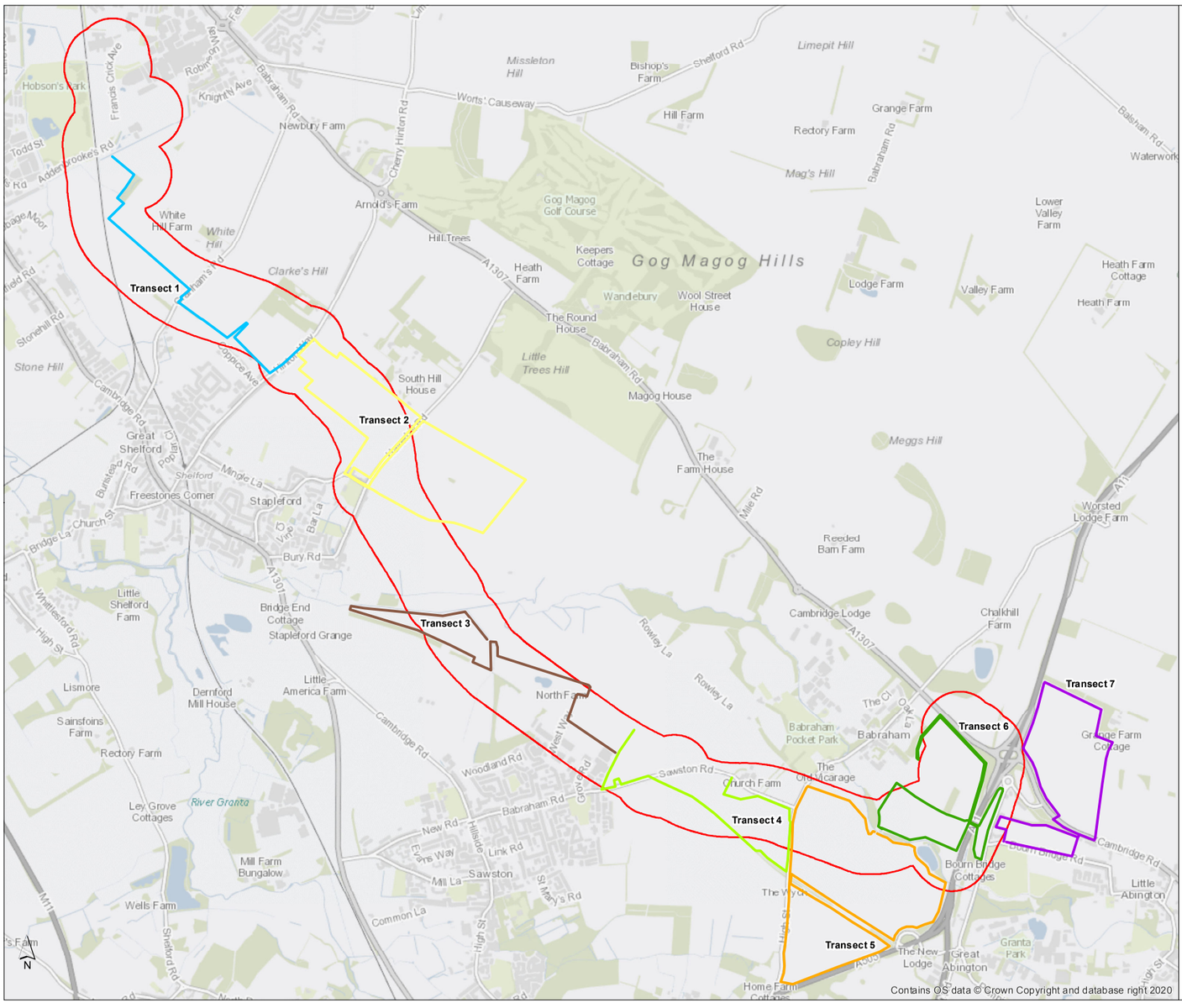
Static detector ID	Date of deployment	Date of collection
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Transect 1 - static 2	15/09/2020	22/09/2020
Transect 1 - static 3	15/09/2020	22/09/2020
Transect 2 - static 1	15/09/2020	22/09/2020
Transect 2 - static 2	15/09/2020	22/09/2020
Transect 2 - static 3	15/09/2020	22/09/2020
Transect 3 - static 1	15/09/2020	22/09/2020
Transect 3 - static 2	15/09/2020	22/09/2020
Transect 3 - static 3	15/09/2020	22/09/2020
Transect 4 - static 1	23/09/2020	30/09/2020
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Transect 4 - static 3	Not deployed	Not deployed
Transect 5 - static 1	23/09/2020	30/09/2020
Transect 5 - static 2	Not deployed	Not deployed
Transect 5 - static 3	23/09/2020	30/09/2020
Transect 6 - static 1	23/09/2020	30/09/2020
Transect 6 - static 2	Not deployed	Not deployed
Transect 6 - static 3	23/09/2020	30/09/2020
Transect 7 - static 1	23/09/2020	30/09/2020
Transect 7 - static 2	23/09/2020	30/09/2020
Transect 7 - static 3	23/09/2020	30/09/2020

Table 16 - October static dates

Static detector ID	Date of deployment	Date of collection
Transect 1 - static 1	06/10/2020	13/10/2020
Transect 1 - static 2	06/10/2020	13/10/2020
Transect 1 - static 3	06/10/2020	13/10/2020
Transect 2 - static 1	06/10/2020	13/10/2020
Transect 2 - static 2	06/10/2020	13/10/2020
Transect 2 - static 3	13/10/2020	20/10/2020
Transect 3 - static 1	06/10/2020	13/10/2020
Transect 3 - static 2	06/10/2020	13/10/2020
Transect 3 - static 3	06/10/2020	13/10/2020
Transect 4 - static 1	13/10/2020	20/10/2020
Transect 4 - static 2	Not deployed	Not deployed
Transect 4 - static 3	Not deployed	Not deployed
Transect 5 - static 1	Not deployed	Not deployed
Transect 5 - static 2	Not deployed	Not deployed
Transect 5 - static 3	Not deployed	Not deployed
Transect 6 - static 1	13/10/2020	20/10/2020
Transect 6 - static 2	Not deployed	Not deployed
Transect 6 - static 3	13/10/2020	20/10/2020
Transect 7 - static 1	13/10/2020	20/10/2020
Transect 7 - static 2	13/10/2020	20/10/2020
Transect 7 - static 3	13/10/2020	20/10/2020

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Appendix C – Transect route maps



KEY:

- Survey Area
- Transect 1
- Transect 2
- Transect 3
- Transect 4
- Transect 5
- Transect 6
- Transect 7

Rev.	Drwn	Chkd	Appd	Description	Date
01	SH	MJ	TB	Created	18/02/2021

Purpose of Issue: S2 - Issued for Information

Classification: Commercial in Confidence

Client: GCP

Project: CSET

Drawing: CSET Bat Transects - Overview Plan

Scale @ A3	Drawn	Checked	Approved
1:25,000	SH	MJ	TB

Project No: CS099797

Date: 18/02/2021

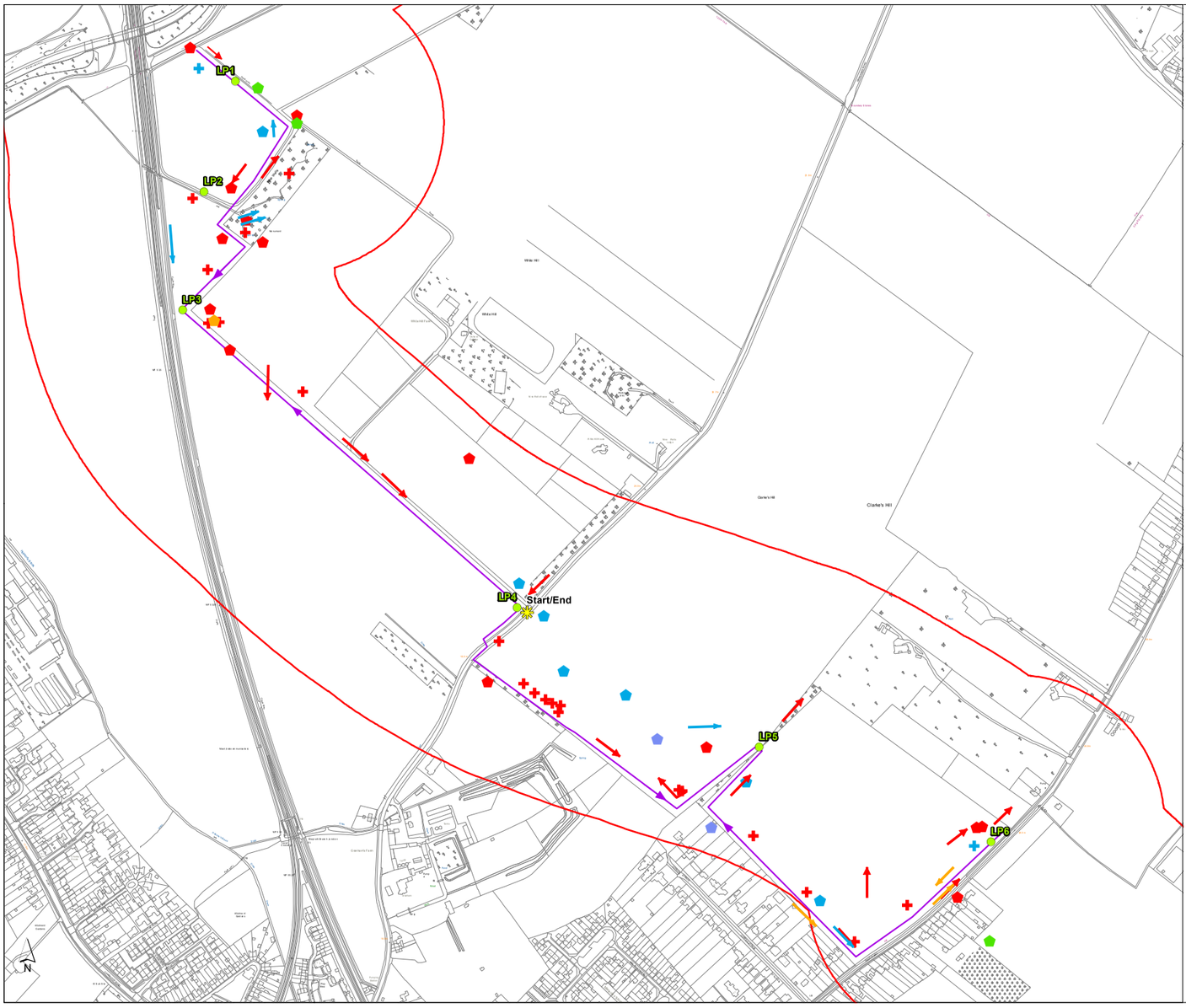
Drawing Identifier: Project - Originator - Zone - Level - FileType - Role - Number

Revision: P01

CAPITA
Property and Infrastructure

Englishgate Plaza, Botchergate, Carlisle, CA1 1RP
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Capita Property and Infrastructure Ltd.

Plot date: 18/02/2021



KEY:

- Survey Area

Species, Activity

- Common Noctule, Commuting
- Common Noctule, Foraging
- Common Noctule, Pass
- Common Pipistrelle, Commuting
- Common Pipistrelle, Foraging
- Common Pipistrelle, Pass
- Myotis species, Pass
- Serotine, Pass
- Soprano Pipistrelle, Commuting
- Soprano Pipistrelle, Pass
- Transects
- Listening points
- Start/End

Rev.	Drwn	Chkd	Appd	Description	Date
01	SH	MJ	TB	Created	22/02/2021

Purpose of Issue: S2 - Issued for Information

Classification: Commercial in Confidence

Client: GCP

Project: CSET

Drawing: CSET Bat Transects - Transect 1 - Summary Plan (May, June, July & August 2020)

Scale @ A3	Drawn	Checked	Approved
1:6,000	SH	MJ	TB

Project No: CS099797

Date: 22/02/2021

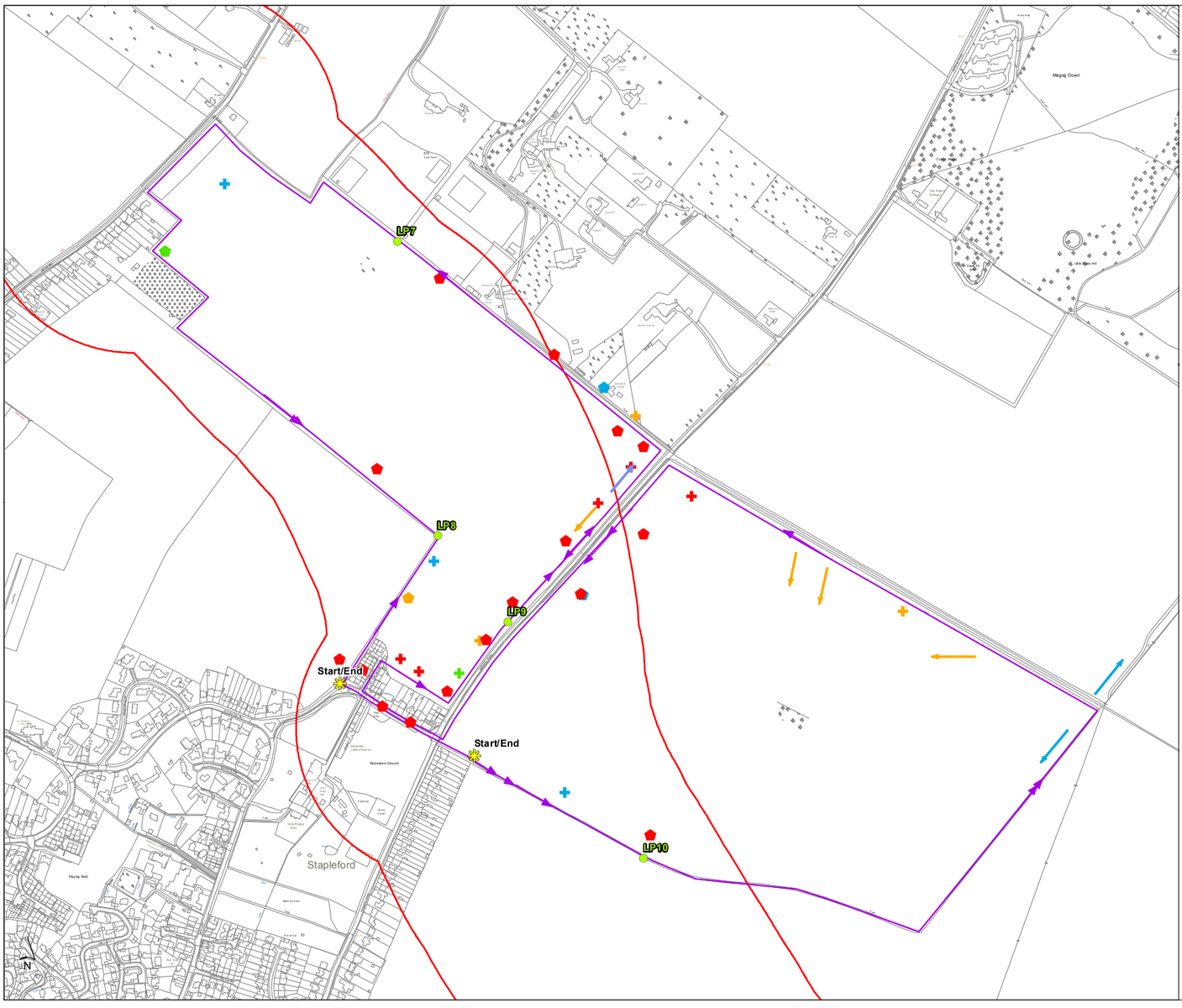
Drawing Identifier: Project - Originator - Zone - Level - FileType - Role - Number

Revision: P01

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Capita Property and Infrastructure Ltd.

Plot date: 22/02/2021



KEY:

Survey Area

Species, Activity

- Common Noctule, Commuting
- Common Noctule, Foraging
- Common Noctule, Heard not seen
- Common Pipistrelle, Commuting
- Common Pipistrelle, Foraging
- Common Pipistrelle, Pass
- Myotis species, Foraging
- Myotis species, Pass
- Serotine, Commuting
- Soprano Pipistrelle, Commuting
- Soprano Pipistrelle, Foraging
- Soprano Pipistrelle, Pass

Transects

Listening points

Start/End

Rev	Drwn	Chk'd	App'd	Description	Date
01	SH	MJ	TB	Created	22/02/2021

Purpose of Issue
S2 - Issued for Information

Classification
Commercial in Confidence

Client
GCP

Project
CSET

Drawing
CSET Bat Transects -
Transect 2 - Summary Plan
(May, June, July & August 2020)

Scale @ A3	Drawn	Checked	Approved
1:6,000	SH	MJ	TB

Project No
CS099797

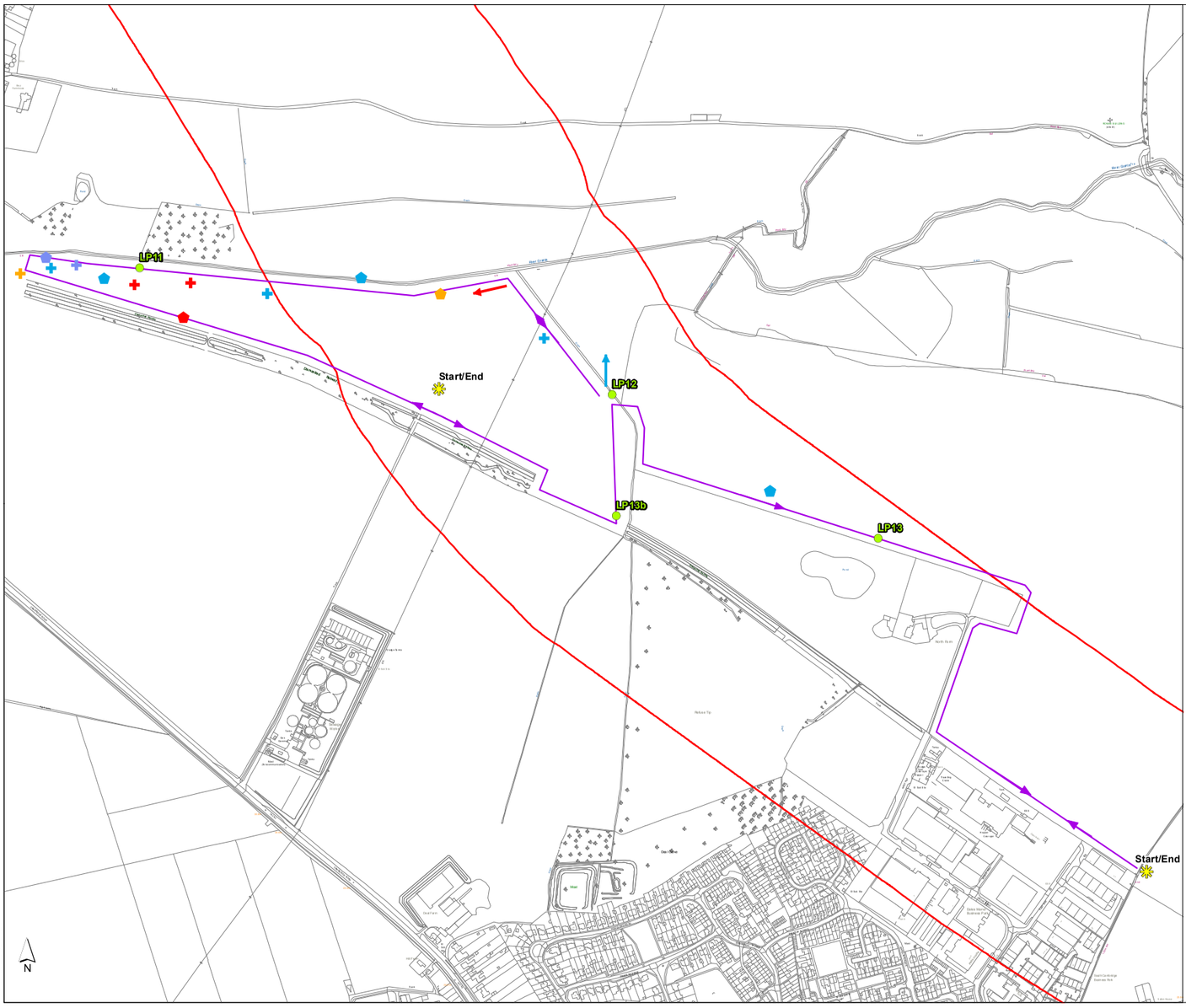
Date
22/02/2021

Drawing Identifier
Project - Originator - Zone - Level - FileType - Role - Number

Revision
P01

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Plot date: 22/02/2021



KEY:

Survey Area

Species, Activity

- Common Noctule, Commuting
- Common Noctule, Foraging
- Common Noctule, Pass
- Common Pipistrelle, Commuting
- Common Pipistrelle, Foraging
- Common Pipistrelle, Pass
- Serotine, Foraging
- Serotine, Heard not seen
- Soprano Pipistrelle, Foraging
- Soprano Pipistrelle, Pass

Transects

Listening points

Start/End

Rev	Drwn	Chk'd	App'd	Description	Date
01	SH	MJ	TB	Created	22/02/2021

Purpose of Issue
S2 - Issued for Information

Classification
Commercial in Confidence

Client
GCP

Project
CSET

Drawing
CSET Bat Transects -
Transect 3 - Summary Plan
(May, June, July & August 2020)

Scale @ A3	Drawn	Checked	Approved
1:6,000	SH	MJ	TB

Project No
CS099797

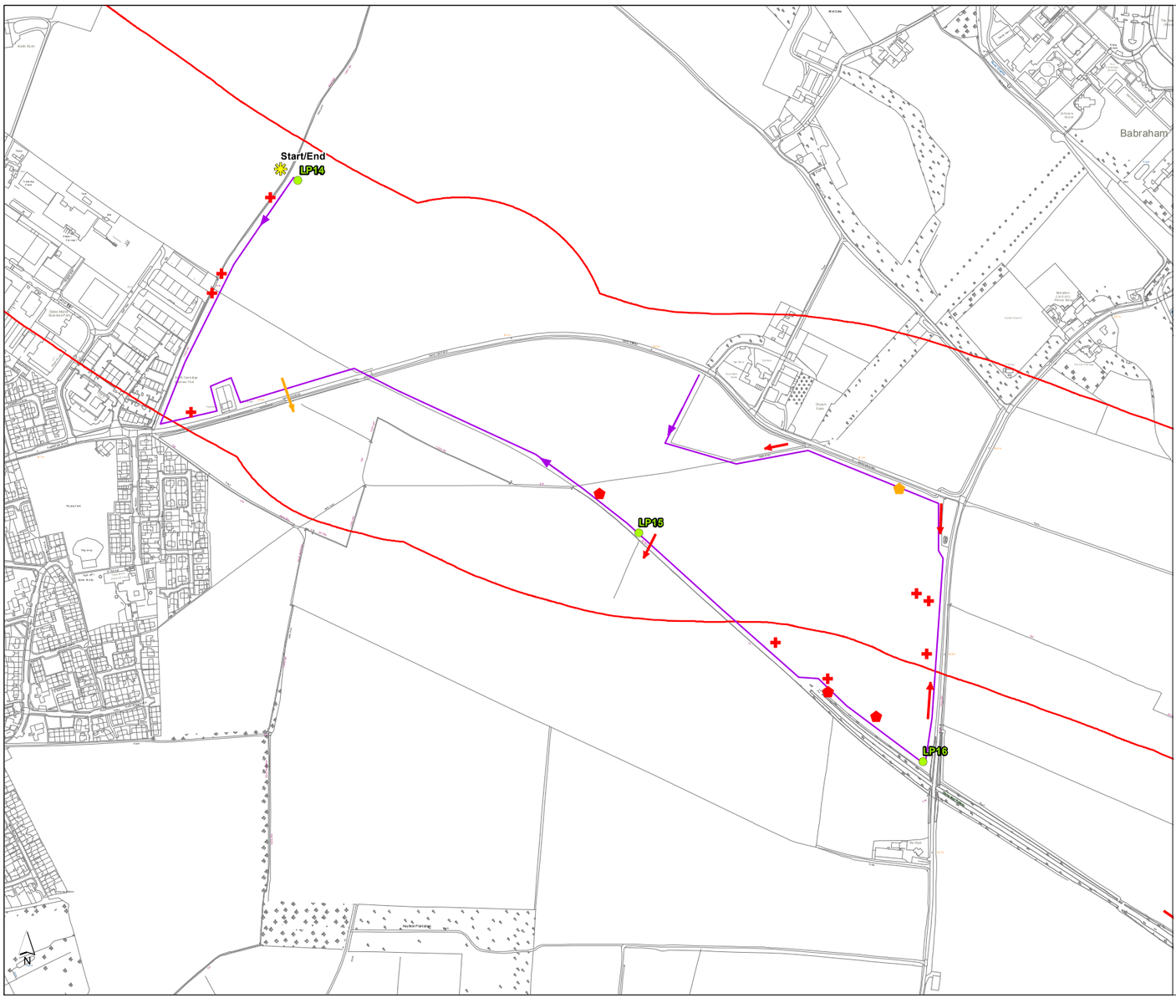
Date
22/02/2021

Drawing Identifier
Project - Originator - Zone - Level - FileType - Role - Number

Revision
P01

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Plot date: 22/02/2021



KEY:

Survey Area

Species, Activity

- Common Pipistrelle, Commuting
- Common Pipistrelle, Foraging
- Common Pipistrelle, Pass
- Soprano Pipistrelle, Commuting
- Soprano Pipistrelle, Pass

Transects

Listening points

Start/End

Rev	Drwn	Chk'd	App'd	Description	Date
01	SH	MJ	TB	Created	22/02/2021

Purpose of Issue
S2 - Issued for Information

Classification
Commercial in Confidence

Client
GCP

Project
CSET

Drawing
CSET Bat Transects -
Transect 4 - Summary Plan
(May, June & July 2020)

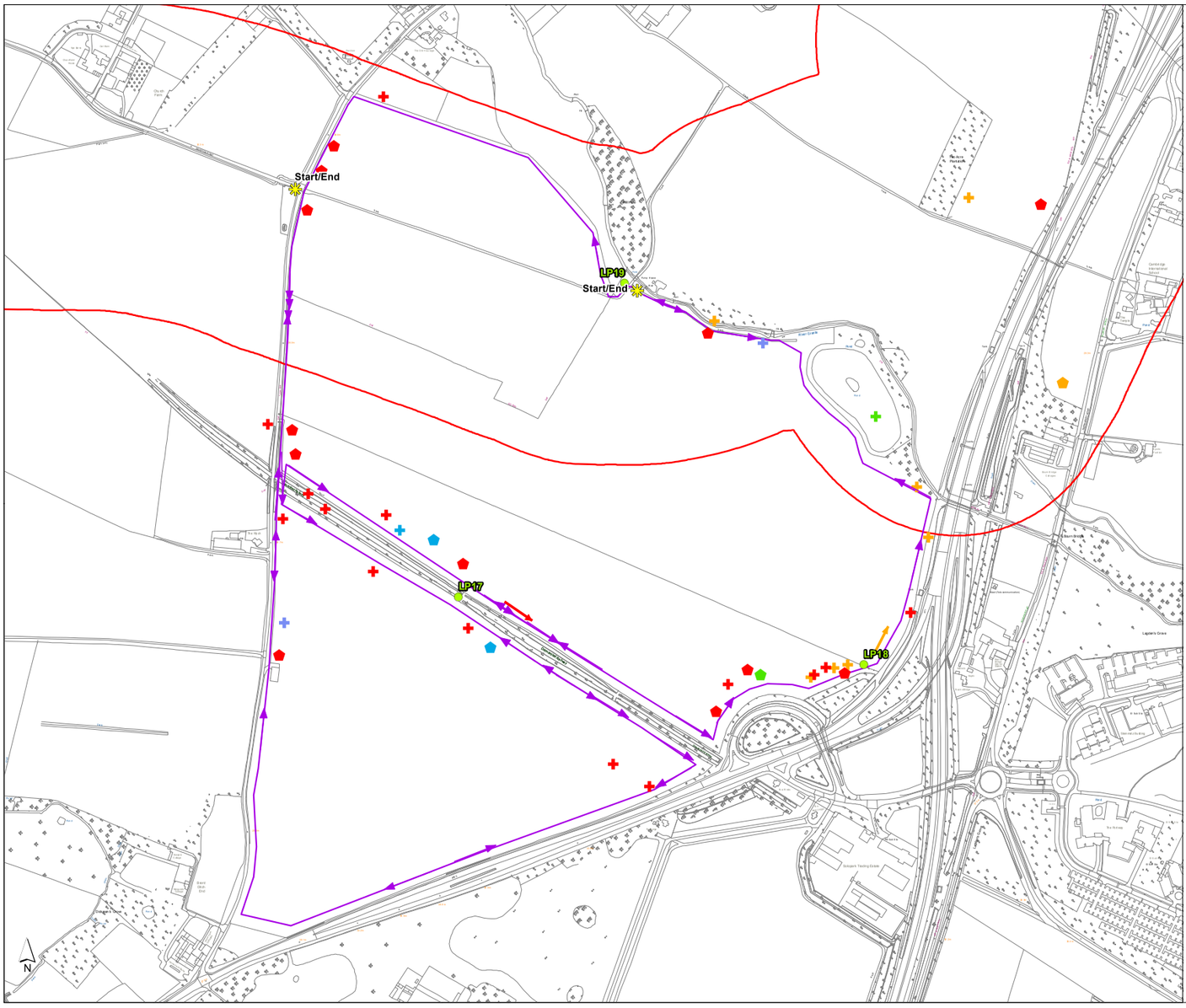
Scale @ A3	Drawn	Checked	Approved
1:6,000	SH	MJ	TB

Project No: CS099797
Date: 22/02/2021

Drawing Identifier
Project - Originator - Zone - Level - FileType - Role - Number
Revision: P01

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Plot date: 22/02/2021



KEY:

Survey Area

Species, Activity

- Common Noctule, Foraging
- Common Noctule, Heard not seen
- Common Pipistrelle, Commuting
- Common Pipistrelle, Foraging
- Common Pipistrelle, Heard not seen
- Myotis species, Foraging
- Myotis species, Heard not seen
- Serotine, Foraging
- Soprano Pipistrelle, Commuting
- Soprano Pipistrelle, Foraging

Transects

Listening points

Start/End

Rev	Drwn	Chk'd	App'd	Description	Date
01	SH	MJ	TB	Created	22/02/2021

Purpose of Issue
S2 - Issued for Information

Classification
Commercial in Confidence

Client
GCP

Project
CSET

Drawing
CSET Bat Transects -
Transect 5- Summary Plan
(May, June, July, August, September & October 2020)

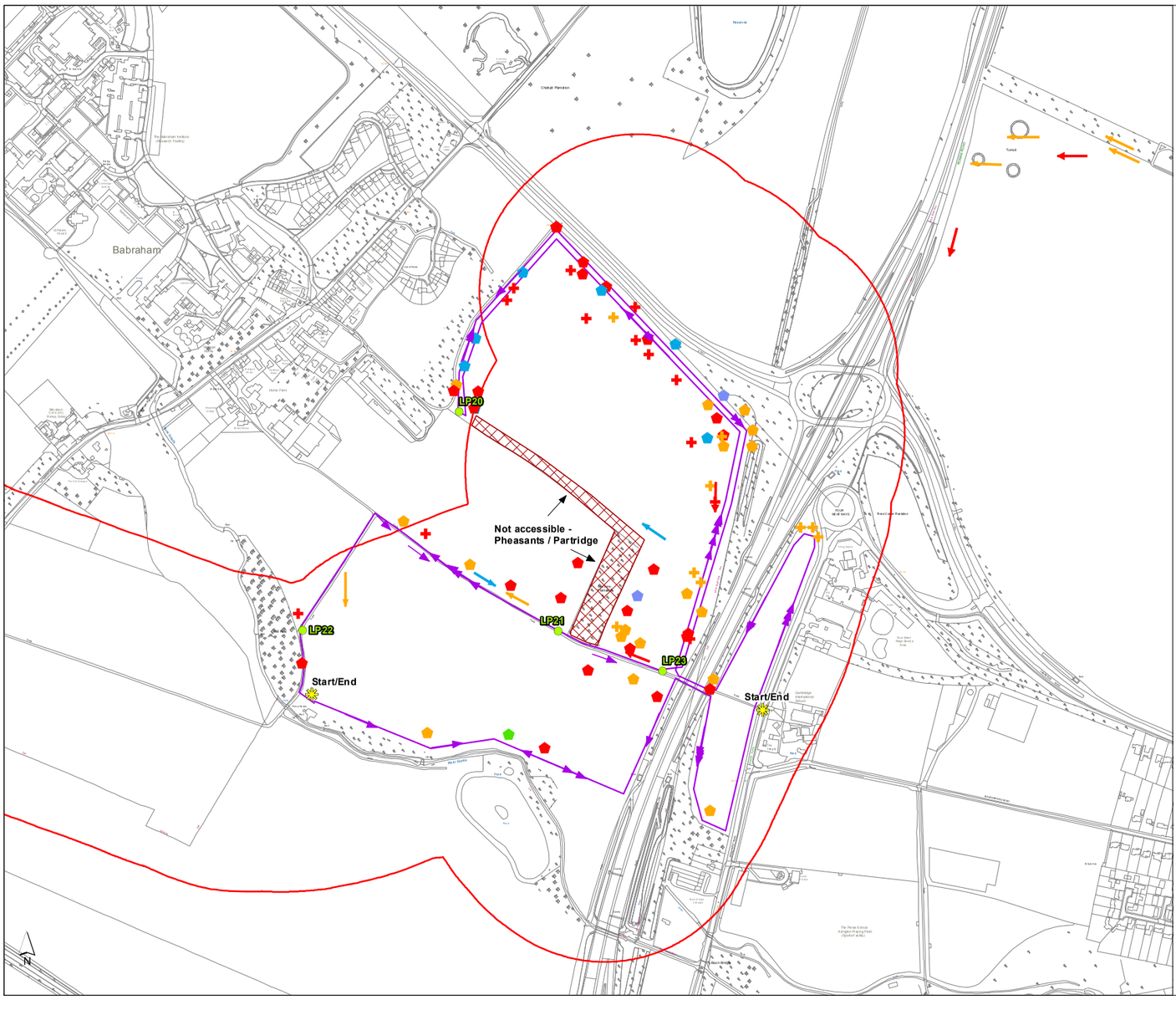
Scale @ A3	Drawn	Checked	Approved
1:6,000	SH	MJ	TB

Project No: CS099797
Date: 22/02/2021

Drawing Identifier
Project - Originator - Zone - Level - FileType - Role - Number
Revision: P01

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Capita Property and Infrastructure Ltd.

Plot date: 22/02/2021



KEY:

Survey Area

Species, Activity

- Common Noctule, Commuting
- Common Noctule, Pass
- Common Pipistrelle, Commuting
- Common Pipistrelle, Foraging
- Common Pipistrelle, Pass
- Myotis species, Pass
- Serotine, Pass
- Soprano Pipistrelle, Commuting
- Soprano Pipistrelle, Foraging
- Soprano Pipistrelle, Pass

Transects

Listening points

Start/End

Not accessible

Rev	Dwn	Chk'd	App'd	Description	Date
01	SH	MJ	TB	Created	22/02/2021

Purpose of Issue
S2 - Issued for Information

Classification
Commercial in Confidence

Client
GCP

Project
CSET

Drawing
CSET Bat Transects -
Transect 6 - Summary Plan
(May, June, July, August, September & October 2020)

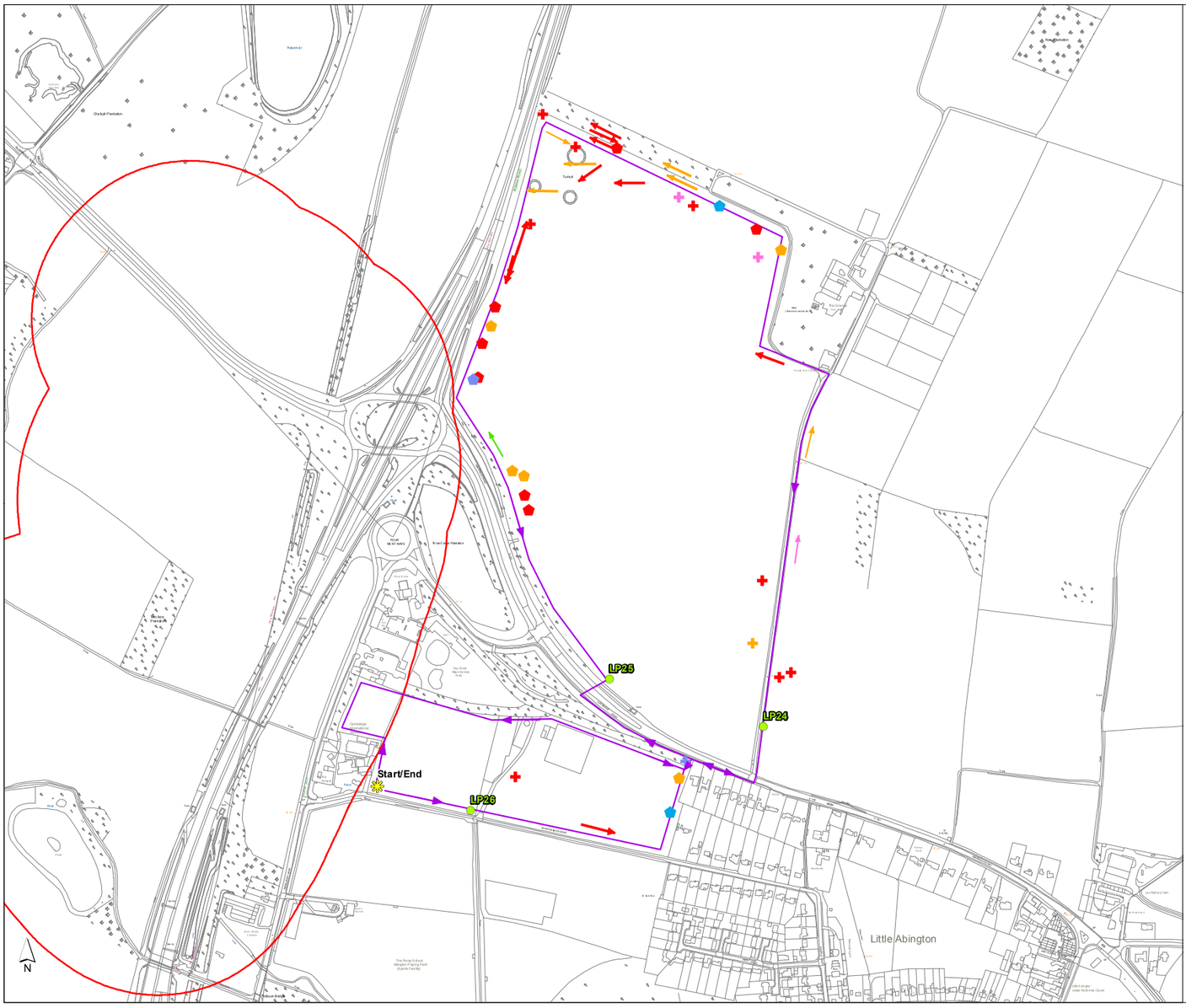
Scale @ A3	Drawn	Checked	Approved
1:6,000	SH	MJ	TB

Project No: CS099797
Date: 22/02/2021

Drawing Identifier
Project - Originator - Zone - Level - FileType - Role - Number
Revision: P01

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Plot date: 22/02/2021



KEY:

Survey Area

Species, Activity

- Barbastelle, Commuting
- Barbastelle, Foraging
- Common Noctule, Pass
- Common Pipistrelle, Commuting
- Common Pipistrelle, Foraging
- Common Pipistrelle, Heard not seen
- Myotis species, Commuting
- Serotine, Foraging
- Serotine, Pass
- Soprano Pipistrelle, Commuting
- Soprano Pipistrelle, Foraging
- Soprano Pipistrelle, Pass

Transects

Listening points

Start/End

Rev	Dwn	Chk'd	App'd	Description	Date
01	SH	MJ	TB	Created	22/02/2021

Purpose of Issue
S2 - Issued for Information

Classification
Commercial in Confidence

Client
GCP

Project
CSET

Drawing
CSET Bat Transects -
Transect 7 - Summary Plan
(May, June & July 2020)

Scale @ A3	Drawn	Checked	Approved
1:6,000	SH	MJ	TB

Project No: CS099797
Date: 22/02/2021

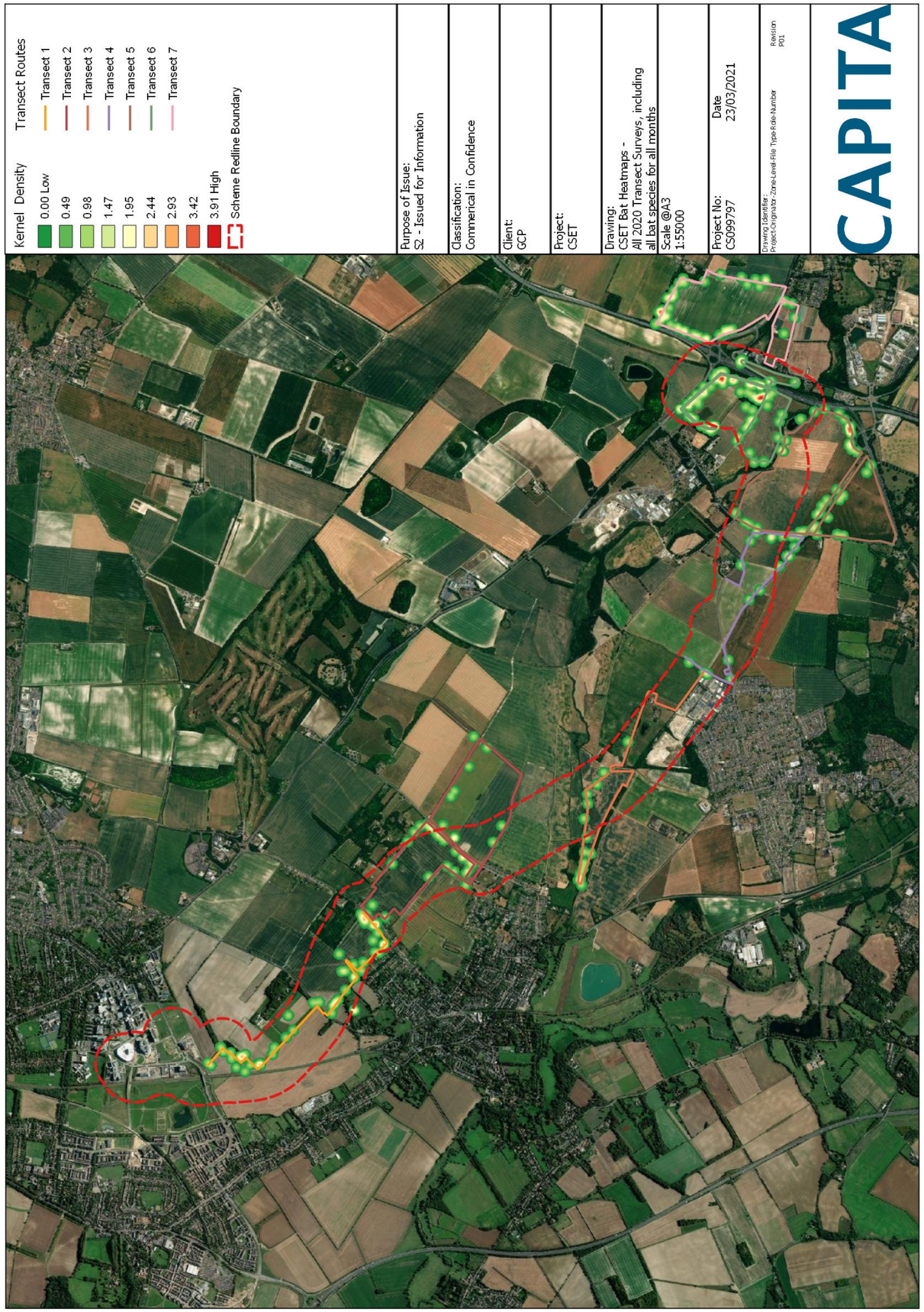
Drawing Identifier
Project - Originator - Zone - Level - FileType - Role - Number
Revision: P01

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Plot date: 22/02/2021

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Appendix D – Transect Heat Maps





Purpose of Issue:
S2 - Issued for Information

Classification:
Commerical in Confidence

Client:
GCP

Project:
CSET

Drawing:
CSET Bat Heatmaps -
Transect 1 2020 Surveys, including all bat species and all months

Scale @A3
1:12000

Project No: CS099797
Date 23/03/2021

Drawing Identifier:
Project-Originator-Zone-Level-File Type-Role-Number
Revision P01

CAPITA



Purpose of Issue:
S2 - Issued for Information

Classification:
Commerical in Confidence

Client:
GCP

Project:
CSET

Drawing:
CSET Bat Heatmaps -
Transect 2 2020 Surveys, including all bat species and all months

Scale @A3
1:12000

Project No: CS099797
Date 23/03/2021

Drawing Identifier:
Project-Originator-Zone-Level-File Type-Role-Number
Revision P01

CAPITA



Purpose of Issue:
S2 - Issued for Information

Classification:
Commerical in Confidence

Client:
GCP

Project:
CSET

Drawing:
CSET Bat Heatmaps -
Transect 3 2020 Surveys, including
all bat species and all months

Scale @A3
1:12000

Project No: CS099797
Date 23/03/2021

Drawing Identifier:
Project-Originator-Zone-Level-File Type-Role-Number
Revision P01

CAPITA



Purpose of Issue:
S2 - Issued for Information

Classification:
Commerical in Confidence

Client:
GCP

Project:
CSET

Drawing:
CSET Bat Heatmaps -
Transect 4 2020 Surveys, including
all bat species and all months

Scale @A3
1:12000

Project No: CS099797
Date 23/03/2021

Drawing Identifier:
Project-Originator-Zone-Level-File Type-Role-Number
Revision P01

CAPITA



Purpose of Issue:
S2 - Issued for Information

Classification:
Commerical in Confidence

Client:
GCP

Project:
CSET

Drawing:
CSET Bat Heatmaps -
Transect 5 2020 Surveys, including
all bat species and all months

Scale @A3
1:12000

Project No: CS099797

Date 23/03/2021

Drawing Identifier:
Project-Originator-Zone-Level-File Type-Role-Number

Revision P01

CAPITA



Purpose of Issue:
S2 - Issued for Information

Classification:
Commerical in Confidence

Client:
GCP

Project:
CSET

Drawing:
CSET Bat Heatmaps -
Transect 6 2020 Surveys, including
all bats species and all months

Scale @A3
1:12000

Project No: CS099797

Date 23/03/2021

Drawing Identifier:
Project-Originator-Zone-Level-File Type-Role-Number

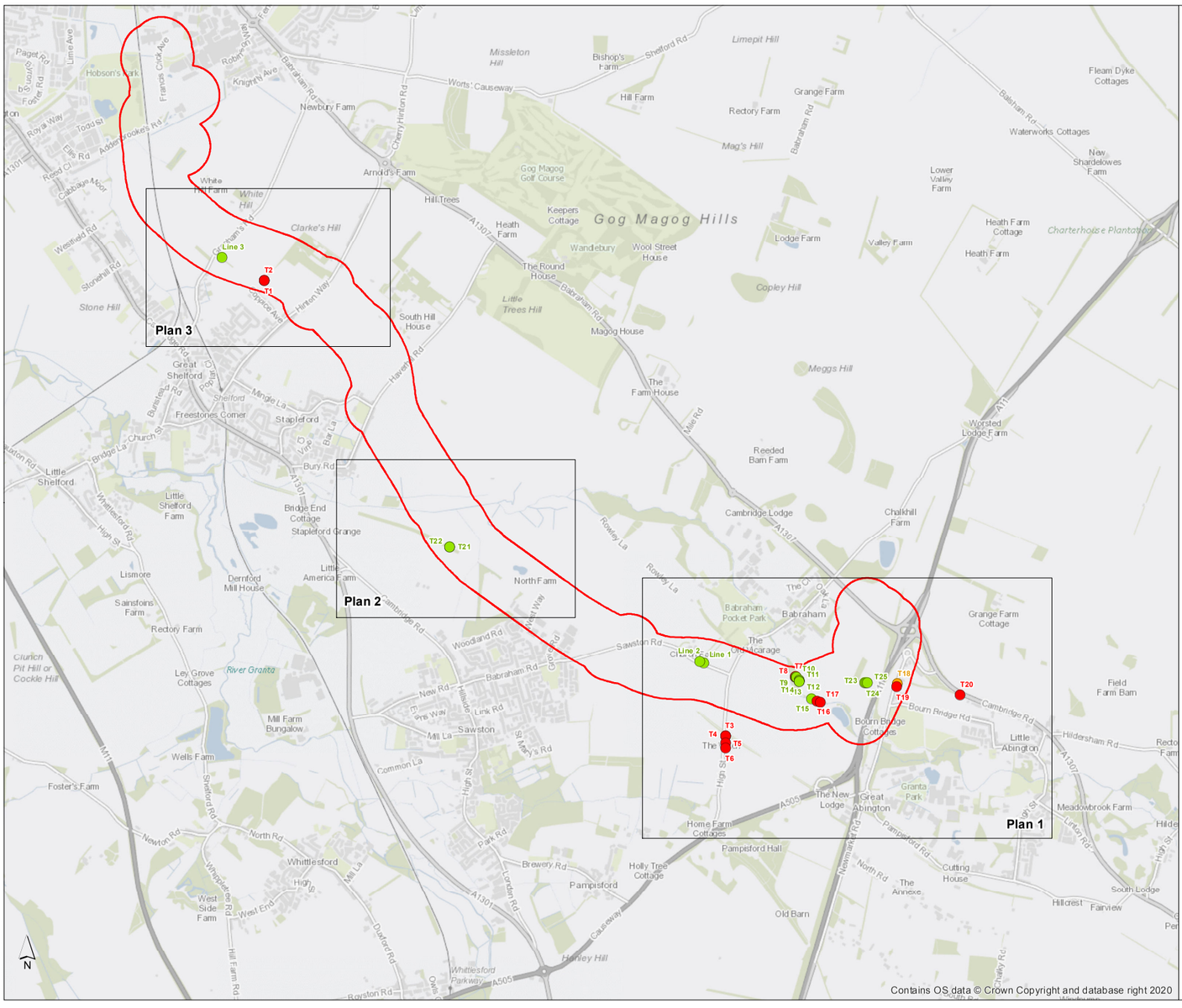
Revision P01

CAPITA



CAPITA

Appendix E - Tree Location Map



KEY:

- Survey Area

Bat Roost Potential

- High potential
- Moderate potential
- Negligible potential

Rev	Drwn	Chkd	Appd	Description	Date
01	SH	TF	TB	For Issue	18/01/2021
01.1	SH	TF	TB	Created	23/10/2020

Purpose of Issue
S2 - Issued for Information

Classification
Commercial in Confidence

Client
GCP

Project
CSET

Drawing
CSET Bat Roost Potential - Trees
Overview plan

Scale @ A3	Drawn	Checked	Approved
1:30,000	SH	TF	TB

Project No
CS099797

Date
18/01/2021

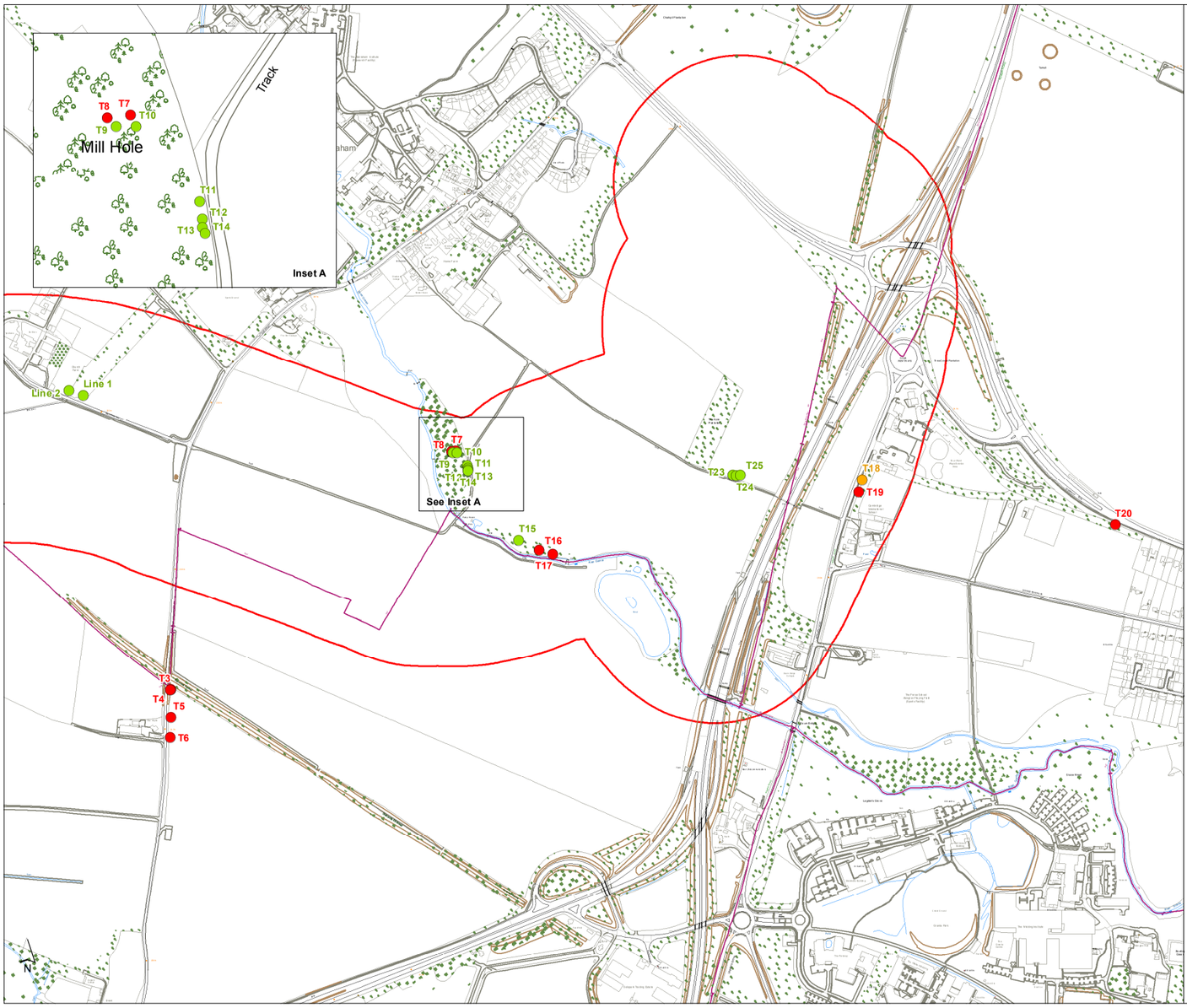
Drawing Identifier
Project - Originator - Zone - Level - FileType - Role - Number

Revision
P01

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Capita Property and Infrastructure Ltd.

Plot date: 18/01/2021



KEY:

- Survey Area

Bat Roost Potential

- High potential
- Moderate potential
- Negligible potential

Rev	Drwn	Chkd	Appd	Description	Date
01	SH	TF	TB	For Issue	18/01/2021
01.1	SH	TF	TB	Created	23/10/2020

Purpose of Issue
S2 - Issued for Information

Classification
Commercial in Confidence

Client
GCP

Project
CSET

Drawing
CSET Bat Roost Potential - Trees
Plan 1 of 3

Scale @ A3	Drawn	Checked	Approved
1:7,500	SH	TF	TB

Project No
CS099797

Date
18/01/2021

Drawing Identifier
Project - Originator - Zone - Level - FileType - Role - Number

Revision
P01

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Capita Property and Infrastructure Ltd.

Plot date: 18/01/2021



KEY:

Survey Area

Bat Roost Potential

- High potential
- Moderate potential
- Negligible potential

Rev.	Drwn	Chk'd	App'd	Description	Date
01	SH	TF	TB	For Issue	18/01/2021
01.1	SH	TF	TB	Created	23/10/2020

Purpose of Issue
S2 - Issued for Information

Classification
Commercial in Confidence

Client
GCP

Project
CSET

Drawing
CSET Bat Roost Potential - Trees
Plan 2 of 3

Scale @ A3	Drawn	Checked	Approved
1:1,250	SH	TF	TB

Project No
CS099797

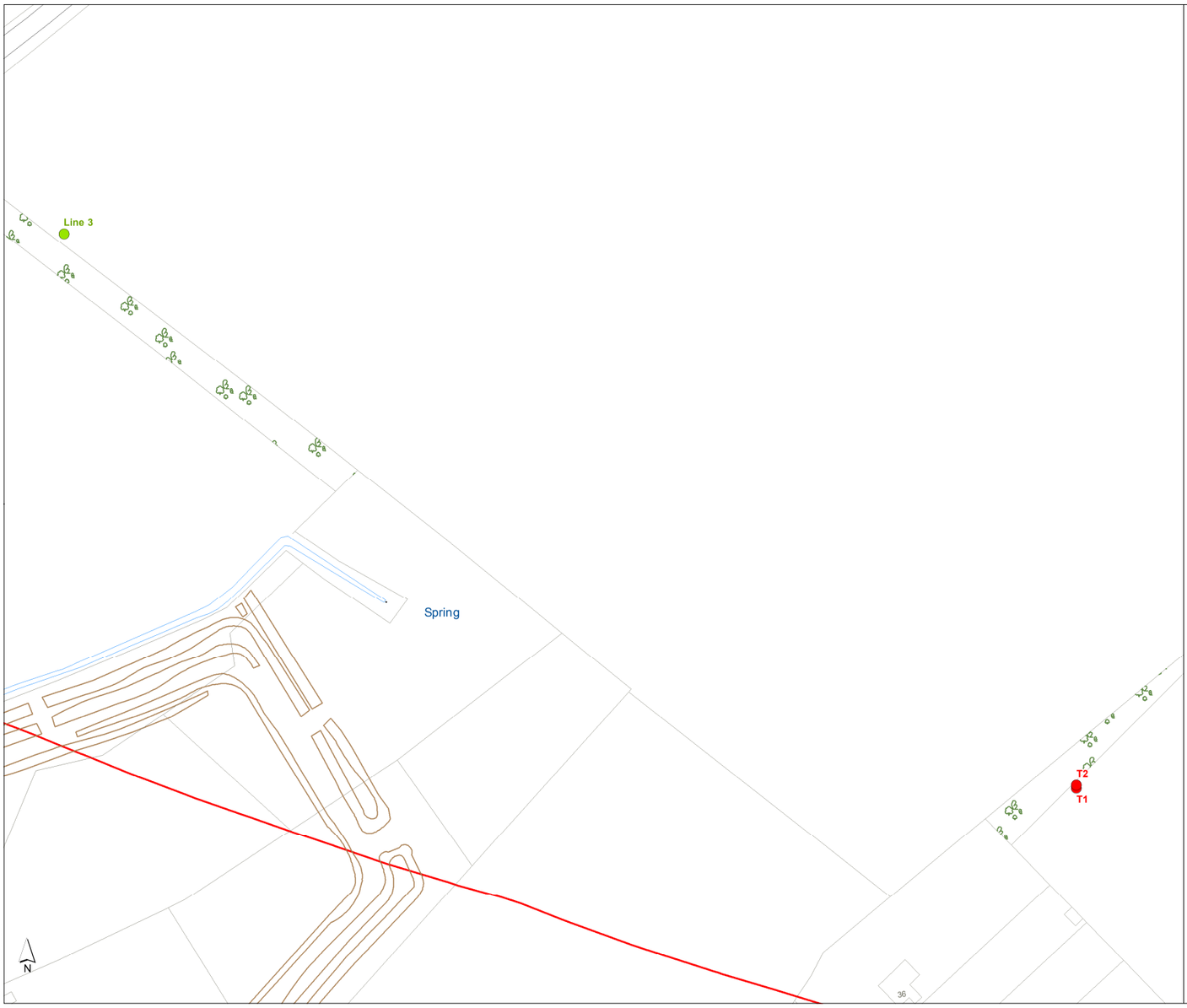
Date
18/01/2021

Drawing Identifier
Project - Originator - Zone - Level - FileType - Role - Number

Revision
P01

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Plot date: 18/01/2021



KEY:

Survey Area

Bat Roost Potential

- High potential
- Moderate potential
- Negligible potential

Rev.	Drwn	Chk'd	App'd	Description	Date
01	SH	TF	TB	For Issue	18/01/2021
01.1	SH	TF	TB	Created	23/10/2020

Purpose of Issue
S2 - Issued for Information

Classification
Commercial in Confidence

Client
GCP

Project
CSET

Drawing
CSET Bat Roost Potential - Trees
Plan 3 of 3

Scale @ A3	Drawn	Checked	Approved
1:1,250	SH	TF	TB

Project No
CS099797

Date
18/01/2021

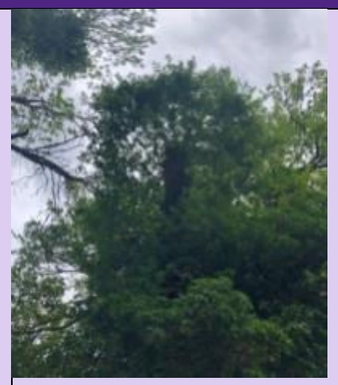
Drawing Identifier
Project - Originator - Zone - Level - FileType - Role - Number

Revision
P01

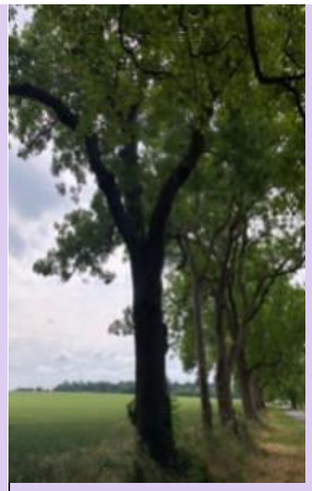
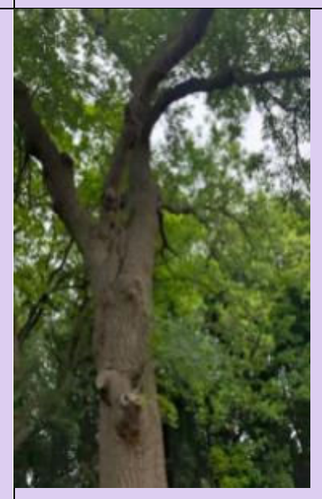
CAPITA
Property and Infrastructure
Englishgate Plaza, Botchergate, Carlisle, CA1 1RP
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Capita Property and Infrastructure Ltd.

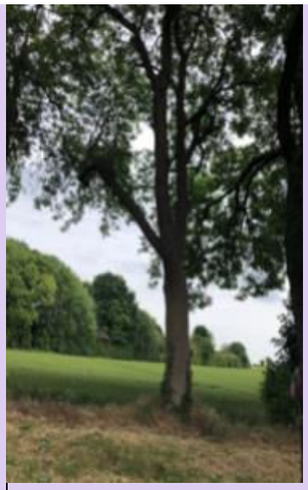
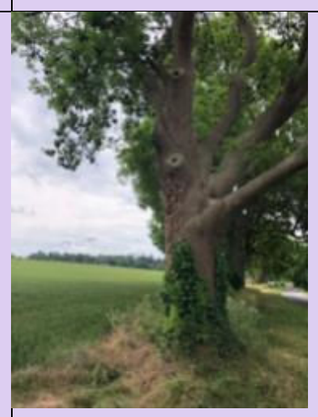
Plot date: 18/01/2021

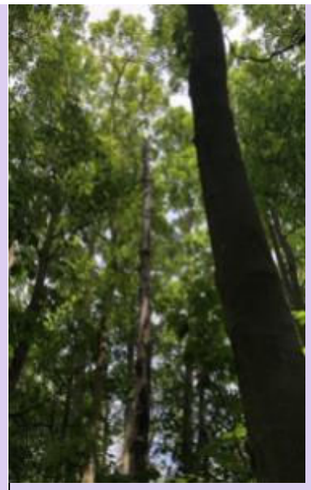
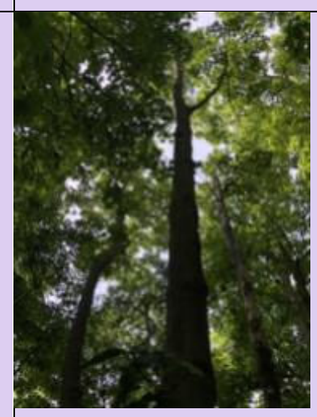
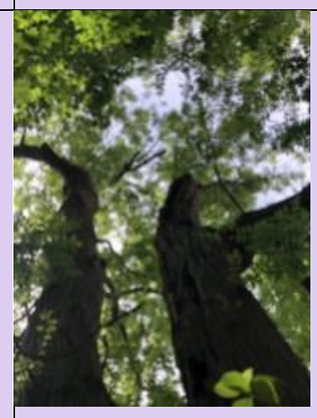
Appendix F - Tree Reference Photos

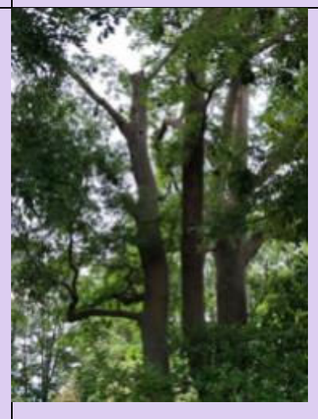
Tree ID	Grid Reference	Tree species and condition	Overall assessment of roosting potential	Photo
1	TL 46865 53157	Ash	Low	
2	TL 46865 53158	Oak	Low	

CAPITA

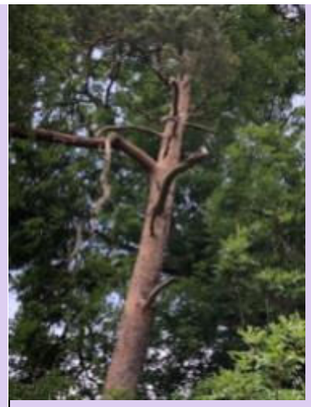
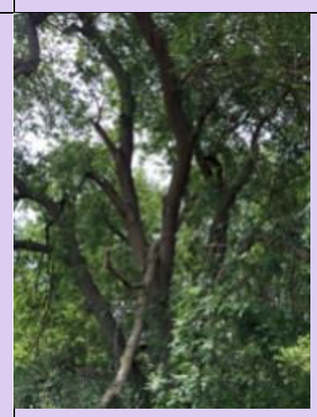
3	TL 50715 49352	*Sycamore*	Low	
4	TL 50714 49351	Ash	Low	

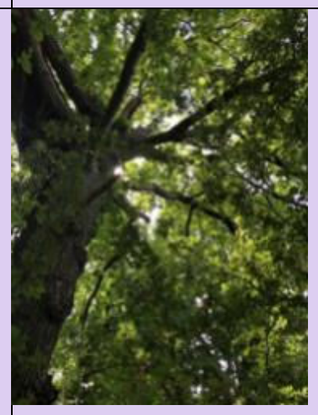
5	TL 50715 49294	Ash	Low	
6	TL 50714 49252	Ash	Low	

7	TL 51308 49848	Oak	Low	
8	TL 51300 49847	Standing dead	Low	
9	TL 51279 49775	Ash	Moderate	

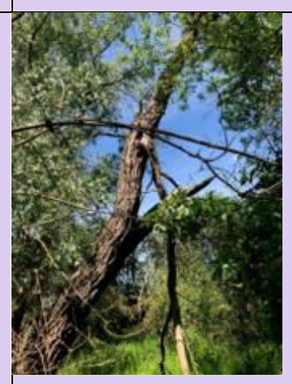
10	TL 51310 49844	Ash	Moderate	
11	TL 51332 49818	Ash	Moderate	
12	TL 51333 49812	Ash	Moderate	

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13	TL 51333 49809	Pine	High	
14	TL 51334 49807	Ash	Moderate	
15	TL 51439 49662	*Crack willow*	Moderate	

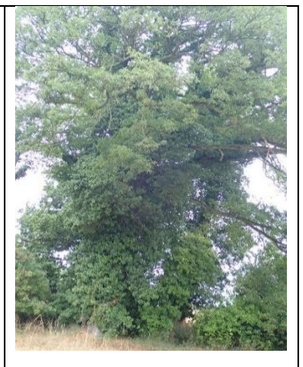
16	TL 51482 49642	*Sycamore*	Low	
17	TL 51509 49633	*Crack willow*	Low	
18	TL 52154 49788	*Oak*	High	No image
19	TL 52146 49763	*Oak*	Low	

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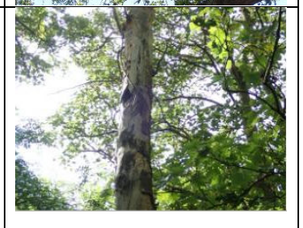
20	TL 52679 49695	*Ash*	Low	
21	TL 48413 50933	*Willow*	Moderate	
22	TL 48429 50918	*Willow*	Moderate	
23	TL 51861 49806	*Oak*	Moderate	No image
24	TL 51906 49786	*Oak*	Moderate	No image
25	TL 51953 49769	*Oak*	Moderate	No image
Line 1	TL 50566 49990	*Lyme*	Moderate	No image

Line 2	TL 50533 49999	*Lyme*	Moderate	No image
Line 3	TL 46515 53347	*Mixed*	Moderate	

Appendix G – Tree Climbing Results

Tree Survey Roost Report Form			Date: 21/07/2020							
Site Name: **CSET – Cheveley Park Farms**			Surveyor: J. Durward / W. O'Connor				Weather: **20 degrees Celsius, sunny, 60% cloud cover.**			
Grid Reference	Tree Species & Tag/Map no.	Potential Roost Features	Camera Image No.	Height from bas of tree	Distance out from stem	PRF on N, E, S, W side of tree	PRF N, E, S, W	Category of PRF	Notes of PRF	Photograph
TL 46852 53159	European Ash T01	Ivy	P8140697	0 – 14M	-	ALL	ALL	Low	Too dangerous to climb tree. Ivy covered the tree with limited potential for the presence of cavities	
TL 46857 53 157	Peduncu late Oak T02	Ivy	P8140696	0 – 14M	-	ALL	ALL	Low	Ivy covered the tree with some potential for the presence of cavities	
		Tear-out / ivy	P8140695	5 – 7M	0 – 3M	S	S	Low	3m long limb that has torn out below the limb and left the heartwood exposed. Limited lifted bark overlapping the sides of the feature amongst the ivy.	
TL 50714 49356	Sycamor e T3	Wound		5M	1.5M	SE	SE	Neg	Exposed inward facing wound goes back 6cm towards tree and narrows to 2cm. Full of woodlice.	N/A

TL 50715 49351	Ash T4	Wound	P666	6M	-	S	S	Neg	4 x 2cm entrance goes in 2cm.	
		Wound	P670	4M	1M	S	S	Mod	4 x 3cm entrance goes in 5cm and up for 30cm. Dry and messy inside cavity.	
		Wound	P670	5M	2M	S	S	Low	6 x 3cm entrance goes in 5cm and up for 10cm. Dry and messy inside cavity.	As above
		Wound	P670	6M	3M	S	SE	Mod	6 x 6cm entrance goes in 8cm and back towards the tree for 25cm. Wren inside cavity.	As above
		Split	P670	6.5M	0.3M	SSE	S	Low	Downward facing split 40cm long. Cavity goes in on the end of the feature and outwards for 2cm.	As above

		2 x knotholes	P671	5M 5.5M	-	NW	NW	Neg	First knothole with exposed downward facing cavity on secondary stem overhanging road. Feature goes down for 10cm.	
TL 51282 49808	Dead Tree T08 P619	Woodpecker hole	P617	10M	-	E	E	Low	Feature could not be inspected properly as too dangerous to climb.	
TL 51274 49809	Twin stemmed European Ash T09	Woodpecker hole / knothole	P620	6M	-	S	S	Mod	5 x 5cm diameter entrance goes into a bowl. The cavity extends into the stem beyond the bowl for 40cm. The heartwood has been removed.	
TL 51274 49809	Twin stemmed European Ash T09	Lighting strike / lifted bark	-	1 – 8M	-	SE	SE	Mod	Feature starts at the union. The split is 10 x 40cm wide up the stem for 8m. Feature could not be inspected properly as too dangerous to climb.	N/A
		Woodpecker hole	P622 P623 P624	12M	2M	S	S	High	Large hole with approx. Diameter of 10x8cm on underside	

									of secondary stem. The hole faces downwards. Feature could not be inspected properly as too dangerous to climb.	
		Woodpecker hole	P621	9M	-	W	W	Low – mod	Hole with approx. Diameter of 7 x 7cm extends into the tree. Feature could not be inspected properly as too dangerous to climb.	
TL 51309 49819	European Ash T10								Tree next to powerlines so not climbed. Grid reference is approximate as not taken in the field.	N/A

TL 51332 49810	European Ash T11	Woodpecker hole	P602	7M	-	S	S	Mod	In secondary stem. 5 x 5cm diameter entrance goes into a depth of 10cm and up 20cm. Old bird's nest at base. Cavity dirty and heartwood present.	
		Wound	P603	6M	-	NE	SE	Low	In secondary stem. Cavity 2 x 2cm at entrance, goes in 9cm behind heartwood.	
		Torn out dead branch with modified woodpecker hole present	P604	7M	0.5M	SE	E	Mod	5 x 5cm diameter entrance goes into a depth of 5cm and up 20cm. Inside there is a 2cm diameter gap behind the exterior bark so cavity inside is 20 x 2cm in dimensions.	

TL 51336 49772	European Ash T12 P593	Weld between dead tree and ash.	P588 / P592	12M	-	SW/NE	SW/NE	Low	3cm gap at base of wedged extending upwards 20cm to a point.	
		Helical split + woodpecker holes on dead tree (+14m)	P589	5M – top of tree	-	All sides	All sides	Low	Open split that varies in width between 3-5cm and a depth of 8cm. Evidence where woodpeckers have caused superficial damage near top of tree. Could not be fully inspected as too dangerous to climb.	
		Woodpecker hole	P591	10M	-	NW	NW	Low	Feeding hole. 5 x 5cm diameter entrance goes into a depth of 8cm.	

										
		Woodpecker hole	P591	10.5M	-	NW	NW	Low	Feeding hole. 5 x 5cm diameter entrance goes into a depth of 10cm.	As above
		Woodpecker hole	P591	9M	-	SE	SE	Low	5 x 5cm diameter entrance goes into a depth of 10cm and down to a nest at 20cm.	As above
		Woodpecker hole	-	8.5M	-	S	S	Low	Feeding hole. 5 x 5cm diameter entrance goes into a depth of 9cm.	As above
TL 51339 49753	Scot's Pine T13 P594	Woodpecker hole	-	8M	-	SE	SE	Neg	Feeding hole. 4 x 4cm diameter entrance goes into a depth of 6cm.	N/A

		Split	P599 P600 P601	8M	-	S	S	Day roost	40 x 5cm vertical split with dead branch at top. Dry inside with old bird's nest at base. Cavity goes up 50cm from base of deadwood and is rough and dry inside. 3 pipistrelle droppings seen on cobwebs and 3 inside the cavity, likely from a single bat.	  

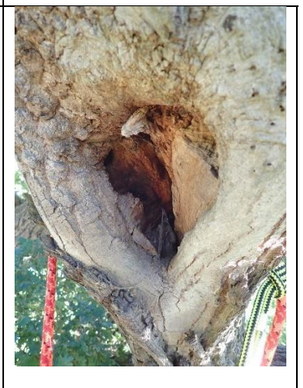
TL 51336 49763	European Ash T14 P595	Woodpecker hole	P596	6M	-	SE	SE	Mod	5 x 5cm diameter entrance goes into a depth of 30cm and down 40cm. Feature is stuffed full of cobwebs and very dry inside. Old heartwood removed from cavity.	
		Wound	P597	7M	1M	SE	E	Mod	On secondary stem. 40cm long open split. 5 x 5cm entrance goes into a dry cavity for 30cm away from the tree. Old bird's nest present.	
		Knothole / tear-out	-	7M	-	N	N	Neg	7 x 7cm entrance goes into an open cavity approx. 10cm deep.	As above
		Woodpecker hole						Low	7 x 7cm diameter entrance goes into a depth of 30cm and down to a nest at 20cm. Cavity is quite cluttered.	As above

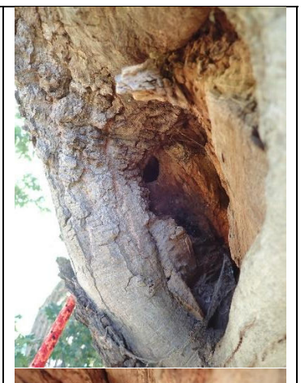
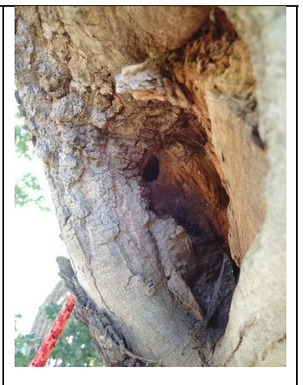
TL 51861 49 806	Peduncul ate Oak T23	Wound	P614	9M	-	N	S	Mod	4 x 5cm opening at top of secondary stem 2m above the union. Cavity goes into deadwood for 5ocm away from the tree. Dry inside.	
		Helical split	P612 P613	9M	-	W	E – N	Mod	Approx. 10cm wide by 1m long crack. First 80cm is exposed and the last 20cm goes underneath the bark near the top of the tear out.	
										
TL 51861 49806	Peduncul ate Oak T23	Branch collar	-	9M	1M	S	S	Low	Upwards facing collar of bark around deadwood goes down 5cm and is 3cm wide.	N/A
		Large knothole		5M	-	S	S	Low	40 x 20cm cavity goes in and down 40cm to a stock dove's nest. 4 chicks present.	N/A
		Knothole		5M	-	N	N	Neg	Approx. 10 x 10cm cavity goes in 5cm.	N/A

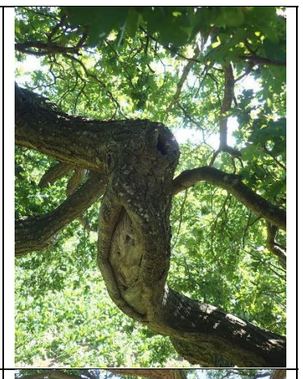
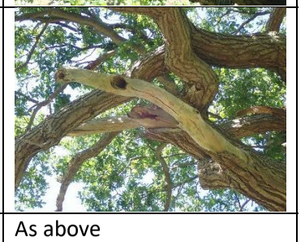
Tree Survey Roost Report Form			**Date: 31/07/2020**							
Site Name: CSET – Cheveley Park Farms			Surveyor: J. Durward / W. O'Connor				Weather: 20 degrees Celsius, sunny, 60% cloud cover.			
Grid Reference	Tree Species & Tag/Map no.	Potential Roost Features	Camera Image No.	Height from bas of tree	Distance out from stem	PRF on N, E, S, W side of tree	PRF N, E, S, W	Category of PRF	Notes of PRF	Photograph
TL 51439 49662	Crack Willow T15	Large tear-out	P660	5M	-	NE	NE	Low	7cm diameter entrance goes down 8cm to an old bird's	

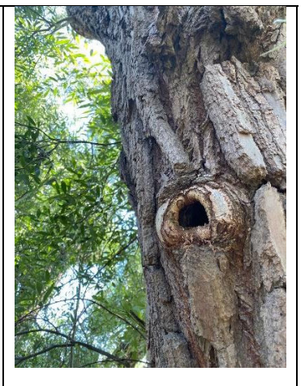
		(3m – 8m) Hole in heartwood							nest. Cavity goes up 50cm but was very dirty and dusty inside.
		Knothole	4797.jpeg	7M	-	N	N	Mod	4 x 4cm opening goes in horizontally for 35cm.
		Large hole in heartwood facing over field	P661	6M	2M	NE	NE	Low	20cm diameter hole goes down 10cm but is exposed.
		Upward facing hole		5M	1.5M	NE	NE	Low	30 x 10cm opening goes in 10cm. Likely used by birds.
TL 51439 49662	Crack Willow T15	Tear out	P662	4M	5M	NE	NE	Mod	Could not inspect. Potential crevice goes into the stem.
		Tear out (above larger tear out)	P663	6M	1M	N	N	Low	Could not inspect. Some lifted bark around deadwood.
TL 51482 49642	Sycamore T16	Large tear out + dead stem + ivy	P664 P665	0-3M	-	W	W	Low	Dense ivy and a series of exposed cracks in the dead stem amongst the ivy.
		Dead stem	P665	3M+	-	W	W	Low	3 exposed cracks in dead stem. The top of the tree has torn out and is covered in ivy.
TL 51509 49633	Crack Willow T17	Large wound/split		2.5M	-	E	E	Low	80 x 30cm entrance. First cavity goes upwards away from the tree for 1m+. Very

									dirty and dusty inside. Second cavity goes downwards away from the tree for 1m+ towards a torn off limb. Third cavity goes in towards tree for 1m+. Fourth cavity goes downwards for 50cm+.
TL 51906 49786	Peduncula te Oak T24	Wound in secondary stem	P643 P644 P646	7M	-	S	S	Mod	Triangular shaped wound 30cm x 40cm x 40cm. There is a cavity inside behind the heartwood, which is 3cm diameter at the entrance, going in 15cm but narrowing to a point. A second cavity 2 x 5cm wide at the base of the feature goes down 15cm.



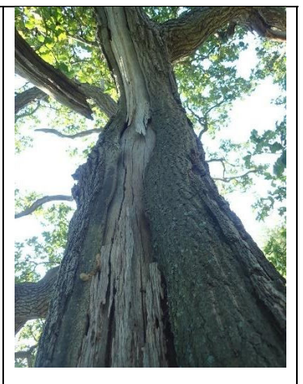
										 
		Branch collar in secondary stem	P647	7.5M	-	E	E	Mod	A 1.5m dead limb goes up from the base of the branch collar. Cavity opening 2cm in diameter goes down 30cm to an old bird's nest. A split at the top of the deadwood is open for 25cm and narrows to a point.	
		Cavity in tear out in branch off main stem	P649 P650	8.5M	-	SE	N	Mod	30cm long and 5cm wide opening behind deadwood, narrows then twists round 7cm and goes up for 20cm.	 

TL 51906 49786	Peduncula te Oak T24	Wound	P651	8M	-	SE	SE	Low	3 x 2cm opening goes into branch away from the tree for 30cm.	
		Wound in dead branch	P659	6M	1M	E	E	Mod	4cm diameter cavity at the end of the deadwood goes into the branch for 40cm. Dry inside	
		Wound in dead branch	P659	6M	0.5M	E	SE	Mod	7 x 7cm cavity in centre of deadwood, which is slightly upwards facing at the entrance. Cavity goes back 30cm towards the main stem. Old bird's nest inside.	As above
		Wound on undersid e of branch	P652 P653 P654	6M	3M	NE	NE	Mod	Wound with dead heartwood inside. Small hole at top of wound 3cm in diameter goes into a long cavity for 50cm.	
										 
		Knothole	P655	7M	-	NE	NE	Mod	7cm diameter opening goes in and down 30cm to an old bird's nest.	
		Lifted bark on dead branch	P656	6M	1M	E	E	Mod	Horizontal strip of lifted bark 40cm long and 15cm deep.	

TL 51906 49786	Peduncula te Oak T24	Knothole	P657	6.5M	-	NW	NW	Mod	3cm diameter opening goes down 20cm to an old bird's nest.	
		Branch collar	P658	6.5M	1M	N	N	Low	8cm diameter entrance goes in 20cm to an old bird's nest.	
										
										
										
										N/A

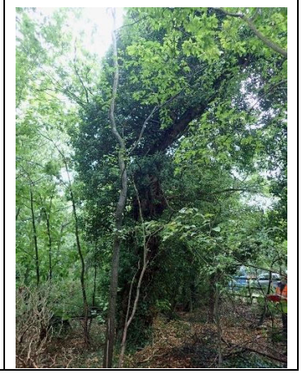
	

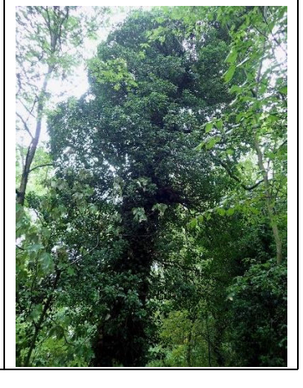
	

TL 51953 49769	Peduncula te Oak T25	Helical split and deadwoo d	P642	6-8M	-	NW	NW	Mod	5-10cm deep and 2-3cm wide gap underneath live tissue for 1m. At the top where the limb changes direction the gap goes up for a further 50cm underneath deadwood.	
		Lifted bark at base of helical split		6M	-	E	E	Low	Approx. 30cm wide piece of lifted bark comes out 5-10cm from the deadwood.	N/A
		Knothole		3M	-	S	S	Low	3 x 4cm opening goes in and down 10cm.	N/A

Tree Survey Roost Report Form			Date: 14/08/2020							
Site Name: CSET			Surveyor: J. Durward / W. O'Connor				Weather: 18 degrees Celsius, northerly wind 1-2, 100% cloud cover, hazy.			
Grid Reference	Tree Species & Tag/Map no.	Potential Roost Features	Camera Image No.	Height from bas of tree	Distance out from stem	PRF on N, E, S, W side of tree	PRF N, E, S, W	Category of PRF	Notes of PRF	Photograph

TL 52154 49788	Peduncula te Oak T18	Split and ivy on a dead stem	P814068 0 P814068 2	5 – 10M	0 – 4M	N	NW/NE	High	Ivy covering the stem from the union of the main stem and the dead stem. The dead stem has split running along its length, and on the north east side there is gap between the lifted bark and ivy of approximately 30 x 4cm.	
		Lifted bark and ivy on a dead stem	P814068 4 P814068 5	8-9M	3 -4M	NW	NW	High	On the underside of the dead stem is an opening between the ivy and the lifted bark that is approximately 1m in length by 20 – 30cm in width. The airspace underneath the stem is uncluttered.	 

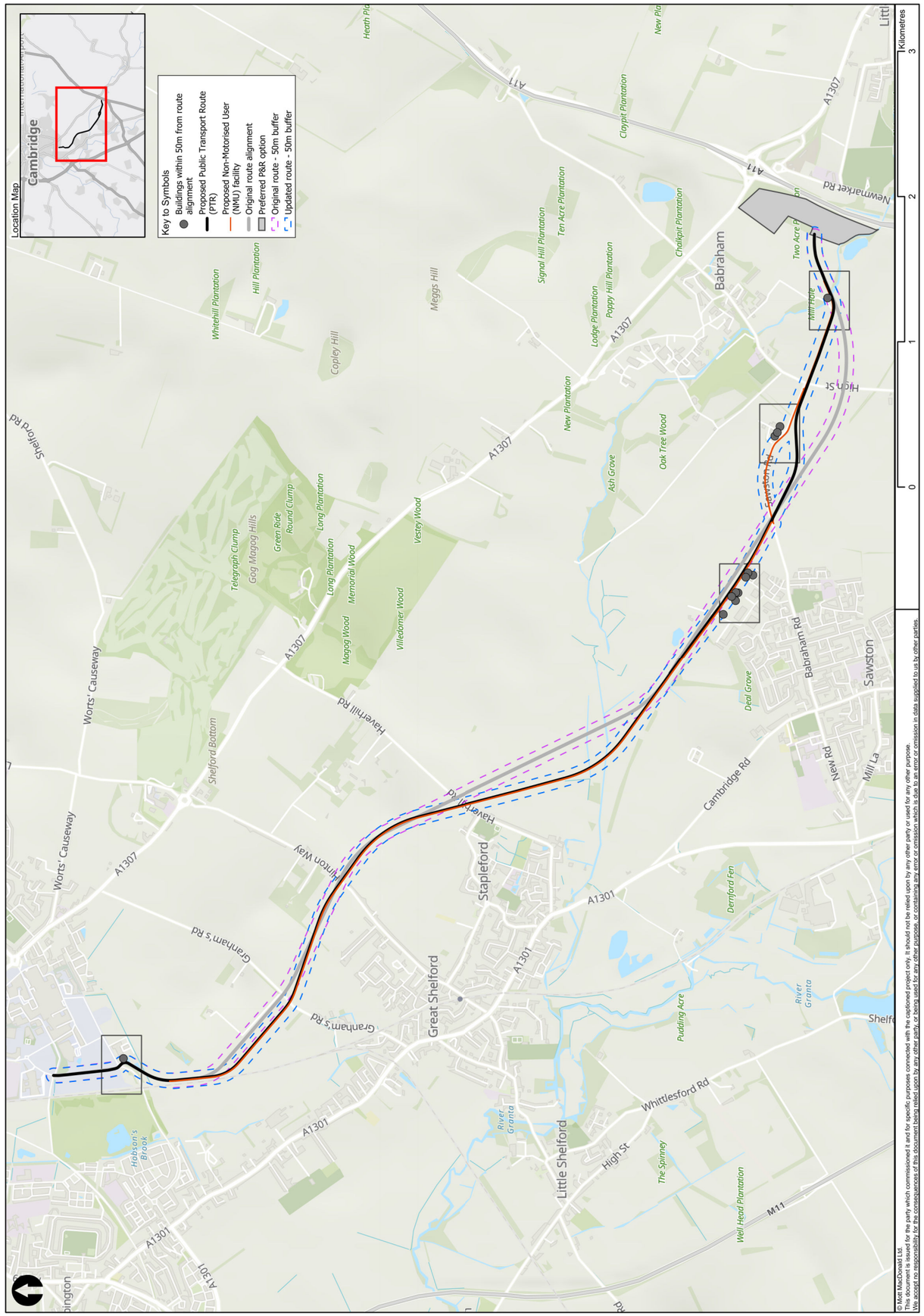
		Ivy	P8140688 P8140689	0 – 12M	-	ALL	ALL	Low	Ivy around the main stem of the tree has some small cavities present that may be used by bats.	 

TL 52146 49783	Peduncula te Oak T19	Ivy	P8140686 P8140687	0 – 10M	-	ALL	ALL	Neg	Ivy around the main stem of the tree is very tight and does not have any cavities present behind it. Old pigeon's nest at 5m on NW side.	 

TL 48434 50919	Crack Willow T22	Woodpecker hole above union on main stem	P8140690	6M	-	S	S	Mod	8x8cm opening into a cavity that goes up 30cm to an open wound (neg) above. Cavity goes down approximately 20cm to an old bird's nest.	
		Woodpecker hole above union on main stem	P8140691	5M	-	ESE	ESE	Mod	6x5cm opening into a cavity that goes up 8cm into deadwood, which is fractured internally and there are series of very small splits. Cavity goes down 5cm to an old bird's nest	
TL 48434 50919	Crack Willow T22	Woodpecker hole above union on dead stem	P8140692	4.8M	-	E	E	Mod	6x5cm opening into a cavity that goes up 1m to an open split (tear out) at the end of the limb. Nesting material is present above the opening. Cavity does not go down.	
		Woodpecker hole below union on dead stem	P8140693	3.7M	-	E	E	Mod	7x7cm opening into a cavity that goes up 10cm into debris. The cavity goes down 1m to the next woodpecker hole (below). The cavity is stuffed full of nesting material.	
		Woodpecker hole below union on dead stem	P8140694	2.7M	-	E	E	Low	6x6cm opening into a cavity that goes up 20cm but is full of nesting material the cavity going down is stuffed full of nesting material.	
		Woodpecker hole below union on dead stem	P8140694	2M	-	E	E	Low	6x6cm opening into a cavity that is stuffed full of nesting material	As above
TL 48413 50933	Crack Willow T23	-	-	-	-	-	-	Neg	No features were present on this tree.	N/A

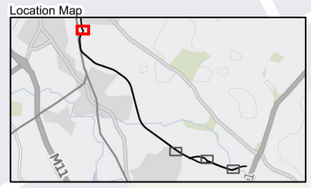
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Appendix H – Building Location map



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Location Map



Key to Symbols

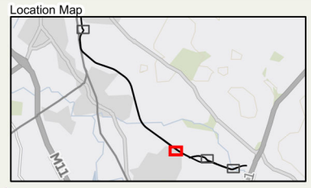
- Proposed Public Transport Route (PTR)
- Proposed Non-Motorised User (NMU) facility
- Original route alignment
- Buildings within 50m from route alignment
- Original route - 50m buffer
- Updated route - 50m buffer

1

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0 50 100 150 Metres

Location Map



Key to Symbols

- Proposed Public Transport Route (PTR)
- Proposed Non-Motorised User (NMU) facility
- Original route alignment
- Buildings within 50m from route alignment
- Original route - 50m buffer
- Updated route - 50m buffer

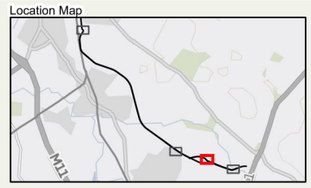
2 3 4 5 6 7 8

West Way
Grove Rd
Grove Rd
Middle Way
Middle Way
East Way
East Way
Grove Rd

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0 50 100 150 Metres

Location Map



Key to Symbols

- Proposed Public Transport Route (PTR)
- Proposed Non-Motorised User (NMU) facility
- Original route alignment
- Buildings within 50m from route alignment
- Original route - 50m buffer
- Updated route - 50m buffer

Sawston Rd

Sawston Rd

Sawston Rd

9

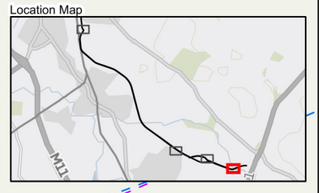
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11

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0 50 100 150 Metres

Location Map



Key to Symbols

- Proposed Public Transport Route (PTR)
- Proposed Non-Motorised User (NMU) facility
- Original route alignment
- Buildings within 50m from route alignment
- Original route - 50m buffer
- Updated route - 50m buffer

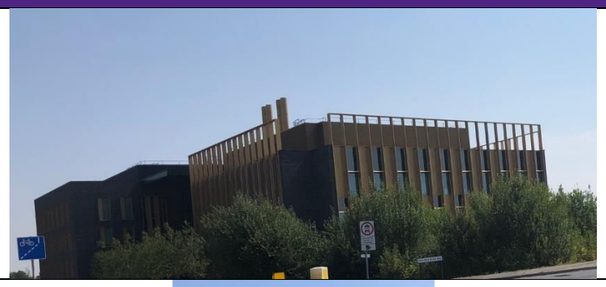
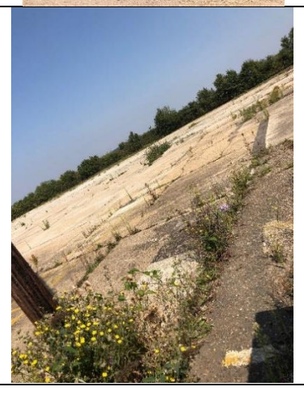
Mill Hole

12

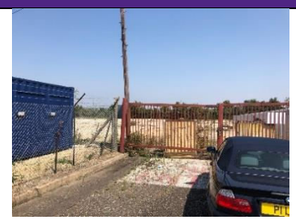
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We accept no responsibility for the consequences of this document being relied upon by any other party, or being used for any other purpose, or containing any error or omission which is due to an error or omission in data supplied to us by other parties.

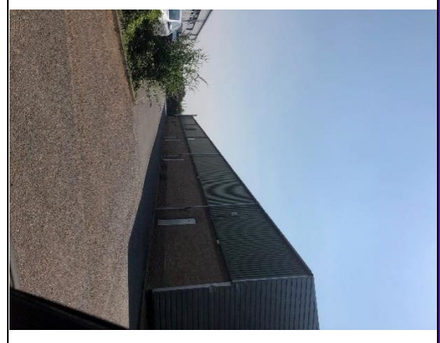
0 50 100 150 Metres

Appendix I – Building Photographs

Building Reference	Photo
1	
2	
3	

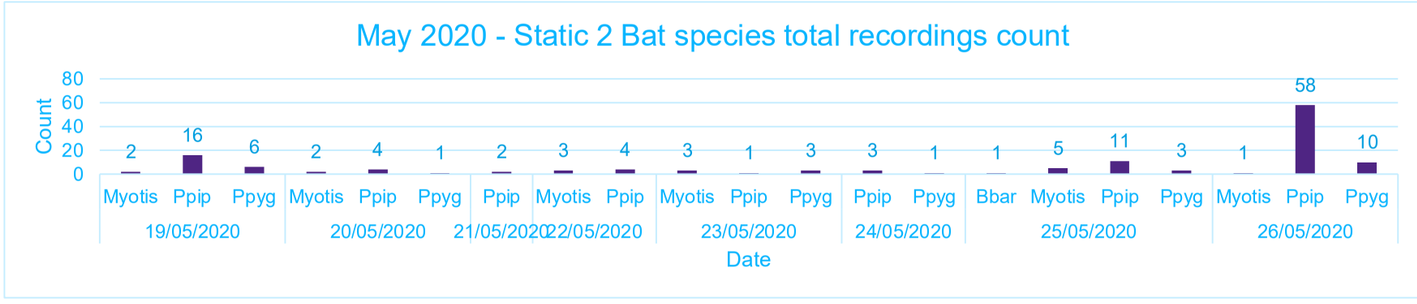
CAPITA

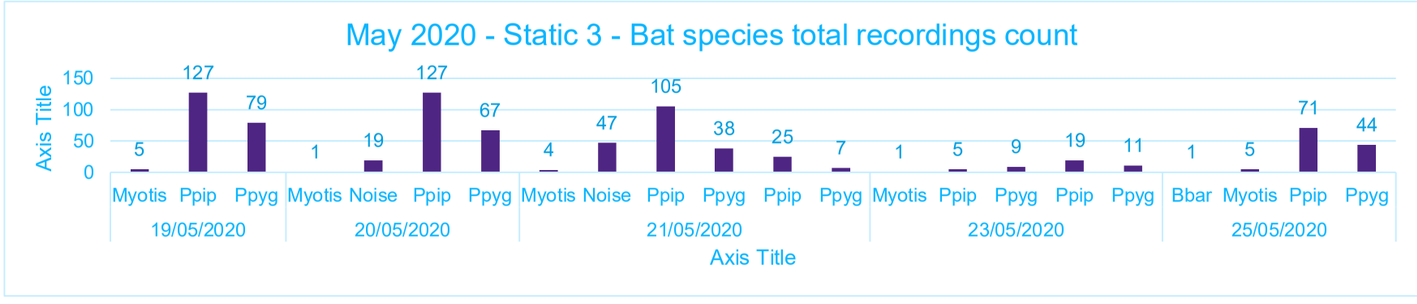
Building Reference	Photo
4	
5	
6	 
7	

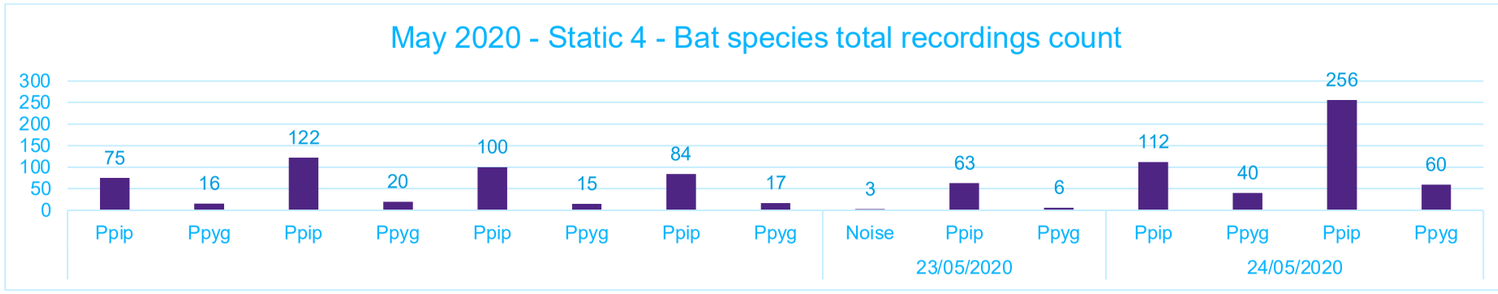
Building Reference	Photo
8	
9	No access
10	No access
11	No access
12	

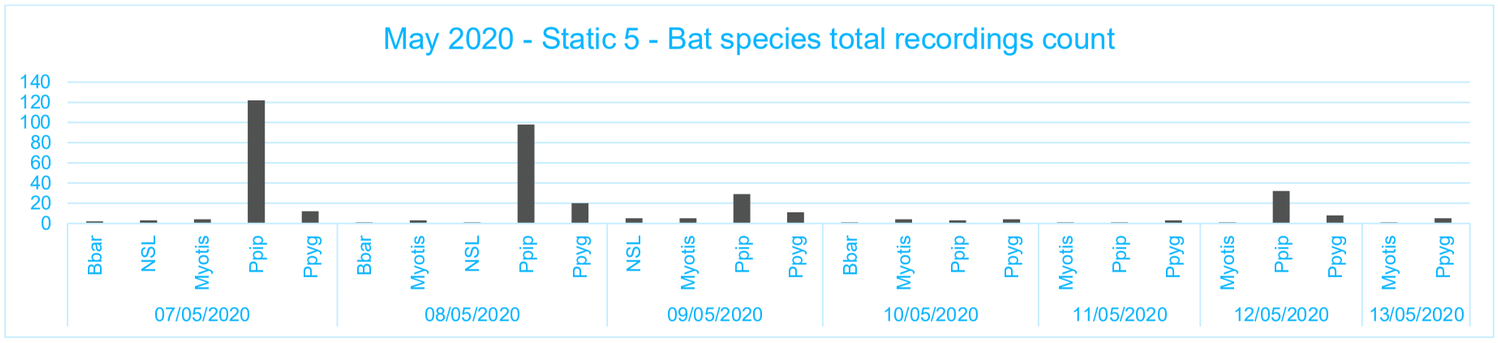
Appendix J – Static detector results graphs

May 2020

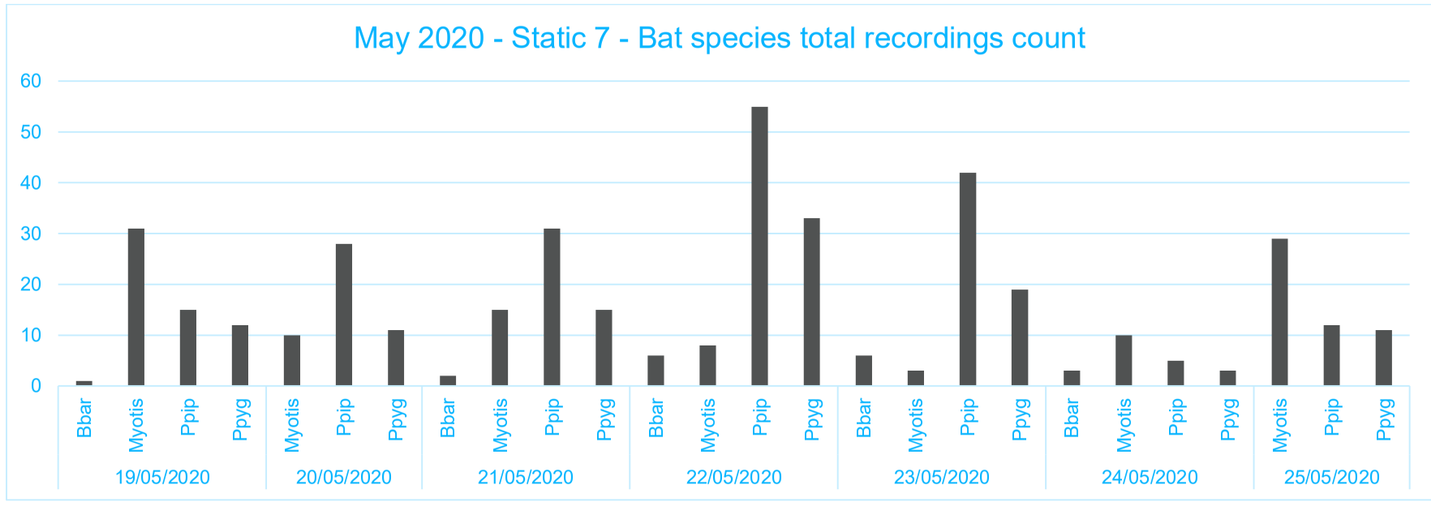






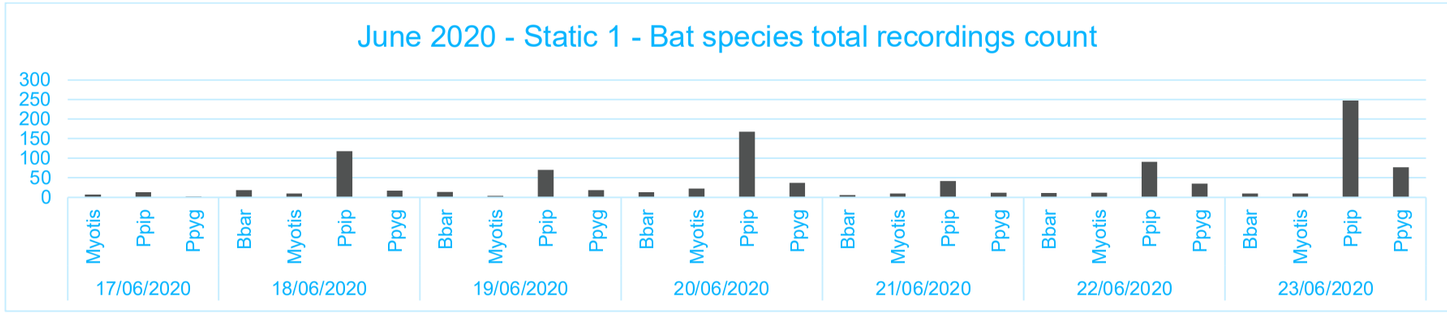


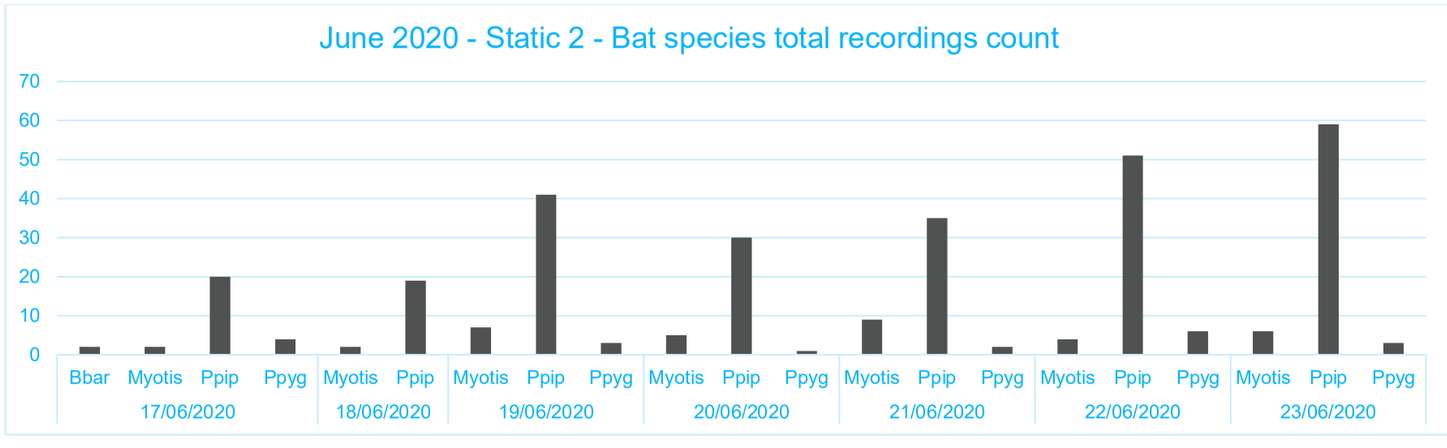
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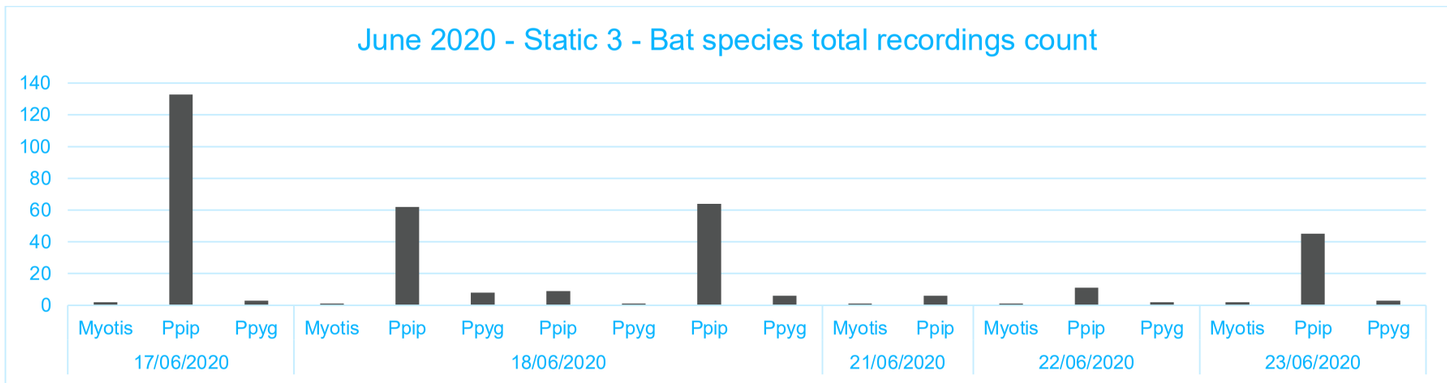


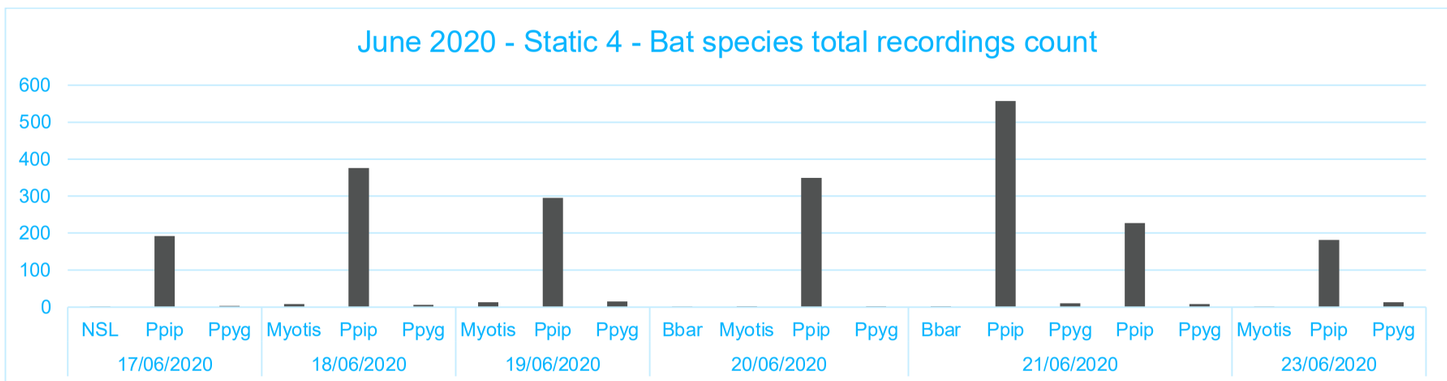
capitaproperty.co.uk

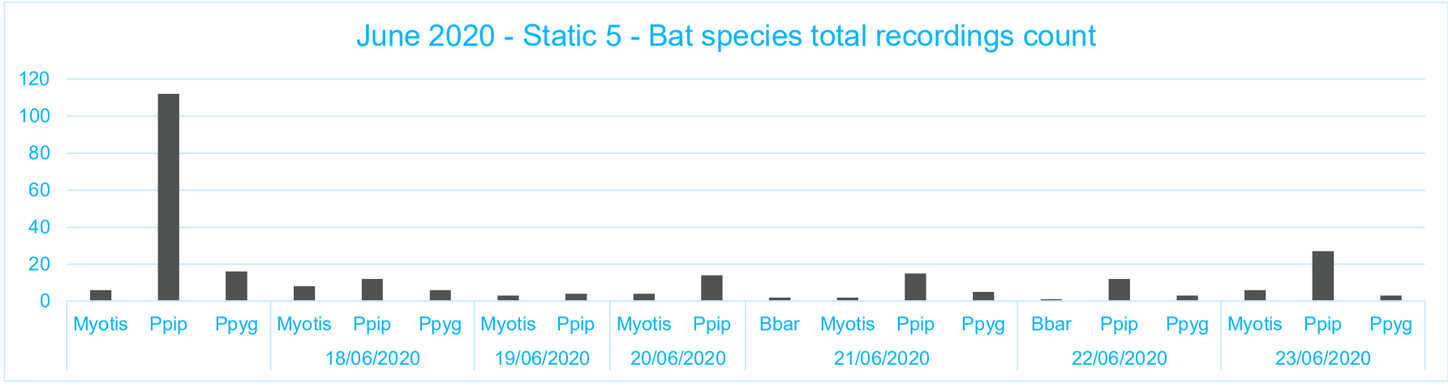
June 2020

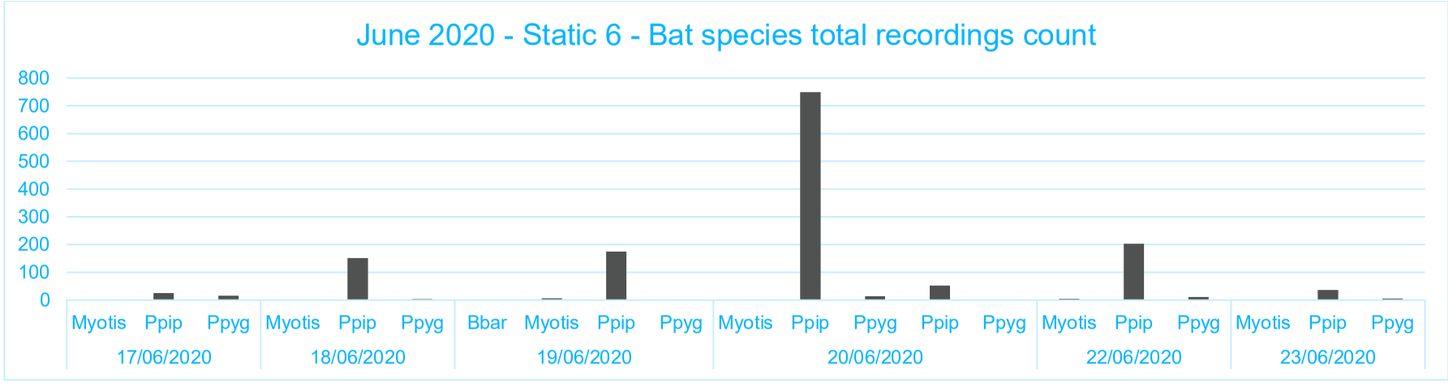

June 2020 - Static 1 - Bat species total recordings count
300
250
200
150
100
50
0
Myotis Ppip Ppyg Bbar Myotis Ppip Ppyg Bbar Myotis Ppip Ppyg Bbar Myotis Ppip Ppyg Bbar Myotis Ppip Ppyg Bbar Myotis Ppip Ppyg Bbar Myotis Ppip Ppyg
17/06/2020
18/06/2020
19/06/2020
20/06/2020
21/06/2020
22/06/2020
23/06/2020

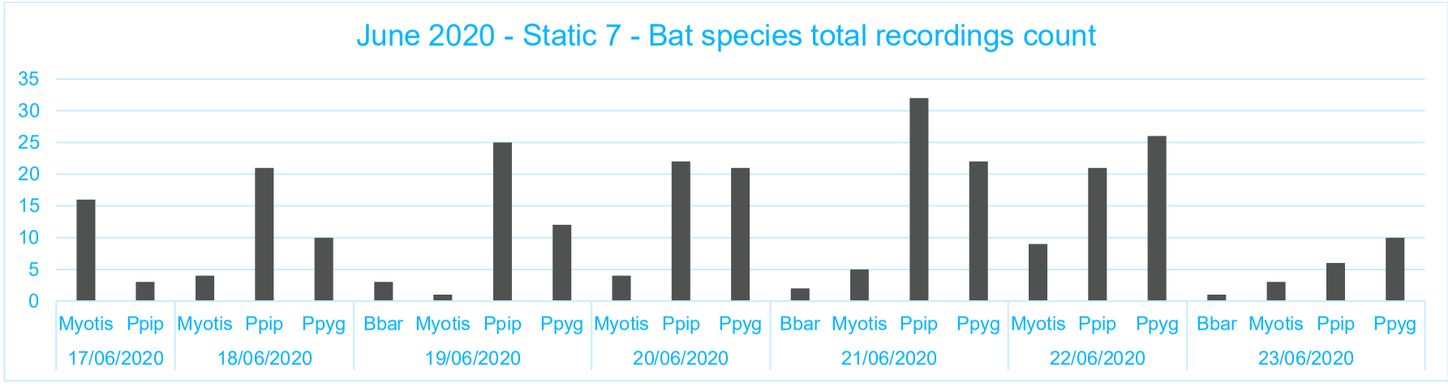

June 2020 - Static 2 - Bat species total recordings count
70
60
50
40
30
20
10
0
Bbar Myotis Ppip Ppyg Myotis Ppip Myotis Ppip Ppyg Myotis Ppip Ppyg Myotis Ppip Ppyg Myotis Ppip Ppyg Myotis Ppip Ppyg
17/06/2020
18/06/2020
19/06/2020
20/06/2020
21/06/2020
22/06/2020
23/06/2020


June 2020 - Static 3 - Bat species total recordings count
140
120
100
80
60
40
20
0
Myotis Ppip Ppyg Myotis Ppip Ppyg Ppip Ppyg Ppip Ppyg Myotis Ppip Myotis Ppip Ppyg Myotis Ppip Ppyg
17/06/2020
18/06/2020
21/06/2020
22/06/2020
23/06/2020

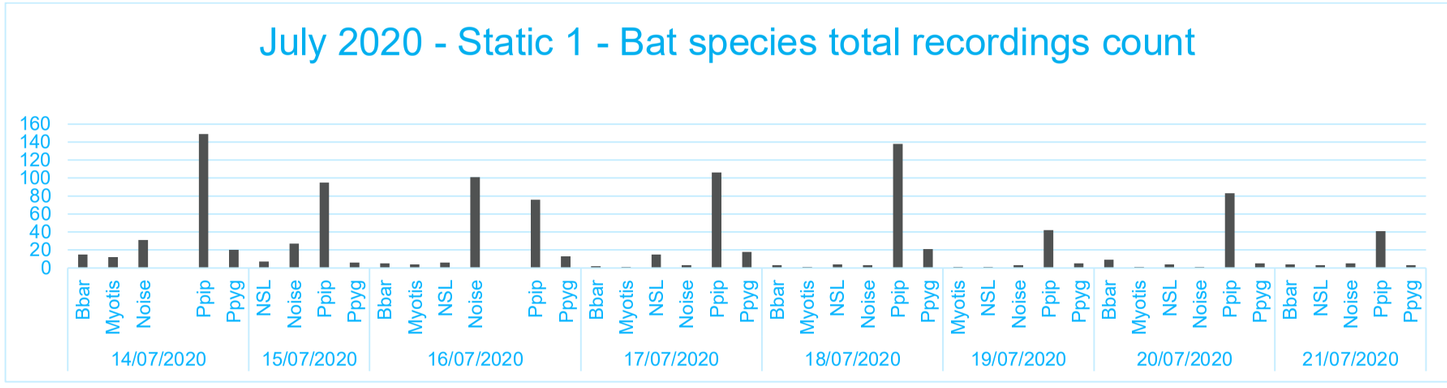

June 2020 - Static 4 - Bat species total recordings count
600
500
400
300
200
100
0
NSL Ppip Ppyg Myotis Ppip Ppyg Myotis Ppip Ppyg Bbar Myotis Ppip Ppyg Bbar Ppip Ppyg Ppip Ppyg Myotis Ppip Ppyg
17/06/2020
18/06/2020
19/06/2020
20/06/2020
21/06/2020
23/06/2020

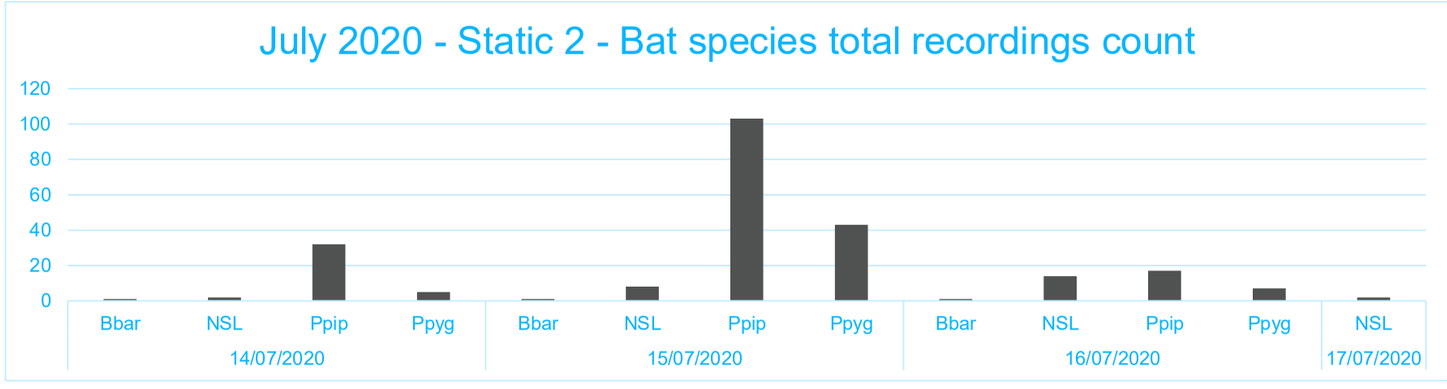

June 2020 - Static 5 - Bat species total recordings count
120
100
80
60
40
20
0
Myotis Ppip Ppyg Myotis Ppip Ppyg Myotis Ppip Myotis Ppip Bbar Myotis Ppip Ppyg Bbar Ppip Ppyg Myotis Ppip Ppyg
18/06/2020
19/06/2020
20/06/2020
21/06/2020
22/06/2020
23/06/2020


June 2020 - Static 6 - Bat species total recordings count
800
700
600
500
400
300
200
100
0
Myotis Ppip Ppyg Myotis Ppip Ppyg Bbar Myotis Ppip Ppyg Myotis Ppip Ppyg Ppip Ppyg Myotis Ppip Ppyg Myotis Ppip Ppyg
17/06/2020
18/06/2020
19/06/2020
20/06/2020
22/06/2020
23/06/2020

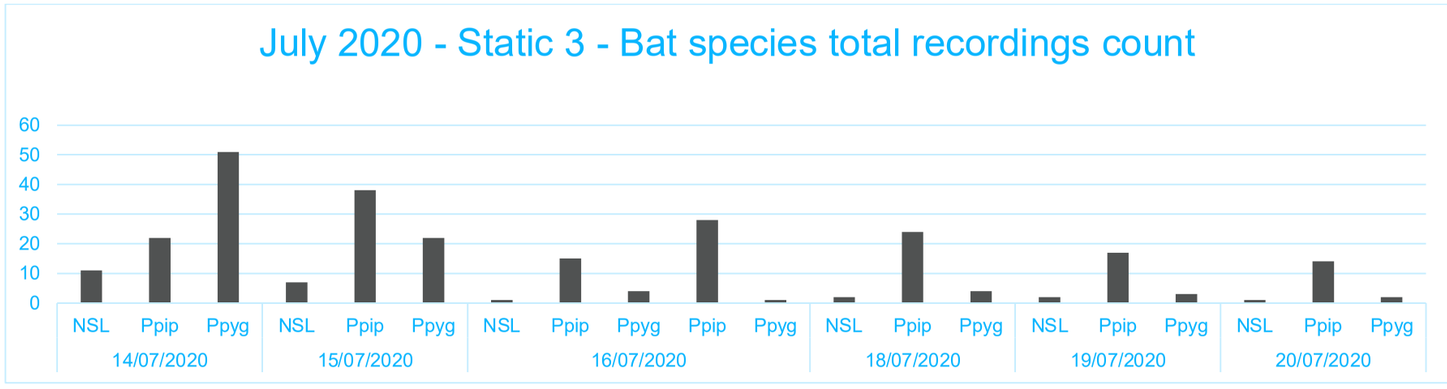

June 2020 - Static 7 - Bat species total recordings count
35
30
25
20
15
10
5
0
Myotis Ppip Myotis Ppip Ppyg Bbar Myotis Ppip Ppyg Myotis Ppip Ppyg Bbar Myotis Ppip Ppyg Myotis Ppip Ppyg Bbar Myotis Ppip Ppyg
17/06/2020
18/06/2020
19/06/2020
20/06/2020
21/06/2020
22/06/2020
23/06/2020

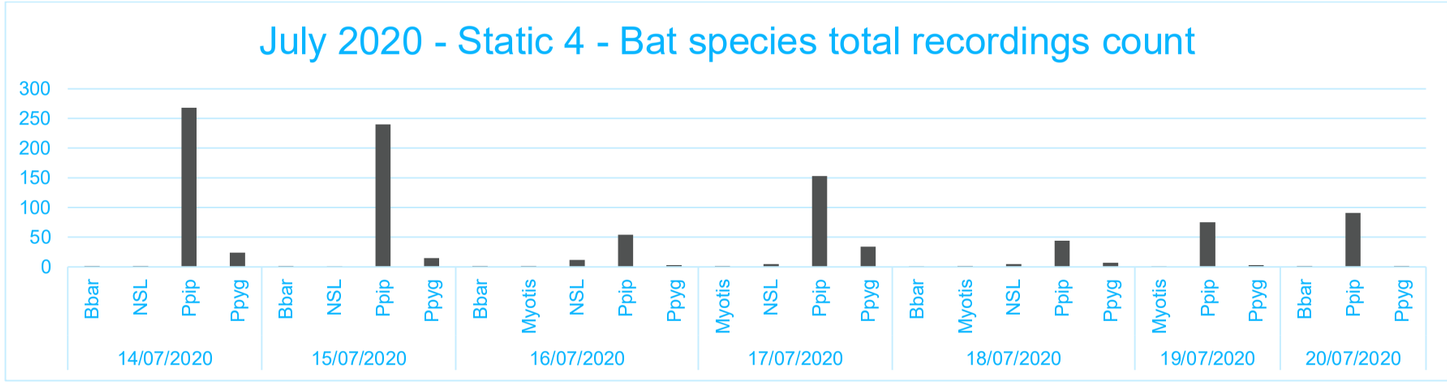
July 2020

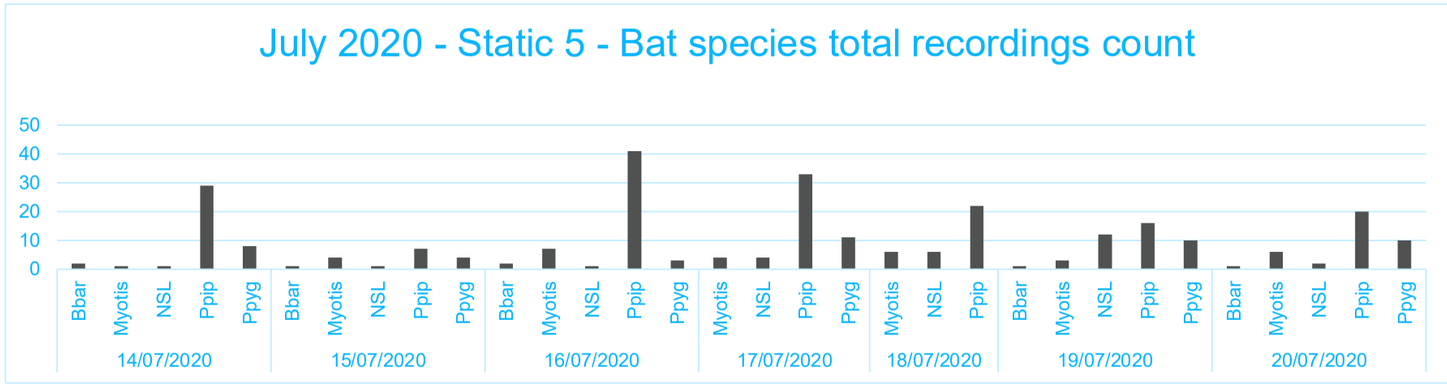


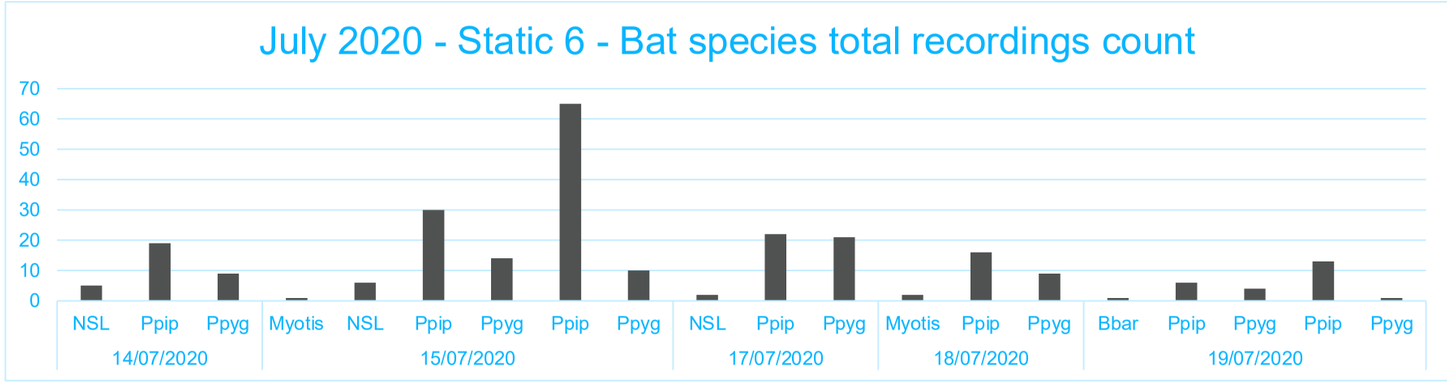


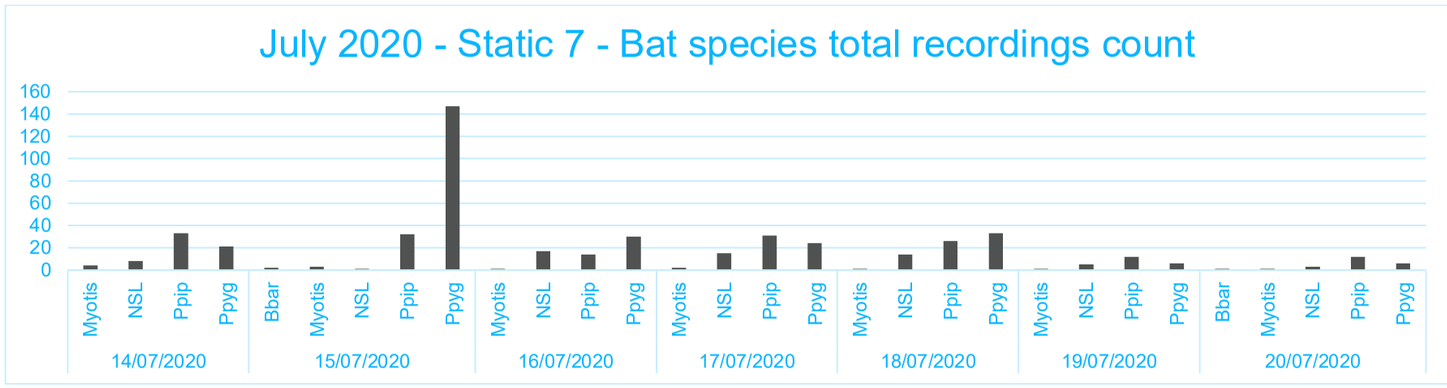
CAPITA



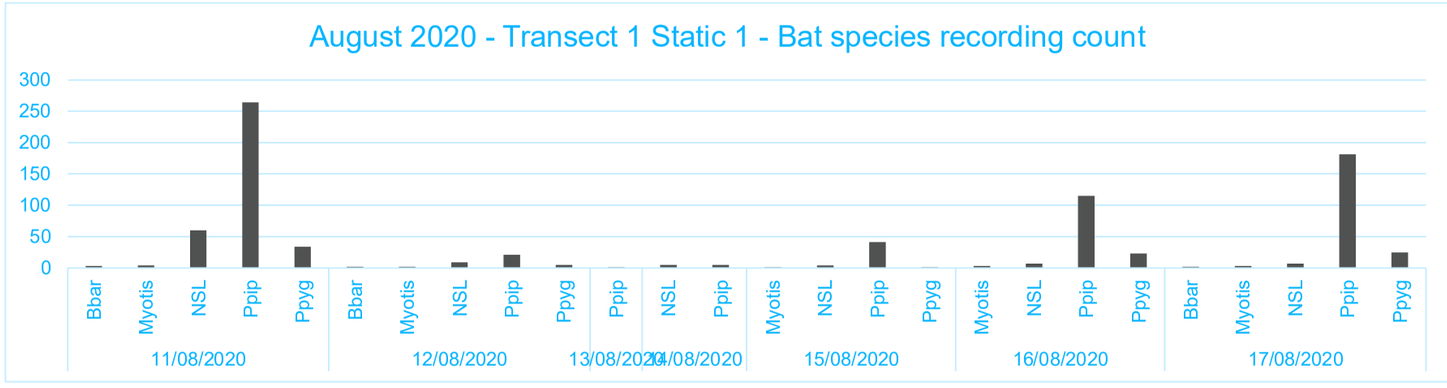


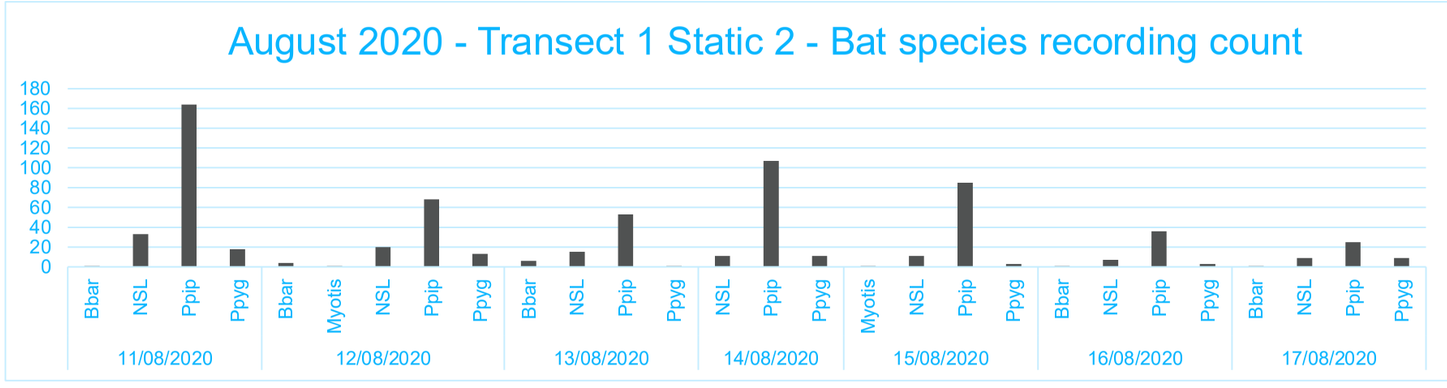

July 2020 - Static 5 - Bat species total recordings count
50
40
30
20
10
0
Bbar Myotis NSL Ppip Ppyg Bbar Myotis NSL Ppip Ppyg Bbar Myotis NSL Ppip Ppyg Myotis NSL Ppip Ppyg Myotis NSL Ppip Bbar Myotis NSL Ppip Ppyg Bbar Myotis NSL Ppip Ppyg
14/07/2020
15/07/2020
16/07/2020
17/07/2020
18/07/2020
19/07/2020
20/07/2020

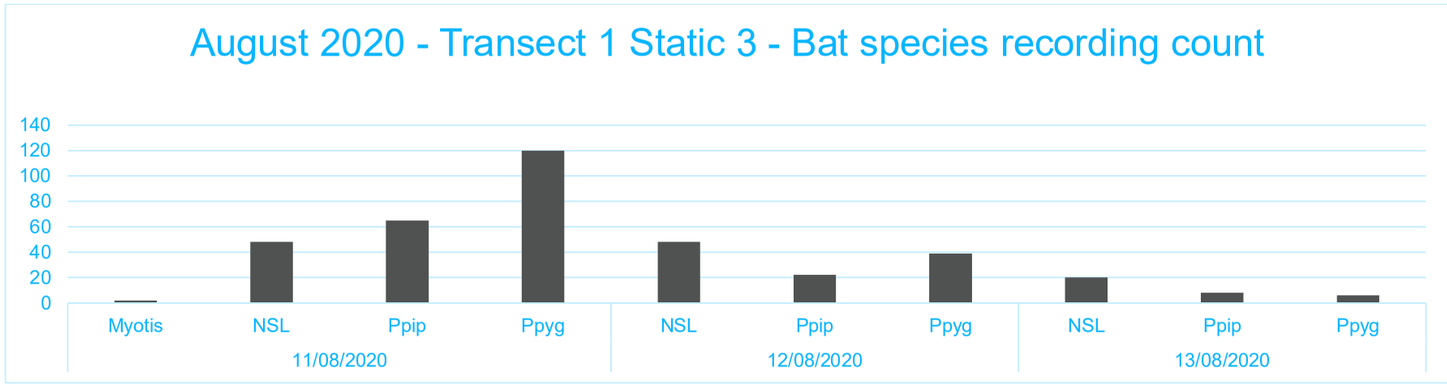

July 2020 - Static 6 - Bat species total recordings count
70
60
50
40
30
20
10
0
NSL Ppip Ppyg Myotis NSL Ppip Ppyg Ppip Ppyg NSL Ppip Ppyg Myotis Ppip Ppyg Bbar Ppip Ppyg Ppip Ppyg
14/07/2020
15/07/2020
17/07/2020
18/07/2020
19/07/2020

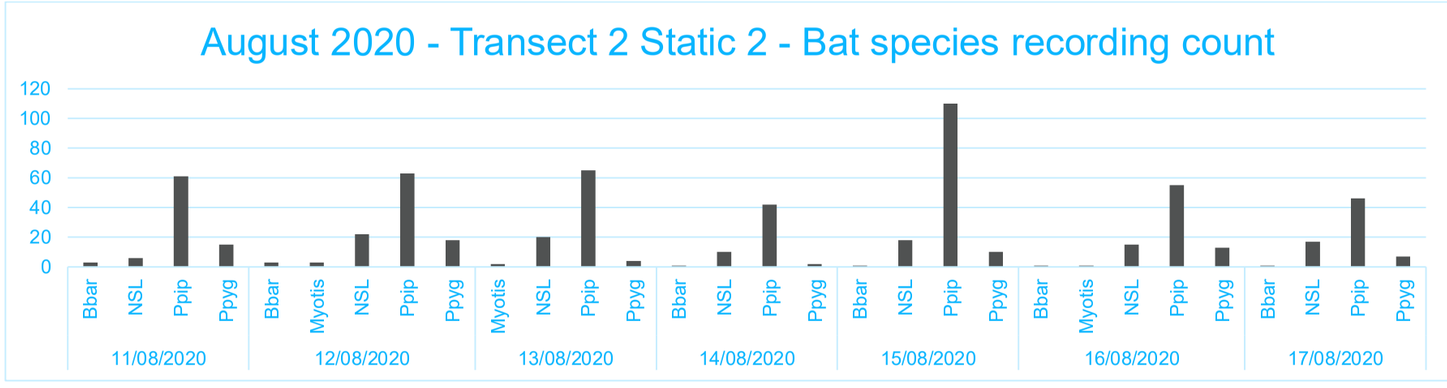

July 2020 - Static 7 - Bat species total recordings count
160
140
120
100
80
60
40
20
0
Myotis NSL Ppip Ppyg Bbar Myotis NSL Ppip Ppyg Myotis NSL Ppip Ppyg Myotis NSL Ppip Ppyg Myotis NSL Ppip Ppyg Myotis NSL Ppip Ppyg Bbar Myotis NSL Ppip Ppyg
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18/07/2020
19/07/2020
20/07/2020

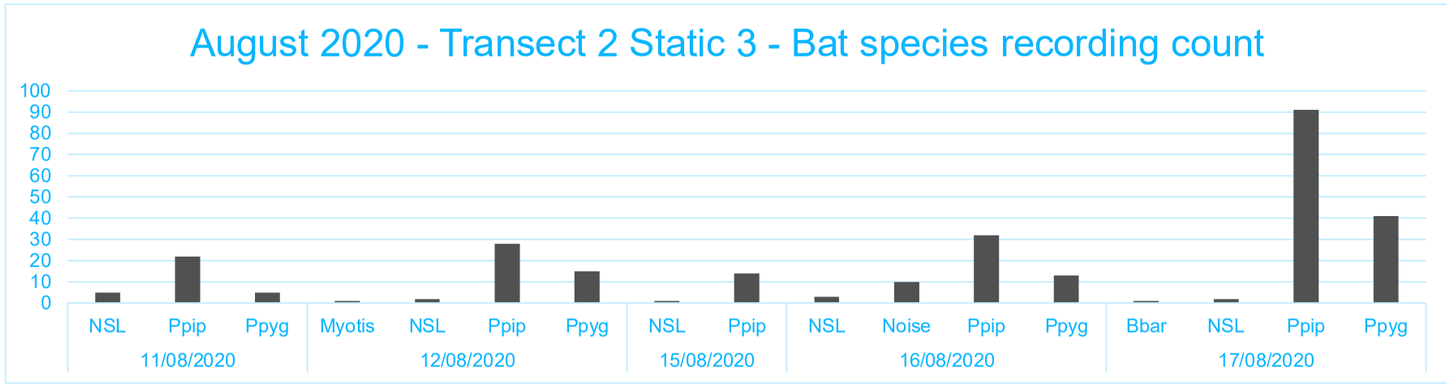
August 2020

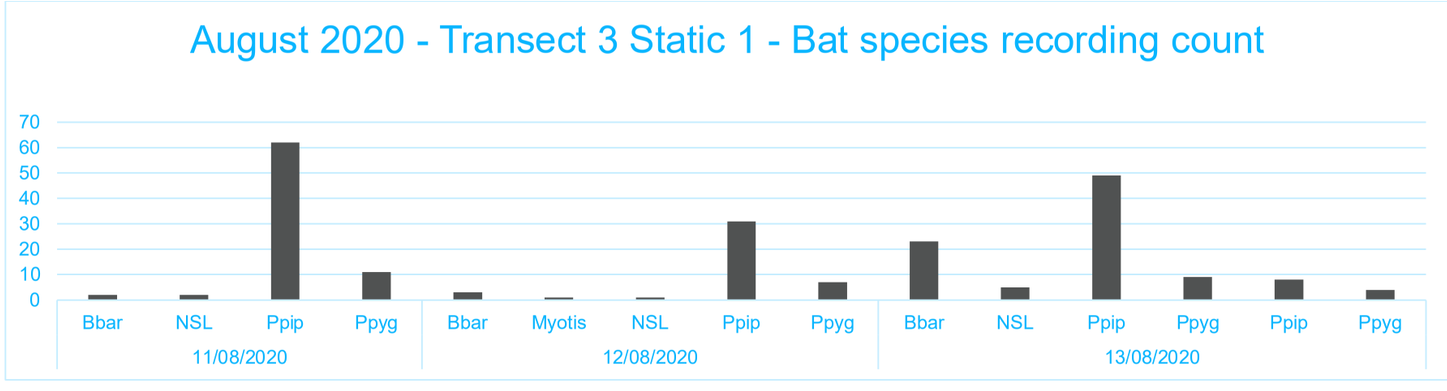

August 2020 - Transect 1 Static 1 - Bat species recording count
300
250
200
150
100
50
0
Bbar
Myotis
NSL
Ppip
Ppyg
11/08/2020
12/08/2020
13/08/2020
14/08/2020
15/08/2020
16/08/2020
17/08/2020

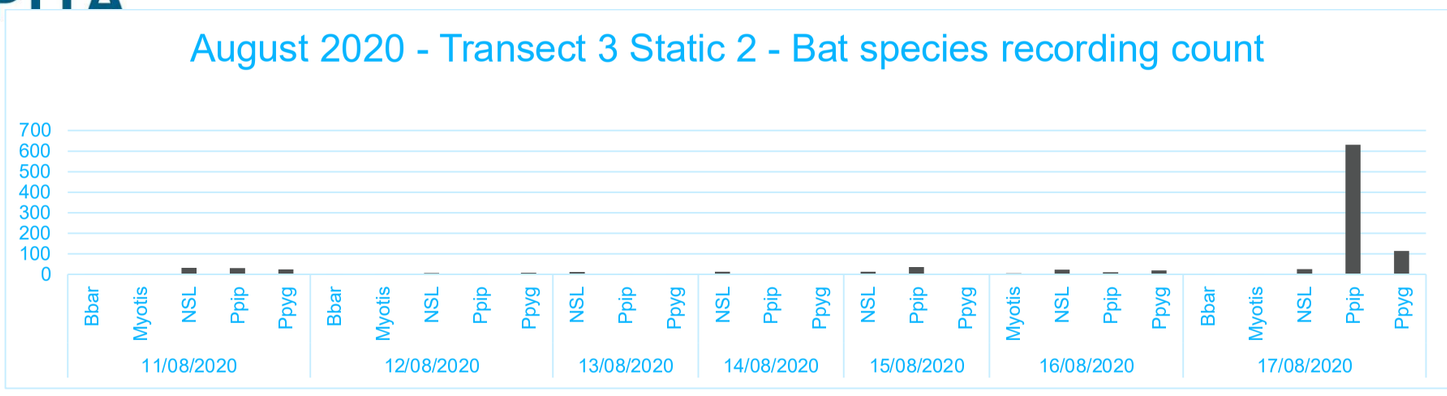

August 2020 - Transect 1 Static 2 - Bat species recording count
180
160
140
120
100
80
60
40
20
0
Bbar
NSL
Ppip
Ppyg
Myotis
11/08/2020
12/08/2020
13/08/2020
14/08/2020
15/08/2020
16/08/2020
17/08/2020

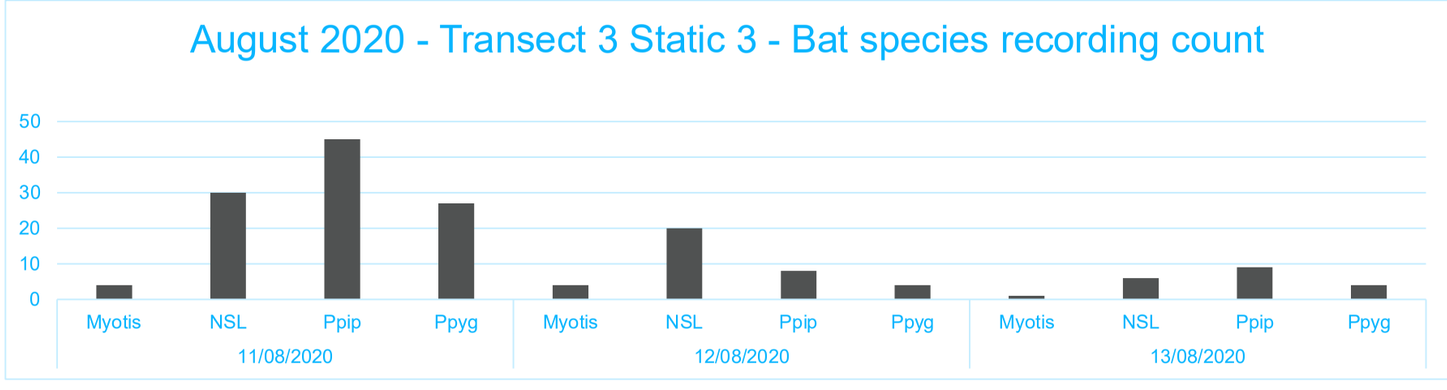

August 2020 - Transect 1 Static 3 - Bat species recording count
140
120
100
80
60
40
20
0
Myotis
NSL
Ppip
Ppyg
11/08/2020
12/08/2020
13/08/2020

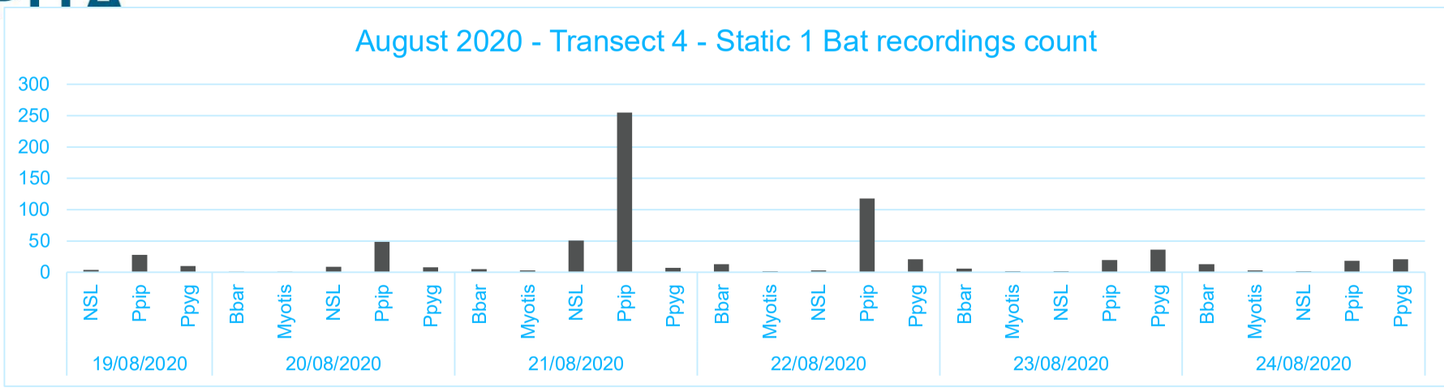

August 2020 - Transect 2 Static 2 - Bat species recording count
120
100
80
60
40
20
0
Bbar
NSL
Ppip
Ppyg
Myotis
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16/08/2020
17/08/2020

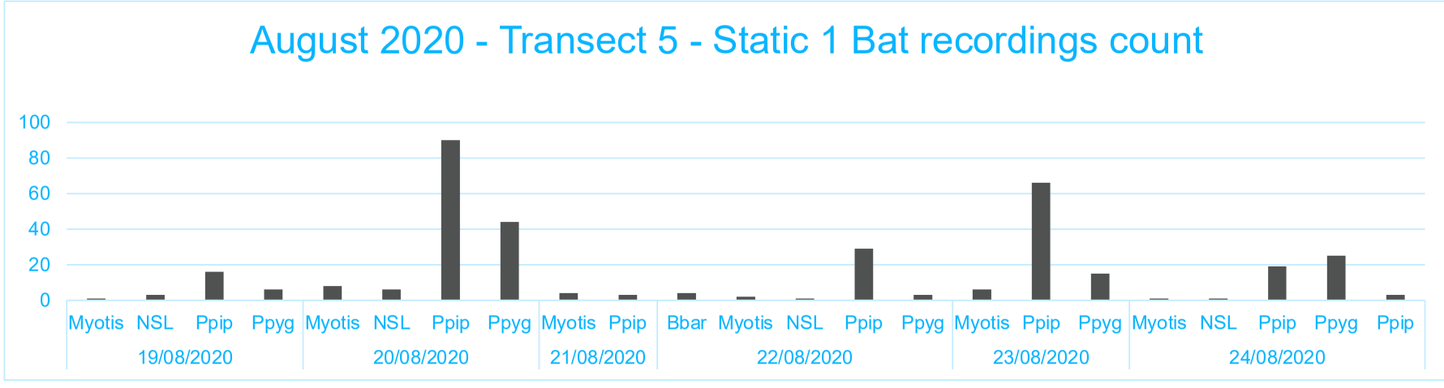

August 2020 - Transect 2 Static 3 - Bat species recording count
100
90
80
70
60
50
40
30
20
10
0
NSL
Ppip
Ppyg
Myotis
NSL
Ppip
Ppyg
NSL
Ppip
NSL
Noise
Ppip
Ppyg
Bbar
NSL
Ppip
Ppyg
11/08/2020
12/08/2020
15/08/2020
16/08/2020
17/08/2020

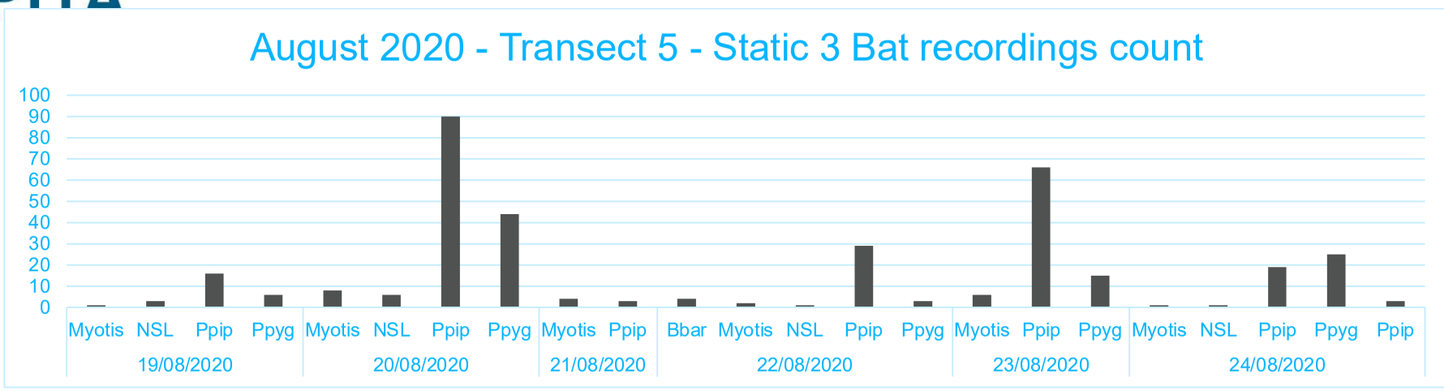

August 2020 - Transect 3 Static 1 - Bat species recording count
70
60
50
40
30
20
10
0
Bbar
NSL
Ppip
Ppyg
Bbar
Myotis
NSL
Ppip
Ppyg
Bbar
NSL
Ppip
Ppyg
Ppip
Ppyg
11/08/2020
12/08/2020
13/08/2020

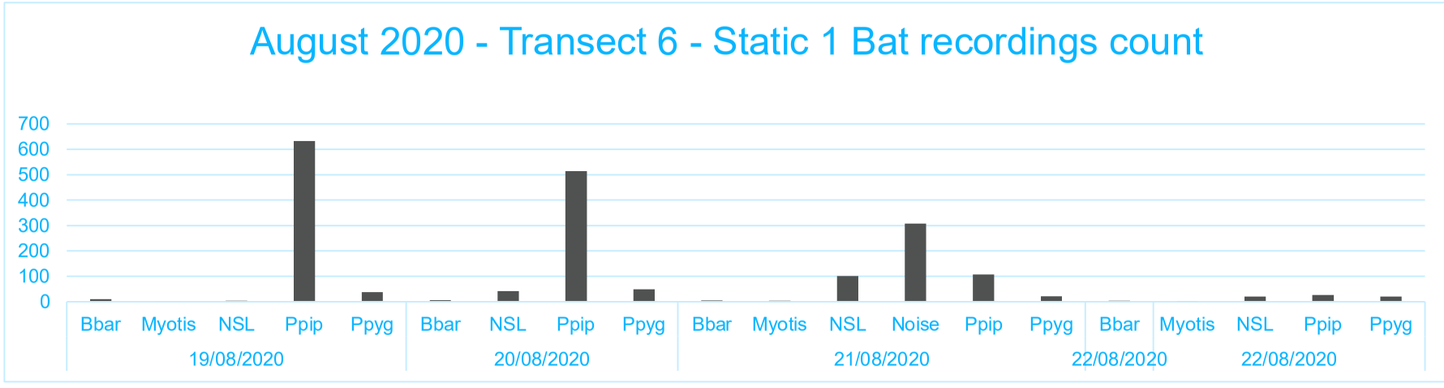

August 2020 - Transect 3 Static 2 - Bat species recording count
700
600
500
400
300
200
100
0
Bbar
Myotis
NSL
Ppip
Ppyg
Bbar
Myotis
NSL
Ppip
Ppyg
NSL
Ppip
Ppyg
NSL
Ppip
Ppyg
NSL
Ppip
Ppyg
Myotis
NSL
Ppip
Ppyg
Bbar
Myotis
NSL
Ppip
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16/08/2020
17/08/2020

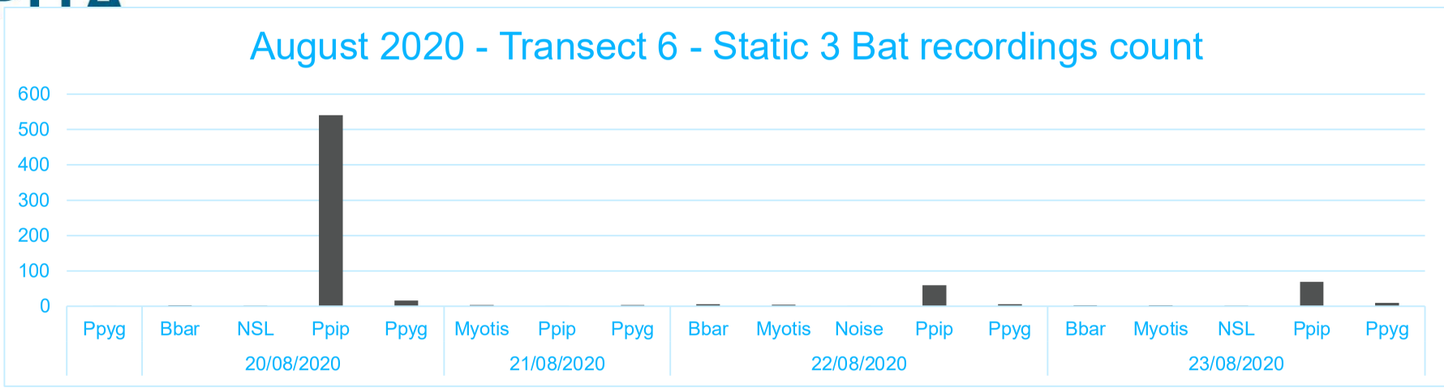

August 2020 - Transect 3 Static 3 - Bat species recording count
50
40
30
20
10
0
Myotis
NSL
Ppip
Ppyg
Myotis
NSL
Ppip
Ppyg
Myotis
NSL
Ppip
Ppyg
11/08/2020
12/08/2020
13/08/2020

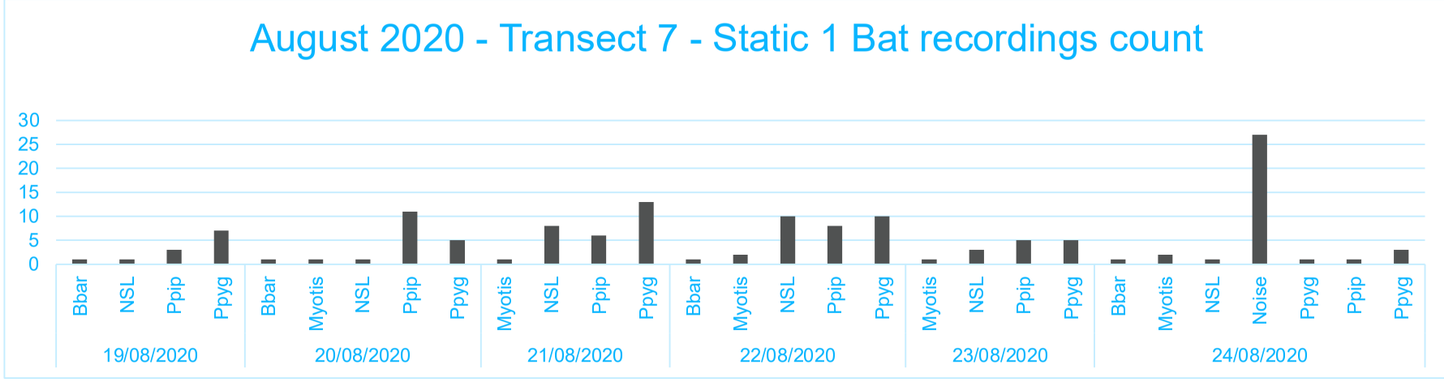

August 2020 - Transect 4 - Static 1 Bat recordings count
300
250
200
150
100
50
0
NSL Ppip Ppyg Bbar Myotis NSL Ppip Ppyg Bbar Myotis NSL Ppip Ppyg Bbar Myotis NSL Ppip Ppyg Bbar Myotis NSL Ppip Ppyg Bbar Myotis NSL Ppip Ppyg
19/08/2020
20/08/2020
21/08/2020
22/08/2020
23/08/2020
24/08/2020

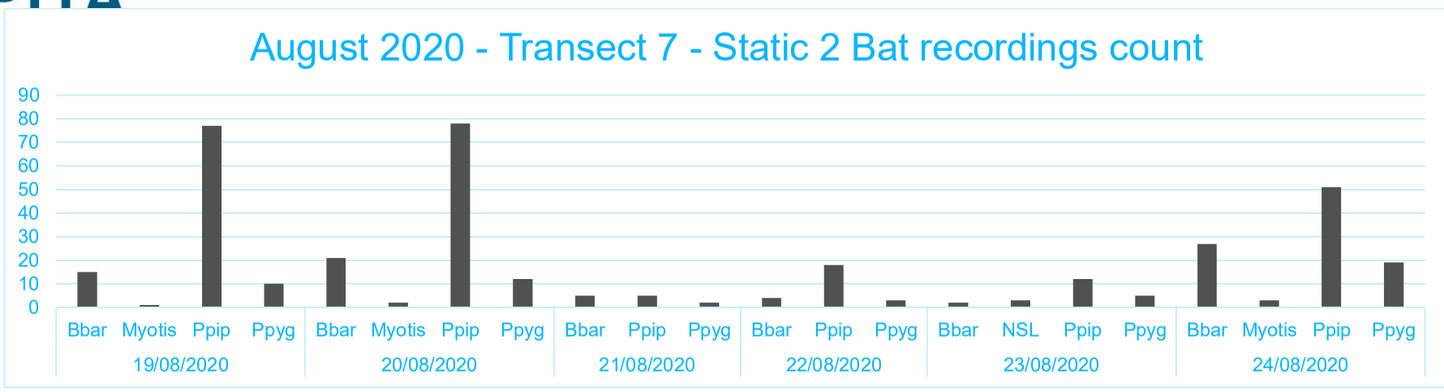

August 2020 - Transect 5 - Static 1 Bat recordings count
100
80
60
40
20
0
Myotis NSL Ppip Ppyg Myotis NSL Ppip Ppyg Myotis Ppip Bbar Myotis NSL Ppip Ppyg Myotis Ppip Ppyg Myotis NSL Ppip Ppyg Ppip
19/08/2020
20/08/2020
21/08/2020
22/08/2020
23/08/2020
24/08/2020

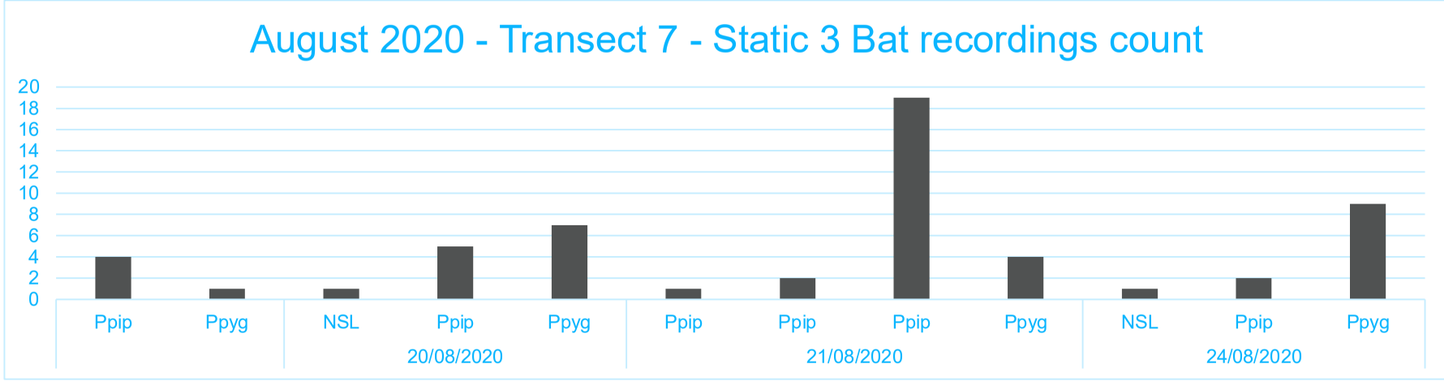

August 2020 - Transect 5 - Static 3 Bat recordings count
100
90
80
70
60
50
40
30
20
10
0
Myotis NSL Ppip Ppyg Myotis NSL Ppip Ppyg Myotis Ppip Bbar Myotis NSL Ppip Ppyg Myotis Ppip Ppyg Myotis NSL Ppip Ppyg Ppip
19/08/2020
20/08/2020
21/08/2020
22/08/2020
23/08/2020
24/08/2020


August 2020 - Transect 6 - Static 1 Bat recordings count
700
600
500
400
300
200
100
0
Bbar Myotis NSL Ppip Ppyg Bbar NSL Ppip Ppyg Bbar Myotis NSL Noise Ppip Ppyg Bbar Myotis NSL Ppip Ppyg
19/08/2020
20/08/2020
21/08/2020
22/08/2020
22/08/2020

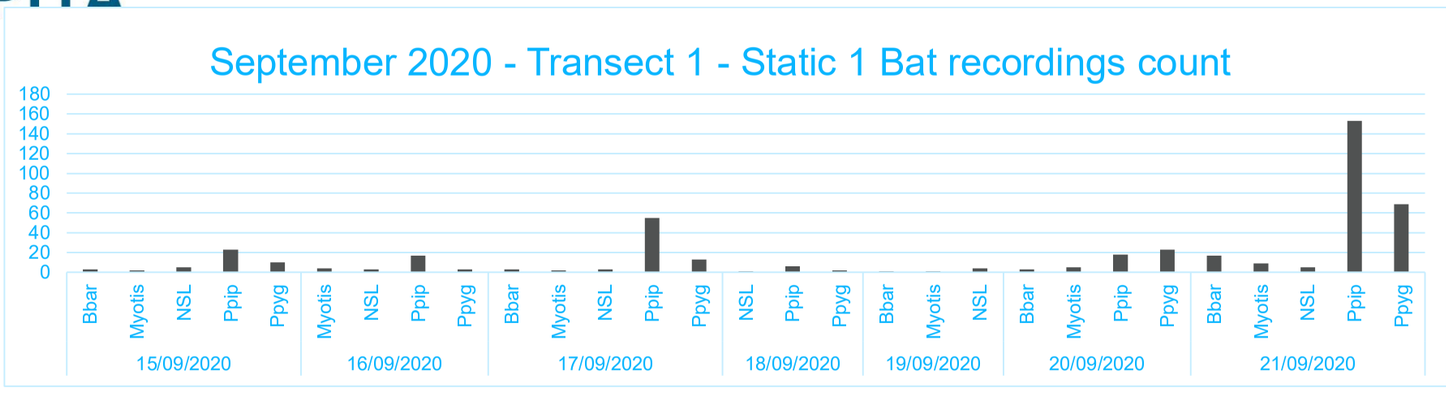


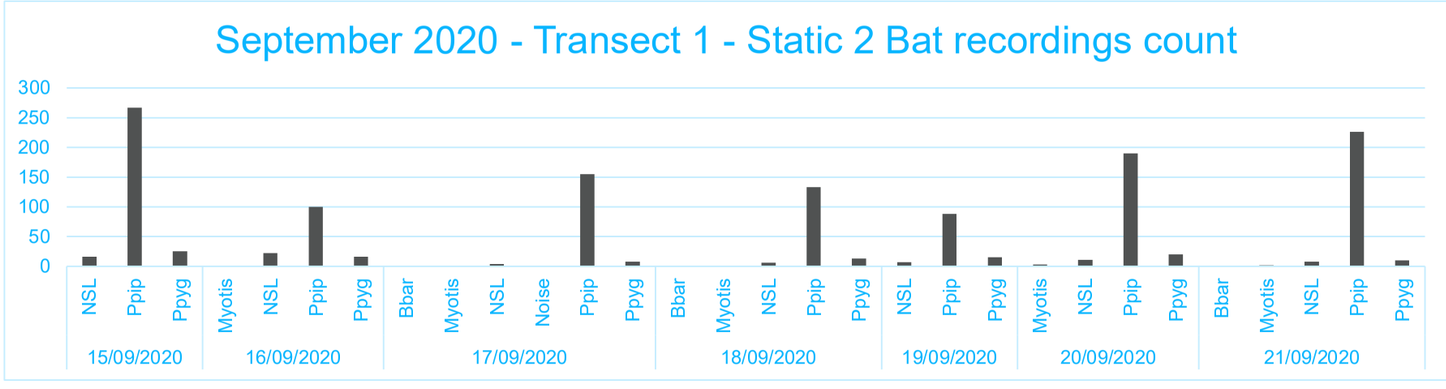


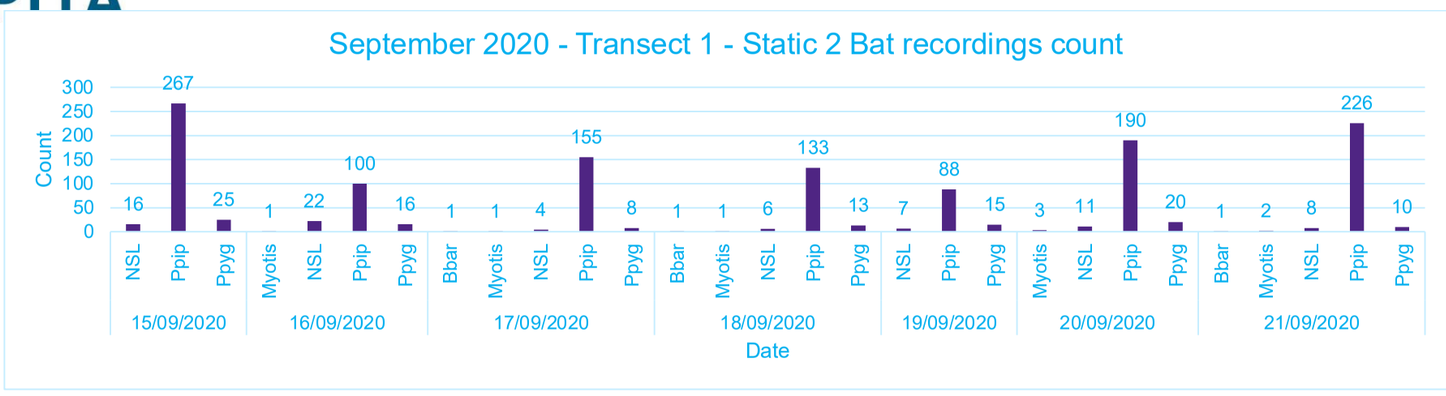


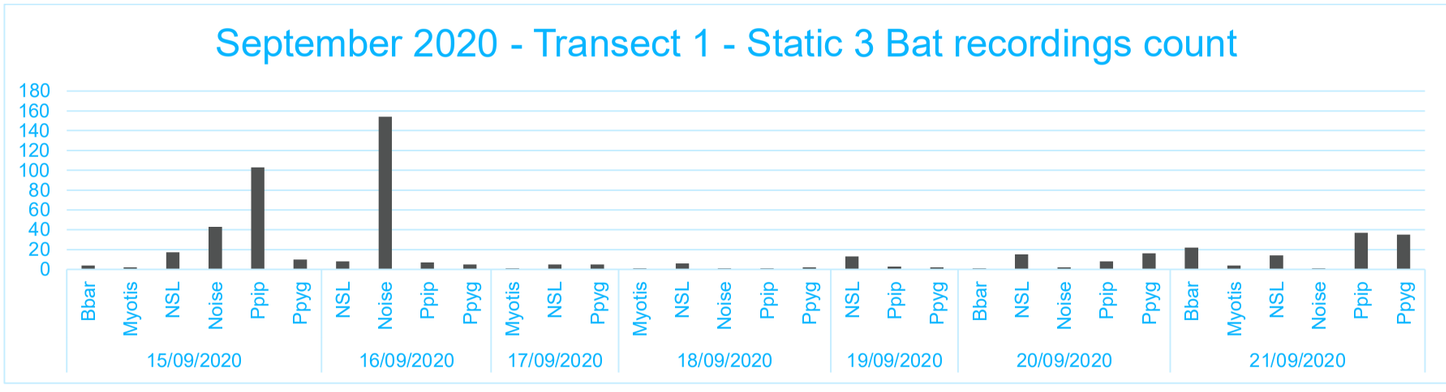


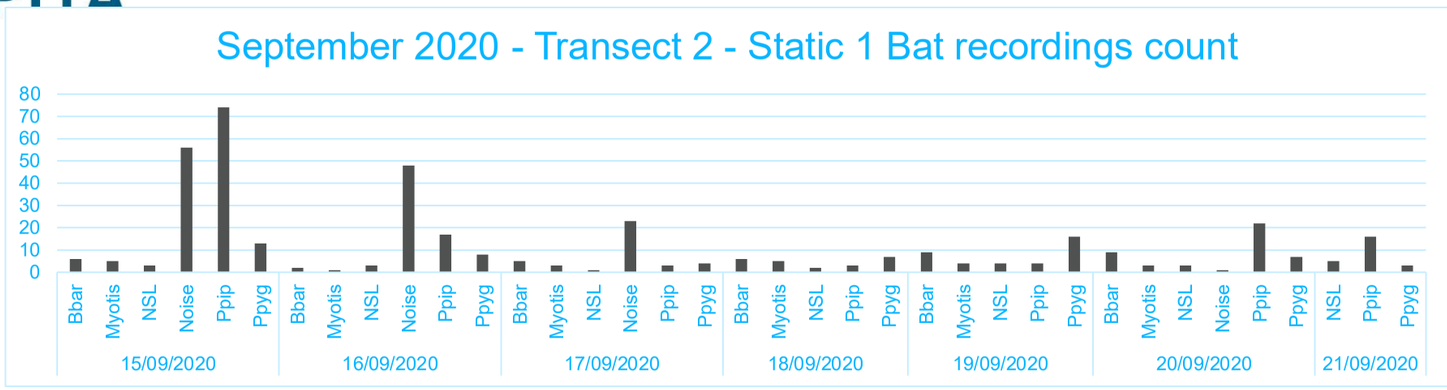
September 2020

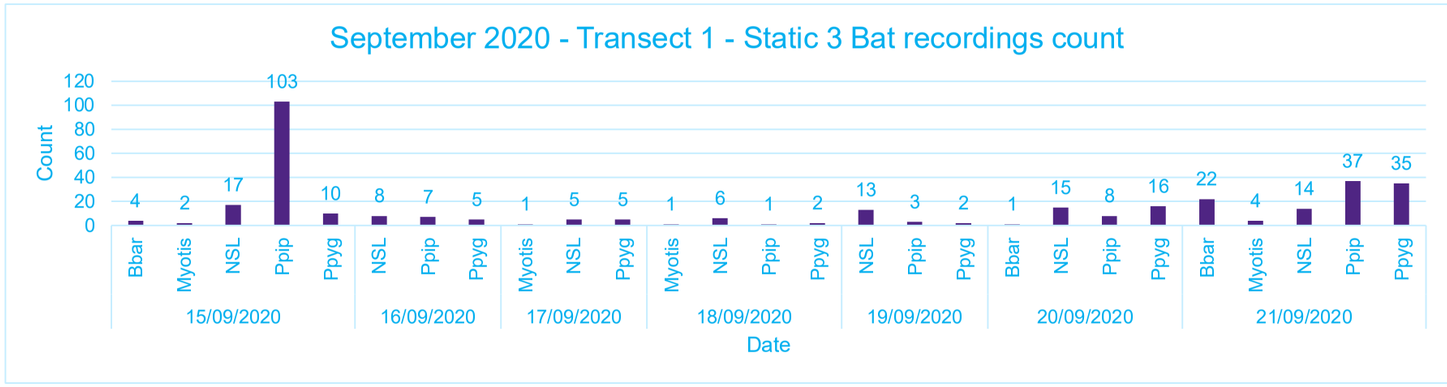

September 2020 - Transect 1 - Static 1 Bat recordings count
180
160
140
120
100
80
60
40
20
0
Bbar Myotis NSL Ppip Ppyg Myotis NSL Ppip Ppyg Bbar Myotis NSL Ppip Ppyg NSL Ppip Ppyg Bbar Myotis NSL Bbar Myotis Ppip Ppyg Bbar Myotis NSL Ppip Ppyg
15/09/2020
16/09/2020
17/09/2020
18/09/2020
19/09/2020
20/09/2020
21/09/2020

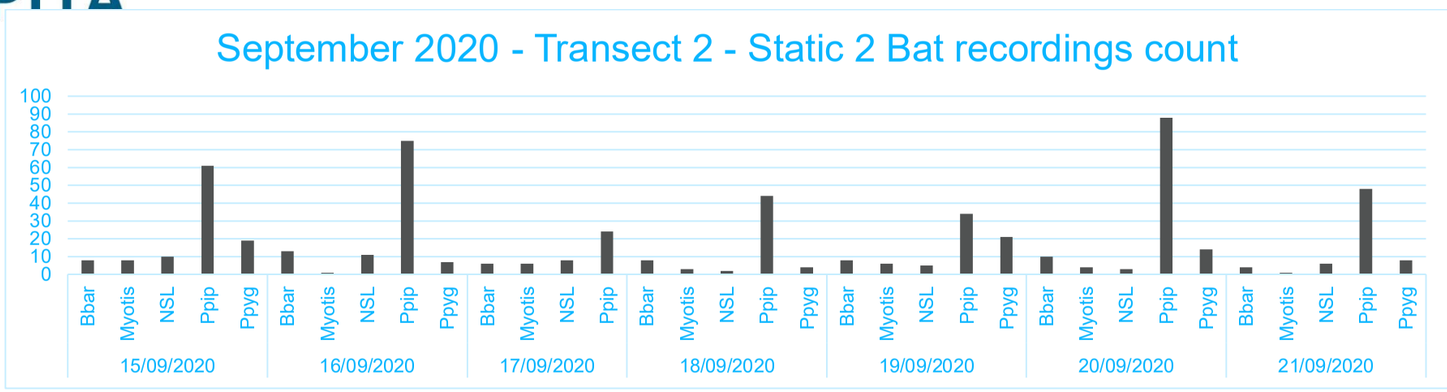

September 2020 - Transect 1 - Static 2 Bat recordings count
300
250
200
150
100
50
0
NSL Ppip Ppyg Myotis NSL Ppip Ppyg Bbar Myotis NSL Noise Ppip Ppyg Bbar Myotis NSL Ppip Ppyg NSL Ppip Ppyg Myotis NSL Ppip Ppyg Bbar Myotis NSL Ppip Ppyg
15/09/2020
16/09/2020
17/09/2020
18/09/2020
19/09/2020
20/09/2020
21/09/2020

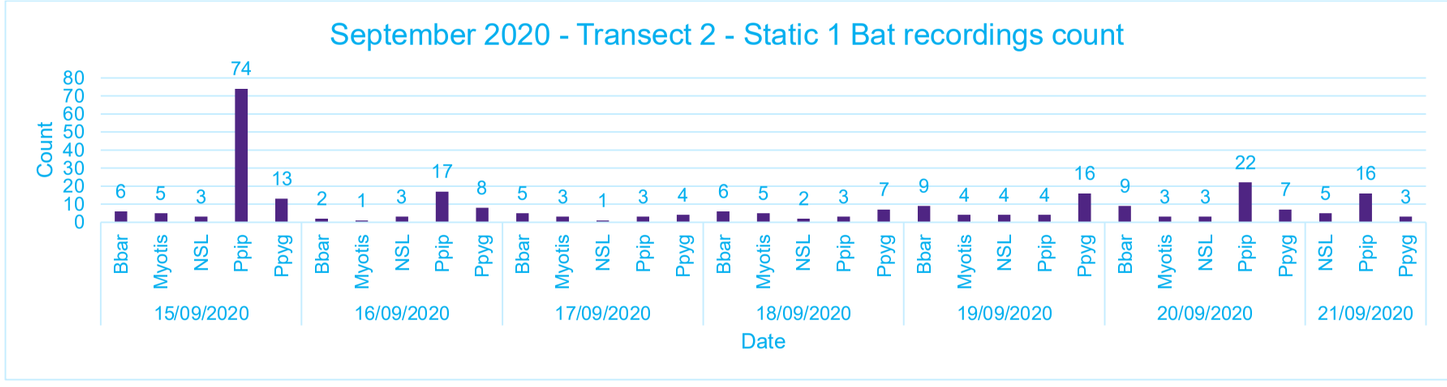

September 2020 - Transect 1 - Static 2 Bat recordings count
Count
300
250
200
150
100
50
0
16 267 25 1 22 100 16 1 1 4 155 8 1 1 6 133 13 7 88 15 3 11 190 20 1 2 8 226 10
NSL Ppip Ppyg Myotis NSL Ppip Ppyg Bbar Myotis NSL Ppip Ppyg Bbar Myotis NSL Ppip Ppyg NSL Ppip Ppyg Myotis NSL Ppip Ppyg Bbar Myotis NSL Ppip Ppyg
15/09/2020
16/09/2020
17/09/2020
18/09/2020
19/09/2020
20/09/2020
21/09/2020
Date

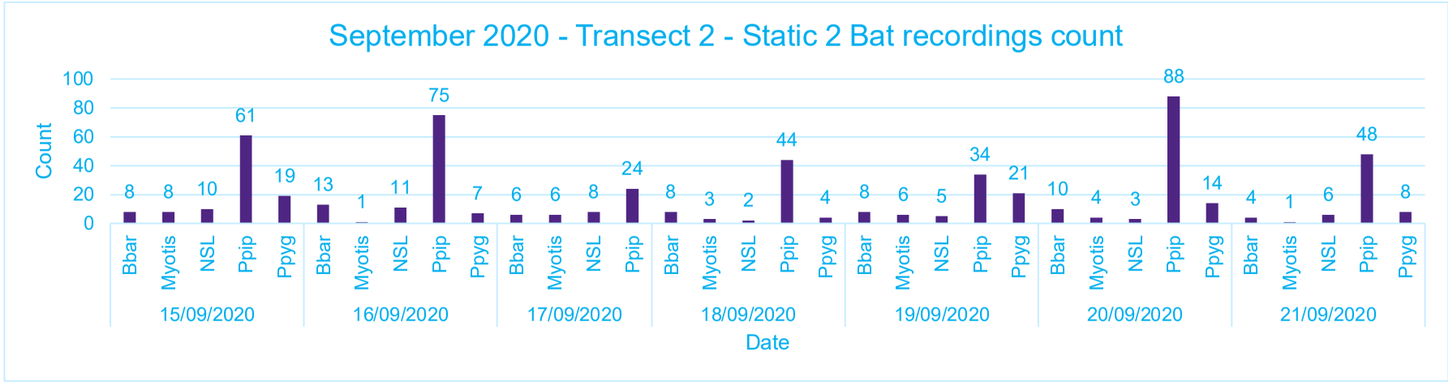

September 2020 - Transect 1 - Static 3 Bat recordings count
180
160
140
120
100
80
60
40
20
0
Bbar Myotis NSL Noise Ppip Ppyg NSL Noise Ppip Ppyg Myotis NSL Ppyg Myotis NSL Noise Ppip Ppyg NSL Ppip Ppyg Bbar NSL Noise Ppip Ppyg Bbar Myotis NSL Noise Ppip Ppyg
15/09/2020
16/09/2020
17/09/2020
18/09/2020
19/09/2020
20/09/2020
21/09/2020

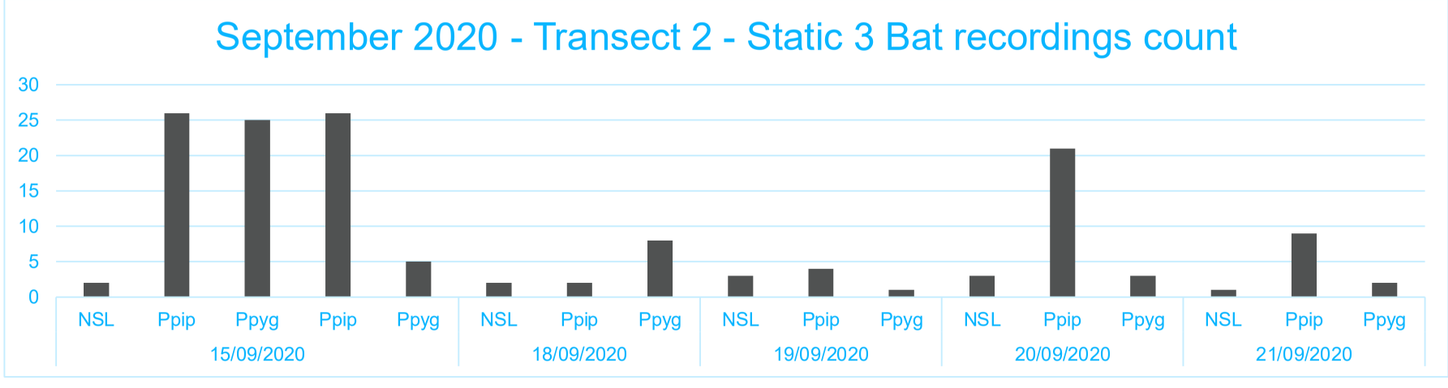

September 2020 - Transect 2 - Static 1 Bat recordings count
80
70
60
50
40
30
20
10
0
Bbar Myotis NSL Noise Ppip Ppyg
15/09/2020
16/09/2020
17/09/2020
18/09/2020
19/09/2020
20/09/2020
21/09/2020

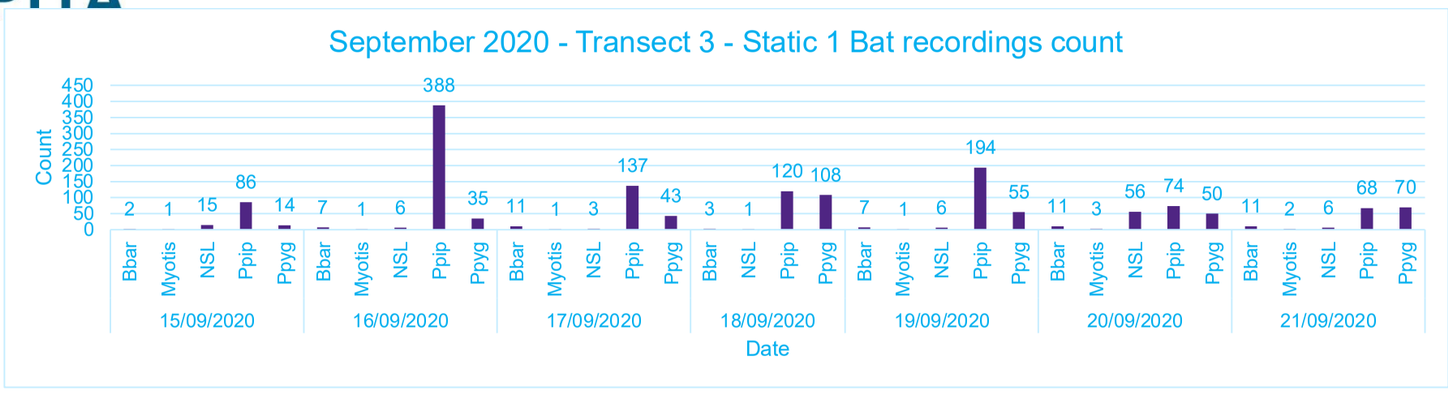

September 2020 - Transect 1 - Static 3 Bat recordings count
Count
120
100
80
60
40
20
0
4 2 17 103 10
8 7 5
1 5 5
1 6 1 2
13 3 2
1 15 8 16
22 4 14 37 35
Bbar Myotis NSL Ppip Ppyg
15/09/2020
16/09/2020
17/09/2020
18/09/2020
19/09/2020
20/09/2020
21/09/2020
Date

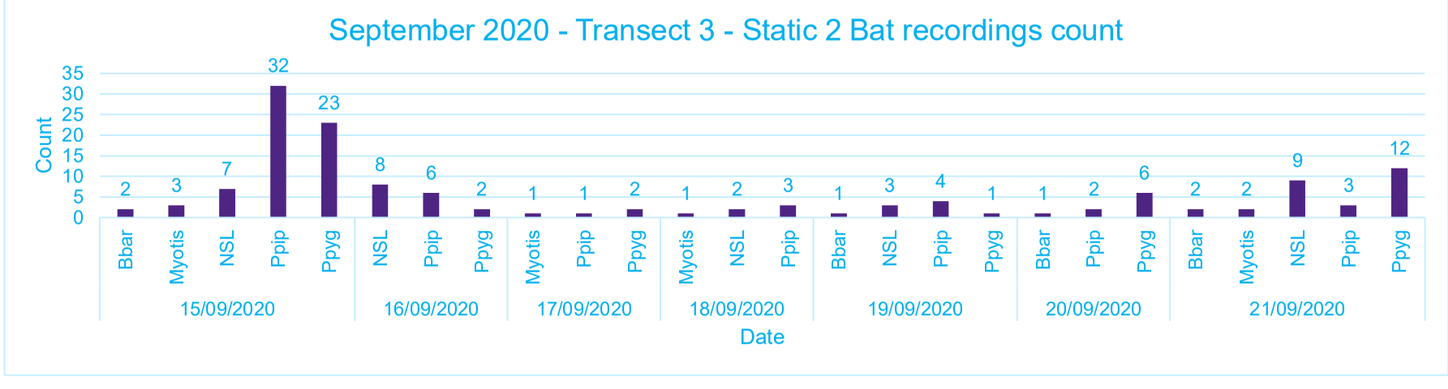

September 2020 - Transect 2 - Static 2 Bat recordings count
100
90
80
70
60
50
40
30
20
10
0
Bbar Myotis NSL Ppip Ppyg
15/09/2020
16/09/2020
17/09/2020
18/09/2020
19/09/2020
20/09/2020
21/09/2020

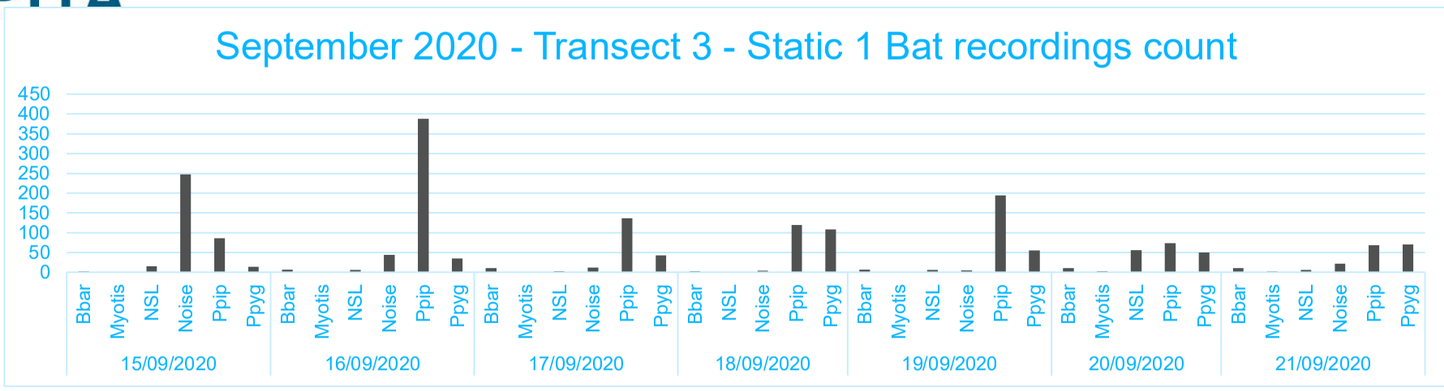

September 2020 - Transect 2 - Static 1 Bat recordings count
Count
80
70
60
50
40
30
20
10
0
6 5 3 74 13
2 1 3 17 8
5 3 1 3 4
6 5 2 3 7
9 4 4 4 16
9 3 3 22 7
5 16 3
Bbar Myotis NSL Ppip Ppyg
15/09/2020
16/09/2020
17/09/2020
18/09/2020
19/09/2020
20/09/2020
21/09/2020
Date

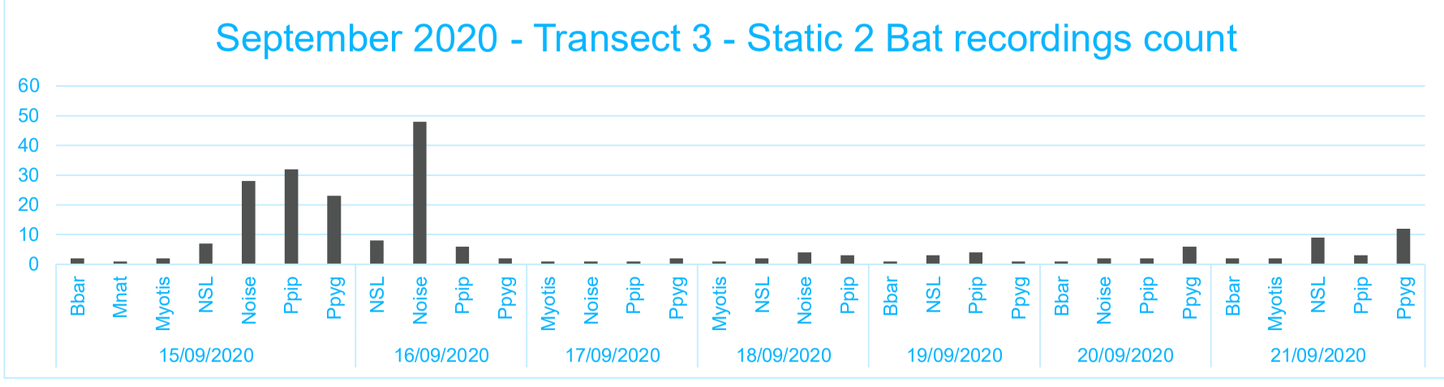

September 2020 - Transect 2 - Static 2 Bat recordings count
Count
Date
Bbar
Myotis
NSL
Ppip
Ppyg
15/09/2020
16/09/2020
17/09/2020
18/09/2020
19/09/2020
20/09/2020
21/09/2020

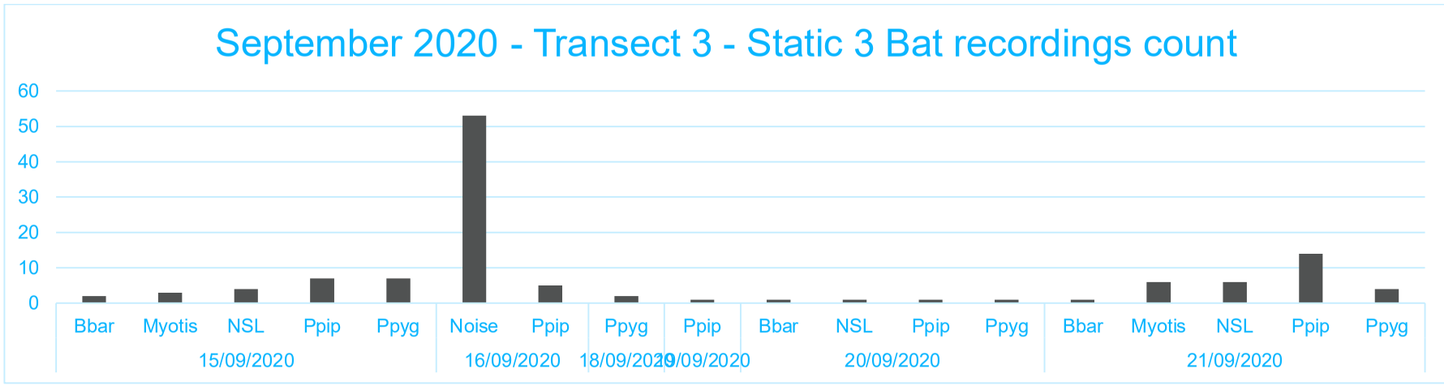

September 2020 - Transect 2 - Static 3 Bat recordings count
NSL
Ppip
Ppyg
15/09/2020
18/09/2020
19/09/2020
20/09/2020
21/09/2020

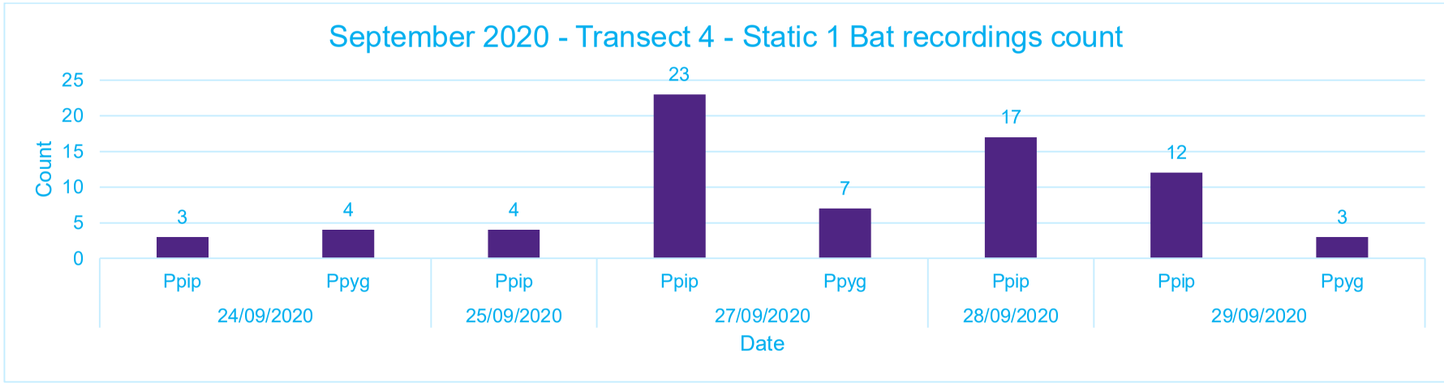

September 2020 - Transect 3 - Static 1 Bat recordings count
Count
Date
Bbar
Myotis
NSL
Ppip
Ppyg
15/09/2020
16/09/2020
17/09/2020
18/09/2020
19/09/2020
20/09/2020
21/09/2020

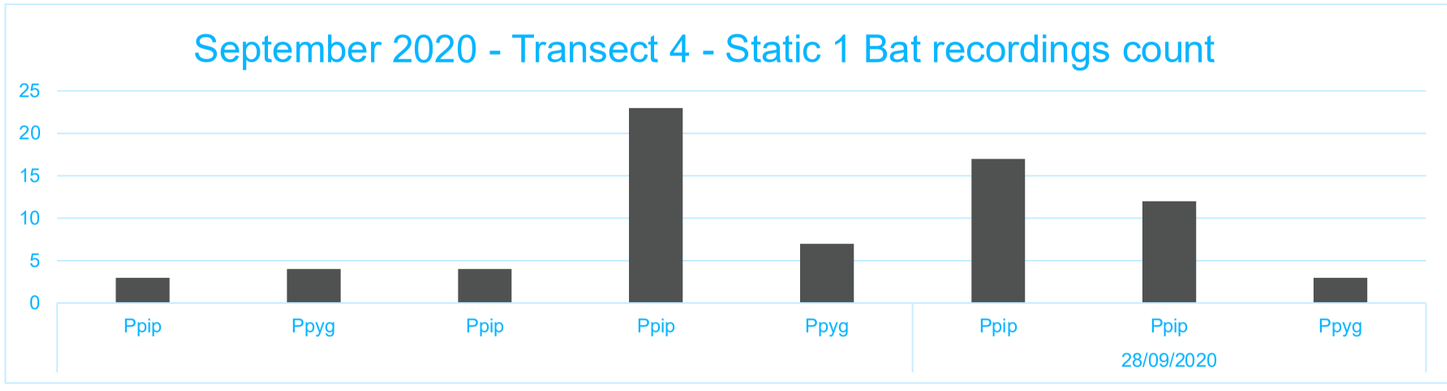

September 2020 - Transect 3 - Static 2 Bat recordings count
Count
Date
Bbar
Myotis
NSL
Ppip
Ppyg
15/09/2020
16/09/2020
17/09/2020
18/09/2020
19/09/2020
20/09/2020
21/09/2020

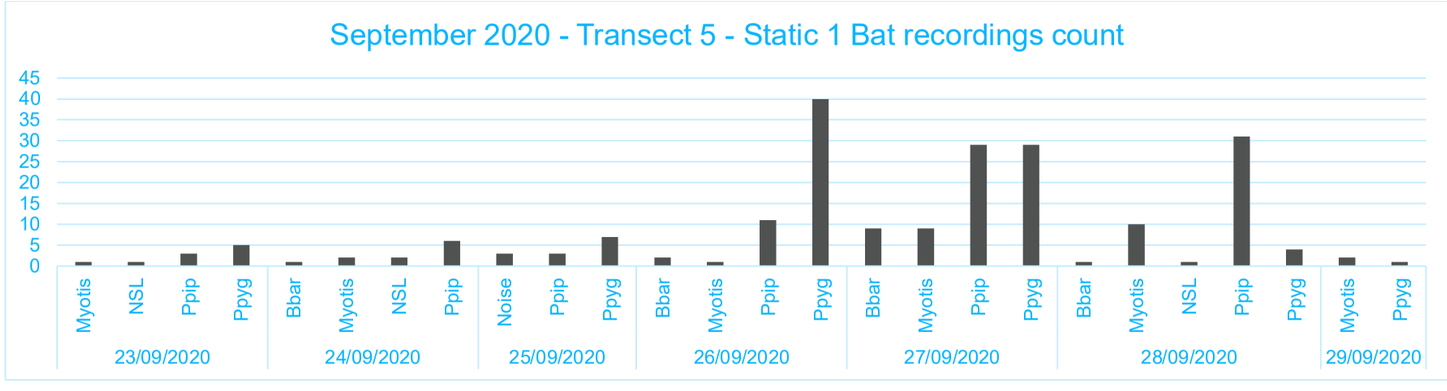

September 2020 - Transect 3 - Static 1 Bat recordings count
450
400
350
300
250
200
150
100
50
0
Bbar Myotis NSL Noise Ppip Ppyg
15/09/2020
16/09/2020
17/09/2020
18/09/2020
19/09/2020
20/09/2020
21/09/2020

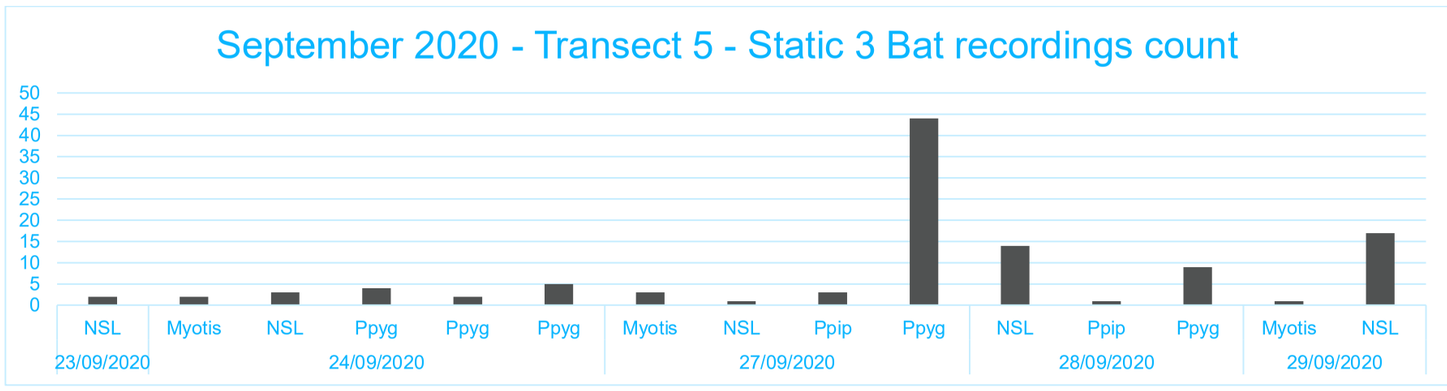

September 2020 - Transect 3 - Static 2 Bat recordings count
60
50
40
30
20
10
0
Bbar Mnat Myotis NSL Noise Ppip Ppyg
15/09/2020
16/09/2020
17/09/2020
18/09/2020
19/09/2020
20/09/2020
21/09/2020

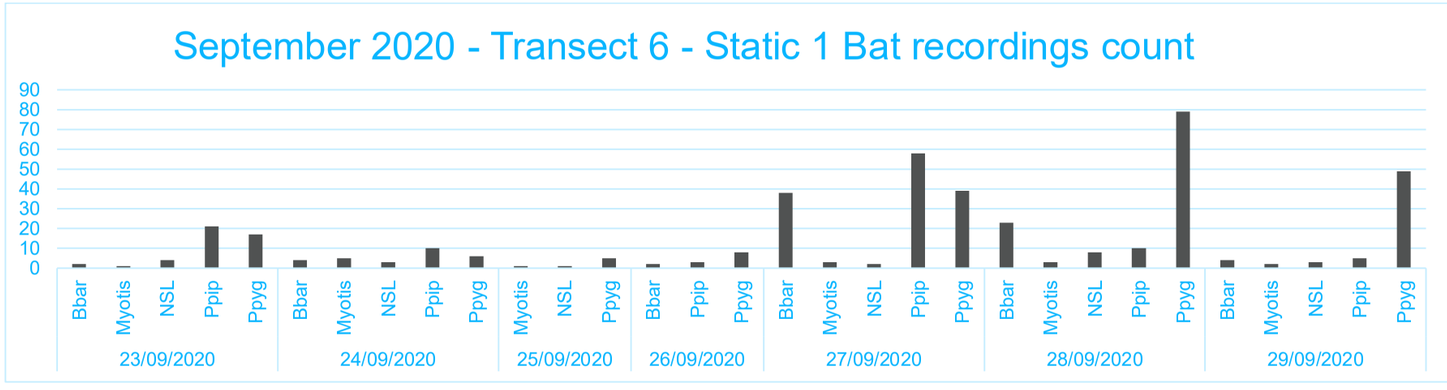

September 2020 - Transect 3 - Static 3 Bat recordings count
60
50
40
30
20
10
0
Bbar Myotis NSL Ppip Ppyg Noise Ppip Ppyg Ppip Bbar NSL Ppip Ppyg Bbar Myotis NSL Ppip Ppyg
15/09/2020
16/09/2020
18/09/2020
19/09/2020
20/09/2020
21/09/2020

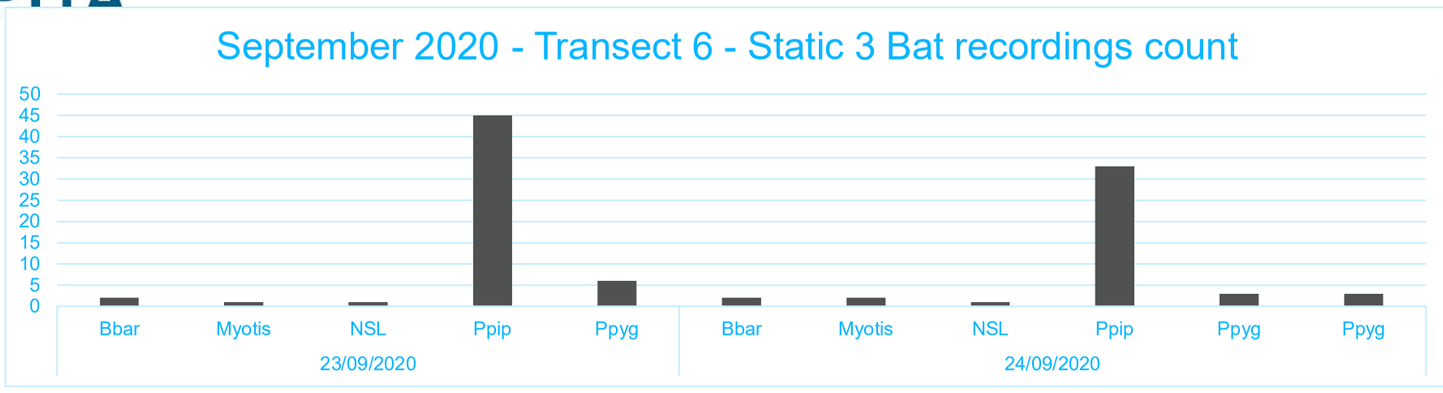

September 2020 - Transect 4 - Static 1 Bat recordings count
25
20
15
10
5
0
Count
3
4
4
23
7
17
12
3
Ppip Ppyg Ppip Ppip Ppyg Ppip Ppip Ppyg
24/09/2020
25/09/2020
27/09/2020
28/09/2020
29/09/2020
Date

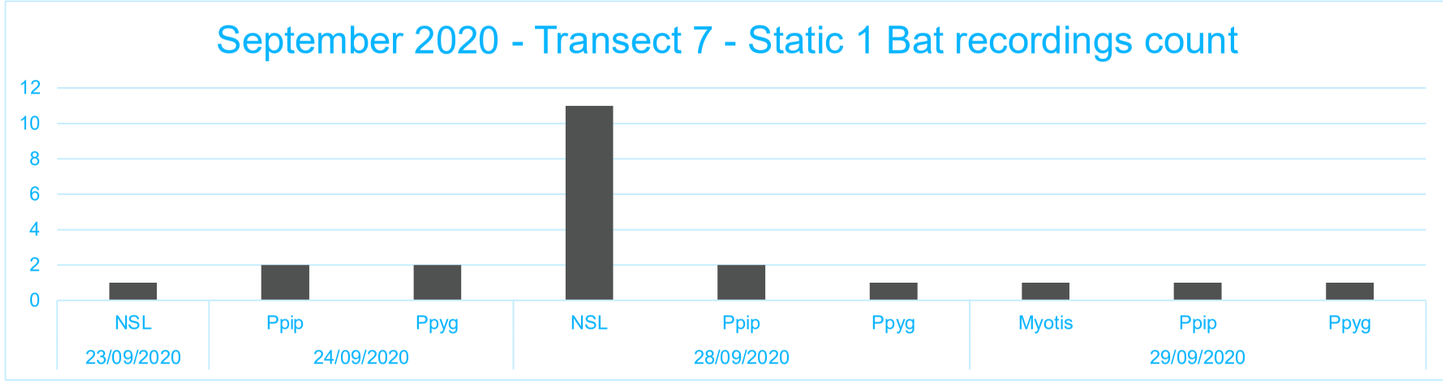

September 2020 - Transect 4 - Static 1 Bat recordings count
25
20
15
10
5
0
Ppip
Ppyg
Ppip
Ppip
Ppyg
Ppip
Ppip
Ppyg
28/09/2020

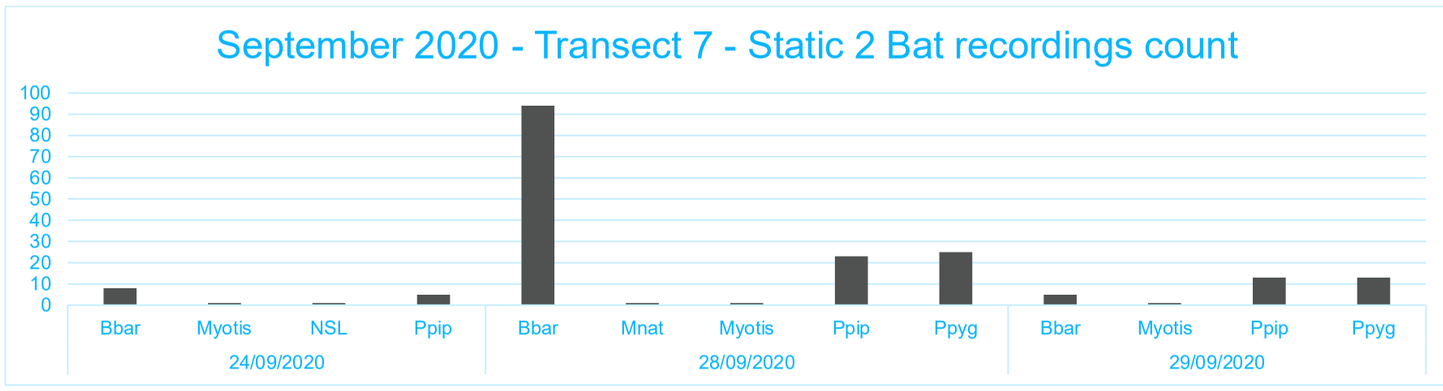

September 2020 - Transect 5 - Static 1 Bat recordings count
45
40
35
30
25
20
15
10
5
0
Myotis
NSL
Ppip
Ppyg
Bbar
Myotis
NSL
Ppip
Noise
Ppip
Ppyg
Bbar
Myotis
Ppip
Ppyg
Bbar
Myotis
Ppip
Ppyg
Bbar
Myotis
NSL
Ppip
Ppyg
Myotis
Ppyg
23/09/2020
24/09/2020
25/09/2020
26/09/2020
27/09/2020
28/09/2020
29/09/2020

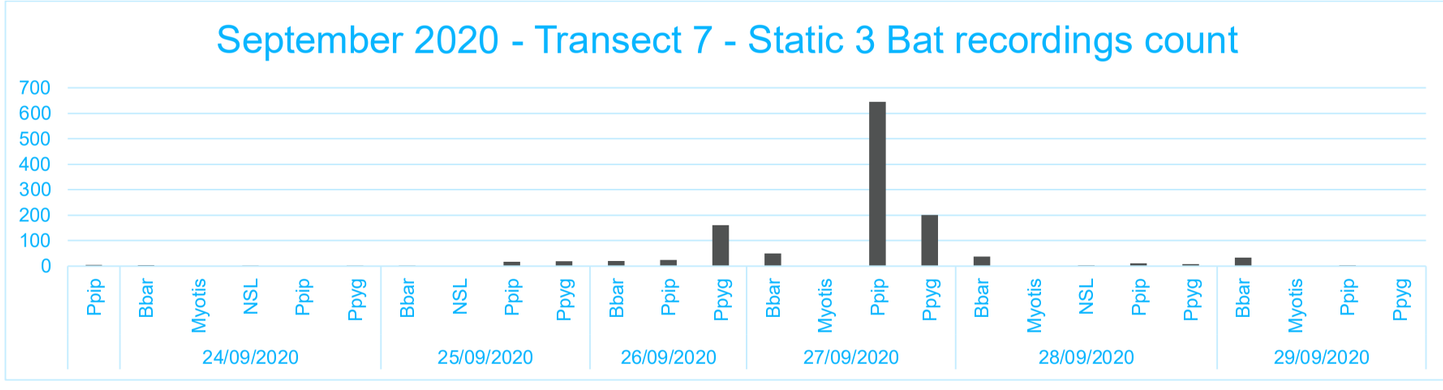

September 2020 - Transect 5 - Static 3 Bat recordings count
50
45
40
35
30
25
20
15
10
5
0
NSL
Myotis
NSL
Ppyg
Ppyg
Ppyg
Myotis
NSL
Ppip
Ppyg
NSL
Ppip
Ppyg
Myotis
NSL
23/09/2020
24/09/2020
27/09/2020
28/09/2020
29/09/2020

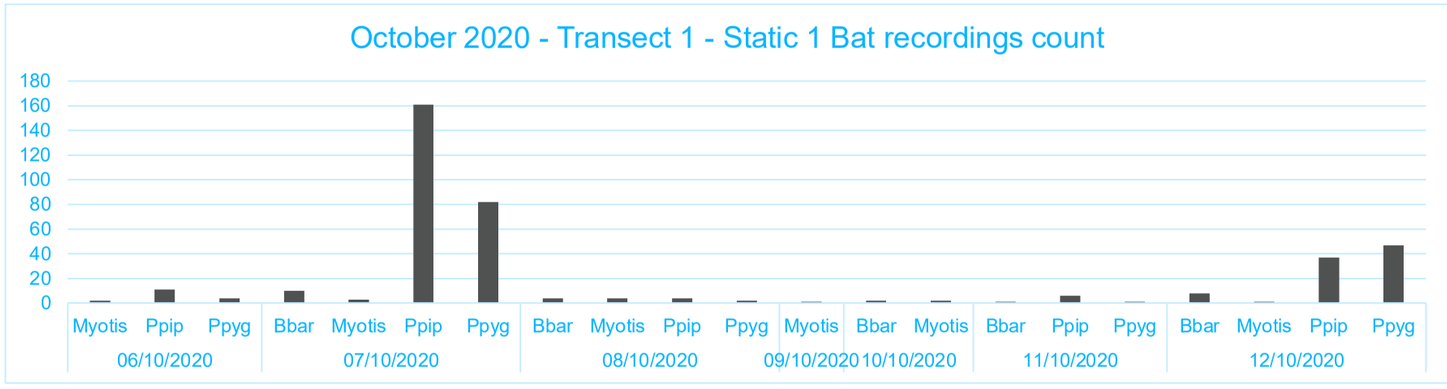

September 2020 - Transect 6 - Static 1 Bat recordings count
90
80
70
60
50
40
30
20
10
0
Bbar
Myotis
NSL
Ppip
Ppyg
Bbar
Myotis
NSL
Ppip
Ppyg
Myotis
NSL
Ppyg
Bbar
Ppip
Ppyg
Bbar
Myotis
NSL
Ppip
Ppyg
Bbar
Myotis
NSL
Ppip
Ppyg
Bbar
Myotis
NSL
Ppip
Ppyg
23/09/2020
24/09/2020
25/09/2020
26/09/2020
27/09/2020
28/09/2020
29/09/2020

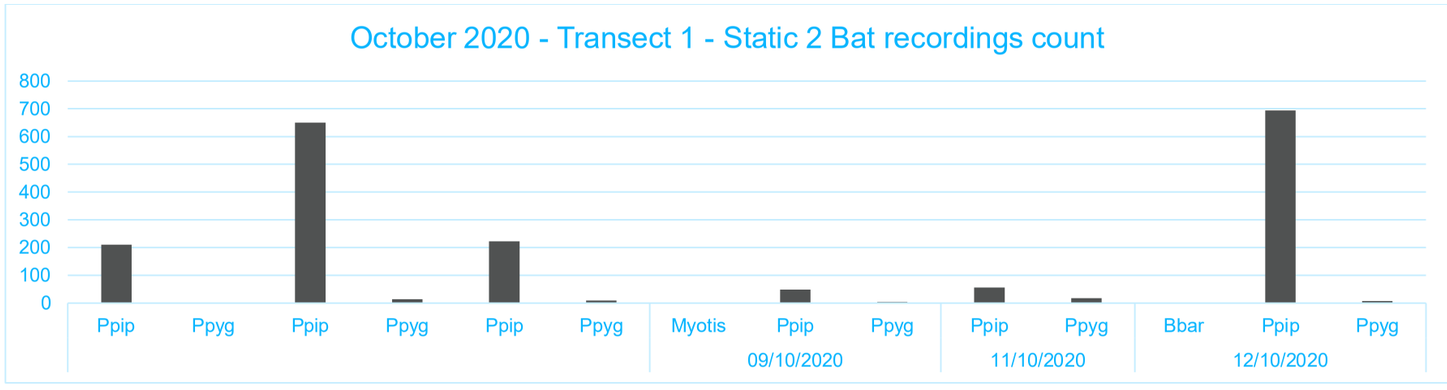

September 2020 - Transect 6 - Static 3 Bat recordings count
50
45
40
35
30
25
20
15
10
5
0
Bbar
Myotis
NSL
Ppip
Ppyg
Bbar
Myotis
NSL
Ppip
Ppyg
Ppyg
23/09/2020
24/09/2020

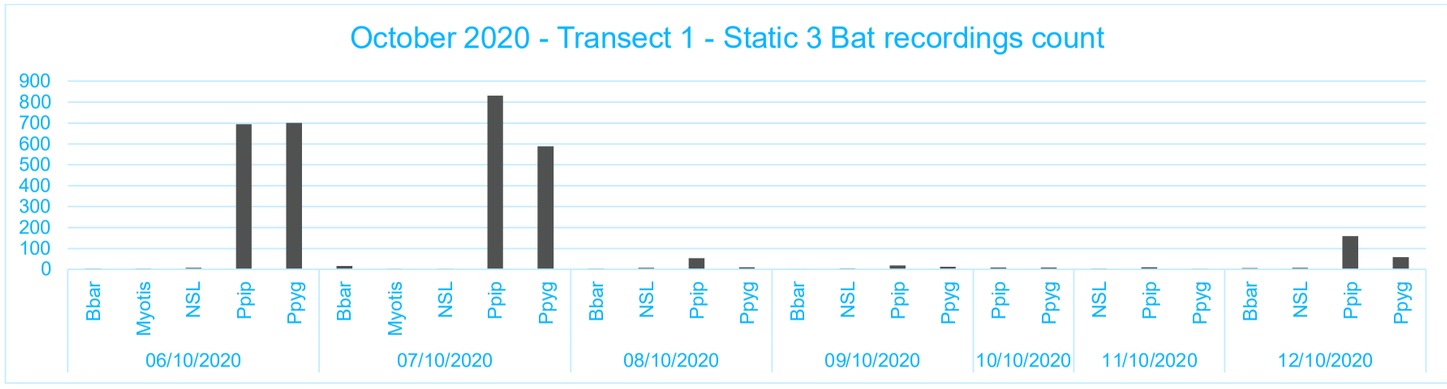

September 2020 - Transect 7 - Static 1 Bat recordings count
12
10
8
6
4
2
0
NSL
Ppip
Ppyg
NSL
Ppip
Ppyg
Myotis
Ppip
Ppyg
23/09/2020
24/09/2020
28/09/2020
29/09/2020

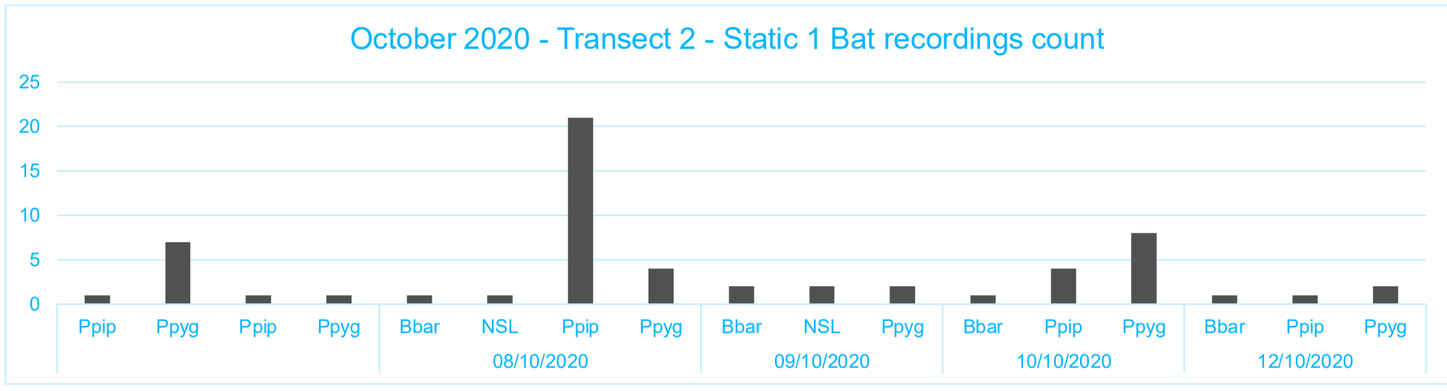

September 2020 - Transect 7 - Static 2 Bat recordings count
100
90
80
70
60
50
40
30
20
10
0
Bbar
Myotis
NSL
Ppip
Bbar
Mnat
Myotis
Ppip
Ppyg
Bbar
Myotis
Ppip
Ppyg
24/09/2020
28/09/2020
29/09/2020

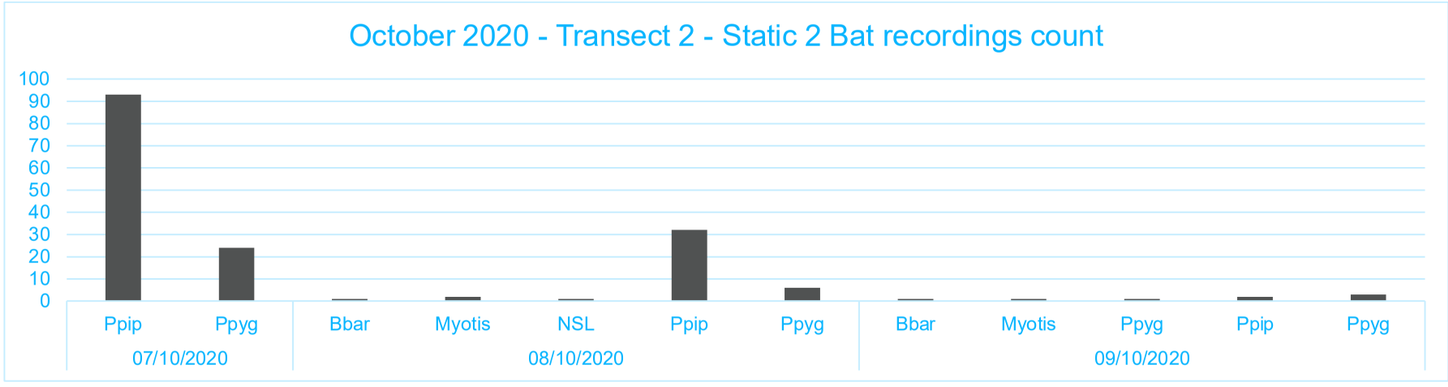

September 2020 - Transect 7 - Static 3 Bat recordings count
700
600
500
400
300
200
100
0
Ppip
Bbar
Myotis
NSL
Ppip
Ppyg
Bbar
NSL
Ppip
Ppyg
Bbar
Ppip
Ppyg
Bbar
Myotis
Ppip
Ppyg
Bbar
Myotis
NSL
Ppip
Ppyg
Bbar
Myotis
Ppip
Ppyg
24/09/2020
25/09/2020
26/09/2020
27/09/2020
28/09/2020
29/09/2020

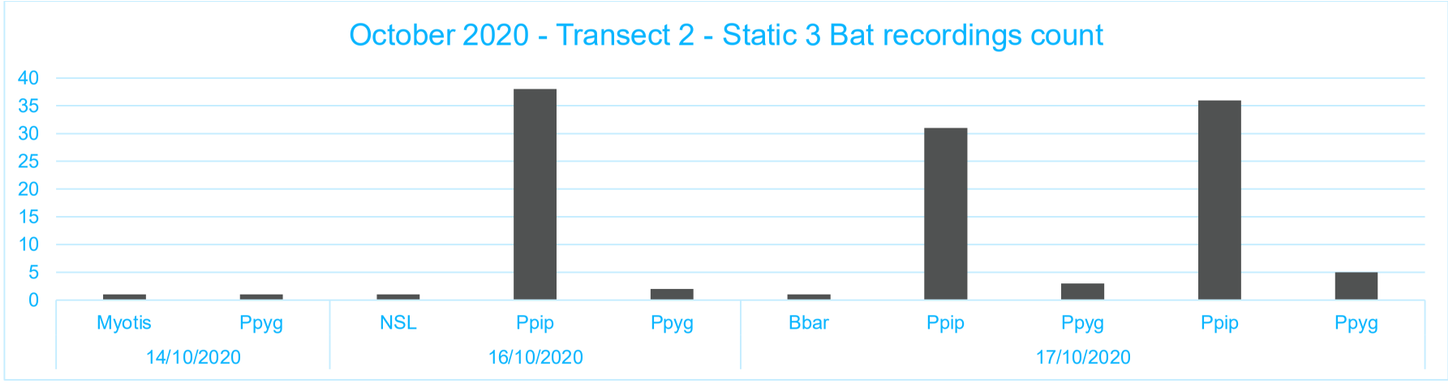

October 2020 - Transect 1 - Static 1 Bat recordings count
180
160
140
120
100
80
60
40
20
0
Myotis Ppip Ppyg Bbar Myotis Ppip Ppyg Bbar Myotis Ppip Ppyg Myotis Bbar Myotis Bbar Ppip Ppyg Bbar Myotis Ppip Ppyg
06/10/2020
07/10/2020
08/10/2020
09/10/2020
10/10/2020
11/10/2020
12/10/2020

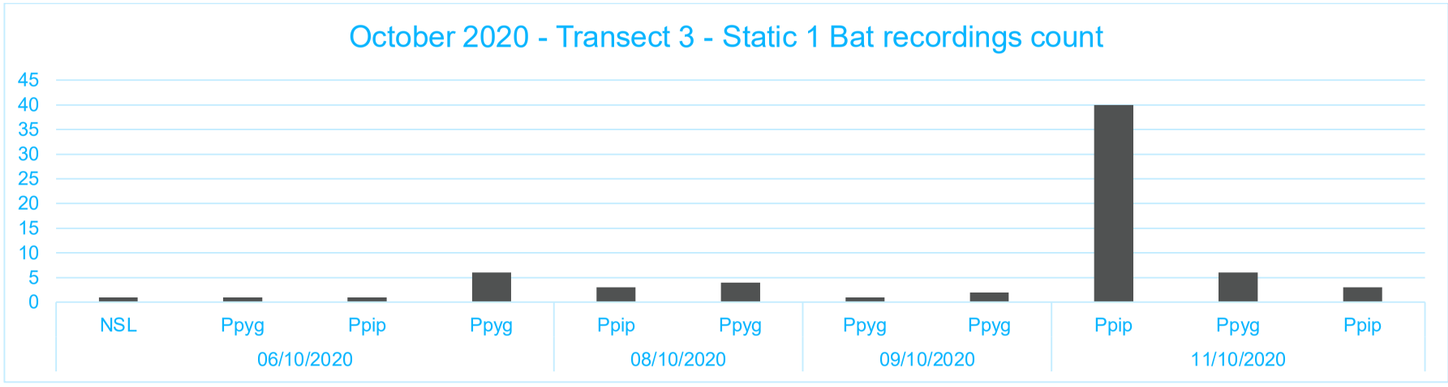

October 2020 - Transect 1 - Static 2 Bat recordings count
800
700
600
500
400
300
200
100
0
Ppip Ppyg Ppip Ppyg Ppip Ppyg Myotis Ppip Ppyg Ppip Ppyg Bbar Ppip Ppyg
09/10/2020
11/10/2020
12/10/2020

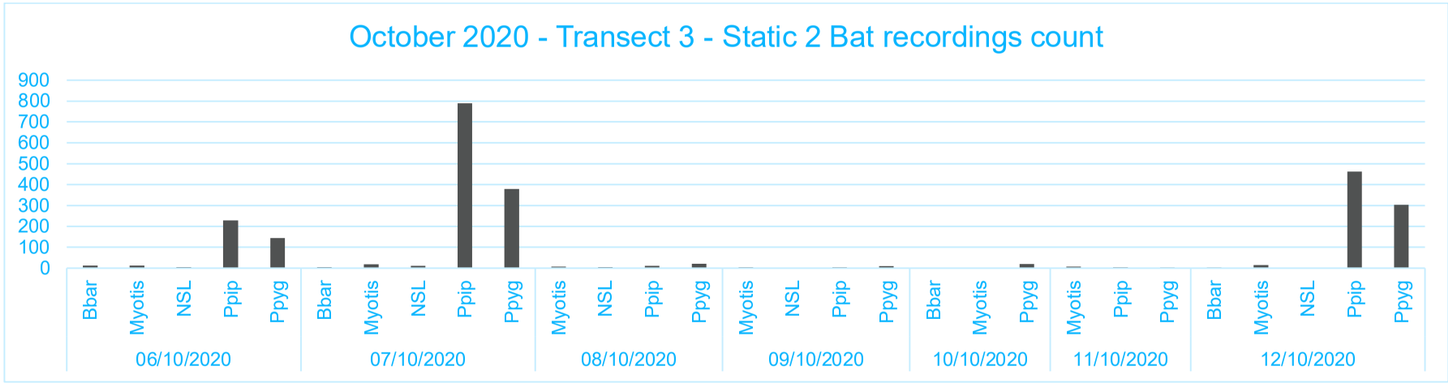

October 2020 - Transect 1 - Static 3 Bat recordings count
900
800
700
600
500
400
300
200
100
0
Bbar Myotis NSL Ppip Ppyg Bbar Myotis NSL Ppip Ppyg Bbar NSL Ppip Ppyg Bbar NSL Ppip Ppyg Ppip Ppyg NSL Ppip Ppyg Bbar NSL Ppip Ppyg
06/10/2020
07/10/2020
08/10/2020
09/10/2020
10/10/2020
11/10/2020
12/10/2020

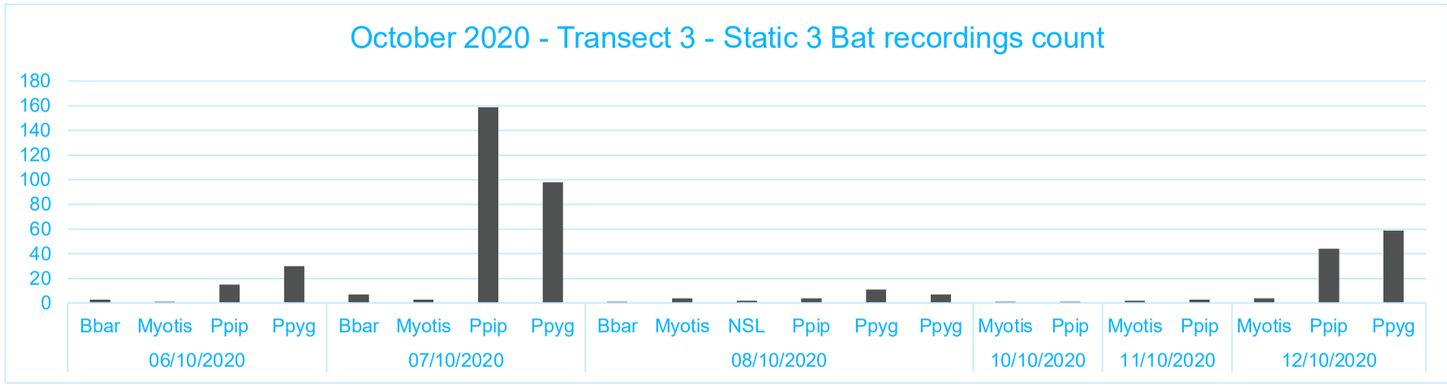

October 2020 - Transect 2 - Static 1 Bat recordings count
25
20
15
10
5
0
Ppip Ppyg Ppip Ppyg Bbar NSL Ppip Ppyg Bbar NSL Ppyg Bbar Ppip Ppyg Bbar Ppip Ppyg
08/10/2020
09/10/2020
10/10/2020
12/10/2020

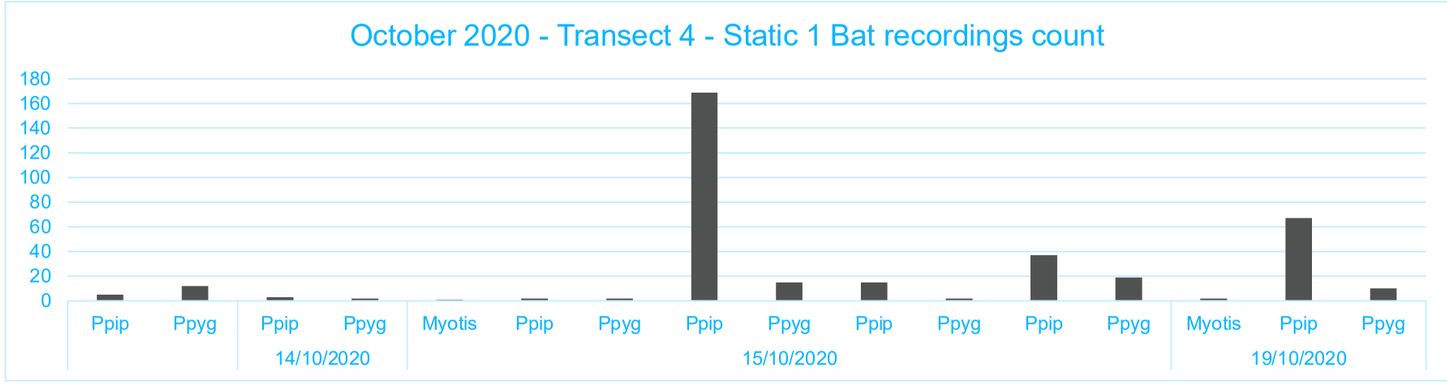

October 2020 - Transect 2 - Static 2 Bat recordings count
100
90
80
70
60
50
40
30
20
10
0
Ppip
Ppyg
Bbar
Myotis
NSL
Ppip
Ppyg
Bbar
Myotis
Ppyg
Ppip
Ppyg
07/10/2020
08/10/2020
09/10/2020

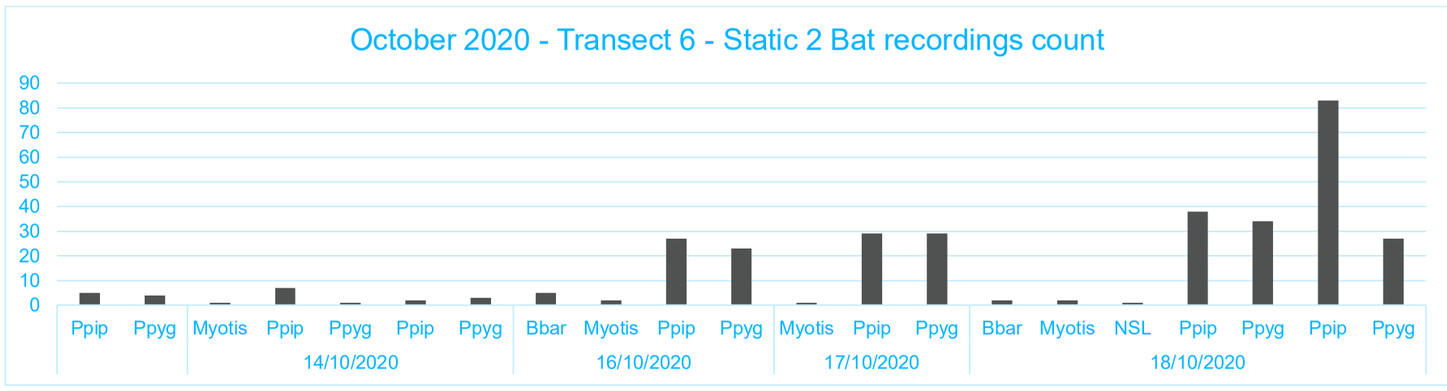

October 2020 - Transect 2 - Static 3 Bat recordings count
40
35
30
25
20
15
10
5
0
Myotis
Ppyg
NSL
Ppip
Ppyg
Bbar
Ppip
Ppyg
Ppip
Ppyg
14/10/2020
16/10/2020
17/10/2020

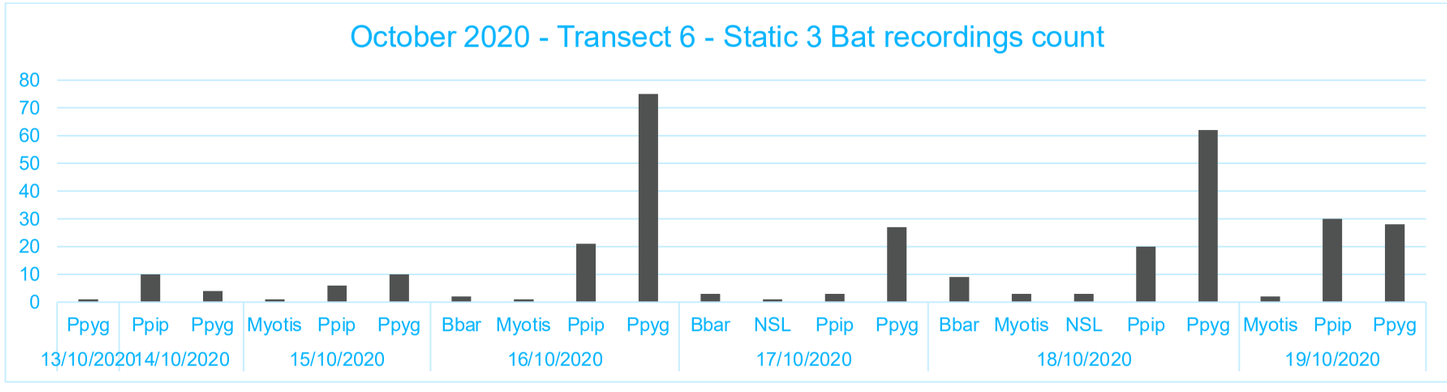

October 2020 - Transect 3 - Static 1 Bat recordings count
45
40
35
30
25
20
15
10
5
0
NSL
Ppyg
Ppip
Ppyg
Ppip
Ppyg
Ppyg
Ppyg
Ppip
Ppyg
Ppip
06/10/2020
08/10/2020
09/10/2020
11/10/2020

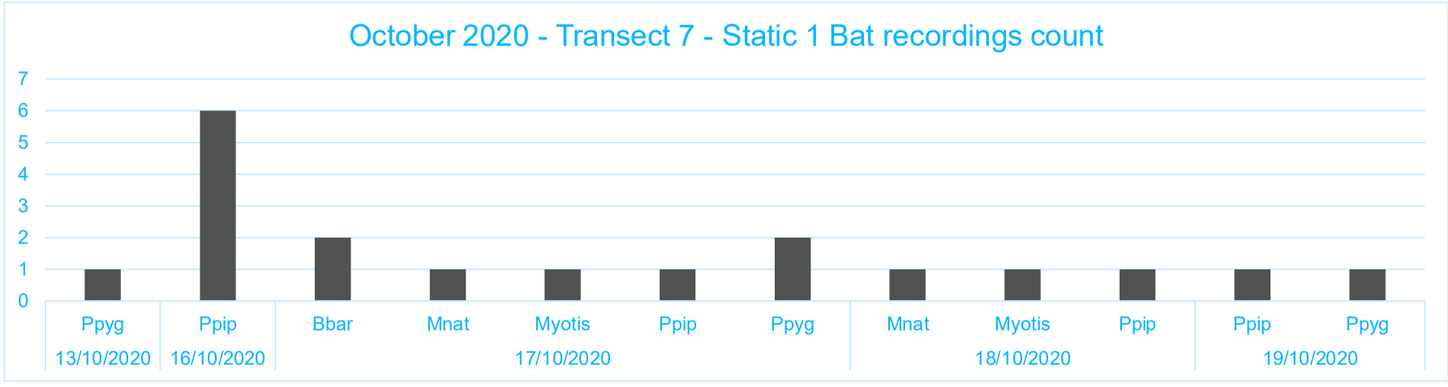

October 2020 - Transect 3 - Static 2 Bat recordings count
900
800
700
600
500
400
300
200
100
0
Bbar
Myotis
NSL
Ppip
Ppyg
Bbar
Myotis
NSL
Ppip
Ppyg
Myotis
NSL
Ppip
Ppyg
Myotis
NSL
Ppip
Ppyg
Bbar
Myotis
Ppyg
Myotis
Ppip
Ppyg
Bbar
Myotis
NSL
Ppip
Ppyg
06/10/2020
07/10/2020
08/10/2020
09/10/2020
10/10/2020
11/10/2020
12/10/2020

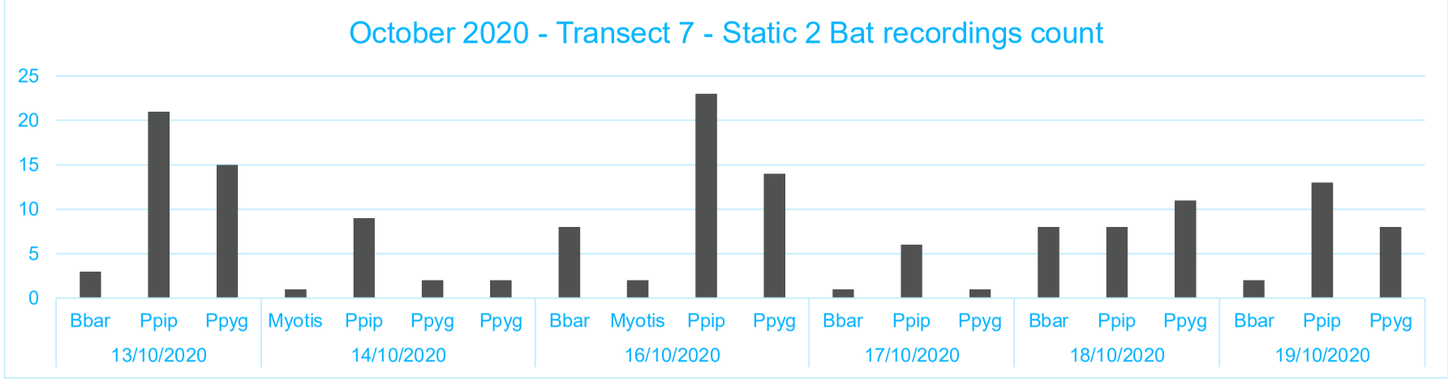

October 2020 - Transect 3 - Static 3 Bat recordings count
180
160
140
120
100
80
60
40
20
0
Bbar Myotis Ppip Ppyg Bbar Myotis Ppip Ppyg Bbar Myotis NSL Ppip Ppyg Ppyg Myotis Ppip Myotis Ppip Myotis Ppip Ppyg
06/10/2020
07/10/2020
08/10/2020
10/10/2020
11/10/2020
12/10/2020

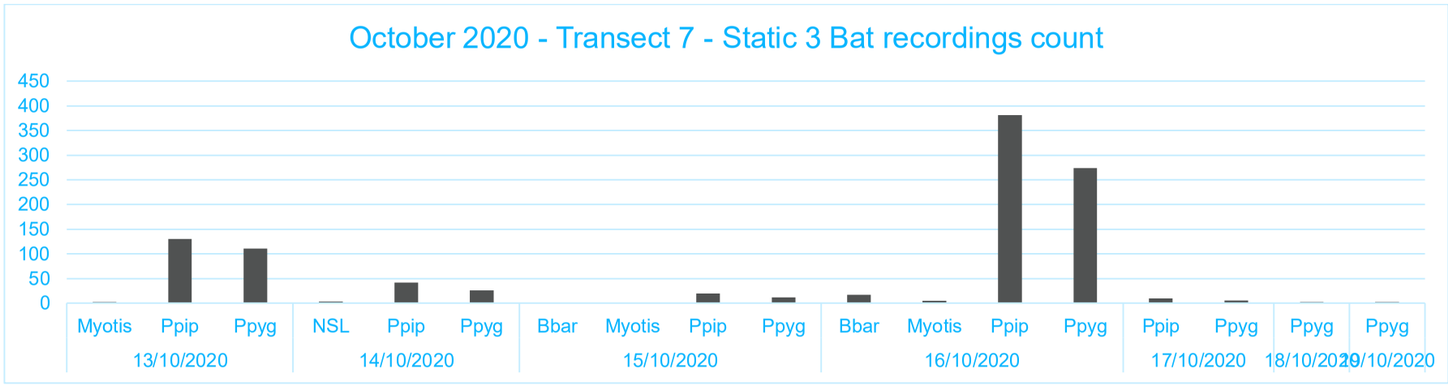

October 2020 - Transect 4 - Static 1 Bat recordings count
180
160
140
120
100
80
60
40
20
0
Ppip Ppyg Ppip Ppyg Myotis Ppip Ppyg Ppip Ppyg Ppip Ppyg Ppip Ppyg Myotis Ppip Ppyg
14/10/2020
15/10/2020
19/10/2020


October 2020 - Transect 6 - Static 2 Bat recordings count
90
80
70
60
50
40
30
20
10
0
Ppip Ppyg Myotis Ppip Ppyg Ppip Ppyg Bbar Myotis Ppip Ppyg Myotis Ppip Ppyg Bbar Myotis NSL Ppip Ppyg Ppip Ppyg
14/10/2020
16/10/2020
17/10/2020
18/10/2020


October 2020 - Transect 6 - Static 3 Bat recordings count
80
70
60
50
40
30
20
10
0
Ppyg Ppip Ppyg Myotis Ppip Ppyg Bbar Myotis Ppip Ppyg Bbar NSL Ppip Ppyg Bbar Myotis NSL Ppip Ppyg Myotis Ppip Ppyg
13/10/2020
14/10/2020
15/10/2020
16/10/2020
17/10/2020
18/10/2020
19/10/2020


October 2020 - Transect 7 - Static 1 Bat recordings count
7
6
5
4
3
2
1
0
Ppyg
Ppip
Bbar
Mnat
Myotis
Ppip
Ppyg
Mnat
Myotis
Ppip
Ppip
Ppyg
13/10/2020
16/10/2020
17/10/2020
18/10/2020
19/10/2020


October 2020 - Transect 7 - Static 2 Bat recordings count
25
20
15
10
5
0
Bbar
Ppip
Ppyg
Myotis
Ppip
Ppyg
Ppyg
Bbar
Myotis
Ppip
Ppyg
Bbar
Ppip
Ppyg
Bbar
Ppip
Ppyg
Bbar
Ppip
Ppyg
13/10/2020
14/10/2020
16/10/2020
17/10/2020
18/10/2020
19/10/2020


October 2020 - Transect 7 - Static 3 Bat recordings count
450
400
350
300
250
200
150
100
50
0
Myotis
Ppip
Ppyg
NSL
Ppip
Ppyg
Bbar
Myotis
Ppip
Ppyg
Bbar
Myotis
Ppip
Ppyg
Ppip
Ppyg
Ppyg
Ppyg
13/10/2020
14/10/2020
15/10/2020
16/10/2020
17/10/2020
18/10/2020
19/10/2020



Cambridge South East Transport (CSET) Phase 2 Winter Bat Survey Report

August 2021

CAPITA

Quality Management

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Date	September 2021		
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1. Summary

Capita Real Estate & Infrastructure's Ecologists was commissioned by the Greater Cambridgeshire Partnership to undertake a series of surveys for bats across the route of Phase 2 of the Cambridge South East Transport (CSET) Project between Great Shelford to Sawston and to Babraham, Cambridgeshire (henceforth referred to as the Site).

The surveys have been carried out to provide baseline ecological information for the CSET Phase 2 Project to inform the design and environmental assessment of the proposals.

This report contains the details of bat surveys carried out between November 2020 and March 2021. Surveys included aerial hibernation inspections of suitable trees and activity surveys for bats. These were carried out to provide additional information over the winter period with particular focus on any evidence of barbastelle bats following discussion with Natural England.

The results are summarised as follows:

- Bat activity was recorded over the winter period with five species detected (including barbastelle), indicating hibernation sites may be within the local vicinity.
- No hibernating bats were recorded during the aerial tree inspections.

A previous report details the results of the 2020 survey season results, inclusive of transect surveys, emergence/re-entry surveys and static detector survey results from May to October 2020.

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2. Introduction

2.1 Background

2.1.1. Capita Real Estate & Infrastructure's Ecologists were commissioned by the Greater Cambridgeshire Partnership (GCP) in August 2020 to undertake a series of winter bat surveys. These surveys were undertaken in relation to the development of Phase 2 of the Cambridge South East Transport (CSET) Project, (the 'Scheme').

2.1.2. The aim of this bat survey report is to summarise the results of the baseline surveys conducted between November 2020 and March 2021 to inform the design of the Scheme, and in conjunction with the Environmental Statement.

2.1.3. The data illustrated within this report follows on from the data gathered for the bat survey report covering the April-October 2020 survey season (Cambridge South East Transport (CSET) Phase 2 Bat Survey Report – Capita March 2021).

2.2 Project Description and Purpose of the Scheme

2.2.1. The Cambridge South East Transport (CSET) Project aims to create a vital link to ease congestion, offer sustainable travel choices, connect communities and support growth in the South East of Cambridge. CSET would form part of the Cambridgeshire Autonomous Metro, providing high quality, frequent and affordable public transport.

2.2.2. CSET Phase 2 comprises a segregated public transport route from the A11 (near Brabham) to the Cambridge Biomedical Campus (CBC). This would include new bus route and walking, cycling and equestrian links.

2.3 Legislation and Policy

2.3.1. Bats receive protection in the UK as a result of both legislation and planning policies. This section outlines the primary legislation protecting bats. All the information below is relevant to this report and to the work proposed at the development site.

Legislation

2.3.2. Bats are protected under Annex II of the EC Council Directive 92/43/EEC 1992 "Conservation of Natural Habitats and Wild Fauna and Flora" (the Habitats Directive) as a European Protected Species (EPS). This legislation has been transposed into UK legislation through the Conservation of Habitats and Species Regulations 2018.

2.3.3. Regulation 41 of the Conservation of Habitats and Species Regulations 2018 makes it an offence to:

- Deliberately capture, injure or kill bats
- Deliberately disturb bats, or
- Damage or destroy a breeding site or resting place of a bat; this applies whether bats are present or not. NB - breeding sites and resting places are generally referred to as roosts.

2.3.4. In addition to the above protection, all bat species in the UK are protected under Schedule 5 of the Wildlife & Countryside Act 1981 (as amended). In addition to the above, it lists the following as additional offences:

- Disturbance of an animal whilst it is occupying a place which it uses for shelter or protection. NB - places of shelter or protection are generally referred to as roosts
- Obstruct access to any structure or place which an animal uses for shelter or protection.

2.3.5. In order to permit a development where the above offences are likely to be committed a European Protected Species Licence can be obtained from Natural England where appropriate mitigation is offered to offset the negative impacts to local bat populations.

2.3.6. Section 40 of NERC Act 2006 places a statutory duty on public bodies, such as local authorities, that “every public body must, in exercising its functions have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity”.

Purpose of the Legislation

2.3.7. The purpose of the legislation is to maintain and restore bat populations within their natural range. This implies that the habitats on which they rely, and the ecology of their life cycles should not be compromised by human activities. Where activities have the potential to compromise bat populations, measures are required to be put in place to avoid impacts or compensate and mitigate for those impacts.

Planning Policy

2.3.8. National Planning Policy is set out by the National Planning Policy Framework (NPPF February 2019) combined with the guidance document Planning for Biodiversity and Geological Conservation: A Guide to Good Practice” (ODPM 2005).

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2.3.9. Biodiversity net gains are referenced strongly in terms of developing local planning policy and decision-making for development applications. The environmental test of sustainable development requires planning policy and planning decisions to help to ‘improve biodiversity’ (paragraph 8c).

2.3.10. References to biodiversity net gain elsewhere in the new NPPF (such as paragraph 175d) support the delivery of biodiversity net gain through sustainable development. Net gain for biodiversity is far more prominent than in the previous NPPF and considers a holistic landscape approach to protect, and enhance biodiversity promoting conservation, restoration and enhancement of Priority Habitats (also listed as Habitats of Principal Importance) identified under the NERC Act 2006), ecological networks and the protection and recovery of Priority Species (also listed as Species of Principal Importance) identified under the NERC Act 2006). The NPPF includes requirements for planning authorities to identifying and pursuing opportunities for securing measurable net gains for biodiversity (paragraph 174b).

2.3.11. Protected sites and species are a material consideration in determining planning applications and therefore all information relating to protected sites and species must be submitted with planning submissions for determination of the whole application. The NPPF (paragraph 175) which promotes Local Planning Authorities to assess if significant harm would occur to biodiversity and decide accordingly.

Biodiversity Policy

2.3.12. Section 40 of NERC Act 2006 places a statutory duty on public bodies, such as local authorities, that “every public body must, in exercising its functions have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity”.

2.3.13. Section 41 of the NERC Act requires the Secretary of State to draw up a list of Habitats and Species of Principal Importance which should be used to guide decision-makers (which include local authorities) in implementing their duty under Section 40. Several species of bat (listed below) are considered Species of Principal Importance, an important factor when considering proposed developments, in accordance with the Natural Environment and Rural Communities (NERC) Act 2006.

- Soprano pipistrelle *Pipistrellus pygmaeus*
- Brown long-eared *Plecotus auritus*
- Barbastelle *Barbastella barbastellus*
- Bechstein’s *Myotis bechsteinii*
- Noctule *Nyctalus noctula*

- Greater horseshoe *Rhinolophus ferrumequinum*
- Lesser horseshoe *Rhinolophus hipposideros*.

2.3.14. Additionally, four species of bat are recognised as Local Priority Species in the Cambridgeshire and Peterborough Biodiversity Group LBAP:

- Soprano pipistrelle
- Brown long-eared
- Barbastelle
- Noctule.

2.4 Personnel and Quality Assurance

2.4.1. The surveys were led by experienced ecologists and carried out in accordance with Bat Surveys for Professional Ecologists: Good Practice Guidelines, (3rd edn) (Collins, 2016). Surveys were carried out under the supervision of Capita senior staff and bat licensed ecologists Suzannah Spencer (Licence ref: 2015-15891-CLS-CLS) and James Johnston (2017-30517- CLS-CLS).

2.4.2. The Ecologists who carried out the surveys and referred by their initials in this report are: Suzannah Spencer ACIEEM, James Johnston ACIEEM, Thomas Fawley, and Mark Johnson. All surveyors have experience in conducting bat surveys and are competent in analysing bat echolocation in the field and using appropriate analysis software.

2.4.3. The surveyors who carried out the tree climbing inspection surveys were James Johnston ACIEEM and Jonny Gregson. Both are fully trained in tree climbing and aerial rescue.

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3. Methods

3.1 Survey and Report Objectives

3.1.1. The surveys and report were carried out to fulfil the following objectives.

1. To identify if any roosts are present in trees identified as having potential to support bat roosts over the hibernation period
2. To identify any evidence of usage of the site over winter by bats
3. To provide data to inform an assessment of the importance of the site for bats and bat conservation.

3.2 Desk-Based Study

3.2.1. A desk-based study including protected species records has been undertaken as part of the wider environmental assessment and is detailed in the bat survey report covering the 2020 surveys (Capita. 2021).

3.3 Field Survey

Static Detector Surveys

3.3.1. Static bat detectors (Anabat swift static detectors) were deployed in November 2020-March 2021 in the locations associated with the transect routes. The detectors were deployed to record any bat echolocation calls over the winter period but with the particular aim of identifying any barbastelle bats bat activity during the winter months.

3.3.2. In total 15 detectors were deployed November through to February inclusive, and 18 in March. Landowner restrictions during October through to February restricted the deployment of three statics. Statics were deployed for seven full days at a time to allow for consistency throughout surveys.

3.3.3. Static detectors will also be deployed over April 2021-September 2021 and will be reported in a separate report upon their completion.

3.3.4. Detectors were placed in locations in order to provide coverage of the scheme. Data was recorded from half an hour before sunset to half an hour after sunrise. The detector sound files were then analysed using Anabat Insight software to assess the level of bat activity at each location.

3.3.5. The detector sound files were analysed in Anabat Insight using the Bat-Classify Auto ID program. 10% of data was manually checked, including noise files, with 100% of files identified through Auto-ID as Noctule/Serotine/Leisler's (NSL) and brown long-eared bat manually checked.

3.3.6. Species from the *Myotis* genus of bats produce frequency modulated calls with overlapping call parameters and cannot be reliably distinguished to species level alone on call alone. As such, *Myotis* calls are identified as *Myotis sp*. Bats of the *Nyctalus* genus produce calls with overlapping call parameters, except in open environments. The two *Nyctalus* species found in this region, noctule and Leisler's, were therefore grouped together, with most bats being noted as noctule and a small number with overlapping parameters. Validating the data through manual checks follows the Bat Conservation Trust (BCT) best practice guidelines (2016).

3.3.7. Bat calls were averaged over seven nights to provide a bat call/hour index, with night length calculated as sunset to sunrise.

3.3.8. All barbastelle calls were manually checked.

3.3.9. The locations of these static detectors shown is in **Appendix A** and a description in **Table 1**.

3.3.10. **Appendix B** shows the dates of when the static detectors were deployed.

Table 1: Static detector locations

Static detector ID	Static Detector Description	Approximate Grid Reference
Transect 1 - static 1	Narrow hedge line with mature trees heading south west to north east between two arable fields. Static detector angled in a north westerly direction.	TL 46924 53227
Transect 1 - static 2	Narrow hedge line with trees heading south west to north east between two arable fields adjacent to nine wells nature reserve, within 50m of a ditch feed by a spring within nine wells woodland. Static detector angled in a north westerly direction.	TL 46092 54075
Transect 1 - static 3	Narrow hedge line with mature trees heading North west to south east between two arable fields. Static detector angled in a north easterly direction.	TL 46515 53347
Transect 2 - static 1	Attached to a tree within a line of trees heading north east to south west beside a B road in between two arable fields with a hedge line on the opposite side of the road. Static detector angled in an easterly direction.	TL 48049 52433
Transect 2 - static 2	Positioned to the bottom of a hedge line north west to south east dissecting two arable fields. Detector angled in a westerly direction.	TL 47449 53095

Transect 2 - static 3	Positioned to the bottom of a hedge line north west to south east dissecting two arable fields. Detector angled in an easterly direction.	TL 47999 51972
Transect 3 - static 1	Positioned within a small section of unmanaged arable land, bordered by woodland and open arable fields with a ditch running north to south. Static detector angled in a south easterly direction.	TL 48660 50798
Transect 3 - static 2	Positioned on the edge of as strip of woodland heading east to west bordering an arable field. Static angled in a northerly direction.	TL 47994 51132
Transect 3 - static 3	Positioned on the edge of a narrow strip of hedge line with trees heading east to west bordering an arable field to the north. A Medium sized waterbody is in the adjacent land parcel to the south. Detector facing north.	TL 49074 50790
Transect 4 - static 1	Within the corner of a field, with tree lines heading south to north, and west to east. Detector facing north easterly direction.	TL 50708 49418
Transect 4 - static 2	Unable to deploy securely due to high use of public footpath. Alternative locations too close to existing detectors or unsecure.	TL 49429 49951
Transect 4 - static 3	Unable to deploy securely due to high use of public footpath. Alternative locations too close to existing detectors or unsecure.	TL 50406 49996
Transect 5 - static 1	Positioned on an ash tree on a tree line heading east to west. Bordered to the south by arable fields, with a ford and river adjacent to the north of the woodland strip. A mature ash and pine woodland are immediately to the north west. Detector angled south.	TL 51318 49707
Transect 5 - static 2	Unable to deploy securely	TL 50757 49840
Transect 5 - static 3	Positioned on a tree within a small section of young plantation trees. Detector angled south with a small man-made reservoir to the north west and arable fields to the south.	TL 51759 49400
Transect 6 - static 1	Positioned on a beech tree, in a short line of 4 trees within a hedge line heading east to west. Arable fields border the hedge line to the north and south. Detector angled north.	TL 51852 49807
Transect 6 - static 2	Unable to deploy securely	TL 52039 50232
Transect 6 - static 3	Positioned on a tree within a hedge line with trees heading north east to south west. An arable field is to the east and west with a farm track running adjacent to the east. Detector angled east.	TL 51453 50017
Transect 7 - static 1	Positioned on a tree within a woodland strip heading south east to north west, between an arable field and an A Road. Detector angled north easterly direction.	TL 52570 49824
Transect 7 - static 2	Positioned on a tree beside a farm track. Farm track heading north to south. Arable fields are adjacent to the east and west. Detector angled west.	TL 52899 50014
Transect 7 - static 3	Positioned on a tree on the edge of a woodland beside a farm track. Farm track heading east to	TL 52787 50613

	west. An arable field is adjacent to the south. Detector angled south.	

Aerial Roost Inspection Surveys via Tree Climbing

3.4.1. Four trees previously identified as having moderate or high suitability to support bat roosts during ground level roost assessments and subsequent aerial inspections during 2020 (Capita, 2021), were climbed in the hibernation period and aerial roost inspections of potential roost features (PRFs) carried out. Inspections were to determine whether the PRFs were supporting roosting bats during the winter hibernation period. The locations of these trees are shown in **Appendix C**. Eight trees identified as requiring climbing (High/Moderate suitability trees) but due to access being denied by the landowners, they were not surveyed.

3.4.2. The aerial inspections were undertaken once per month between December 2020 and February 2021. Results of these inspections are found in **Table 2.**

3.4.3. The survey consisted of each tree being climbed using a harness and ropes or ladder, where appropriate. The PRFs identified during the previous assessments were inspected using torches and/or an endoscope to look for evidence of use by bats and collect information on the PRF. Whilst in the tree, climbers checked for additional features not visible from the ground and any found were inspected using the endoscope and/or torch. Notes were made on the current condition of the PRFs and the presence or absence of bats or signs of bats, as well as any roost competitors such as nesting birds or invertebrates.

3.5 Limitations and Assumptions

Tree climbing

3.5.1. Only 4 trees could be climbed in the bat hibernation period due to landowner access permission (eight not accessible). This is a constraint, but it is not considered to be a significant limitation as none of these trees are being removed.

Static detectors

3.5.2. Transects 1, 2, 3 were deployed together, followed by Transects 4, 5, 6 and 7 deployed the following week. As five nights deployment would cause them to fall on a weekend, it was determined to deploy for seven nights to ensure consistency.

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3.5.3. Transect 5 static detectors were not deployed in November-February due to landowner permissions not being granted in relation to the location of their game birds and disturbance. It was not possible to deploy four static detectors due to security and lack of suitable locations as described in **Table 1.** Due to the number and distribution of the remaining static detectors the impact of this is negligible and the validity and assumptions of this report are not negatively impacted as all areas of the scheme were still covered. As a result, 15 detectors were deployed across the scheme from November – February and 18 detectors in March.

3.5.4. Noise files were recorded during the deployment of the statics. This is consistent across devices and is explained by weather conditions and the sensitivity settings of the statics.

3.5.5. These deviations do not impact the validity and accuracy of the data. Sufficient data has been collected to provide a sufficient assessment of the usage of the site by bats over the winter period. A cause for noise files is due to increased wind and rain during the dates of deployment. Analysis of some of the noise files indicate rainfall which is consistent with winter weather expectations.

4. Results

4.1 Aerial roost inspections

4.1.1. No bats or signs of bats were found in any of the trees inspected during any inspection.

4.1.2. Some PRFs contained signs of use by birds from the presence of feathers and nesting material such as moss, twigs and grasses. However, no nests were currently in use. Many features contained woodlice and other invertebrates.

4.1.3. **Table 2** details the results of the aerial roost inspections.

Table 2: Aerial roost inspection survey results

Tree ID	Grid Reference	Tree species	December 2020 (14th, 15th)	January 2021 (26th,27th)	February 2021 (16th,17th)
22	TL 48429 50918	Willow	No evidence of bats present. Cobwebs present in some features	No evidence of bats present. Cobwebs present in some features	No evidence of bats present. Cobwebs present in some features
23	TL 51861 49806	Oak	No evidence of bats present. Feathers still present in 5 m knothole, but nest is now inactive.	No evidence of bats present. Feathers still present in 5 m knothole, but nest remains inactive.	No evidence of bats present. Feathers still present in 5 m knothole, but nest remains inactive.
24	TL 51906 49786	Oak	This tree has now partially fallen making many features no longer present. No evidence of bats present. Some features filled with acorns. Evidence of old bird nests present, but currently inactive.	Tree remains in same state with no further limb loss. No evidence of bats present. Some features filled with acorns. Evidence of old bird nests present but remain inactive.	Tree remains in same state with no further limb loss. No evidence of bats present. Some features filled with acorns. Evidence of old bird nests present but remain inactive.
25	TL 51953 49769	Oak	No evidence of bats present. Woodlice present throughout helical split.	No evidence of bats present. Woodlice present throughout helical split. Feature at base of split is damp and cobwebs present in knothole.	No evidence of bats present. Woodlice present throughout helical split. Feature at base of split is damp and cobwebs present in knothole.

4.2 Static detector survey results

4.2.1. Static detector maps showing the locations of the static detectors are provided in **Appendix A** and are described in **Table 1**. The results of the data collected from the static detectors is detailed in the sections below with percentage of bat sound recordings per species noted in brackets (round to the nearest 0.5 to account for slight inaccuracies in the sound analysis).

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November

Transect 1

4.2.2. **Static 1** – A total of five species were detected with the following number of sound recordings: 1,878 (66.5%) common pipistrelle, 798 (28.5%) soprano pipistrelle, 5 (>1%) *Myotis* species, 8 (>1%) NSL and **126 (4.5%) barbastelle bat** out of a total of 2,611 recordings; the remainder were noise.

4.2.3. **Static 2** - A total of four species were detected with the following number of sound recordings: 3,577 (92.5%) common pipistrelle, 281 (7%) soprano pipistrelle, 2 (>1%) NSL and **1 (>1%) barbastelle bat** out of a total of 3,766 recordings; the remainder were noise.

4.2.4. **Static 3** - A total of five species were detected with the following number of sound recordings: 483 (62.5%) common pipistrelle, 202 (26.5%) soprano pipistrelle, 18 (2.5%) *Myotis* species, 6 (>1%) NSL and **59 (7.5%) barbastelle bat** out of a total of 802 recordings; the remainder were noise.

Transect 2

4.2.5. **Static 1** - A total of four species were detected with the following number of sound recordings: 23 (46.5%) common pipistrelle, 21 (42.5%) soprano pipistrelle, 4 NSL (8%) and **1 (2%) barbastelle bat** out of a total of 774 recordings; the remainder were noise.

4.2.6. **Static 2** - A total of four species were detected with the following number of sound recordings: 686 (95.5%) common pipistrelle, 15 (2%) soprano pipistrelle, 2 (>1%) *Myotis* species and **16 (2.5%) barbastelle bat** out of a total of 448 recordings; the remainder were noise.

4.2.7. **Static 3** - A total of four species were detected with the following number of sound recordings: 278 (69.5%) common pipistrelle, 112 (27%) soprano pipistrelle, 3 (>1%) NSL and **8 (2%) barbastelle bat** out of a total of 448 recordings; the remainder were noise.

Transect 3

4.2.8. **Static 1** - A total of four species were detected with the following number of sound recordings: 559 (88.5%) common pipistrelle, 69 (11%) soprano pipistrelle, 2 (>1%) NSL and **1 (>1%) barbastelle bat** out of a total of 754 recordings; the remainder were noise.

4.2.9. **Static 2** - A total of five species were detected with the following number of sound recordings: 420 (60.5%) common pipistrelle, 257 (37%) soprano pipistrelle, 11 (1.5%) *Myotis* species, 2 (>1%) NSL and **4 (>1%) barbastelle bat** out of a total of 986 recordings; the remainder were noise.

4.2.10. **Static 3** - A total of five species were detected with the following number of sound recordings: 138 (69%) common pipistrelle, 50 (25%) soprano pipistrelle, 5 (2.5%) *Myotis* species, 3 (1.5%) NSL and **4 (2%) barbastelle bat** out of a total of 383 recordings; the remainder were noise.

Transect 4

4.2.11. **Static 1** - A total of two species were detected with the following number of sound recordings 516 (82.5%) common pipistrelle and 109 (17.5%) soprano pipistrelle out of a total of 1,516 recordings the remainder were noise.

Transect 6

4.2.12. **Static 1** -. A total of four species were detected with the following number of sound recordings: 4 (33.5%) common pipistrelle, 2 (16.5%) soprano pipistrelle, 5 (41.5%) *Myotis* species and **1 (8.5%) barbastelle bat**, out of a total of 4,286 recordings; the remainder were noise.

4.2.13. **Static 3** - A total of two species were detected with the following number of sound recordings: 1 (50%) common pipistrelle and 1 (50%) soprano pipistrelle, out of a total of 614 recordings; the remainder were noise.

Transect 7

4.2.14. **Static 1** - A total of two species were detected with the following number of sound recordings: 6 (75%) *Myotis* species and **2 (25%) barbastelle bat,** out of a total of 5115 recordings; the remainder were noise.

4.2.15. **Static 2** - A total of three species were detected with the following number of sound recordings 6 (38%) common pipistrelle, 5 (31%) soprano pipistrelle and 5 (31%) *Myotis* species out of a total of 617 recordings; the remainder were noise.

4.2.16. **Static 3 -** A total of one species was detected with the following number of sound recordings 2 (100%) *Myotis* species out of a total of 537 recordings; the remainder were noise

December

Transect 1

4.2.17. **Static 1** – No bat species were recorded. A total of 890 noise files were recorded.

4.2.18. **Static 2** - A total of one species was detected in 42 sound recordings. 100% common pipistrelle out of a total of 906 recordings, the remainder were noise.

4.2.19. **Static 3** - A total of one species was detected in 6 sound recordings. (100%) common pipistrelle out of a total of 2,675 recordings, the remainder were noise.

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Transect 2

4.2.20. **Static 1** - No bat species were recorded. A total of 6,629 noise files were recorded

4.2.21. **Static 2** - No bat species were recorded. A total of 570 noise files were recorded

4.2.22. **Static 3** - No bat species were recorded. A total of 146 noise files were recorded

Transect 3

4.2.23. **Static 1** - A total of one species was detected in one sound recording. (100%) common pipistrelle out of a total of 261 recordings, the remainder were noise.

4.2.24. **Static 2** - No bat species were recorded. A total of 2,545 noise files were recorded.

4.2.25. **Static 3** - A total of one species was detected in 2 sound recordings. (100%) common pipistrelle out of a total of 455 recordings, the remainder were noise.

Transect 4

4.2.26. **Static 1** - A total of one species was detected in one sound recordings. (100%) common pipistrelle out of a total of 1,283 recordings, the remainder were noise.

Transect 6

4.2.27. **Static 1** -. A total of three species were detected in the following number of sound recordings: 17 (27.5%) common pipistrelle, 44 (71%) soprano pipistrelle and 1 (1.5%) *Myotis* species, out of a total of 4,540 recordings; the remainder were noise.

4.2.28. **Static 3** - A total of two species were detected with the following number of sound recordings: 26 (50%) common pipistrelle and 26 (50%) soprano pipistrelle, out of a total of 872 recordings; the remainder were noise.

Transect 7

4.2.29. **Static 1** - No bat species were recorded. A total of 3,325 noise files were recorded.

4.2.30. **Static 2** - A total of four species were detected with the following number of sound recordings 20 (64.5%) common pipistrelle, 6 (19.5%) soprano pipistrelle, 1 (3%) *Myotis* species and **4 (13%) barbastelles** out of a total of 1039 recordings; the remainder were noise.

4.2.31. **Static 3** - A total of three species were detected with the following number of sound recordings 5 (33%) common pipistrelle, 1 (1%) soprano pipistrelle, and **12 (66%) barbastelle bats** out of a total of 185 recordings; the remainder were noise.

January

Transect 1

4.2.32. **Static 1** – A total of four species were detected with the following number of sound recordings: 19 (40.5%) common pipistrelle, 14 (30%) soprano pipistrelle, 2 (2%) *Myotis* species and **12 (28.5%) barbastelle bat** out of a total of 2,253 recordings the remainder were noise.

4.2.33. **Static 2** - A total of one species was detected with the following number of sound recordings: 80 (100%) common pipistrelle out of a total of 1192 recordings the remainder were noise.

4.2.34. **Static 3** - A total of two species were detected with the following number of sound recordings: 10 (92%) soprano pipistrelle and 1 (8%) *Myotis* species out of a total of 1,126 recordings the remainder were noise.

Transect 2

4.2.35. **Static 1** - A total of two species were detected with the following number of sound recordings 1 common pipistrelle (25%) and 3 (75%) soprano pipistrelle out of a total of 6,613 recordings the remainder were noise.

4.2.36. **Static 2** - A total of two species were detected with the following number of sound recordings: 22 common pipistrelle (96%) and **1 (4%) barbastelle bat** out of a total of 662 recordings the remainder were noise.

4.2.37. **Static 3** - No bat species were recorded. A total of 329 noise files were recorded

Transect 3

4.2.38. **Static 1** - No bat species were recorded. A total of 522 noise files were recorded

4.2.39. **Static 2** - A total of one *Myotis* species was detected in one sound recording out of a total of 1,236 recordings the remainder were noise.

4.2.40. **Static 3** - No bat species were recorded. A total of 1,910 noise files were recorded

Transect 4

4.2.41. **Static 1** - A total of one species was detected with the following number of sound recordings: 2 (100%) soprano pipistrelle out of a total of 531 recordings the remainder were noise.

Transect 6

4.2.42. **Static 1** - A total of one species was detected with the following number of sound recordings: 3 (100%) soprano pipistrelle out of a total of 1,504 recordings the remainder were noise.

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4.2.43. **Static 3** - A total of one species was detected with the following number of sound recordings: 1 (100%) *Myotis* species out of a total of 498 recordings the remainder were noise.

Transect 7

4.2.44. **Static 1** - No bat species were recorded. A total of 2,105 noise files were recorded.

4.2.45. **Static 2** - A total of two species were detected with the following number of sound recordings: 2 (50%) common pipistrelle and **2 (50%) barbastelle**, out of a total of 144 recordings; the remainder were noise.

4.2.46. **Static 3** - No bat species were recorded. A total of 545 noise files were recorded.

February

Transect 1

4.2.47. **Static 1** – A total of two species were detected with the following number of sound recordings 2 (40%) *Myotis* species and **3 (60%) barbastelle bat** out of a total of 269 recordings the remainder were noise.

4.2.48. **Static 2** - No bat species were recorded. A total of 252 noise files were recorded

4.2.49. **Static 3** - A total of three species were detected with the following number of sound recordings 9 (30%) common pipistrelle, 12 (40%) soprano pipistrelle and **9 (30%) barbastelle bat** out of a total of 466 recordings the remainder were noise.

Transect 2

4.2.50. **Static 1** - A total of one species was detected with the following number of sound recordings: **1 (100%) barbastelle bat** out of a total of 355 recordings the remainder were noise.

4.2.51. **Static 2** - No bat species were recorded. A total of 193 noise files were recorded

4.2.52. **Static 3** - No bat species were recorded. A total of 53 noise files were recorded

Transect 3

4.2.53. **Static 1** - No bat species were recorded. A total of 632 noise files were recorded

4.2.54. **Static 2** - A total of one species was detected with the following number of sound recordings 3 (100%) common pipistrelle out of a total of 352 recordings the remainder were noise.

4.2.55. **Static 3** - A total of two species were detected with the following number of sound recordings: 1 (16%) common pipistrelle and 5 (84%) soprano pipistrelle, out of a total of 872 recordings; the remainder were noise.

Transect 4

4.2.56. **Static 1** - A total of one species was detected with the following number of sound recordings: 2 (100%) common pipistrelle out of a total of 1,406 recordings the remainder were noise.

Transect 6

4.2.57. **Static 1** -. No bat species were recorded. A total of 2,073 noise files were recorded

4.2.58. **Static 3** - No bat species were recorded. A total of 1,532 noise files were recorded

Transect 7

4.2.59. **Static 1** - No bat species were recorded. A total of 1,569 noise files were recorded.

4.2.60. **Static 2** - A total of two species were detected with the following number of sound recordings: 1 (50%) common pipistrelle and **1 (50%) barbastelle**, out of a total of 2,391 recordings; the remainder were noise.

4.2.61. **Static 3** - No bat species were recorded. A total of 311 noise files were recorded.

March

Transect 1

4.2.62. **Static 1** – A total of two species were detected with the following number of sound recordings: 2 (15%) *Myotis* species and **11 (84%) barbastelle bat** out of a total of 269 recordings the remainder were noise.

4.2.63. **Static 2** - No bat species were recorded. A total of 665 noise files were recorded

4.2.64. **Static 3** - A total of three species were detected with the following number of sound recordings: 10 (83%) soprano pipistrelle, 1 (8.5%) *Myotis sp.* and one **(8.5%) barbastelle bat** out of a total of 633 recordings; the remainder were noise.

Transect 2

4.2.65. **Static 1** - No bat species were recorded. A total of 1,208 noise files were recorded

4.2.66. **Static 2** - No bat species were recorded. A total of 168 noise files were recorded

4.2.67. **Static 3** - A total of two species were detected with the following number of sound recordings: 40 (85%) common pipistrelle and 7 (15%) soprano pipistrelle, out of a total of 872 recordings; the remainder were noise.

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Transect 3

4.2.68. **Static 1** - A total of one species was detected with the following number of sound recordings: 3 (100%) common pipistrelle out of a total of 212 recordings; the remainder were noise.

4.2.69. **Static 2** - A total of three species were detected with the following number of sound recordings: 10 (55.5%) common pipistrelle, 6 (33.5%) soprano pipistrelle and 2 (11%) *Myotis sp*. out of a total of 885 recordings; the remainder were noise.

4.2.70. **Static 3** - A total of two species were detected with the following number of sound recordings: 1 (50%) soprano pipistrelle and 1 (50%) *Myotis sp*., out of a total of 1,315 recordings; the remainder were noise.

Transect 4

4.2.71. **Static 1** - A total of two species were detected with the following number of sound recordings: 1 (50%) common pipistrelle and 1 (50%) soprano pipistrelle out of a total of 1,405 recordings; the remainder were noise.

Transect 5

4.2.72. **Static 1** - A total of three species were detected with the following number of sound recordings: 13 (52%) common pipistrelle, 4 (16%) soprano pipistrelle and 8 (32%) *Myotis sp*. out of a total of 5,468 recordings; the remainder were noise.

4.2.73. **Static 3** - A total of four species were detected with the following number of sound recordings: 4 (40%) common pipistrelle, 1 (10%) soprano pipistrelle 3 (30%) *Myotis sp*. and 4 (20%) NSL out of a total of 355 recordings; the remainder were noise.

Transect 6

4.2.74. **Static 1** - A total of three species were detected with the following number of sound recordings: 10 (59%) soprano pipistrelle, 4 (23.5%) *Myotis sp*. and 3 (17.5%) NSL out of a total of 3,426 recordings; the remainder were noise.

4.2.75. **Static 3** - A total of three species were detected with the following number of sound recordings: 2 (28.5%) common pipistrelle, 4 (57.5%) soprano pipistrelle and 1 (14%) NSL out of a total of 2,606 recordings; the remainder were noise

Transect 7

4.2.76. **Static 1** - A total of one species was detected with the following number of sound recordings 2 (100%) common pipistrelle out of a total of 609 recordings; the remainder were noise.

4.2.77. **Static 2** - A total of three species were detected with the following number of sound recordings: 6 (60%) common pipistrelle, 1 (10%) soprano pipistrelle and **3 (30%) barbastelle bat** out of a total of 1,906 recordings; the remainder were noise

4.2.78. **Static 3** - A total of three species were detected with the following number of sound recordings: 11 (32.5%) common pipistrelle, 1 (3%) *Myotis sp*., and **22 (64.5%) barbastelle bat** out of a total of 3474 recordings; the remainder were noise.

Summary of Results

4.2.79. A summary table is provided below that shows the percentage of the all bat calls for each species at each static location throughout the survey period November – March.

Table 3: Percentage of total bat sound recordings per species (Nov- Mar)

Static ID	Ppip	Ppyg	Myotis Sp.	NSL	Barbastelle
Transect 1 Static 1	65.9%	28.2%	0.4%	0.3%	5.3%
Transect 1 Static 2	92.9%	7.1%	0.0%	0.1%	>0.1%
Transect 1 Static 3	60.2%	28.3%	2.4%	0.7%	8.3%
Transect 2 Static 1	44.4%	44.4%	0.0%	7.4%	3.7%
Transect 2 Static 2	95.4%	2.0%	0.3%	0.0%	2.3%
Transect 2 Static 3	71.0%	26.6%	0.0%	0.7%	1.8%
Transect 3 Static 1	88.7%	10.9%	0.0%	0.3%	0.2%
Transect 3 Static 2	60.5%	36.7%	2.0%	0.3%	0.6%
Transect 3 Static 3	67.1%	26.7%	2.9%	1.4%	1.9%
Transect 4 Static 1	82.3%	17.7%	0.0%	0.0%	0.0%
Transect 5 Static 1	52.0%	16.0%	32.0%	0.0%	0.0%
Transect 5 Static 3	33.3%	8.3%	25.0%	33.3%	0.0%
Transect 6 Static 1	22.3%	62.8%	10.6%	3.2%	1.1%
Transect 6 Static 3	46.8%	50.0%	1.6%	1.6%	0.0%
Transect 7 Static 1	20.0%	0.0%	60.0%	0.0%	20.0%
Transect 7 Static 2	55.6%	19.0%	9.5%	0.0%	15.9%
Transect 7 Static 3	29.6%	1.9%	5.6%	0.0%	63.0%
Total across all statics	77.9%	18.3%	0.8%	0.3%	2.7%

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5. Conclusion

5.1. Evidence of at least five species of bats: common and soprano pipistrelle, Myotis species, NSL and barbastelle bats were recorded during the winter surveys and found to be present across the seven transect locations through recordings from the static detectors.

5.2. Barbastelle is of particular note being an Annex II species and one of the rarer species recorded in the UK, and with Eversden and Wimpole Woods SAC (barbastelle one of the qualifying features) lying approximately 10 km west of the route. Although the overall number of recordings was relatively low, the recoding of bats throughout the winter months may indicate nearby hibernation roosts, particularly for barbastelle at Transect 7 in the east of the site, where a high percentage of recordings for this species was identified. The surveys recorded barbastelle across the majority of the scheme.

5.3. The aerial inspections during the bat hibernation period recorded no bats or any evidence of bats.

5.4. Summer static surveys are also being undertaken in 2021 to inform barbastelle activity levels. These additional surveys will be subject to an additional report.

6. References

Capita (March 2021). *Cambridge South East Transport (CSET) Phase 2 Bat Survey Report*

Collins, J. (ed. (2016). *Bat Surveys for Professional Ecologists —Good Practice* Guidelines, 3rd edition, Bat Conservation Trust, London.

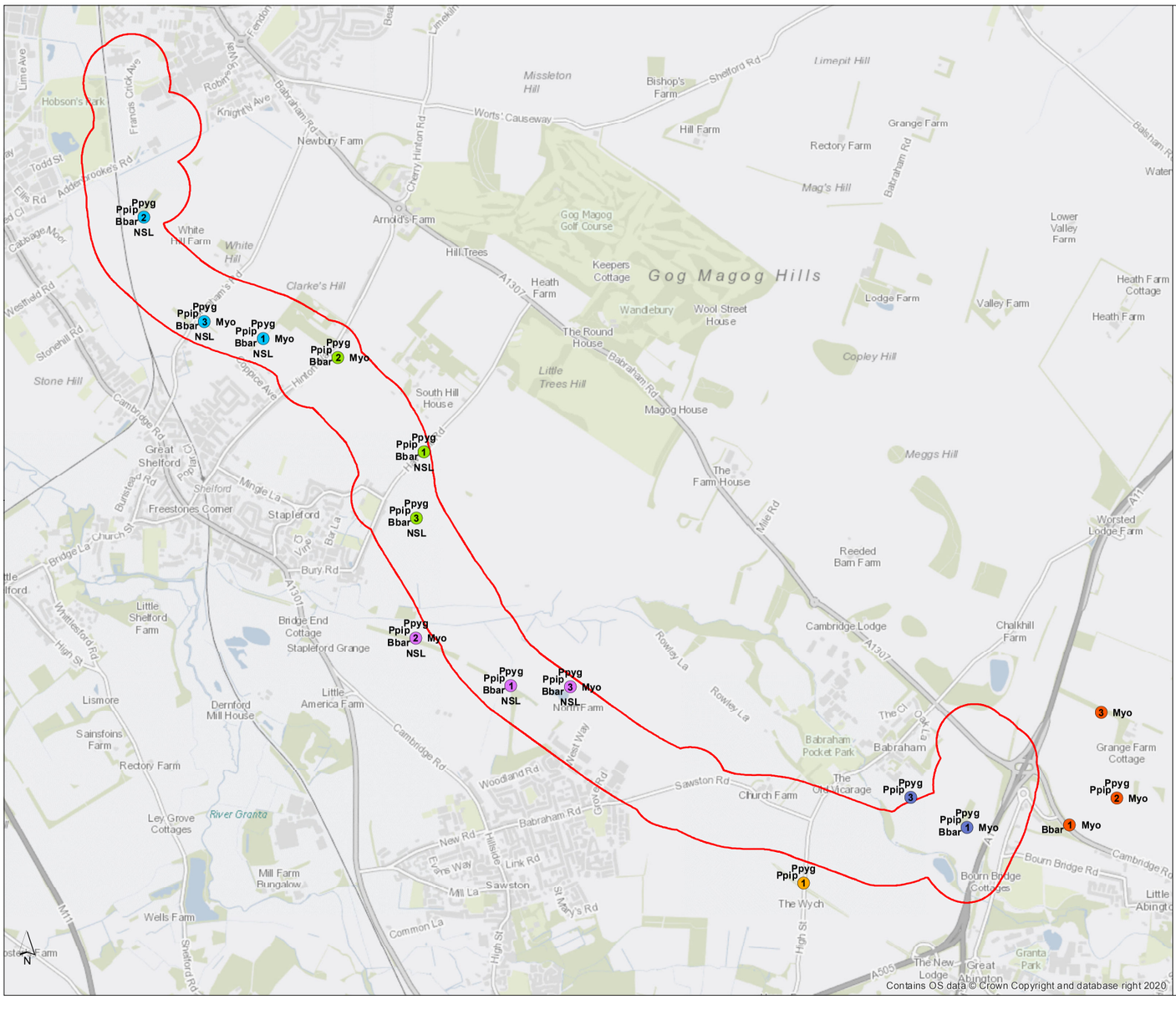
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Appendices

Appendix A – Static Detector Location Map and Species Recorded

Capita Property and Infrastructure Ltd
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Tel +44 077 1378 5585



KEY:

Scheme red line boundary

Static locations

- Transect 1
- Transect 2
- Transect 3
- Transect 4
- Transect 6
- Transect 7

SPECIES
Ppip – Common pipistrelle
Ppyg – Soprano pipistrelle
NSL – Noctule/Serotine/Leislers
Bbar – Barbastelle
Myo – Myotis species

Rev.	Drwn	Chkd	Appd	Description	Date
01	SH	TF	TB	For Issue	14/04/2021
01.1	SH	TF	TB	Created	16/03/2021

Purpose of Issue
S2 - Issued for Information

Classification
Commercial in Confidence

Client
GCP

Project
CSET

Drawing
CSET Static Detector Locations and Species Recorded November 2020

Scale @ A3	Drawn	Checked	Approved
1:25,000	SH	TF	TB

Project No: CS099797
Date: 14/04/2021

Drawing Identifier
Project - Originator - Zone - Level - FileType - Role - Number
Revision: P02

CAPITA
Property and Infrastructure

Englehgate Plaza, Botchergate, Carlisle, C A1 1RP
T 01228 673000 www.capita.co.uk/property
Capita Property and Infrastructure Ltd.

Plot date: 14/04/2021

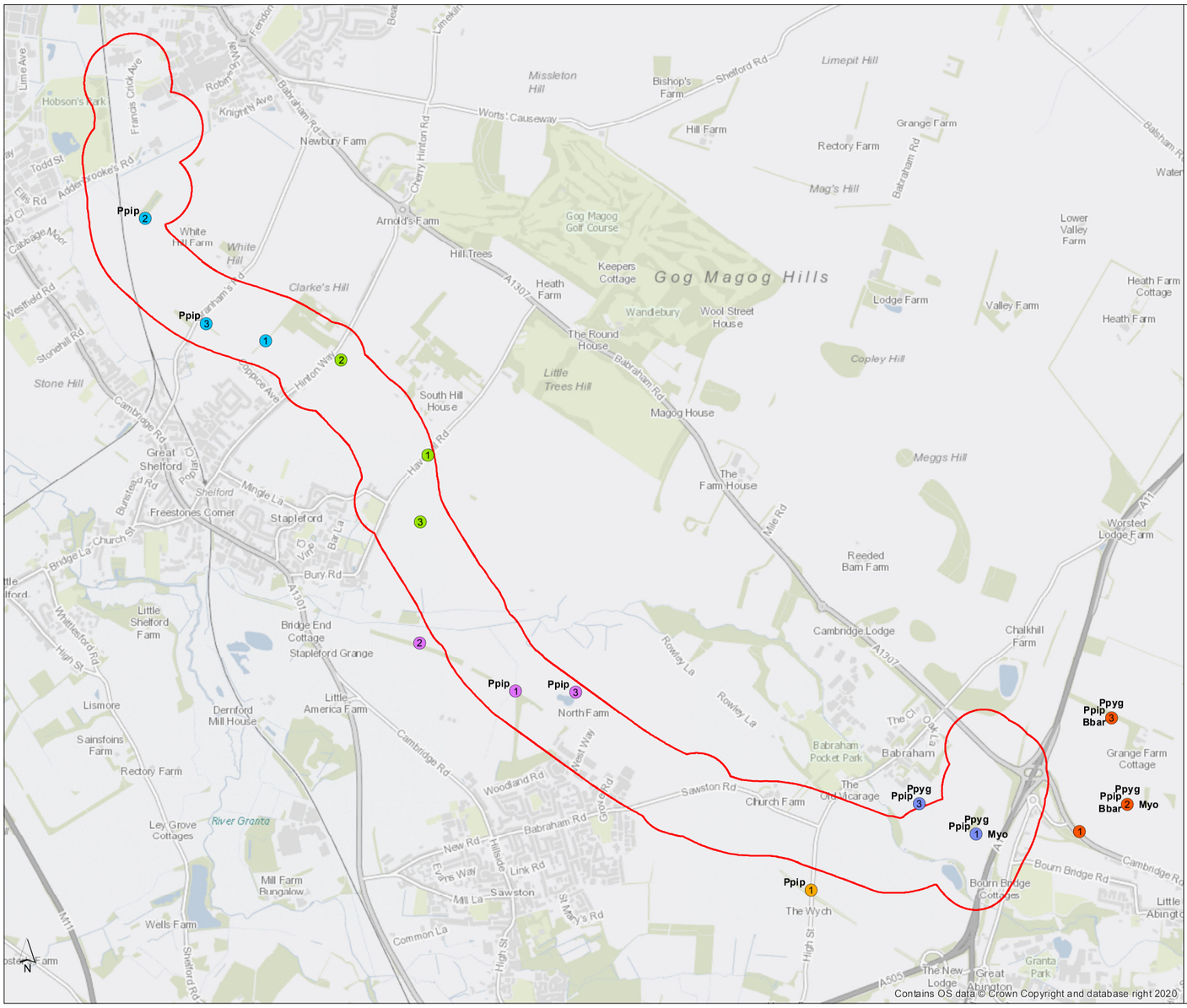
KEY:

Scheme red line boundary

Static locations

- Transect 1
- Transect 2
- Transect 3
- Transect 4
- Transect 6
- Transect 7

SPECIES
Ppip – Common pipistrelle
Ppyg – Soprano pipistrelle
NSL – Noctule/Serotine/Leislers
Bbar – Barbastelle
Myo – Myotis species



Rev.	Drwn	Chkd	Appd	Description	Date
01	SH	TF	TB	For Issue	14/04/2021
01.1	SH	TF	TB	Created	16/03/2021

Purpose of Issue
S2 - Issued for Information

Classification
Commercial in Confidence

Client
GCP

Project
CSET

Drawing
CSET Static Detector Locations and Species Recorded December 2020

Scale @ A3	Drawn	Checked	Approved
1:25,000	SH	TF	TB

Project No: CS099797
Date: 14/04/2021

Drawing Identifier
Project - Originator - Zone - Level - FileType - Role - Number
Revision: P02

CAPITA
Property and Infrastructure

Englehgate Plaza, Botchergate, Carlisle, C A1 1RP
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Capita Property and Infrastructure Ltd.

Plot date: 14/04/2021

KEY:

Scheme red line boundary

Static locations

- Transect 1
- Transect 2
- Transect 3
- Transect 4
- Transect 6
- Transect 7

SPECIES
Ppip – Common pipistrelle
Ppyg – Soprano pipistrelle
NSL – Noctule/Serotine/Leislers
Bbar – Barbastelle
Myo – Myotis species

Rev.	Drwn	Chkd	Appd	Description	Date
01	SH	TF	TB	For Issue	14/04/2021
01.1	SH	TF	TB	Created	16/03/2021

Purpose of Issue
S2 - Issued for Information

Classification
Commercial in Confidence

Client
GCP

Project
CSET

Drawing
CSET Static Detector Locations and Species Recorded January 2021

Scale @ A3	Drawn	Checked	Approved
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Project No: CS099797
Date: 14/04/2021

Drawing Identifier
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KEY:

Scheme red line boundary

Static locations

- Transect 1
- Transect 2
- Transect 3
- Transect 4
- Transect 6
- Transect 7

SPECIES
Ppip – Common pipistrelle
Ppyg – Soprano pipistrelle
NSL – Noctule/Serotine/Leislers
Bbar – Barbastelle
Myo – Myotis species

Rev.	Drwn	Chkd	Appd	Description	Date
01	SH	TF	TB	For Issue	14/04/2021
01.1	SH	TF	TB	Created	16/03/2021

Purpose of Issue
S2 - Issued for Information

Classification
Commercial in Confidence

Client
GCP

Project
CSET

Drawing
CSET Static Detector Locations and Species Recorded February 2021

Scale @ A3	Drawn	Checked	Approved
1:25,000	SH	TF	TB

Project No: CS099797
Date: 14/04/2021

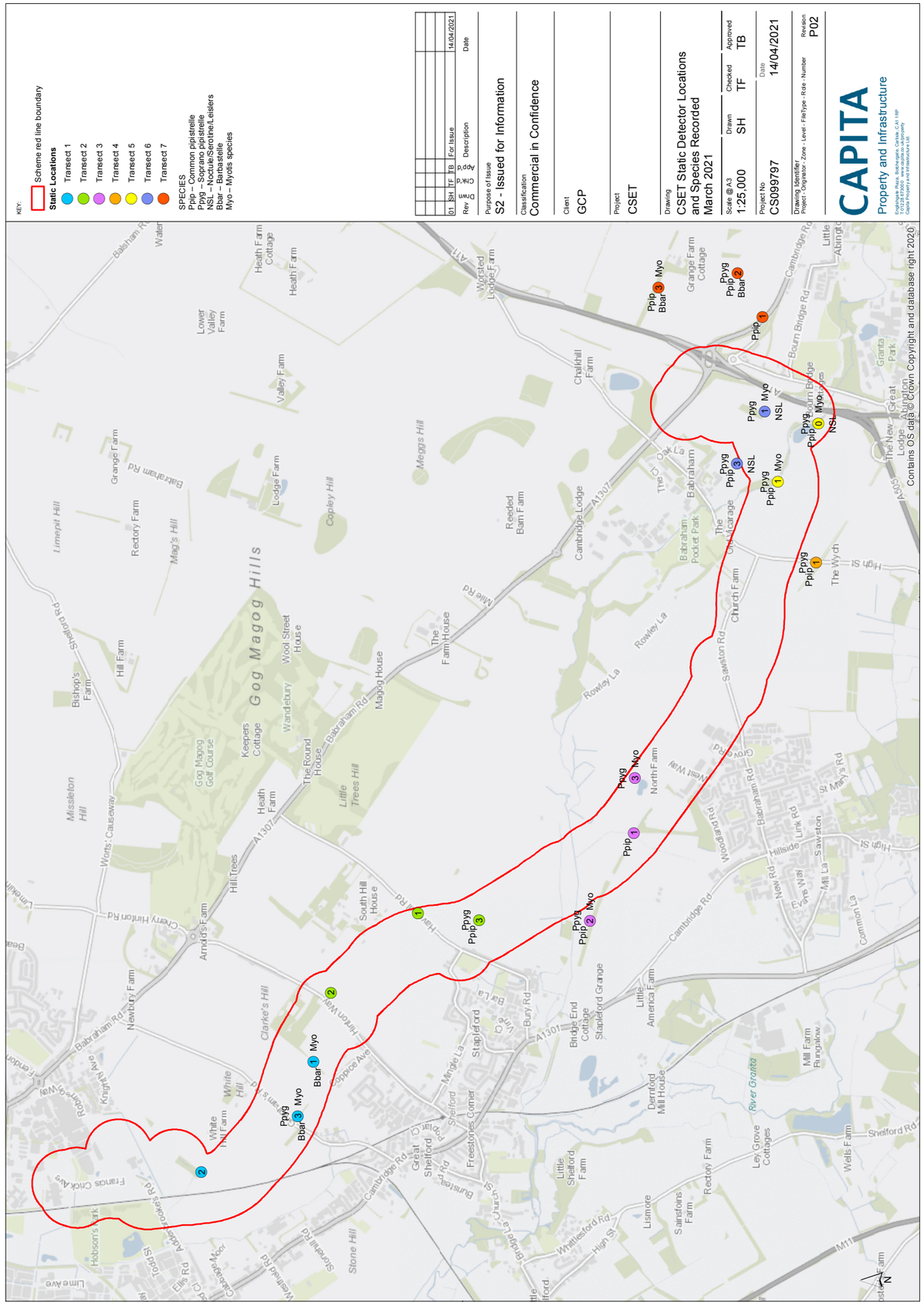
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Appendix B – Static Deployment Dates

Table 4: November 2020 static dates

Static detector ID	Date of deployment	Date of collection
Transect 1 - static 1	03/11/2020	10/11/2020
Transect 1 - static 2	03/11/2020	10/11/2020
Transect 1 - static 3	03/11/2020	10/11/2020
Transect 2 - static 1	03/11/2020	10/11/2020
Transect 2 - static 2	03/11/2020	10/11/2020
Transect 2 - static 3	03/11/2020	10/11/2020
Transect 3 - static 1	03/11/2020	10/11/2020
Transect 3 - static 2	03/11/2020	10/11/2020
Transect 3 - static 3	03/11/2020	10/11/2020
Transect 4 - static 1	11/11/2020	18/11/2020
Transect 4 - static 2	Not deployed	Not deployed
Transect 4 - static 3	Not deployed	Not deployed
Transect 5 - static 1	Not deployed	Not deployed
Transect 5 - static 2	Not deployed	Not deployed
Transect 5 - static 3	Not deployed	Not deployed
Transect 6 - static 1	11/11/2020	18/11/2020
Transect 6 - static 2	Not deployed	Not deployed
Transect 6 - static 3	11/11/2020	18/11/2020
Transect 7 - static 1	11/11/2020	18/11/2020
Transect 7 - static 2	11/11/2020	18/11/2020
Transect 7 - static 3	11/11/2020	18/11/2020

Table 5: December 2020 static dates

Static detector ID	Date of deployment	Date of collection
Transect 1 - static 1	01/12/2020	08/12/2020
Transect 1 - static 2	01/12/2020	08/12/2020
Transect 1 - static 3	01/12/2020	08/12/2020
Transect 2 - static 1	01/12/2020	08/12/2020
Transect 2 - static 2	01/12/2020	08/12/2020
Transect 2 - static 3	01/12/2020	08/12/2020
Transect 3 - static 1	01/12/2020	08/12/2020
Transect 3 - static 2	01/12/2020	08/12/2020
Transect 3 - static 3	01/12/2020	08/12/2020
Transect 4 - static 1	08/12/2020	15/12/2020
Transect 4 - static 2	Not deployed	Not deployed
Transect 4 - static 3	Not deployed	Not deployed
Transect 5 - static 1	Not deployed	Not deployed
Transect 5 - static 2	Not deployed	Not deployed
Transect 5 - static 3	Not deployed	Not deployed
Transect 6 - static 1	08/12/2020	15/12/2020
Transect 6 - static 2	Not deployed	Not deployed
Transect 6 - static 3	08/12/2020	15/12/2020
Transect 7 - static 1	08/12/2020	15/12/2020
Transect 7 - static 2	08/12/2020	15/12/2020
Transect 7 - static 3	08/12/2020	15/12/2020

Table 6: January 2021 static dates

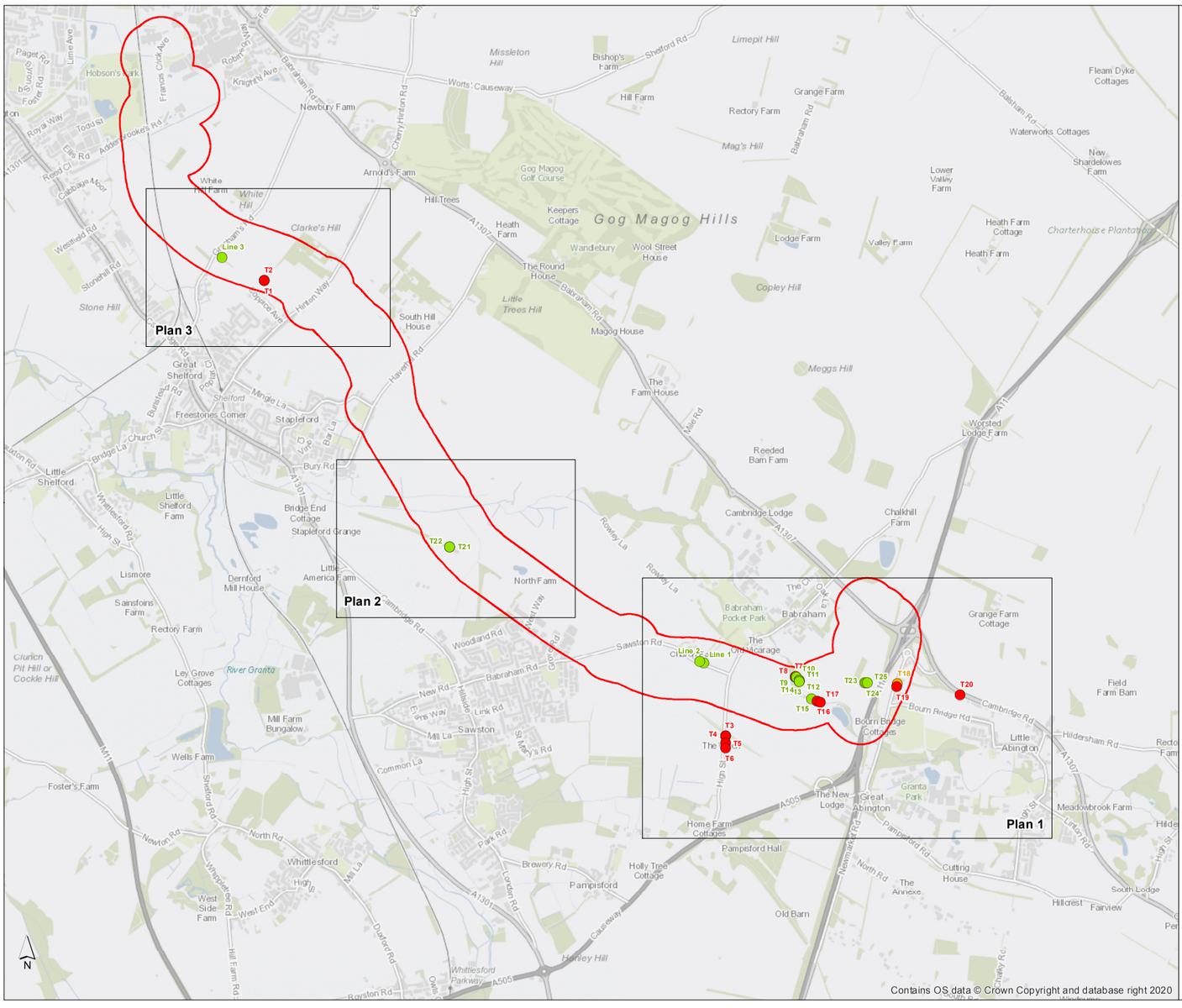
Static detector ID	Date of deployment	Date of collection
Transect 1 - static 1	05/01/2021	12/01/2021
Transect 1 - static 2	05/01/2021	12/01/2021
Transect 1 - static 3	05/01/2021	12/01/2021
Transect 2 - static 1	05/01/2021	12/01/2021
Transect 2 - static 2	05/01/2021	12/01/2021
Transect 2 - static 3	05/01/2021	12/01/2021
Transect 3 - static 1	05/01/2021	12/01/2021
Transect 3 - static 2	05/01/2021	12/01/2021
Transect 3 - static 3	05/01/2021	12/01/2021
Transect 4 - static 1	12/01/2021	19/01/2021
Transect 4 - static 2	Not deployed	Not deployed
Transect 4 - static 3	Not deployed	Not deployed
Transect 5 - static 1	Not deployed	Not deployed
Transect 5 - static 2	Not deployed	Not deployed
Transect 5 - static 3	Not deployed	Not deployed
Transect 6 - static 1	12/01/2021	19/01/2021
Transect 6 - static 2	12/01/2021	Not deployed
Transect 6 - static 3	12/01/2021	19/01/2021
Transect 7 - static 1	12/01/2021	19/01/2021
Transect 7 - static 2	12/01/2021	19/01/2021
Transect 7 - static 3	12/01/2021	19/01/2021

Table 7: February 2021 static dates

Static detector ID	Date of deployment	Date of collection
Transect 1 - static 1	04/02/2021	11/02/2021
Transect 1 - static 2	04/02/2021	11/02/2021
Transect 1 - static 3	04/02/2021	11/02/2021
Transect 2 - static 1	04/02/2021	11/02/2021
Transect 2 - static 2	04/02/2021	11/02/2021
Transect 2 - static 3	04/02/2021	11/02/2021
Transect 3 - static 1	04/02/2021	11/02/2021
Transect 3 - static 2	04/02/2021	11/02/2021
Transect 3 - static 3	04/02/2021	11/02/2021
Transect 4 - static 1	11/02/2021	17/02/2021
Transect 4 - static 2	Not deployed	Not deployed
Transect 4 - static 3	Not deployed	Not deployed
Transect 5 - static 1	Not deployed	Not deployed
Transect 5 - static 2	Not deployed	Not deployed
Transect 5 - static 3	Not deployed	Not deployed
Transect 6 - static 1	11/02/2021	17/02/2021
Transect 6 - static 2	11/02/2021	Not deployed
Transect 6 - static 3	11/02/2021	17/02/2021
Transect 7 - static 1	11/02/2021	17/02/2021
Transect 7 - static 2	11/02/2021	17/02/2021
Transect 7 - static 3	11/02/2021	17/02/2021

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Appendix C – Tree location map



KEY:

- Survey Area

Bat Roost Potential

- High potential
- Moderate potential
- Negligible potential

Rev	Drwn	Chkd	Appd	Description	Date
01	SH	TF	TB	For Issue	18/01/2021
01.1	SH	TF	TB	Created	23/10/2020

Purpose of Issue
S2 - Issued for Information

Classification
Commercial in Confidence

Client
GCP

Project
CSET

Drawing
CSET Bat Roost Potential - Trees
Overview plan

Scale @ A3	Drawn	Checked	Approved
1:30,000	SH	TF	TB

Project No
CS099797

Date
18/01/2021

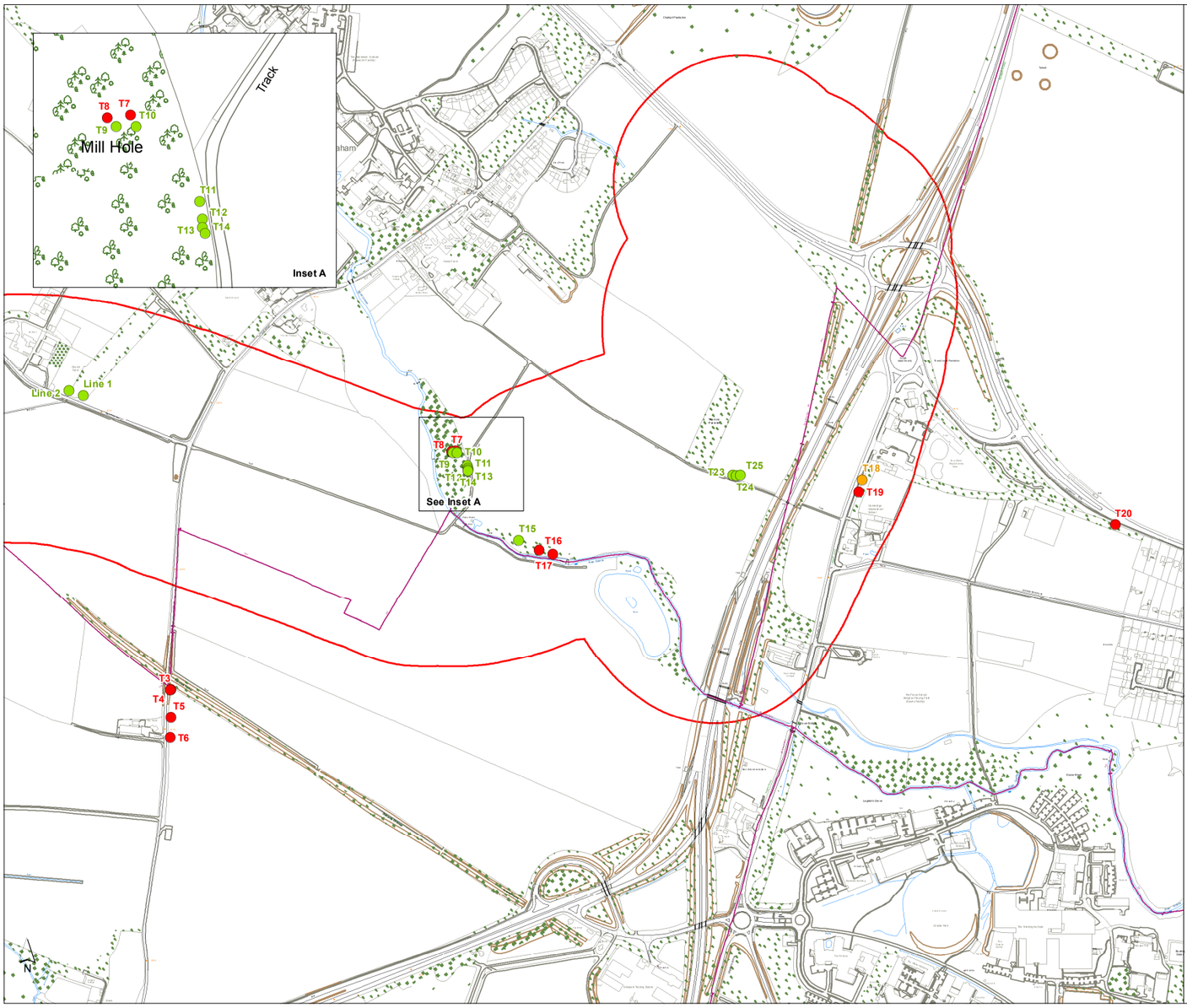
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KEY:

- Survey Area

Bat Roost Potential

- High potential
- Moderate potential
- Negligible potential

Rev	Drwn	Chkd	Appd	Description	Date
01	SH	TF	TB	For Issue	18/01/2021
01.1	SH	TF	TB	Created	23/10/2020

Purpose of Issue
S2 - Issued for Information

Classification
Commercial in Confidence

Client
GCP

Project
CSET

Drawing
CSET Bat Roost Potential - Trees
Plan 1 of 3

Scale @ A3	Drawn	Checked	Approved
1:7,500	SH	TF	TB

Project No
CS099797

Date
18/01/2021

Drawing Identifier
Project - Originator - Zone - Level - FileType - Role - Number

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KEY:

Survey Area

Bat Roost Potential

- High potential
- Moderate potential
- Negligible potential

Rev.	Drwn	Chk'd	App'd	Description	Date
01	SH	TF	TB	For Issue	18/01/2021
01.1	SH	TF	TB	Created	23/10/2020

Purpose of Issue
S2 - Issued for Information

Classification
Commercial in Confidence

Client
GCP

Project
CSET

Drawing
CSET Bat Roost Potential - Trees
Plan 2 of 3

Scale @ A3	Drawn	Checked	Approved
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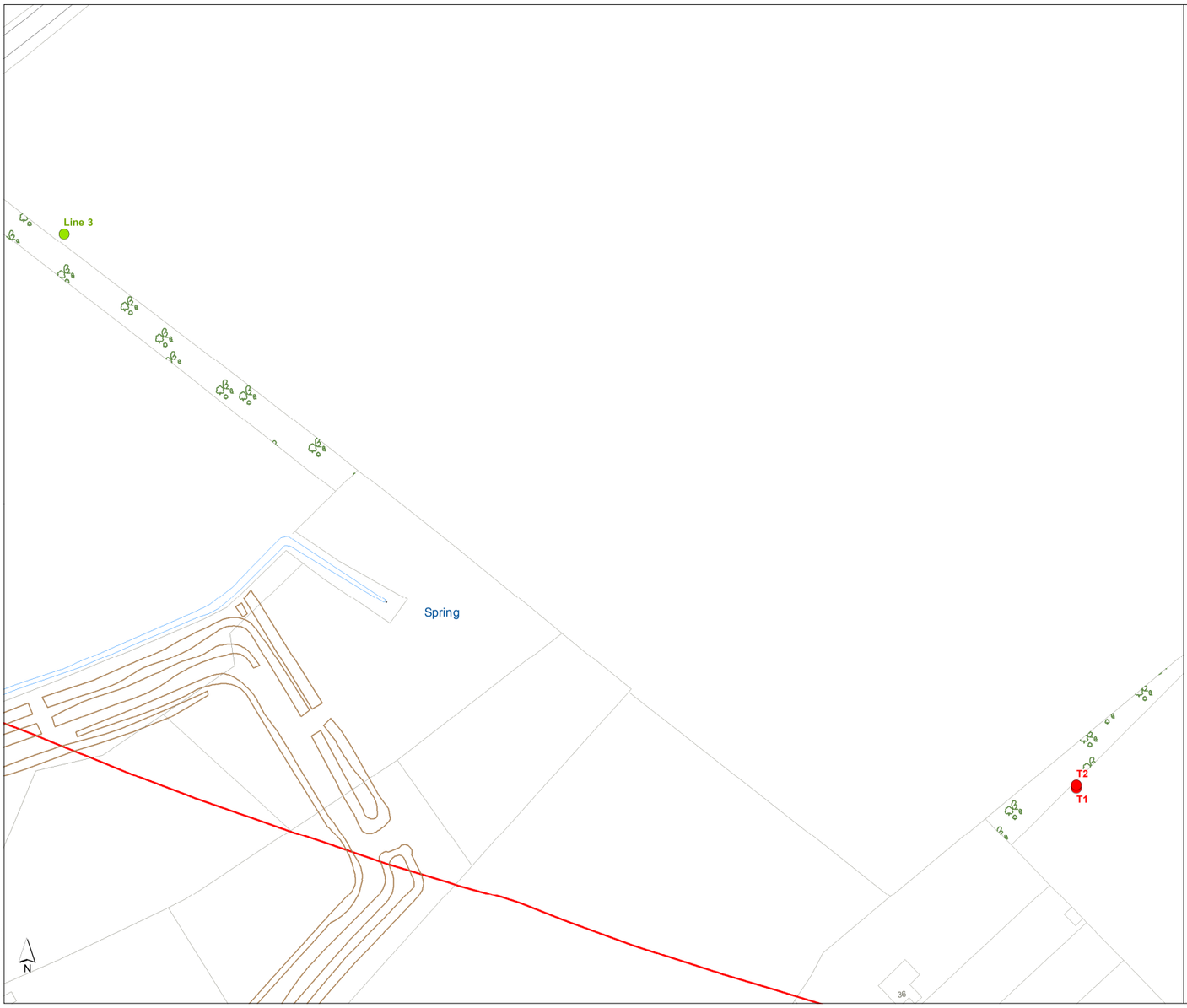
Date
18/01/2021

Drawing Identifier
Project - Originator - Zone - Level - FileType - Role - Number

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KEY:

Survey Area

Bat Roost Potential

- High potential
- Moderate potential
- Negligible potential

Rev.	Drwn	Chk'd	App'd	Description	Date
01	SH	TF	TB	For Issue	18/01/2021
01.1	SH	TF	TB	Created	23/10/2020

Purpose of Issue
S2 - Issued for Information

Classification
Commercial in Confidence

Client
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Project
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Drawing
CSET Bat Roost Potential - Trees
Plan 3 of 3

Scale @ A3	Drawn	Checked	Approved
1:1,250	SH	TF	TB

Project No
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Date
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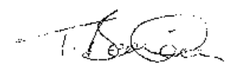
Cambridgeshire South East Transport (CSET)

Bat Survey Report 2021

November 2021

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Quality Management

Job No	CS/101272-02		
Project	Cambridgeshire South East Transport (CSET)		
Location	Trumpington to Babraham, Cambridgeshire		
Title	Cambridgeshire South East Transport (CSET) Bat Survey Report		
Document Ref	Bat Survey Report 2021	**Issue / Revision**	02
File reference	CSET Bat Survey Report Rev 1 Oct21.docx (sharepoint.com)		
Date	November 2021		
Prepared by	Jonathon Gregson Assistant Ecologist	Signature (for file)	
Prepared by	Mark Johnson Assistant Ecologist	Signature (for file)	
Reviewed by	James Johnston ACIEEM Principal Ecologist	Signature (for file)	
Authorised by	Tabatha Boniface CEnv MCIEEM Technical Director	Signature (for file)	

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1. Summary

Capita Real Estate & Infrastructure's Ecologists were commissioned by the Greater Cambridgeshire Partnership to undertake a series of surveys for bats across the route of the Cambridge South East Transport (CSET) between Great Shelford to Sawston and to Babraham, Cambridgeshire (henceforth referred to as the Site).

This report includes the results of all preliminary roost assessments, bat emergence/re-entry and bat activity surveys conducted during the 2021 survey season that have been carried out to provide additional information on how bats, in particular barbastelle, are using the Site to inform the design and environmental assessment of the proposals.

Surveys were carried out between April and October 2021, focussing on the proposed areas of land to be affected by the CSET scheme.

The results are summarised as follows. A total of:

- Seven species/groups of bat were recorded during the static detector deployment consisting of barbastelle *Barbastella barbastellus*, common pipistrelle *Pipistrellus pipistrellus*, soprano pipistrelle *Pipistrellus pygmaeus*, Nathusius' pipistrelle *Pipistrellus nathusii,* noctule *Nyctalus noctula*/serotine *Eptesicus serotinus*/Leister's *Nyctalus leisleri* (NSL), *Myotis* species *Myotis spp* and brown long-eared *Plecotus auritus* (BLE).
- No bats were recorded roosting within any of the trees surveyed within close proximity to the scheme.

The range of farmland, riparian, woodland, and suburban habitats across the survey area provides a range of foraging, commuting and roosting opportunities for bat species.

2. Introduction

2.1 Background

2.1.1. Capita Real Estate & Infrastructure's Ecologists were commissioned by the Greater Cambridgeshire Partnership (GCP) in March 2020 to undertake a series of bat surveys. These surveys were undertaken in relation to the development of the Cambridge South East Transport (CSET) Project, (the 'Scheme').

2.1.2. This report includes the results of all preliminary roost assessments, bat emergence/re-entry and bat activity surveys conducted during the 2021 survey season.

2.1.3. The aim of this bat survey report is to summarise the results of the baseline static detector bat surveys conducted between April and October 2021 to inform the design of the Scheme, and in conjunction with the Environmental Statement, provide sufficient information to allow the Local Planning Authority (LPA) when deciding whether to grant planning permission for the Scheme, to do so in full knowledge of the likely significant effects on bat species, and any avoidance or mitigation measures that will be required to address any likely significant effects.

2.2 Project Description and Purpose of the Scheme

2.2.1. The Cambridge South East Transport (CSET) project aims to create a new public transport route which would link the Cambridge Biomedical Campus via Great Shelford, Stapleford and Sawston to a new travel hub near the A11/A1307 with connections to Babraham and Granta Park.

2.2.2. The route will be entirely off-road, only interacting with other traffic at junctions. Junctions between existing roads and the new public transport route would be controlled by traffic lights. Alongside this new public transport route would be a new path for active travel. The section between Babraham and Sawston has been reviewed in terms of its detailed alignment, to reduce the impact on farm operations and reduce impacts on landscape character in the area.

2.3 Legislation and Policy

2.3.1. Bats receive protection in the UK as a result of both legislation and planning policies. This section outlines the primary legislation protecting bats. All the information below is relevant to this report and to the work proposed at the development site.

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Legislation

2.3.2. Bats are protected under Annex II of the EC Council Directive 92/43/EEC 1992 "Conservation of Natural Habitats and Wild Fauna and Flora" (the Habitats Directive) as a European Protected Species (EPS). This legislation has been transposed into UK legislation through the Conservation of Habitats and Species Regulations 2018.

2.3.3. Regulation 41 of the Conservation of Habitats and Species Regulations 2017 (as amended) makes it an offence to:

- Deliberately capture, injure, or kill bats
- Deliberately disturb bats, or
- Damage or destroy a breeding site or resting place of a bat; this applies whether bats are present or not. NB - breeding sites and resting places are generally referred to as roosts.

2.3.4. In addition to the above protection, all bat species in the UK are protected under Schedule 5 of the Wildlife & Countryside Act 1981 (as amended). In addition to the above, it lists the following as additional offences:

- Disturbance of an animal whilst it is occupying a place which it uses for shelter or protection. NB - places of shelter or protection are generally referred to as roosts
- Obstruct access to any structure or place which an animal uses for shelter or protection.

2.3.5. In order to permit a development where the above offences are likely to be committed a European Protected Species Licence can be obtained from Natural England where appropriate mitigation is offered to offset the negative impacts to local bat populations.

Natural Environment and Rural Communities (NERC) Act 2006

2.3.6. Section 40 of NERC Act 2006 places a statutory duty on public bodies, such as local authorities, that "every public body must, in exercising its functions have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity".

Purpose of the Legislation

2.3.7. The purpose of the legislation is to maintain and restore bat populations within their natural range. This implies that the habitats on which they rely, and the ecology of their life cycles should not be compromised by human activities. Where activities have the potential to compromise bat populations, measures are required to be put in place to avoid impacts or compensate and mitigate for those impacts.

Planning Policy

2.3.8. National Planning Policy is set out by the National Planning Policy Framework (NPPF July 2021) combined with the guidance document Planning for Biodiversity and Geological Conservation: A Guide to Good Practice" (ODPM 2005).

2.3.9. Biodiversity net gains are referenced strongly in terms of developing local planning policy and decision-making for development applications. The environmental test of sustainable development requires planning policy and planning decisions to help to 'improve biodiversity' (paragraph 8c).

2.3.10. References to biodiversity net gain elsewhere in the new NPPF (such as paragraph 175d) support the delivery of biodiversity net gain through sustainable development. Net gain for biodiversity is far more prominent than in the previous NPPF and considers a holistic landscape approach to protect, and enhance biodiversity promoting conservation, restoration, and enhancement of Priority Habitats (also listed as Habitats of Principal Importance) identified under the NERC Act 2006), ecological networks and the protection and recovery of Priority Species (also listed as Species of Principal Importance) identified under the NERC Act 2006). The NPPF includes requirements for planning authorities to identifying and pursuing opportunities for securing measurable net gains for biodiversity (paragraph 174b).

2.3.11. Protected sites and species are a material consideration in determining planning applications and therefore all information relating to protected sites and species must be submitted with planning submissions for determination of the whole application. The NPPF (paragraph 175) which promotes Local Planning Authorities to assess if significant harm would occur to biodiversity and decide accordingly.

Biodiversity Policy

2.3.12. Section 41 of the NERC Act requires the Secretary of State to draw up a list of Habitats and Species of Principal Importance which should be used to guide decision-makers (which include local authorities) in implementing their duty under Section 40. Several species of bat (listed below) are considered Species of Principal Importance, an important factor when considering proposed developments, in accordance with the NERC Act 2006.

- Soprano pipistrelle *Pipistrellus pygmaeus*

- Brown long-eared *Plecotus auritus*
- Barbastelle *Barbastella barbastellus*
- Bechstein's *Myotis bechsteinii*
- Noctule *Nyctalus noctula*
- Greater horseshoe *Rhinolophus ferrumequinum*
- Lesser horseshoe *Rhinolophus hipposideros*.

2.3.13. Additionally, four species of bat are recognised as Priority Species in the Cambridgeshire and Peterborough Biodiversity Group Local Biodiversity Action Plan (LBAP):

- Soprano pipistrelle
- Brown long eared
- Barbastelle
- Noctule.

2.4 Personnel and Quality Assurance

2.4.1. The surveys were led by experienced ecologists and carried out in accordance with Bat Surveys for Professional Ecologists: Good Practice Guidelines, (3rd ed) (Collins, 2016). Surveys were carried out under the supervision of bat licensed ecologist James Johnston (2017-30517-CLS-CLS).

2.4.2. The Capita surveyors who carried out the surveys in this report are James Johnson ACIEEM, Philip Dutt MCIEEM, Alex Scott, Mark Johnson, and Jonathon Gregson.

2.4.3. The surveyors who carried out the tree climbing inspection surveys were James Johnston, Jonathon Gregson, and Mark Johnson. All are fully trained in tree climbing and aerial rescue.

3. Methods

3.1 Survey and Report Objectives

3.1.1. The surveys and report were carried out to fulfil the following objectives:

1. To identify any features on site with the potential to support bats.
2. To identify any evidence of usage of the site by bats.
3. To provide data to inform an assessment of the importance of the site for bats and bat conservation, in particularly barbastelle.

3.2 Desk-Based Study

3.2.1. Local ecological records were obtained from Cambridgeshire and Peterborough Environmental Records Centre in July 2020 from within 2km of the scheme.

3.2.2. Incidental Information was gathered from local news articles in relation to bats.

3.3 Field Survey

Tree Preliminary Roost Assessment Surveys

3.2.3. The Preliminary Roost Assessments (PRAs) for trees was undertaken on the 23rd June and 4th August 2021.

3.2.4. Due to a lack of access in 2020, all accessible trees within an 80 m meter buffer from the scheme boundary around North Farm were subject to a preliminary roost assessment.

3.2.5. Tree assessments were initially undertaken from ground level, using high-powered torches and binoculars, where necessary, for the inspection of any Potential Roost Features (PRFs). An endoscope was available for use by Ecologists with a Level 2 bat licence.

3.2.6. Trees were assessed for the presence of suitable roosting features including holes in the trunk and lifted bark and signs of bat presence including droppings, staining and scratch marks. All trees with low, moderate or high potential were identified using a small metal disc where landowner permission allowed, and their location and species detail recorded to inform further surveys.

3.2.7. Trees that were scoped in for further assessment were those assessed as having moderate or high potential for roosting features based on the Bat Conservation Trust (BCT) guidance outlined in Table 1.

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Aerial Roost Inspection Surveys

3.2.8. In March 2021, four trees within North Farm which had been assessed as having moderate potential to support roosting bats were identified for aerial roost inspections. The details of these four trees are as follows:

- T2 – TL 49175 50501 – Ash, moderate.
  - (F1) Callus roll at 3 m, west facing, 4 cm diameter. Moderate. Further surveys required.
  - (F2) Callus roll at 2.5 m facing east, 3 cm diameter, 4 cm deep. No further surveys required.
- T3 – TL 49181 50516 – Ash, moderate.
  - (F1) Callus roll at 3 m, south-east facing, 6 cm diameter.
  - (F2) Two rot holes at 1.5 m and 2.5 m, both west facing. Further surveys required.
- T4 – TL 49178 50520 – Ash, moderate.
  - (F1) Callus roll and light ivy cover.
  - (F2) Callus roll at 3 m, south facing, 7 cm diameter. Further surveys required.
- T5 – TL 49181 50546 – Ash, moderate.
  - (F1) Ivy cover, light and dead.
  - (F2) Woodpecker hole at 5 m, south facing. Further surveys required.

3.2.9. The tree climbing inspections were carried out on the 5th May 2021.

3.2.10. The aerial survey consisted of each tree being climbed using a harness and ropes. The PRFs identified during the ground level assessment were inspected using torches and/or an endoscope to look for evidence of use by bats and collect information on the PRF.

3.2.11. Whilst in the tree, climbers checked for additional features not visible from the ground and, if present, inspected them using the endoscope and torch. The size, both internal and external, of the PRF was noted, as well as the condition within the PRF. The potential for each PRF to host bats was graded either high, moderate, low or negligible. PRFs were either downgraded where no feature with the potential for roosting was found, retained at the original assessed potential, upgraded to high potential or identified as a confirmed roost if a bat or evidence of bats (droppings, scratch marks) were found.

3.2.12. The overall assessment of roosting suitability of each tree was updated based on the highest potential feature identified during the aerial inspections.

Table 1: Bat Roost Potential Categories

Roost Potential Category	Description of Roosting Habitat	Commuting and Foraging Habitats
Negligible	Negligible habitat features on site unlikely to be used by roosting bats.	Negligible habitat features on site likely to be used by commuting or foraging bats only.
Low	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, shelter, appropriate conditions and / or suitable surrounding habitat to be used on a regular basis.	Habitat that could be used by small numbers of commuting bats such as gappy hedgerows or a vegetated stream, but isolated, e.g., not very connected habitat to the surrounding landscape by other habitats such as trees, hedges, or water courses. 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	A structure or tree with one or more potential roost features that could be used by bats due to their size, shelter, protection, conditions, and surrounding habitat but unlikely to support a roost of high conservation status (with respect to roost type only- the assessments in this table are made irrespective of species conservation status, which is established after presence is confirmed).	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.
High	A structure or tree with one or more potential roost feature that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions, and surrounding habitat.	Continuous, high quality habitat that is well connected to the wider landscape that it is likely to be used regularly by commuting bats such as river valleys, streams, hedgerows, lines or trees and woodland edge. High quality habitat that is well connected to the wider landscape that is likely to be used regularly by foraging bats such as broadleaved woodland, tree-lined water courses and grazed parkland.

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Roost Potential Category	Description of Roosting Habitat	Commuting and Foraging Habitats
		Site is close to and connected to known roosts.

Static Detector Surveys

3.2.13. Static bat detectors (Anabat Swift) were deployed in April - October 2021 in the locations associated with the transect routes surveyed in 2020. Seventeen detectors were deployed over five consecutive nights each month from April to October 2021.

3.2.14. Following a PRA assessment of the woodland boundary between North Farm and the Cambridge Football Club (FC) site, an additional detector was deployed (Transect 3 – Static 4) in August - October 2021. Static detector deployment dates are detailed in Appendix B.

3.2.15. Detectors recorded full spectrum sound files from half an hour before sunset to half an hour after sunrise. The sound files were then analysed using Anabat Insight software to identify the species present and indicate the level of bat activity at each deployment location.

3.2.16. Acoustic analysis was completed using the following workflow:

- All sound files were run through the auto-ID plugin BatClassify at a tag certainty threshold of 75%.
- All files labelled as barbastelle, NSL (noctule, serotine, Leisler's), brown long-eared bat and any of the *Myotis* species were manually checked.
- 10% of common pipistrelle, soprano pipistrelle and undetermined pipistrelle species were manually checked or, if they numbered less than 50, all were manually checked.
- 10% of unlabelled (noise) files were manually checked or, if they numbered less than 50, all were manually checked. If a high proportion of these unlabelled noise files contained bat passes, more files were checked.

3.2.17. The following principles were followed during manual acoustic analysis. When calls are identified to species level it is confirmed using call parameters which are characteristic of the species with regards to the location of the static detector in both a regional and habitat context. Certain species produce highly similar calls with overlapping parameters and cannot be reliably distinguished to species level

using acoustic analysis alone. When a call cannot be reliably distinguished, it has been labelled as one of a group of possible species.

3.2.18. All calls from a species within the *Myotis* genus has been labelled as *Myotis sp*.

3.2.19. Any calls that are unable to be differentiated between noctule and Leisler's bats have been grouped under the *Nyctalus sp* label. In certain environments, *Nyctalus* bats cannot be reliably distinguished from serotine bats, in which case these calls have been labelled as NSL (noctule, serotine, Leisler's).

3.2.20. Validating the data through manual checks follows the BCT Good Practice Guidelines (2016). The locations of these static detectors are shown in Appendix A and a description in Table 2.

Table 2: Static Detector Locations

Static Detector ID	Static Detector Description	Approximate Grid Reference
Transect 1 – Static 1	Narrow hedge line with mature trees heading south west to north east between two arable fields. Static detector pointing in north westerly direction.	TL 46924 53227
Transect 1 – Static 2	Narrow hedge line with trees heading south west to north east between two arable fields adjacent to Nine Wells Nature Reserve, within 50m of a ditch fed by a spring within Nine Wells woodland. Static detector pointing north westerly.	TL 46092 54075
Transect 1 – Static 3	Narrow hedge line with mature trees heading north west to south east between two arable fields. Static detector pointing north easterly.	TL 46515 53347
Transect 2 – Static 1	Attached to a tree within a line of trees heading north east to south west beside a B road in between two arable fields with a hedge line on the opposite side of the road. Static detector points easterly.	TL 48049 52433
Transect 2 – Static 2	Positioned at the end of a hedge line north west to south east dissecting two arable fields. Detector points westerly.	TL 47449 53095
Transect 2 – Static 3	Positioned at the bottom of a hedge line north west to south east dissecting two arable fields. Detector points easterly.	TL 47999 51972
Transect 3 – Static 1	Positioned within a small section of unmanaged arable land, bordered by woodland and open arable fields with a ditch running north to south. Static detector points south easterly.	TL 48660 50798

Static Detector ID	Static Detector Description	Approximate Grid Reference
Transect 3 – Static 2	Positioned on the edge of a strip of woodland heading east to west bordering an arable field. Static facing northerly.	TL 47994 51132
Transect 3 – Static 3	Positioned on the edge of a narrow strip of hedge line with trees heading east to west bordering an arable field to the north. A medium sized waterbody is in the adjacent land parcel to the south. Detector facing north.	TL 49074 50790
Transect 3 – Static 4	Attached to wooden fencing along driveway inside entrance to North Farm site. Adjacent to southern woodland boundary and industrial estate, bordering arable land the east. Detector pointing west.	TL 49155 50493
Transect 4 – Static 1	Within the corner of a field, with tree lines heading south to north and west to east. Detector facing north easterly.	TL 50708 49418
Transect 4 – Static 2	Unable to deploy securely due to high use public footpath. Alternative locations too close to existing detectors or unsecure.	TL 49429 49951
Transect 4 – Static 3	Unable to deploy securely due to high use public footpath. Alternative locations too close to existing detectors or unsecure.	TL 50406 49996
Transect 5 – Static 1	Positioned on an ash tree on a tree line heading east to west. Bordered to the south by arable fields with a ford and river adjacent to the north of the woodland strip. A mature ash and pine woodland are immediately to the north west. Detector pointing south.	TL 51318 49707
Transect 5 – Static 2	Unable to deploy securely.	TL 50757 49840
Transect 5 – Static 3	Positioned on a tree within a small section of young plantation trees. Detector facing south with a small man-made reservoir to the north west and arable fields to the south.	TL 51759 49400
Transect 6 – Static 1	Positioned on a beech tree in a short line of 4 trees within a hedge line heading east to west. Arable fields border the hedge line to the north and south. Detector pointing north.	TL 51852 49807
Transect 6 – Static 2	Unable to deploy securely.	TL 52039 50232
Transect 6 – Static 3	Positioned on a tree within a hedge line with trees heading north east to south west. An arable field is to the east and west with a farm track running adjacent to the east. Detector facing east.	TL 51453 50017
Transect 7 – Static 1	Positioned on a tree within a woodland strip heading south east to north west, between	TL 52570 49824

Static Detector ID	Static Detector Description	Approximate Grid Reference
	an arable field and an A Road. Detector facing north easterly.	
Transect 7 – Static 2	Positioned on a tree beside a farm track. Farm track heading north to south. Arable fields are adjacent to the east and west. Detector facing west.	TL 52899 50014
Transect 7 – Static 3	Positioned on a tree on the edge of a woodland beside a farm track. Farm track heading east to west. An arable field is adjacent to the south. Detector facing south.	TL 52787 50613

Emergence and Re-Entry Surveys

3.2.21. Trees were selected for emergence/re-entry surveys based on their suitability assessed during the Preliminary Roost Assessment and tree climbing surveys, the location of the tree in relation to the scheme and if they had been identified as being affected directly or indirectly by the proposed scheme.

3.2.22. Trees with low potential were not surveyed further. Trees with moderate potential required two surveys.

3.2.23. Tree T5 was identified as being of moderate potential and therefore surveyed twice. No other trees were of sufficient quality to require further surveys.

3.2.24. Emergence surveys were undertaken within the months of July, and August 2021. Dates are shown in Table 3.

Table 3: Tree Emergence/Re-entry Survey Dates

Tree	Survey no.	Date	Dusk/ Dawn	Sunset/ Sunrise	Start/End Time	Temp °C	Rain	Wind	Cloud Cover
T5	1	13/07/2021	Dusk	21:15	21:00/22:45	17	0	1	50
	2	04/08/2021	Dusk	20:44	20:29/22:14	18	0	1	0

3.2.25. Surveyors were strategically positioned around the tree focusing on areas where potential access points had been identified during the Preliminary Roost Assessment, to be able to observe any bats leaving or entering roosts.

3.2.26. All observed bat passes were recorded on a plan, noting the time, the location and, where possible, the direction of flight, species and behaviour of the bat (i.e. commuting, foraging, social calling). Importance was placed on noting the location of any points where bats were observed leaving or entering the tree. The weather details were also noted.

3.2.27. Capita's surveyors were equipped with Anabat Walkabout detectors.

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3.2.28. After completion of each survey session, digital bat recordings were analysed using Anabat Insight analysis software to confirm species identification.

3.2.29. The emergence surveys commenced 15 minutes prior to sunset and continued for 1.5-2 hours after sunset.

3.2.30. The re-entry surveys commenced 1.5 hours before sunrise and continued for 15 minutes past sunrise.

3.4 Limitations and Assumptions

Static detectors

3.3.1. It was not possible to deploy four static detectors due to security and lack of suitable locations as described in Table 2. Due to the number and distribution of the remaining static detectors the impact of this on the survey results is considered negligible and the validity and assumptions of this report are not negatively impacted.

3.3.2. The number of detectors deployed was increased in August due to landowner permission being granted to access North Farm.

3.3.3. The following static deviations occurred:

- June Transect 6 Static 3 - no recordings of bat species occurred. Device appeared to have malfunctioned and was therefore redeployed in the same month (June) for another week.
- October Transect 1 Static 3 - no recordings of bat species occurred. Device appeared to have malfunctioned and was therefore redeployed in the same month (October) for another week.
- August Transect 5 Static 1 - recorded for the first four nights only due to noise files filling the memory cards.
- August Transect 7 Static 3 - recorded for the first four nights only due to noise files filling the memory cards.

3.3.4. These deviations whilst not providing fully comparative data, do not impact the validity and accuracy of the data as sufficient data has been collected during the rest of the season and site to provide a sufficient bat assessment of the site.

3.3.5. A cause for excess noise files is likely due to increased wind and rain during the dates of deployment. Analysis of some of the noise files indicate rainfall. However, this likely unsuitable weather does not appear to have affected the number of bat calls recorded during these months when compared to other months. The site is very open and even light breeze through vegetation may increase the noise files

significantly. Reducing the sensitivity of the detectors was discussed, but this may have led to a decrease in bat calls being recording.

Trees

3.3.6. Access to the woodland on North Farm's southern boundary was restricted by a six-foot high metal fence. This meant that visibility of potential bat roosting features was limited.

3.3.7. Identification of potential roosting features was limited by the presence of substantial ivy cladding on several ash trees on the southern boundary of North Farm. The masking effect of this ivy was taken into account when assessing the overall roosting potential of these trees.

3.3.8. This limitation does not impact the validity and assumptions of this report.

4. Results

4.1 Desk Study

4.1.1. The local ecological records search included the following notable bat records having been recorded within 2km of CSET.

1. Brown long-eared bat *Plecotus auritus*
2. Common pipistrelle *Pipistrellus*
3. Daubenton's bat *Myotis daubentonii*
4. Nathusius's pipistrelle *Pipistrellus nathusii*
5. Natterer's bat *Myotis nattereri*
6. Noctule bat *Nyctalus noctula*
7. Serotine *Eptesicus serotinus*
8. Soprano pipistrelle *Pipistrellus pygmaeus*
9. Western barbastelle *Barbastella barbastellus.*

4.1.2. A barbastelle bat was identified roosting in the grounds of The Perse School, Cambridge's Upper School Site, as described in an article published on their website on 22nd September 2021 (The Perse School, 2021). This observation is located 650 m north east of the northern end of the Scheme.

4.2 Tree Roost Assessment Survey

Results

4.2.1. The woodland along North Farm's southern boundary was surveyed from ground-level in order to assess any individual trees suitable to support roosting bats. The majority of the trees in the woodland were clad with a heavy ivy (which in itself can provide bat roosting features) and it was not possible to see any other features because of the dense foliage present at the time of the survey. A static detector was therefore deployed on the edge of the woodland to record any bat activity in the vicinity. None of the other trees in the woodland were noted to have any visible PRF.

4.2.2. A total of 5,721 sound files were recorded of which 248 contained bats. These bats were identified as the following species or groups of species:

- 37 barbastelle (14.9%)
- 103 common pipistrelle (41.5%)
- 74 soprano pipistrelle (29.8%)
- 28 NSL (11.3%)
- 2 *Myotis* species (<1%)
- 4 BLE (1.6%)

4.2.3. The following results show the calls by species which were recorded on the detector around sunset. It has been split by species due to the different emergence times of species.

- Common and soprano pipistrelle were frequently recorded on the detector around sunset ±5 minutes.
- Barbastelle and myotis sp. were not recorded near to the time of sunset or sunrise.
- NSL were recorded within 15 minutes of sunset on a single night in August.
- BLE were recorded within 1 hour of sunset on a single night in August.

4.2.4. Tree climbing was undertaken in May 2021. The four trees due for aerial inspection were previously identified as ash by Mott Macdonald but were re-identified as walnut *Juglans regia*.

4.2.5. All PRF identified by the preliminary ground-level assessment carried out by Mott MacDonald were found and inspected. Tree T5 retained a moderate potential to support roosting bats following assessment. Trees T2, T3 and T4 were downgraded from moderate to negligible.

4.2.6. Table 4 details the results of the preliminary roost assessment results of all trees surveyed with moderate or above suitability.

Table 4: Tree Climbing Roost Inspection Survey Results

Tree ID	Grid Reference	Tree Species and Condition	Assessment Prior to Tree Climb	Tree Climb Assessment
2	TL 49175 50501	Walnut (previously ash)	Moderate	**Negligible** – Features from GLA were unsuitable
3	TL 49181 50516	Walnut (previously ash)	Moderate	**Negligible** – Features from

Tree ID	Grid Reference	Tree Species and Condition	Assessment Prior to Tree Climb	Tree Climb Assessment
				GLA were unsuitable
4	TL 49178 50520	Walnut (previously ash)	Moderate	**Negligible** – Features from GLA were unsuitable
5	TL 49181 50546	Walnut (previously ash)	Moderate	**Moderate** - Woodpecker hole at 5 m, south facing, extends.

4.3 Tree Emergence/Re-entry Survey Results

4.3.1. During the emergence/re-entry surveys, no roosts were recorded.

4.3.2. Common and soprano pipistrelle were recorded foraging and commuting during emergence surveys in very low numbers. Noctules were occasionally recorded commuting high above the survey site.

4.3.3. The level of bat activity during these surveys is considered to be very low.

4.4 Static Detector Survey Results

4.4.1. Maps showing the locations of the static detectors are provided in Appendix A and are described in Table 2. The results of the data collected from the static detectors is detailed in the sections below with percentage of bat sound recordings per species noted in Table 5.

4.4.2. Where the totals of individual bat species or species groups does not equal the total number of files containing bats, this is due to files containing multiple species of bats.

April 2021

Transect 1

- **Static 1** - A total of 87 sound files were recorded of which 13 contained bats. These bats were identified as the following species or groups of species:
  - 8 common pipistrelle (61.5%)
  - 1 soprano pipistrelle (7.7%)

- 4 *Myotis* species (30.8%)

- **Static 2** – A total of 222 sound files were recorded, of which 17 contained bats. These bats were identified as the following species or groups of species:
    - 5 common pipistrelle (29.4%)
    - 4 soprano pipistrelle (23.5%)
    - 8 NSL (47.1%)
- **Static 3** – A total of 217 sound files were recorded of which 172 contained bats. These bats were identified as the following species or groups of species:
    - **11 barbastelle (5.9 %)**
    - 27 common pipistrelle (14.4%)
    - 147 soprano pipistrelle (78.2%)
    - 1 NSL (>1%)
    - 2 *Myotis* species (1.1%)

Transect 2

- **Static 1** – A total of 58 sound files were recorded of which 5 contained bats. These bats were identified as the following species or groups of species:
    - 1 common pipistrelle (20%)
    - 1 soprano pipistrelle (20%)
    - 2 NSL (40%)
    - 1 *Myotis* species (20%)

- **Static 2** – A total of 101 sound files were recorded of which 3 contained bats. These bats were identified as the following species or groups of species:
    - 1 common pipistrelle (33.3%)
    - 2 *Myotis* species (66.6%)
- **Static 3** – A total of 125 sound files were recorded of which 3 contained bats. These bats were identified as the following species or groups of species:

- 1 common pipistrelle (33.3%)
- 1 soprano pipistrelle (33.3%)
- 1 *Myotis* species (33.3%)

Transect 3

- **Static 1** – A total of 88 sound files were recorded of which 34 contained bats. These bats were identified as the following species or groups of species:
    - 21 common pipistrelle (60%)
    - 7 soprano pipistrelle (20%)
    - 7 *Myotis* species (20%)
- **Static 2** – A total of 712 sound files were recorded of which 465 contained bats. These bats were identified as the following species or groups of species:
    - **3 barbastelle (<1%)**
    - 341 common pipistrelle (67.1%)
    - 149 soprano pipistrelle (29.3%)
    - 1 NSL (>1%)
    - 14 *Myotis* species (3.8%)
- **Static 3** – A total of 169 sound files were recorded of which 42 contained bats. These bats were identified as the following species or groups of species:
    - 25 common pipistrelle (59.5%)
    - 15 soprano pipistrelle (35.7%)
    - 2 *Myotis* species (4.8%)

Transect 4

- **Static 1** – A total of 297 sound files were recorded of which 55 contained bats. These bats were identified as the following species or groups of species:
    - 50 common pipistrelle (90.9%)
    - 3 soprano pipistrelle (5.5%)

- 1 NSL (1.8%)
- 1 *Myotis* species (1.8%)

Transect 5

- **Static 1** - A total of 3,080 sound files were recorded of which 3,032 contained bats. These bats were identified as the following species or groups of species:
    - **1 barbastelle (<1%)**
    - 2,061 common pipistrelle (53.6%)
    - 1,733 soprano pipistrelle (45.1%)
    - 29 NSL (1%)
    - 20 *Myotis* species (<1%)
        - Including Daubenton's bat confirmed with social calls.
- **Static 3** – A total of 237 sound files were recorded of which 208 contained bats. These bats were identified as the following species or groups of species:
    - 85 common pipistrelle (31%)
    - 40 soprano pipistrelle (14.6%)
    - 135 NSL (49.3%)
    - 14 *Myotis* species (5.1%)
        - Including Daubenton's bat confirmed with social calls.

Transect 6

- **Static 1** – A total of 65 sound files were recorded of which 52 contained bats. These bats were identified as the following species or groups of species:
    - 44 common pipistrelle (84.6%)
    - 3 soprano pipistrelle (5.8%)
    - 2 NSL (3.8%)
    - 3 *Myotis* species (5.8%)

- **Static 3** – A total of 126 sound files were recorded of which 36 contained bats. These bats were identified as the following species or groups of species:
    - 12 common pipistrelle (33.3%)
    - 5 soprano pipistrelle (13.9%)
    - 10 NSL (27.8%)
    - 9 *Myotis* species (25%)

Transect 7

- **Static 1** – A total of 110 sound files were recorded of which 1 contained bats. This bat was identified as 1 NSL (100%)
- **Static 2** – A total of 73 sound files were recorded of which 13 contained bats. These bats were identified as the following species or groups of species:
    - **2 barbastelle (15.4%)**
    - 5 common pipistrelle (38.5%)
    - 1 soprano pipistrelle (7.7%)
    - 1 NSL (7.7%)
    - 4 *Myotis* species (30.8%)
- **Static 3** – A total of 163 sound files were recorded of which 26 contained bats. These bats were identified as the following species or groups of species:
    - **18 barbastelle (69.2%)**
    - 8 common pipistrelle (30.8%)

May 2021

Transect 1

- **Static 1** - A total of 676 sound files were recorded of which 642 contained bats. These bats were identified as the following species or groups of species:
    - **144 barbastelle (21.1%)**

- 406 common pipistrelle (59.6%)
- 116 soprano pipistrelle (17%)
- 9 NSL (1.3%)
- 6 *Myotis* species (<1%)

- **Static 2** – A total of 2,046 sound files were recorded, of which 343 contained bats. These bats were identified as the following species or groups of species:
  - **14 barbastelle (4%)**
  - 301 common pipistrelle (86.2%)
  - 16 soprano pipistrelle (4.6%)
  - 17 NSL (4.9%)
  - 1 *Myotis* species (<1%)

- **Static 3** – A total of 5,634 sound files were recorded, of which 1,809 contained bats. These bats were identified as the following species or groups of species:
  - **23 barbastelle (1.1%)**
  - 1520 common pipistrelle (69.9%)
  - 598 soprano pipistrelle (27.5%)
  - 30 NSL (1.4%)
  - 2 *Myotis* species (<1%)
  - 1 BLE (<1%)

Transect 2

- **Static 1** – A total of 1,378 sound files were recorded of which 23 contained bats. These bats were identified as the following species or groups of species:
  - 13 common pipistrelle (56.5%)
  - 7 soprano pipistrelle (30.4%)
  - 3 NSL (13%)

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- **Static 2** – A total of 725 sound files were recorded of which 404 contained bats. These bats were identified as the following species or groups of species:
  - **9 barbastelle (2.2%)**
  - 377 common pipistrelle (90.5%)
  - 26 soprano pipistrelle (6.2%)
  - 5 NSL (1.2%)

- **Static 3** – A total of 1,140 sound files were recorded of which 411 contained bats. These bats were identified as the following species or groups of species:
  - **8 barbastelle (1.9%)**
  - 305 common pipistrelle (71.9%)
  - 100 soprano pipistrelle (23.6%)
  - 5 NSL (1.2%)
  - 6 *Myotis* species (1.4%)

Transect 3

- **Static 1** – A total of 773 sound files were recorded of which 250 contained bats. These bats were identified as the following species or groups of species:
  - **12 barbastelle (4.5%)**
  - 180 common pipistrelle (68.2%)
  - 56 soprano pipistrelle (21.2%)
  - 1 Nathusius' pipistrelle (<1%)
  - 4 NSL (1.5%)
  - 11 *Myotis* species (4.2%)

- **Static 2** – A total of 1,992 sound files were recorded of which 1,764 contained bats. These bats were identified as the following species or groups of species:
  - **18 barbastelle (<1%)**

- 1600 common pipistrelle (82%)
- 293 soprano pipistrelle (15%)
- 5 NSL (<1%)
- 36 *Myotis* species (1.8%)

- **Static 3** – A total of 3,357 sound files were recorded of which 1,621 contained bats. These bats were identified as the following species or groups of species:
  - 716 common pipistrelle (39.3%)
  - 657 soprano pipistrelle (36%)
  - 439 NSL (24.1%)
  - 11 *Myotis* species (<1%)

Transect 4

- **Static 1** – A total of 1,825 sound files were recorded of which 647 contained bats. These bats were identified as the following species or groups of species:
  - **2 barbastelle (<1%)**
  - 642 common pipistrelle (99.1%)
  - 3 soprano pipistrelle (<1%)
  - 1 *Myotis* species (<1%)

Transect 5

- **Static 1** - A total of 1,284 sound files were recorded of which 124 contained bats. These bats were identified as the following species or groups of species:
  - **1 barbastelle (<1 %)**
  - 90 common pipistrelle (64.7 %)
  - 37 soprano pipistrelle (26.6 %)
  - 11 *Myotis* species (7.9 %)

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- **Static 3** – A total of 1,031 sound files were recorded of which 223 contained bats. These bats were identified as the following species or groups of species:
  - 105 common pipistrelle (40.4%)
  - 147 soprano pipistrelle (56.5%)
  - 5 NSL (1.9%)
  - 3 *Myotis* species (1.2%)

Transect 6

- **Static 1** – A total of 1,185 sound files were recorded of which 151 contained bats. These bats were identified as the following species or groups of species:
  - 141 common pipistrelle (93.4%)
  - 8 soprano pipistrelle (5.3%)
  - 2 NSL (1.3%)
- **Static 3** – A total of 3,535 sound files were recorded of which 519 contained bats. These bats were identified as the following species or groups of species:
  - 478 common pipistrelle (91%)
  - 30 soprano pipistrelle (5.7%)
  - 11 NSL (2.1%)
  - 6 *Myotis* species (1.1%)

Transect 7

- **Static 1** – A total of 1,819 sound files were recorded, of which 37 contained bats. These bats were identified as the following species or groups of species:
  - 29 common pipistrelle (78.4%)
  - 6 soprano pipistrelle (16.2%)
  - 2 NSL (5.4%)

- **Static 2** – A total of 1,390 sound files were recorded of which 123 contained bats. These bats were identified as the following species or groups of species:
    - **8 barbastelle (6.5%)**
    - 94 common pipistrelle (75.8%)
    - 17 soprano pipistrelle (13.7%)
    - 1 NSL (<1%)
    - 4 *Myotis* species (3.2%)
- **Static 3** – A total of 4,863 sound files were recorded, of which 38 contained bats. These bats were identified as the following species or groups of species:
    - **10 barbastelle (25.6%)**
    - 18 common pipistrelle (46.2%)
    - 11 soprano pipistrelle (28.2%)

Transect 1

- **Static 1** - A total of 1,809 sound files were recorded of which 1,649 contained bats. These bats were identified as the following species or groups of species:
    - **48 barbastelle (2.8%)**
    - 1289 common pipistrelle (74.6%)
    - 264 soprano pipistrelle (15.3%)
    - 94 NSL (5.4%)
    - 7 *Myotis* species (<1%)
    - 27 BLE (1.6%)
- **Static 2** – A total of 1,776 sound files were recorded of which 1,638 contained bats. These bats were identified as the following species or groups of species:
    - **1 barbastelle (<1%)**

    - 1417 common pipistrelle (79.6%)
    - 268 soprano pipistrelle (15%)
    - 94 NSL (5.3%)
    - 1 *Myotis* species (<1%)
- **Static 3** – A total of 5,753 sound files were recorded of which 5,712 contained bats. These bats were identified as the following species or groups of species:
    - **1 barbastelle (<1%)**
    - 5484 common pipistrelle (91.7%)
    - 328 soprano pipistrelle (5.5%)
    - 1 Nathusius' pipistrelle (<1%)
    - 164 NSL (2.7%)
    - 3 *Myotis* species (<1%)
    - 2 BLE (<1%)

Transect 2

- **Static 1** – A total of 122 sound files were recorded of which 59 contained bats. These bats were identified as the following species or groups of species:
    - **2 barbastelle (3.3%)**
    - 23 common pipistrelle (38.3%)
    - 8 soprano pipistrelle (13.3%)
    - 27 NSL (45%)
- **Static 2** – A total of 1,557 sound files were recorded of which 1,515 contained bats. These bats were identified as the following species or groups of species:
    - **3 barbastelle (<1%)**
    - 1463 common pipistrelle (95.2%)

- 20 soprano pipistrelle (1.3%)
- 50 NSL (3.3%)
- 1 BLE (<1%)

- **Static 3** – A total of 1,001 sound files were recorded of which 900 contained bats. These bats were identified as the following species or groups of species:
  - 768 common pipistrelle (81%)
  - 134 soprano pipistrelle (14.1%)
  - 14 NSL (4.7%)
  - 1 BLE (<1%)

Transect 3

- **Static 1** – A total of 492 sound files were recorded of which 463 contained bats. These bats were identified as the following species or groups of species:
  - **3 barbastelle (<1%)**
  - 290 common pipistrelle (57.7%)
  - 167 soprano pipistrelle (33.2%)
  - 35 NSL (7%)
  - 8 *Myotis* species (1.6%)
- **Static 2** – A total of 1,882 sound files were recorded of which 1,831 contained bats. These bats were identified as the following species or groups of species:
  - **3 barbastelle (<1%)**
  - 1,470 common pipistrelle (72%)
  - 328 soprano pipistrelle (16.1%)
  - 217 NSL (10.6%)
    - Including noctule and Leisler's bat social calls.
  - 12 *Myotis* species (<1%)
  - 11 BLE (<1%)

CAPITA

- **Static 3** – A total of 863 sound files were recorded of which 632 contained bats. These bats were identified as the following species or groups of species:
  - **1 barbastelle (<1%)**
  - 378 common pipistrelle (57%)
  - 210 soprano pipistrelle (31.7%)
  - 72 NSL (10.9%)
  - 1 *Myotis* species (<1%)
  - 1 BLE (<1%)

Transect 4

- **Static 1** – A total of 2,330 sound files were recorded of which 669 contained bats. These bats were identified as the following species or groups of species:
  - **2 barbastelle (<1%)**
  - 633 common pipistrelle (92.3%)
  - 47 soprano pipistrelle (6.9%)
  - 1 NSL (<1%)
  - 3 *Myotis* species (<1%)

Transect 5

- **Static 1** - A total of 4,842 sound files were recorded of which 4,178 contained bats. These bats were identified as the following species or groups of species:
  - **6 barbastelle (<1%)**
  - 3506 common pipistrelle (73.3%)
  - 1227 soprano pipistrelle (25.6%)
  - 17 NSL (<1%)
  - 29 *Myotis* species (<1%)
- **Static 3** – A total of 139 sound files were recorded of which 101 contained bats. These bats were identified as the following species or groups of species:

- 33 common pipistrelle (31.7%)
- 49 soprano pipistrelle (47.1%)
- 7 NSL (6.7%)
- 15 *Myotis* species (14.4%)

Transect 6

- **Static 1** – A total of 3,080 sound files were recorded of which 1,422 contained bats. These bats were identified as the following species or groups of species:
  - **17 barbastelle (1.2%)**
  - 1379 common pipistrelle (96.4%)
  - 28 soprano pipistrelle (2%)
  - 2 NSL (<1%)
  - 5 BLE (<1%)
- **Static 3** – A total of 76 sound files were recorded of which 37 contained bats. These bats were identified as the following species or groups of species:
  - 27 common pipistrelle (67.5%)
  - 10 soprano pipistrelle (2 %)
  - *1 Myotis* species (2.5%)
  - 2 BLE (5%)

Transect 7

- **Static 1** – A total of 2,257 sound files were recorded of which 101 contained bats. These bats were identified as the following species or groups of species:
  - 36 common pipistrelle (35%)
  - 3 soprano pipistrelle (2.9%)
  - 60 NSL (58.3%)
  - 4 *Myotis* species (3.9%)

CAPITA

- **Static 2** – A total of 718 sound files were recorded of which 287 contained bats. These bats were identified as the following species or groups of species:
  - **2 barbastelle (<1%)**
  - 243 common pipistrelle (83.2%)
  - 41 soprano pipistrelle (14%)
  - 4 NSL (1.4%)
  - 2 *Myotis* species (<1%)
- **Static 3** – A total of 3,773 sound files were recorded of which 609 contained bats. These bats were identified as the following species or groups of species:
  - **7 barbastelle (1.1%)**
  - 522 common pipistrelle (83%)
  - 98 soprano pipistrelle (15.6%)
  - 1 NSL (<1%)
  - 1 *Myotis* species (<1%)

July 2021

Transect 1

- **Static 1** – A total of 858 sound files were recorded of which 798 contained bats. These bats were identified as the following species or groups of species:
  - **8 barbastelle (1%)**
  - 572 common pipistrelle (71.7%)
  - 73 soprano pipistrelle (9.1%)
  - 141 NSL (17.7%)
  - 2 *Myotis* species (>1%)
  - 2 BLE (>1%)

- **Static 2** - A total of 555 sound files were recorded of which 483 contained bats. These bats were identified as the following species or groups of species:
    - 363 common pipistrelle (75.2%)
    - 90 soprano pipistrelle (18.6%)
    - 30 NSL (6.2%)
- **Static 3** - A total of 1,217 sound files were recorded of which 1,165 contained bats. These bats were identified as the following species or groups of species:
    - 975 common pipistrelle (83.7%)
    - 137 soprano pipistrelle (11.8%)
    - 51 NSL (4.4%)
    - 2 *Myotis* species (>1%)

Transect 2

- **Static 1** - A total of 476 sound files were recorded of which 243 contained bats. These bats were identified as the following species or groups of species:
    - **1 barbastelle (>1%)**
    - 105 common pipistrelle (43.2%)
    - 40 soprano pipistrelle (16.5%)
    - 97 NSL (39.9%)
- **Static 2** - A total of 510 sound files were recorded of which 335 contained bats. These bats were identified as the following species or groups of species:
    - 263 common pipistrelle (78.5%)
    - 25 soprano pipistrelle (7.5%)
    - 47 NSL (14%)
- **Static 3** - A total of 805 sound files were recorded of which 726 contained bats. These bats were identified as the following species or groups of species:
    - 468 common pipistrelle (64.5%)

    - 214 soprano pipistrelle (29.5%)
    - 44 NSL (6%)

Transect 3

- **Static 1** - A total of 516 sound files were recorded of which 397 contained bats. These bats were identified as the following species or groups of species:
    - **1 barbastelle (>1 %)**
    - 289 common pipistrelle (72.8%)
    - 94 soprano pipistrelle (23.7%)
    - 11 NSL (2.8%)
    - 2 *Myotis* species (>1%)
- **Static 2** - A total of 157 sound files were recorded of which 129 contained bats. These bats were identified as the following species or groups of species:
    - **2 barbastelle (1.6%)**
    - 68 common pipistrelle (52.7%)
    - 34 soprano pipistrelle (26.4%)
    - 22 NSL (17.1%)
    - 3 *Myotis* species (2.3%)
- **Static 3** - A total of 661 sound files were recorded of which 146 contained bats. These bats were identified as the following species or groups of species:
    - 64 common pipistrelle (43.8%)
    - 61 soprano pipistrelle (41.8%)
    - 20 NSL (13.7%)
    - 1 *Myotis* species (>1%)

Transect 4

- **Static 1** - A total of 419 sound files were recorded of which 280 contained bats. These bats were identified as the following species or groups of species:
    - **7 barbastelle (2.5%)**
    - 227 common pipistrelle (81.1%)
    - 29 soprano pipistrelle (10.4%)
    - 17 NSL (6.1%)

Transect 5

- **Static 1** - A total of 1,639 sound files were recorded of which 638 contained bats. These bats were identified as the following species or groups of species:
    - **5 barbastelle (>1%)**
    - 270 common pipistrelle (42.3%)
    - 337 soprano pipistrelle (52.8%)
    - 13 NSL (2%)
    - 13 *Myotis* species (2%)
- **Static 3** - A total of 160 sound files were recorded, of which 132 contained bats. These bats were identified as the following species or groups of species:
    - 57 common pipistrelle (43.2%)
    - 54 soprano pipistrelle (40.9%)
    - 12 NSL (9.1%)
    - 9 *Myotis* species (6.8%)

Transect 6

- **Static 1** - A total of 1,267 sound files were recorded of which 1,183 contained bats. These bats were identified as the following species or groups of species:

    - 972 common pipistrelle (82.2%)
    - 187 soprano pipistrelle (15.8%)
    - 10 NSL (<1%)
    - 14 *Myotis* species (1.2%)
- **Static 3** - A total of 1,528 sound files were recorded of which 428 contained bats. These bats were identified as the following species or groups of species:
    - **1 barbastelle (>1%)**
    - 316 common pipistrelle (73.8%)
    - 102 soprano pipistrelle (23.8%)
    - 8 NSL (1.9%)
    - 1 *Myotis* species (>1%)

Transect 7

- **Static 1** - A total of 201 sound files were recorded of which 75 contained bats. These bats were identified as the following species or groups of species:
    - 52 common pipistrelle (69.3%)
    - 18 soprano pipistrelle (24%)
    - 2 NSL (2.7%)
    - 3 *Myotis* species (4%)
- **Static 2** - A total of 1,927 sound files were recorded of which 479 contained bats. These bats were identified as the following species or groups of species:
    - **3 barbastelle (<1%)**
    - 358 common pipistrelle (74.7%)
    - 113 soprano pipistrelle (23.6%)
    - 3 NSL (<1%)
    - 2 *Myotis* species (<1%)

- **Static 3** - A total of 238 sound files were recorded of which 191 contained bats. These bats were identified as the following species or groups of species:
    - **6 barbastelle (3.1%)**
    - 135 common pipistrelle (70.7%)
    - 44 soprano pipistrelle (23%)
    - 6 NSL (3.1%)

August 2021

Transect 1

- **Static 1** – A total of 2,530 sound files were recorded, of which 1,841 contained bats. These bats were identified as the following species or groups of species:
    - **21 barbastelle (1.1%)**
    - 1332 common pipistrelle (72.4%)
    - 421 soprano pipistrelle (22.9%)
    - 64 NSL (3.5%)
    - 1 *Myotis* species (<1%)
    - 2 BLE (<1%)
- **Static 2** - A total of 6,589 sound files were recorded, of which 322 contained bats. These bats were identified as the following species or groups of species:
    - **16 barbastelle (5%)**
    - 174 common pipistrelle (54%)
    - 34 soprano pipistrelle (10.6%)
    - 97 NSL (30.1%)
    - 1 *Myotis* species (<1%)
- **Static 3** – A total of 6,596 sound files were recorded of which 6,002 contained bats. These bats were identified as the following species or groups of species:

- **11 barbastelle (<1%)**
- 4598 common pipistrelle (76.6%)
- 1033 soprano pipistrelle (17.2%)
- 359 NSL (6%)
- 1 *Myotis* species (<1%)

Transect 2

- **Static 1** – A total of 1,033 sound files were recorded of which 22 contained bats. These bats were identified as the following species or groups of species:
    - **5 barbastelle (23.7%)**
    - 5 common pipistrelle (23.7%)
    - 7 soprano pipistrelle (31.8%)
    - 5 NSL (23.7%)
- **Static 2** – A total of 9,699 sound files were recorded of which 292 contained bats. These bats were identified as the following species or groups of species:
    - **43 barbastelle (14.7%)**
    - 228 common pipistrelle (78.1%)
    - 5 soprano pipistrelle (1.7%)
    - 16 NSL (5.5%)
- **Static 3** – A total of 13,439 sound files were recorded of which 392 contained bats. These bats were identified as the following species or groups of species:
    - **8 barbastelle (2%)**
    - 301 common pipistrelle (76.8%)
    - 61 soprano pipistrelle (15.6%)
    - 21 NSL (5.4%)
    - 1 *Myotis* species (<1%)

Transect 3

- **Static 1** – A total of 4,080 sound files were recorded, of which 215 contained bats. These bats were identified as the following species or groups of species:
    - **15 barbastelle (7%)**
    - 150 common pipistrelle (69.8%)
    - 27 soprano pipistrelle (12.6%)
    - 23 NSL (10.7%)
- **Static 2** – A total of 4,055 sound files were recorded of which 2,141 contained bats. These bats were identified as the following species or groups of species:
    - **12 barbastelle (<1%)**
    - 1707 common pipistrelle (79.8%)
    - 342 soprano pipistrelle (16%)
    - 71 NSL (3.3%)
    - 4 *Myotis* species (<1%)
    - 2 BLE (<1%)
- **Static 3** - A total of 5,443 sound files were recorded of which 856 contained bats. These bats were identified as the following species or groups of species:
    - **14 barbastelle (1.6%)**
    - 337 common pipistrelle (39.4%)
    - 456 soprano pipistrelle (53.3%)
    - 45 NSL (5.3%)
    - 4 *Myotis* species (<1%).
- **Static 4** - A total of 5,721 sound files were recorded of which 248 contained bats. These bats were identified as the following species or groups of species:

CAPITA

- **37 barbastelle (14.9%)**
- 103 common pipistrelle (41.5%)
- 74 soprano pipistrelle (29.8%)
- 28 NSL (11.3%)
- 2 *Myotis* species (<1%)
- 4 BLE (1.6%)

Transect 4

- **Static 1** - A total of 870 sound files were recorded of which 203 contained bats. These bats were identified as the following species or groups of species:
    - **3 barbastelle (1.5%)**
    - 29 common pipistrelle (14.3%)
    - 156 soprano pipistrelle (76.8%)
    - 14 NSL (6.9%)
    - 1 *Myotis* species (<1%)

Transect 5

- **Static 1** – A total of 15,457 sound files were recorded of which 527 contained bats. These bats were identified as the following species or groups of species:
    - **24 barbastelle (4.6%)**
    - 190 common pipistrelle (36.1%)
    - 290 soprano pipistrelle (55%)
    - 17 NSL (3.2%)
    - 6 *Myotis* (1.1%)
- **Static 3** - A total of 13,788 sound files were recorded of which 305 contained bats. These bats were identified as the following species or groups of species:

- **6 barbastelle (2%)**
- 131 common pipistrelle (43%)
- 120 soprano pipistrelle (39.3%)
- 25 NSL (8.2%)
- 23 *Myotis* species (7.5%)

Transect 6

- **Static 1** – A total of 10,014 sound files were recorded of which 1,045 contained bats. These bats were identified as the following species or groups of species:
  - **8 barbastelle (<1%)**
  - 298 common pipistrelle (28.5%)
  - 729 soprano pipistrelle (69.8%)
  - 6 NSL (<1%)
  - 3 *Myotis* species (<1%)
- **Static 3** – A total of 14,832 sound files were recorded of which 764 contained bats. These bats were identified as the following species or groups of species:
  - **54 barbastelle (6.6%)**
  - 193 common pipistrelle (23.6%)
  - 493 soprano pipistrelle (60.3%)
  - 68 NSL (8.3%)
  - 10 *Myotis* species (1.2%)

Transect 7

- **Static 1** – A total of 1,370 sound files were recorded of which 28 contained bats. These bats were identified as the following species or groups of species:
  - **3 barbastelle (10.7%)**
  - 14 common pipistrelle (50%)

CAPITA

  - 4 soprano pipistrelle (14.3%)
  - 4 NSL (14.3%)
  - *2 Myotis* species (7.1%)
  - 1 BLE (3.6%)
- **Static 2** – A total of 11,526 sound files were recorded of which 472 contained bats. These bats were identified as the following species or groups of species:
  - **16 barbastelle (3.4%)**
  - 163 common pipistrelle (34.5%)
  - 287 soprano pipistrelle (60.8%)
  - 5 NSL (1. %)
  - 1 *Myotis* species (<1%)
- **Static 3** – A total of 16,084 sound files were recorded of which 314 contained bats. These bats were identified as the following species or groups of species:
  - **40 barbastelle (12.7%)**
  - 222 common pipistrelle (70. %)
  - 46 soprano pipistrelle (14.6%)
  - 5 NSL (1.6%)
  - 1 BLE (<1%)

September 2021

Transect 1

- **Static 1** – A total of 1,038 sound files were recorded of which 588 contained bats. These bats were identified as the following species or groups of species:
  - **4 barbastelle (<1%)**
  - 333 common pipistrelle (56.6%)
  - 198 soprano pipistrelle (33.7%)

- 40 NSL (6.8%)
- 12 *Myotis* species (2%)
- 1 BLE (<1%)

- **Static 2** – A total of 2,528 sound files were recorded of which 528 contained bats. These bats were identified as the following species or groups of species:
  - 345 common pipistrelle (65.3%)
  - 29 soprano pipistrelle (5.5%)
  - 154 NSL (29.2%)
- **Static 3** – A total of 11,219 sound files were recorded of which 323 contained bats. These bats were identified as the following species or groups of species:
  - **43 barbastelle (13.3%)**
  - 195 common pipistrelle (60.4%)
  - 48 soprano pipistrelle (14.9%)
  - 33 NSL (10.2%)
  - 4 *Myotis* species (1.2%)

Transect 2

- **Static 1** – A total of 450 sound files were recorded of which 22 contained bats. These bats were identified as the following species or groups of species:
  - **1 barbastelle (4.5%)**
  - 1 common pipistrelle (4.5%)
  - 12 soprano pipistrelle (54.5%)
  - 8 NSL (36.4%)

CAPITA

- **Static 2** – A total of 7,214 sound files were recorded of which 316 contained bats. These bats were identified as the following species or groups of species:
  - **12 barbastelle (3.8%)**
  - 236 common pipistrelle (74.7%)
  - 35 soprano pipistrelle (11.1%)
  - 23 NSL (7.3%)
  - 8 *Myotis* species (2.5%)
  - 2 BLE (<1%)
- **Static 3** – A total of 14,521 sound files were recorded of which 115 contained bats. These bats were identified as the following species or groups of species:
  - **12 barbastelle (10.4%)**
  - 51 common pipistrelle (44.3%)
  - 25 soprano pipistrelle (21.7%)
  - 26 NSL (22.6%)
  - 1 *Myotis* species (<1%)

Transect 3

- **Static 1** – A total of 4,231 sound files were recorded of which 102 contained bats. These bats were identified as the following species or groups of species:
  - **16 barbastelle (15.7%)**
  - 38 common pipistrelle (37.3%)
  - 27 soprano pipistrelle (26.5%)
  - 18 NSL (17.6%)
  - 3 *Myotis* species (2.9%)

- **Static 2** – A total of 511 sound files were recorded of which 116 contained bats. These bats were identified as the following species or groups of species:
    - **3 barbastelle (2.6%)**
    - 43 common pipistrelle (37.1%)
    - 47 soprano pipistrelle (40.5%)
    - 22 NSL (19%)
    - 1 *Myotis* species (<1%)
- **Static 3** – A total of 7,511 sound files were recorded of which 189 contained bats. These bats were identified as the following species or groups of species:
    - **7 barbastelle (3.7%)**
    - 34 common pipistrelle (18%)
    - 141 soprano pipistrelle (74.6%)
    - 5 NSL (2.6%)
    - 2 *Myotis* species (1.1%)
- **Static 4** – A total of 577 sound files were recorded of which 251 contained bats. These bats were identified as the following species or groups of species:
    - **11 barbastelle (4.4%)**
    - 162 common pipistrelle (64.5%)
    - 56 soprano pipistrelle (22.3%)
    - 18 NSL (7.2%)
    - 2 *Myotis* species (<1%)
    - 2 BLE (<1%)

Transect 4

- **Static 1** – A total of 1,245 sound files were recorded, of which 276 contained bats. These bats were identified as the following species or groups of species:

    - **6 barbastelle (2.2%)**
    - 126 common pipistrelle (45.7%)
    - 130 soprano pipistrelle (47.1%)
    - 12 NSL (4.3%)
    - 2 *Myotis* species (<1%)

Transect 5

- **Static 1** – A total of 1,775 sound files were recorded of which 283 contained bats. These bats were identified as the following species or groups of species:
    - **2 barbastelle (<1%)**
    - 19 common pipistrelle (6.7%)
    - 237 soprano pipistrelle (83.7%)
    - 15 NSL (5.3%)
    - 10 *Myotis* species (3.5%)
- **Static 3** – A total of 5,886 sound files were recorded of which 71 contained bats. These bats were identified as the following species or groups of species:
    - **13 barbastelle (18.3%)**
    - 13 common pipistrelle (18.3%)
    - 26 soprano pipistrelle (36.6%)
    - 10 NSL (14.1%)
    - 9 *Myotis* species (12.7%)

Transect 6

- **Static 1** -. A total of 2,641 sound files were recorded of which 676 contained bats. These bats were identified as the following species or groups of species:
    - **1 barbastelle (<1%)**
    - 104 common pipistrelle (15.4%)

- 563 soprano pipistrelle (83.3%)
- 8 NSL (1.2%)

- **Static 3** – A total of 8,512 sound files were recorded of which 351 contained bats. These bats were identified as the following species or groups of species:
  - **19 barbastelle (5.4 %)**
  - 89 common pipistrelle (25.4 %)
  - 202 soprano pipistrelle (57.5 %)
  - 35 NSL (10 %)
  - 6 *Myotis* species (1.7 %)

Transect 7

- **Static 1** – A total of 1,284 sound files were recorded of which 32 contained bats. These bats were identified as the following species or groups of species:
  - **6 barbastelle (18.8%)**
  - 11 common pipistrelle (34.4%)
  - 7 soprano pipistrelle (21.9%)
  - 7 NSL (21.9%)
  - 1 *Myotis* species (3.1 %)

- **Static 2** – A total of 5,360 sound files were recorded of which 307 contained bats. These bats were identified as the following species or groups of species:
  - **16 barbastelle (5.2%)**
  - 217 common pipistrelle (70.7%)
  - 71 soprano pipistrelle (23.1%)
  - 3 NSL (1%)

- **Static 3** – A total of 8,841 sound files were recorded of which 208 contained bats. These bats were identified as the following species or groups of species:
  - **31 barbastelle (14.9%)**
  - 101 common pipistrelle (48.6%)
  - 70 soprano pipistrelle (33.7%)
  - 3 NSL (1.4%)
  - 3 *Myotis* species (1.4%)

October 2021

Transect 1

- **Static 1** – A total of 1,747 sound files were recorded of which 1,515 contained bats. These bats were identified as the following species or groups of species:
  - **10 barbastelle (<1%)**
  - 980 common pipistrelle (64.7%)
  - 499 soprano pipistrelle (32.9%)
  - 13 NSL (<1%)
  - 13 *Myotis* species (<1%)

- **Static 2** – A total of 2,305 sound files were recorded of which 1,195 contained bats. These bats were identified as the following species or groups of species:
  - **3 barbastelle (<1%)**
  - 1007 common pipistrelle (84.3%)
  - 164 soprano pipistrelle (13.7%)
  - 20 NSL (1.7%)
  - 1 *Myotis* species (<1 %)

- **Static 3** – A total of 4,170 sound files were recorded of which 3,802 contained bats. These bats were identified as the following species or groups of species:
    - **3 barbastelle (<1%)**
    - 2833 common pipistrelle (74.5%)
    - 931 soprano pipistrelle (24.5%)
    - 24 NSL (<1%)
    - 11 *Myotis* species (<1%)

Transect 2

- **Static 1** – A total of 82 sound files were recorded of which 45 contained bats. These bats were identified as the following species or groups of species:
    - 1 common pipistrelle (2.2%)
    - 14 soprano pipistrelle (31.1%)
    - 30 NSL (66.7%)
- **Static 2** – A total of 454 sound files were recorded of which 255 contained bats. These bats were identified as the following species or groups of species:
    - **1 barbastelle (<1%)**
    - 225 common pipistrelle (88.2%)
    - 13 soprano pipistrelle (5.1%)
    - 14 NSL (5.5%)
    - 2 *Myotis* species (<1%)
- **Static 3** – A total of 939 sound files were recorded of which 890 contained bats. These bats were identified as the following species or groups of species:
    - **1 barbastelle (<1%)**
    - 607 common pipistrelle (68.2%)
    - 272 soprano pipistrelle (30.6%)
    - 9 NSL (1%)

    - 1 *Myotis* species (<1%)

Transect 3

- **Static 1** – A total of 1,139 sound files were recorded of which 83 contained bats. These bats were identified as the following species or groups of species:
    - 59 common pipistrelle (71.1%)
    - 21 soprano pipistrelle (25.3%)
    - 3 NSL (3.6%)
- **Static 2** – A total of 5,837 sound files were recorded of which 5,793 contained bats. These bats were identified as the following species or groups of species:
    - **18 barbastelle (<1%)**
    - 3762 common pipistrelle (64.9%)
    - 1833 soprano pipistrelle (31.6%)
    - 169 NSL (2.9%)
    - 9 *Myotis* species (<1%)
    - 2 BLE (<1%)
- **Static 3** – A total of 1,110 sound files were recorded, of which 766 contained bats. These bats were identified as the following species or groups of species:
    - **5 barbastelle (<1%)**
    - 278 common pipistrelle (36.3%)
    - 463 soprano pipistrelle (60.4%)
    - 17 NSL (2.2%)
    - 3 *Myotis* species (<1%)
- **Static 4** – A total of 89 sound files were recorded of which 69 contained bats. These bats were identified as the following species or groups of species:
    - **7 barbastelle (10.1%)**
    - 47 common pipistrelle (68.1%)

- 13 soprano pipistrelle (18.8%)
- 2 NSL (2.9%)

Transect 4

- **Static 1** – A total of 498 sound files were recorded of which 440 contained bats. These bats were identified as the following species or groups of species:
  - 311 common pipistrelle (70.7%)
  - 111 soprano pipistrelle (25.2%)
  - 16 NSL (3.6%)
  - 2 *Myotis* species (<1%)

Transect 5

- **Static 1** – A total of 170 sound files were recorded of which 138 contained bats. These bats were identified as the following species or groups of species:
  - **1 barbastelle (<1%)**
  - 32 common pipistrelle (23.2%)
  - 93 soprano pipistrelle (67.4%)
  - 8 NSL (5.8%)
  - 4 *Myotis* species (2.9%)
- **Static 3** – A total of 71 sound files were recorded of which 53 contained bats. These bats were identified as the following species or groups of species:
  - 5 common pipistrelle (9.4%)
  - 20 soprano pipistrelle (37.7%)
  - 17 NSL (32.1%)
  - 11 *Myotis* species (20.8%)

Transect 6

- **Static 1** – A total of 212 sound files were recorded of which 174 contained bats. These bats were identified as the following species or groups of species:

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- **6 barbastelle (3.4%)**
- 87 common pipistrelle (50%)
- 79 soprano pipistrelle (45.4%)
- 1 NSL (<1%)
- 1 *Myotis* species (<1%)
- **Static 3** – A total of 303 sound files were recorded of which 204 contained bats. These bats were identified as the following species or groups of species:
  - **5 barbastelle (2.5%)**
  - 13 common pipistrelle (6.4%)
  - 167 soprano pipistrelle (81.9%)
  - 16 NSL (7.8%)
  - 3 *Myotis* species (1.5%)

Transect 7

- **Static 1** – A total of 56 sound files were recorded of which 23 contained bats. These bats were identified as the following species or groups of species:
  - **1 barbastelle (4.3%)**
  - 9 common pipistrelle (39.1%)
  - 4 soprano pipistrelle (17.4%)
  - 9 NSL (39.1%)
- **Static 2** – A total of 329 sound files were recorded of which 244 contained bats. These bats were identified as the following species or groups of species:
  - **1 barbastelle (<1%)**
  - 148 common pipistrelle (60.7%)
  - 92 soprano pipistrelle (37.7%)
  - 3 NSL (1.2%)

- **Static 3** – A total of 12,199 sound files were recorded of which 146 contained bats. These bats were identified as the following species or groups of species:
  - **38 barbastelle (26%)**
  - 49 common pipistrelle (33.6%)
  - 49 soprano pipistrelle (33.6%)
  - 9 NSL (6.2%)
  - 1 *Myotis* species (<1%)

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Table 5: Total Counts and Percentages of Bat Sound Recordings per Species or Species Group

Static ID		Barbastelle		Common pipistrelle		Soprano pipistrelle		Nathusius' pipistrelle		NSL		*Myotis* species		BLE	
		Total at static location	% of bats at static location	Total at static location	% of bats at static location	Total at static location	% of bats at static location	Total at static location	% of bats at static location	Total at static location	% of bats at static location	Total at static location	% of bats at static location	Total at static location	% of bats at static location
Transect 1	Static 1	**235***	**3.3**	4920	68.7	1572	21.9	0	0	361	5	45	0.6	**32***	0.4
	Static 2	34	0.7	3612	77.3	605	12.9	0	0	420	9	4	0.1	0	0
	Static 3	92	0.5	**15632***	79.6	3222	16.4	**1***	<0.1	**662***	3.4	25	0.1	3	<0.1
Transect 2	Static 1	9	2.1	149	35.5	89	21.2	0	0	172	41	1	0.2	0	0
	Static 2	68	2.2	2793	88.5	124	3.9	0	0	155	4.9	12	0.4	3	0.1
	Static 3	29	0.8	2501	71.6	833	23.8	0	0	119	3.4	10	0.3	1	<0.1
Transect 3	Static 1	47	2.9	1027	64.2	399	25	**1***	0.1	94	5.9	31	1.9	0	0
	Static 2	59	0.5	8991	70.9	3026	23.9	0	0	507	4	79	0.6	15	0.1
	Static 3	27	0.6	1832	40.8	2003	44.7	0	0	598	13.3	24	0.5	1	<0.1
	Static 4	55	9.7	312	54.9	143	25.2	0	0	48	8.5	4	0.7	6	1.1
Transect 4	Static 1	20	0.8	2018	78	479	18.5	0	0	61	2.4	10	0.4	0	0
Transect 5	Static 1	40	0.4	6168	59.6	**3954***	38.2	0	0	99	1	**93***	0.9	0	0
	Static 3	19	1.6	445	36.6	456	37.5	0	0	211	17.4	84	6.9	0	0
Transect 6	Static 1	32	0.7	3025	64.2	1597	33.9	0	0	31	0.7	21	0.4	5	0.1
	Static 3	79	3.3	1128	47.0	1009	42.0	0	0	148	6.2	36	1.5	2	0.1
Transect 7	Static 1	10	3.3	151	50.5	42	14.0	0	0	85	28.4	10	3.3	1	0.3
	Static 2	48	2.4	1228	61.4	622	31.1	0	0	88	4.4	13	0.7	0	0
	Static 3	150	8.7	1055	61	494	28.6	0	0	24	1.4	5	0.3	1	0.1
Total across all statics		1053	1.3	56987	68.5	20669	24.9	2	<0.1	3883	4.7	507	0.6	70	0.1

* denotes max count for each species/species group.

5. Conclusion

5.1.1. Evidence of at least seven species/groups of bat: barbastelle, common, soprano, and Nathusius' pipistrelle, *Myotis* species, noctule/serotine/Leisler's (NSL) and brown long-eared (BLE) bats were recorded during the surveys and found to be present across the seven transect locations through recordings from the static detectors.

5.1.2. The presence of barbastelle bats is of particular note being an Annex II species and one of the rarer species recorded in the UK particularly with Eversden and Wimpole Woods SAC (that has been designated for the colony of barbastelle bats associated with the trees in Wimpole Woods[1]) lying approximately 10 km west of the route.

5.1.3. Barbastelle bats were recorded at all static locations with the highest number of barbastelle passes recorded at:

- Transect 1 S1 in May (144) – North-west of the site.
- Transect 6 S3 in August (54) – South-east of the site.
- Transect 1 S1 in June (48) - North-west of the site.
- Transect 1 S3 in September (43) - North-west of the site.
- Transect 2 S2 in August (43) - North-west of the site.

5.1.4. No bat roosts have been recorded during the 2021 survey season in the trees in close proximity to North Farm. Due to the recording times on the static detector near the woodland to the south of North Farm, common and soprano pipistrelle may be using trees in the woodland as roosting sites. However, none of the trees are to be directly impacted by the scheme.

5.1.5. Sufficient survey effort consisting of tree PRAs, static detector deployment, emergence/re-entry surveys of trees have been undertaken during 2021 to provide a comprehensive survey data throughout the scheme.

5.1.6. The total number of recordings and species found, combined with the presence of habitats suitable of supporting bats including woodlands, open fields, waterbodies, and linear habitat features such as rivers, streams and hedge lines, show that the survey route provides suitable habitats for foraging and commuting bats.

[1] JNCC Eversden and Wimpole Woods SAC information sheet. Available: https://sac.jncc.gov.uk/site/UK0030331

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6. References

Collins, J. (2016) *Bat Surveys for Professional Ecologists —Good Practice Guidelines, 3rd edition.* Bat Conservation Trust, London.

JNCC (2021) Eversden and Wimpole Woods https://sac.jncc.gov.uk/site/UK0030331

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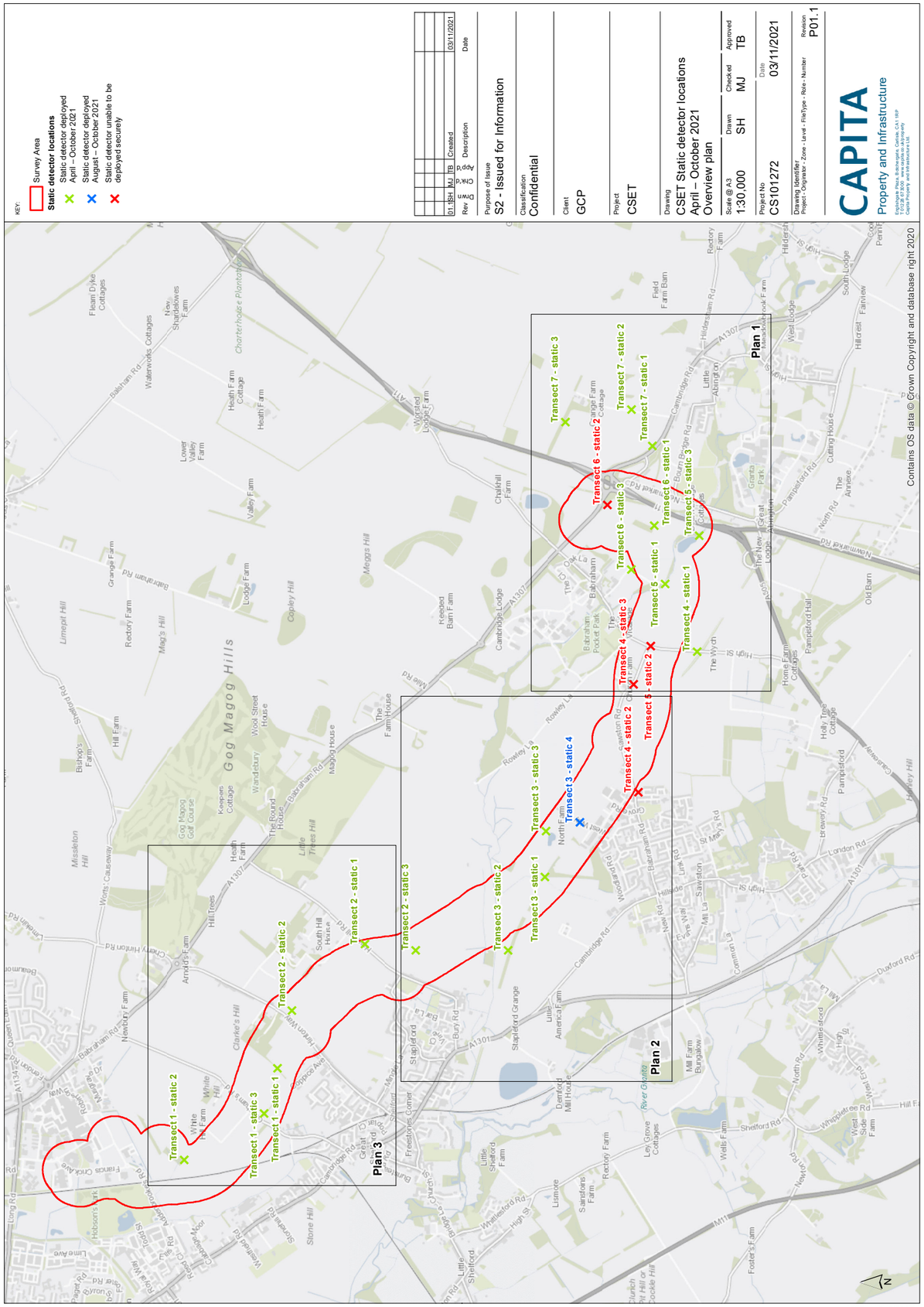
WYG. (Dec 2019). *Cambridge South East Transport Strategy (CSET). Bat Activity Report*

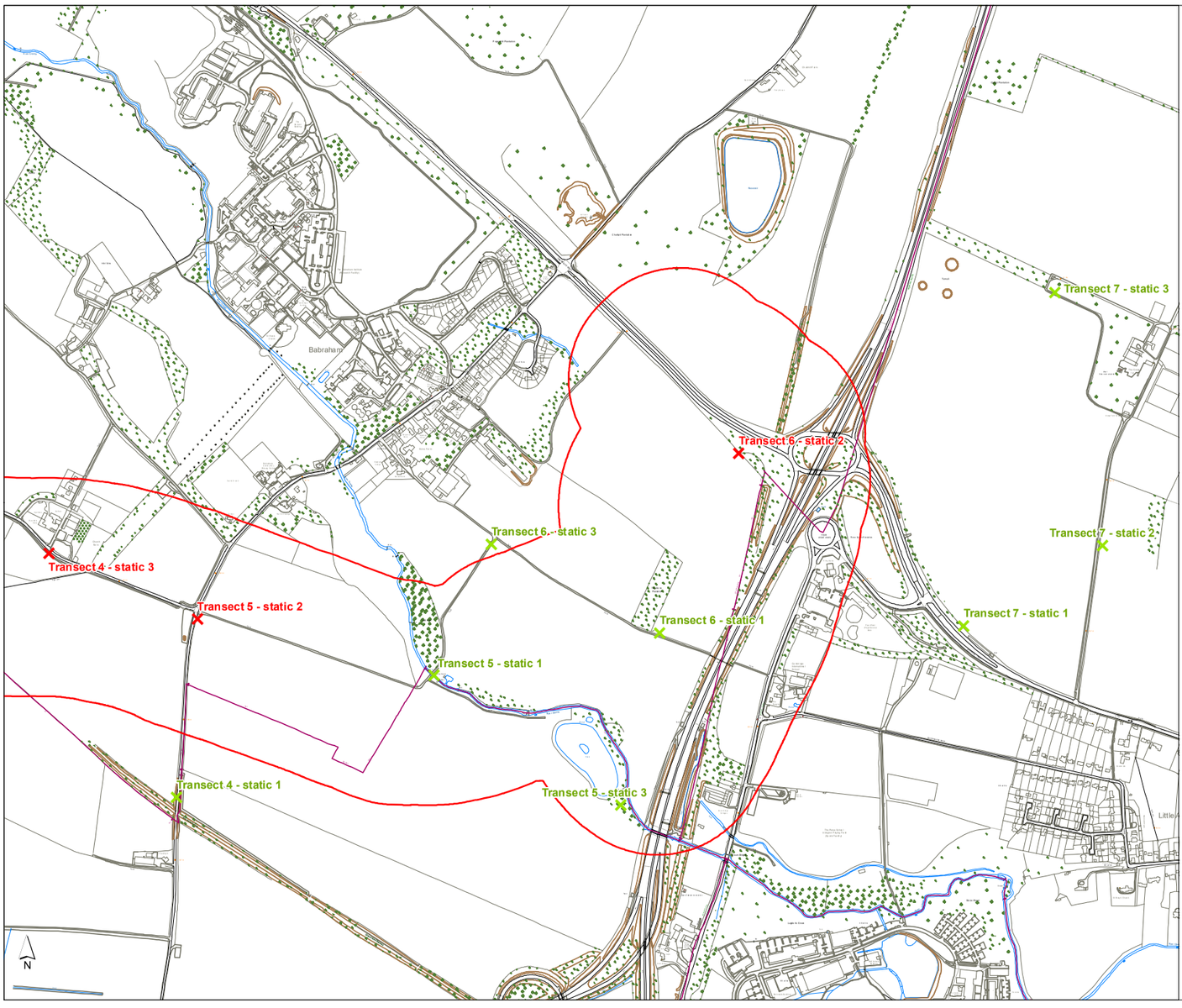
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Appendices

Appendix A – Static Detector Location Map





KEY:

Survey Area

Static detector locations

- April – October 2021
- Static detector deployed August – October 2021
- Static detector unable to be deployed securely

Rev.	Drawn	Chk'd	App'd	Description	Date
01.1	SH	MJ	TB	Created	03/11/2021

Purpose of Issue
S2 - Issued for Information

Classification
Confidential

Client
GCP

Project
CSET

Drawing
CSET Static detector locations
April – October 2021
Plan 1

Scale @ A3	Drawn	Checked	Approved
1:8,500	SH	MJ	TB

Project No
CS101272

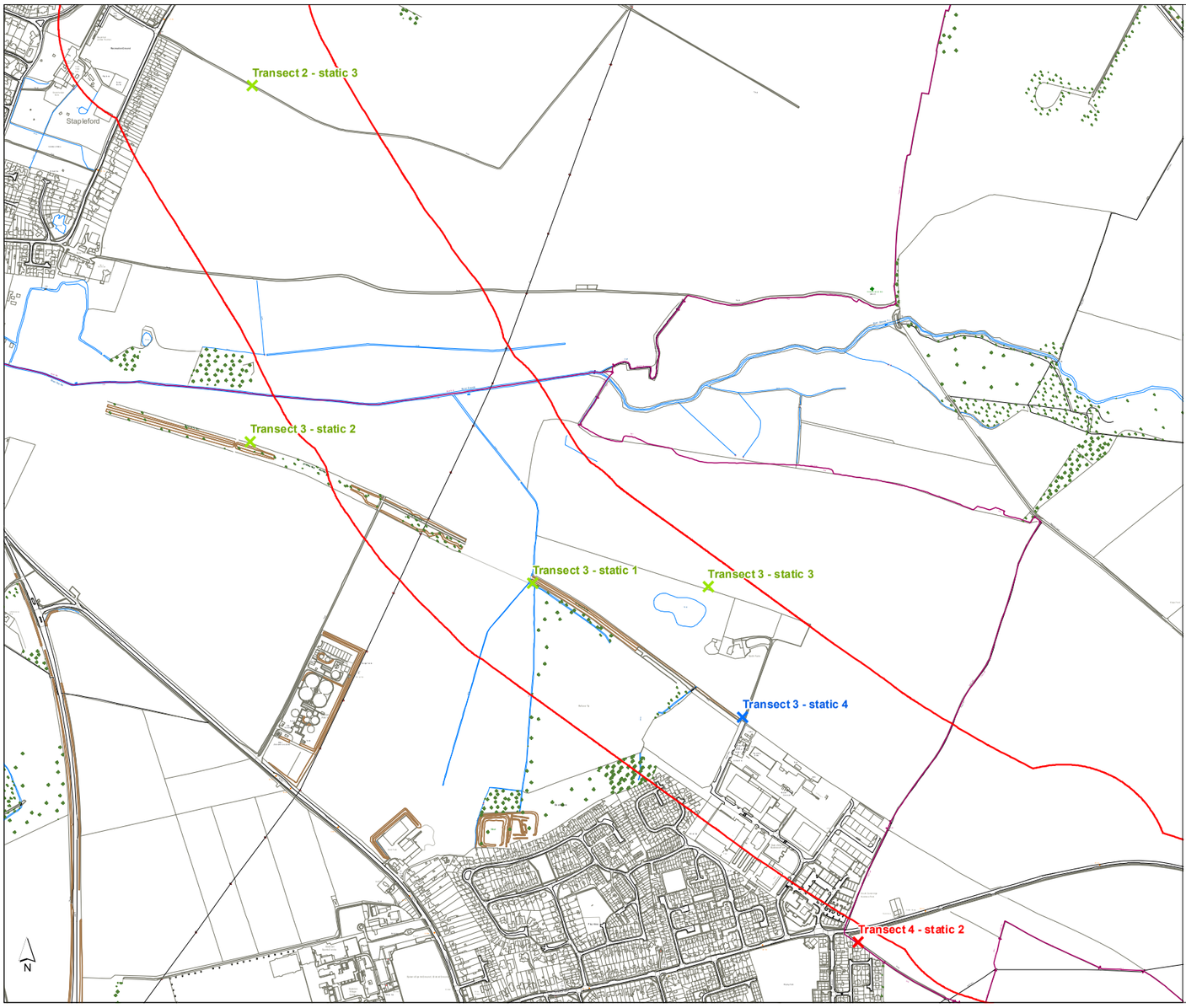
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03/11/2021

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Project - Originator - Zone - Level - FileType - Role - Number

Revision
P01.1

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KEY:

Survey Area

Static detector locations

- April – October 2021
- Static detector deployed August – October 2021
- Static detector unable to be deployed securely

Rev.	Drawn	Chk'd	App'd	Description	Date
01.1	SH	MJ	TB	Created	03/11/2021

Purpose of Issue
S2 - Issued for Information

Classification
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Client
GCP

Project
CSET

Drawing
CSET Static detector locations
April – October 2021
Plan 2

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1:8,500	SH	MJ	TB

Project No
CS101272

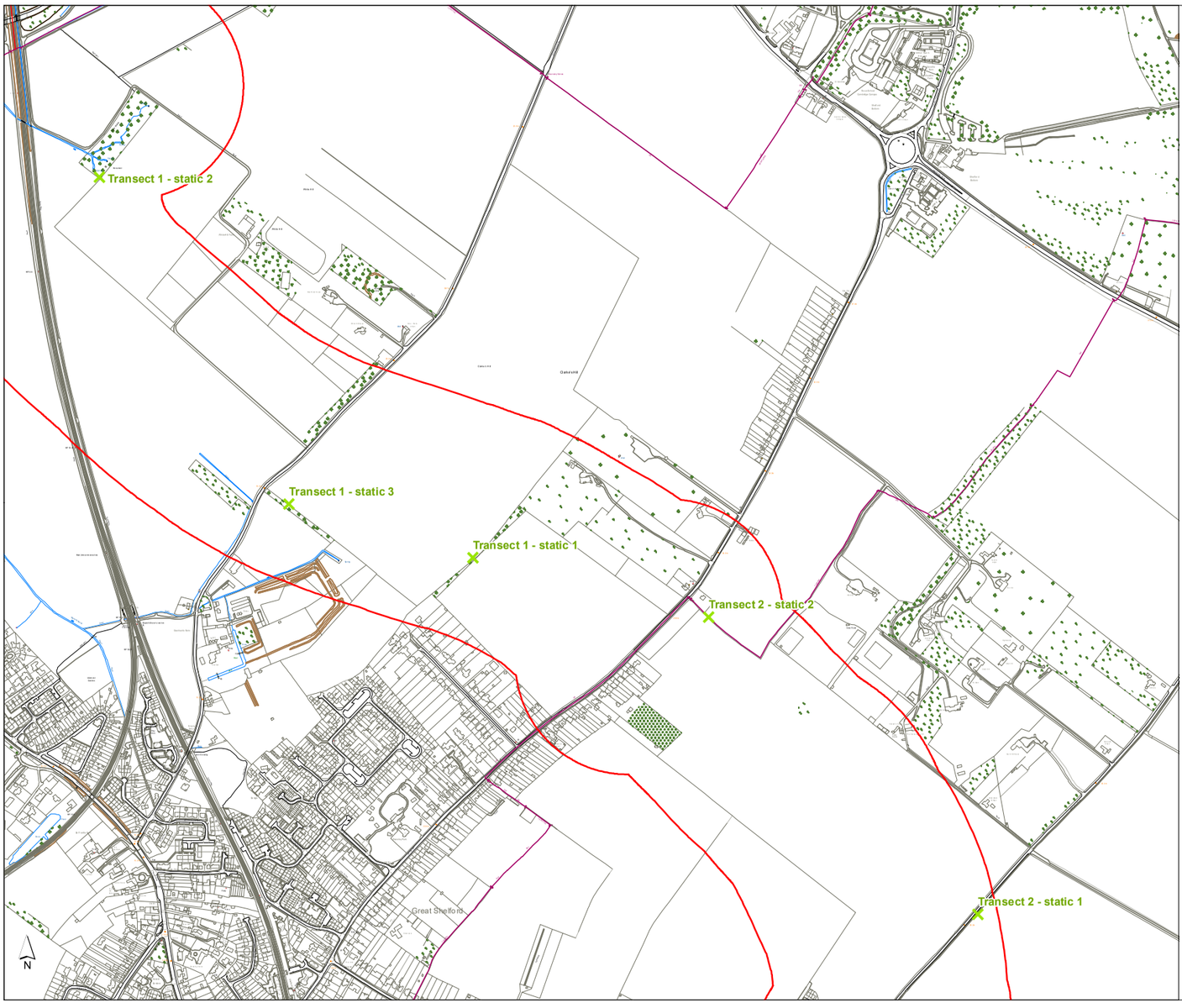
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Revision
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KEY:

Survey Area

Static detector locations

- April – October 2021
- Static detector deployed August – October 2021
- Static detector unable to be deployed securely

Rev.	Drawn	Chk'd	App'd	Description	Date
01.1	SH	MJ	TB	Created	03/11/2021

Purpose of Issue
S2 - Issued for Information

Classification
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Client
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Project
CSET

Drawing
CSET Static detector locations
April – October 2021
Plan 3

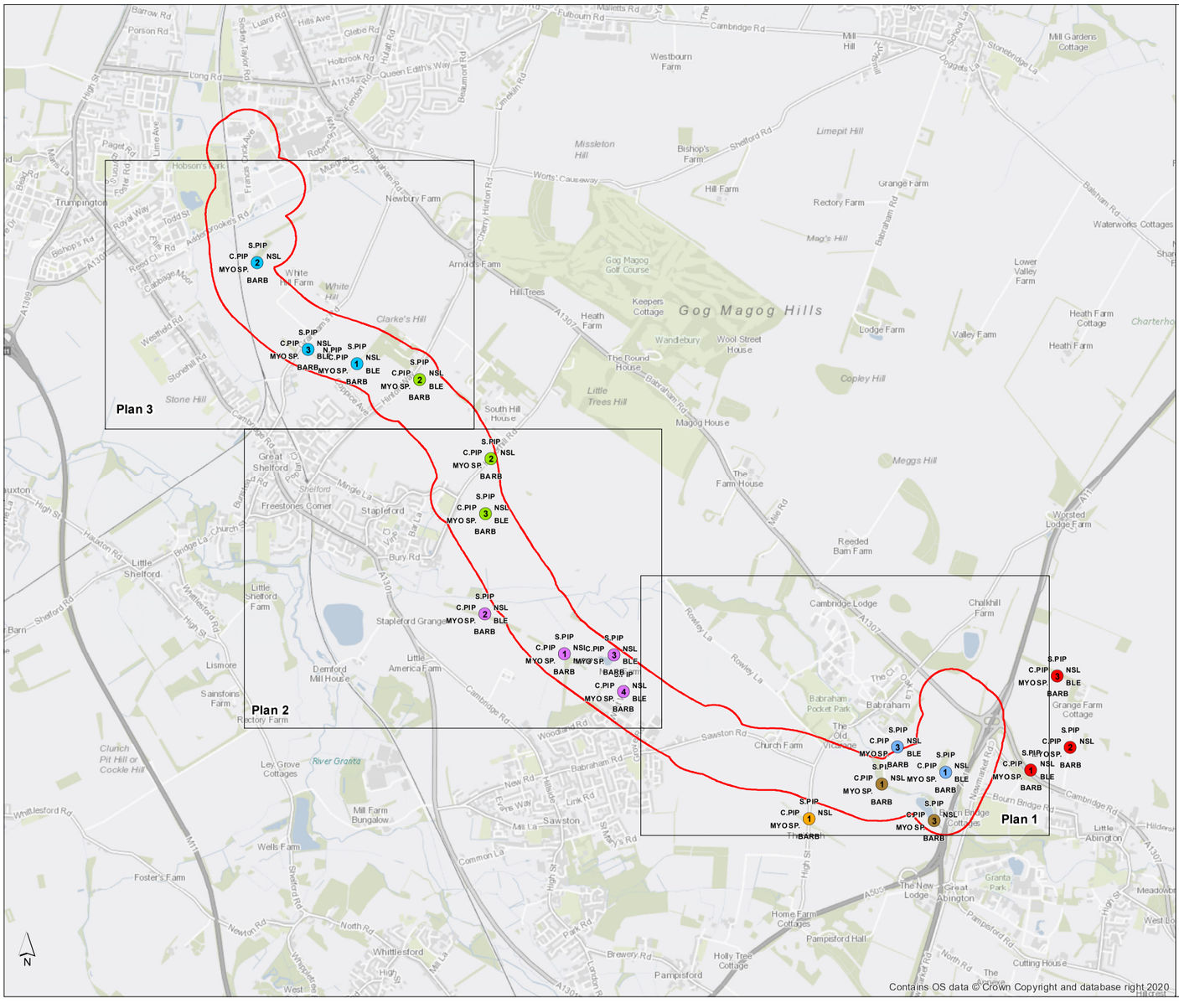
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1:8,000	SH	MJ	TB

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Date: 03/11/2021

Drawing Identifier
Project - Originator - Zone - Level - FileType - Role - Number
Revision: P01.1

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Plot date: 03/11/2021



KEY:

Survey Area

Static Detector locations

- Transect 1
- Transect 2
- Transect 3
- Transect 4
- Transect 5
- Transect 6
- Transect 7

SPECIES
BARB – Barbastelle
C.PIP – Common pipistrelle
S.PIP – Soprano pipistrelle
NSL – Noctule/Serotine/Leislers
MYO SP. – Myotis species
BLE. – Brown Long-eared
N.PIP – Nathusius' pipistrelle

Rev.	Drawn	Chk'd	App'd	Description	Date
01.1	SH	MJ	TB	Created	04/11/2021

Purpose of Issue
S2 - Issued for Information

Classification
Confidential

Client
GCP

Project
CSET

Drawing
CSET Static detector locations
April – October 2021
Overview plan

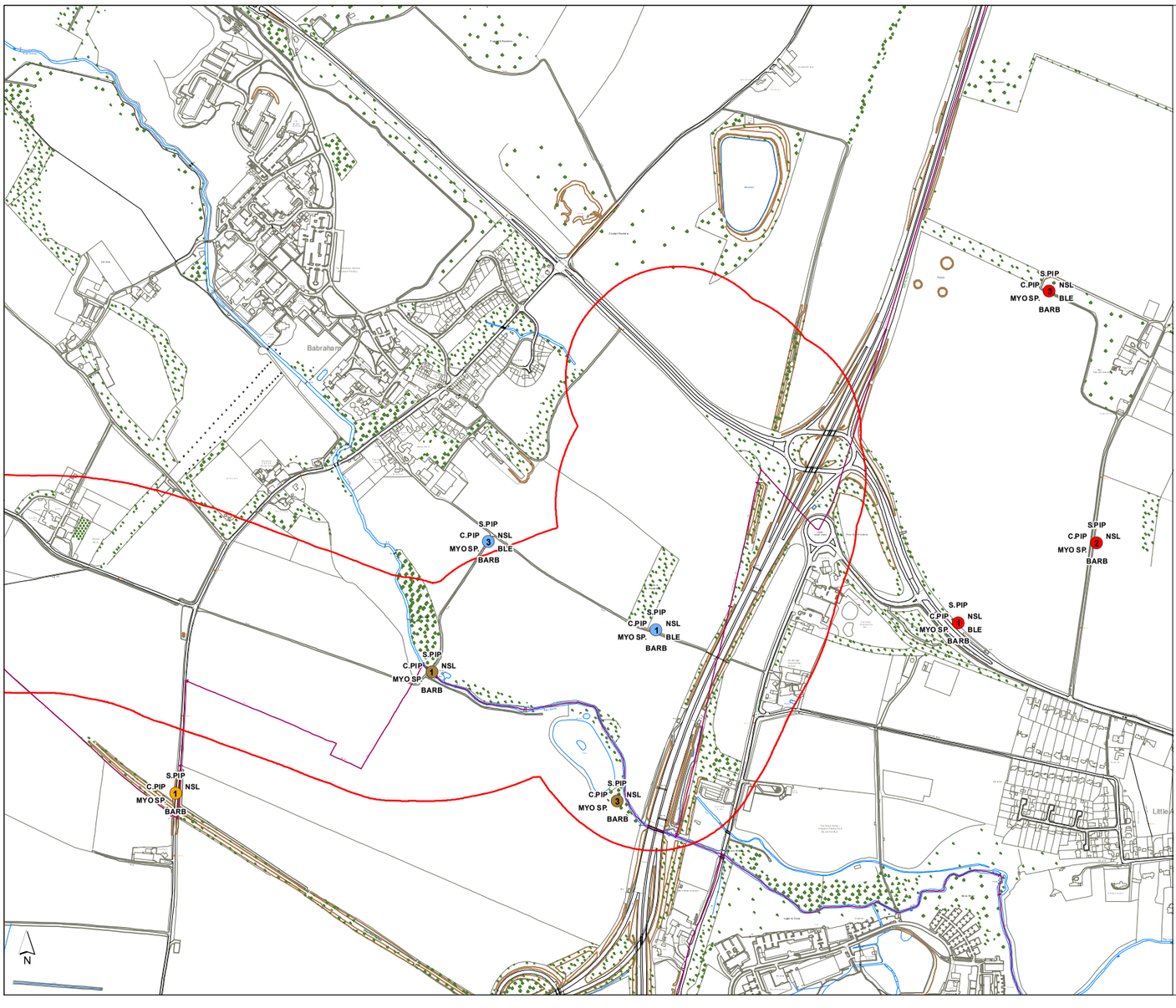
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Project No: CS101272
Date: 04/11/2021

Drawing Identifier
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Revision: P01.1

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Plot date: 04/11/2021



KEY:

Survey Area

Static Detector locations

- Transect 1
- Transect 2
- Transect 3
- Transect 4
- Transect 5
- Transect 6
- Transect 7

SPECIES
BARB – Barbastelle
C.PIP – Common pipistrelle
S.PIP – Soprano pipistrelle
NSL – Noctule/Serotine/Leislers
MYO SP. – Myotis species
BLE. – Brown Long-eared
N.PIP – Nathusius' pipistrelle

Rev.	Drawn	Chk'd	App'd	Description	Date
01.1	SH	MJ	TB	Created	04/11/2021

Purpose of Issue
S2 - Issued for Information

Classification
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Client
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Project
CSET

Drawing
CSET Static detector locations - Species
Plan 1 of 3

Scale @ A3	Drawn	Checked	Approved
1:8,500	SH	MJ	TB

Project No
CS101272

Date
04/11/2021

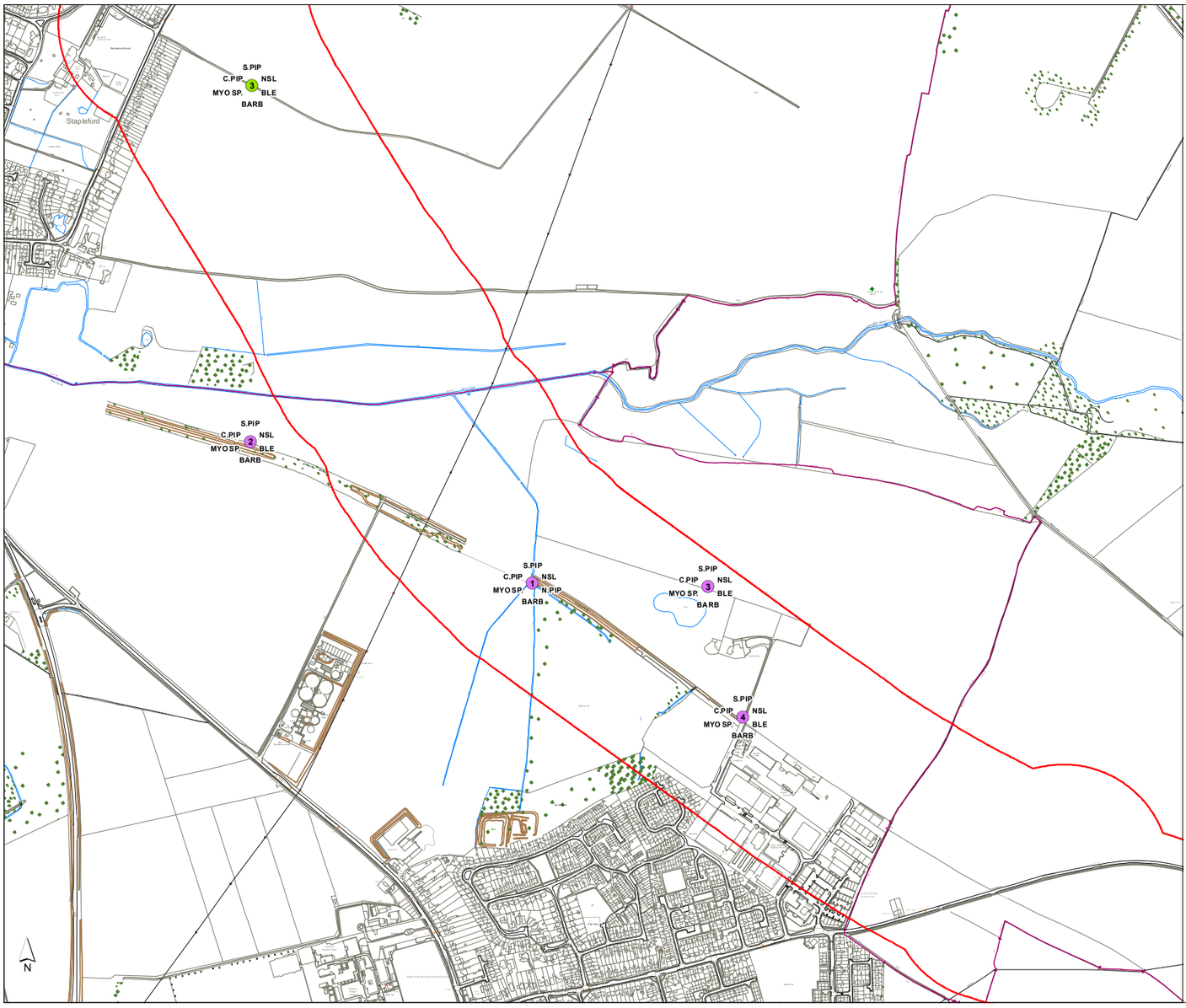
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Project - Originator - Zone - Level - FileType - Role - Number

Revision
P01.1

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Plot date: 04/11/2021



KEY:

Survey Area

Static Detector locations

- Transect 1
- Transect 2
- Transect 3
- Transect 4
- Transect 5
- Transect 6
- Transect 7

SPECIES
BARB – Barbastelle
C.PIP – Common pipistrelle
S.PIP – Soprano pipistrelle
NSL – Noctule/Serotine/Leislers
MYO SP. – Myotis species
BLE. – Brown Long-eared
N.PIP – Nathusius' pipistrelle

Rev.	Drawn	Chk'd	App'd	Description	Date
01.1	SH	MJ	TB	Created	04/11/2021

Purpose of Issue
S2 - Issued for Information

Classification
Confidential

Client
GCP

Project
CSET

Drawing
CSET Static detector locations - Species
Plan 2 of 3

Scale @ A3	Drawn	Checked	Approved
1:8,500	SH	MJ	TB

Project No
CS101272

Date
04/11/2021

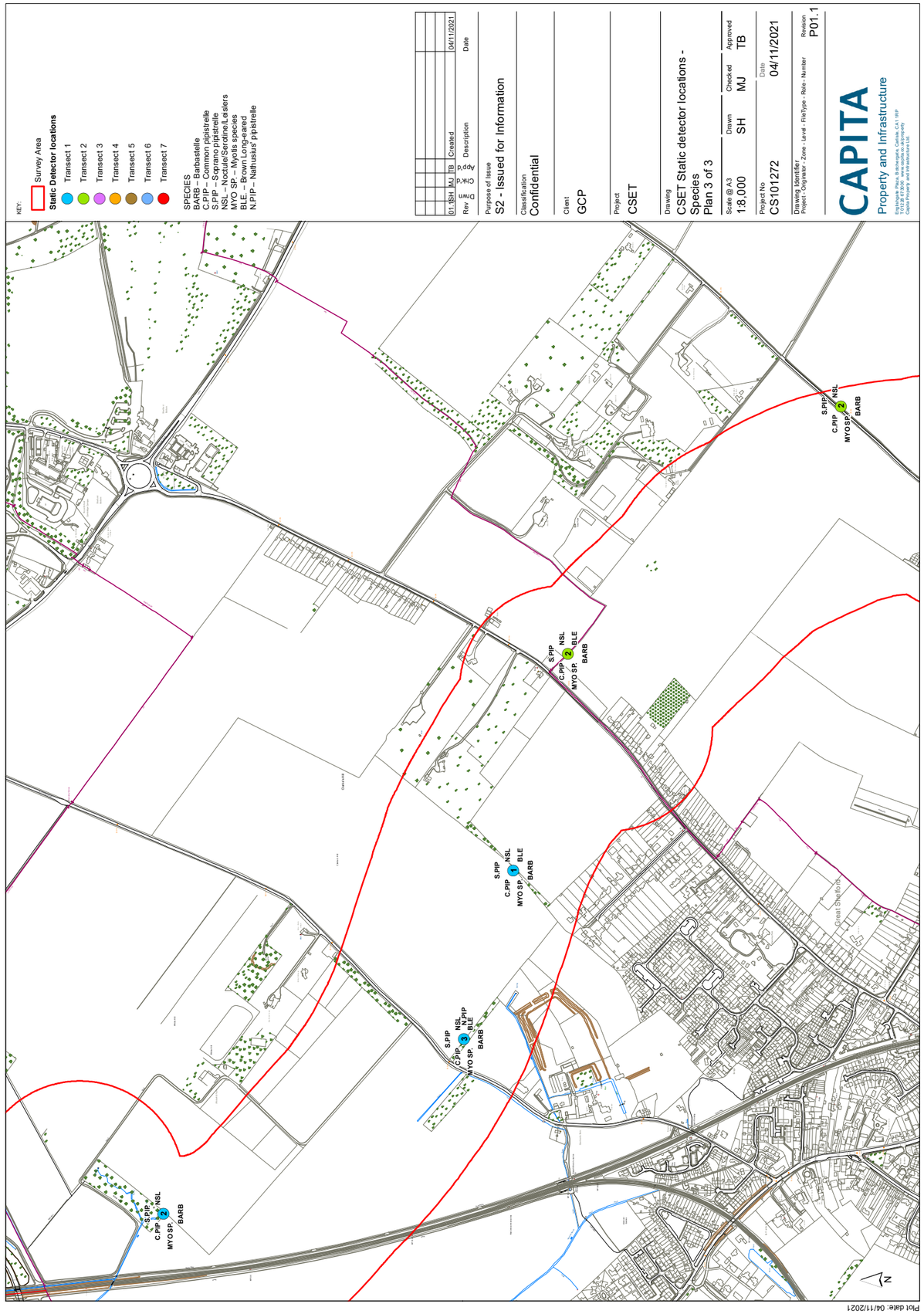
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Project - Originator - Zone - Level - FileType - Role - Number

Revision
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Appendix B – Static Deployment Dates

Table 6: April Static Deployment Dates

Static Detector ID	Date of Deployment	Date of Collection
Transect 1 – Static 1	07/04/2021	20/04/2021
Transect 1 – Static 2	07/04/2021	20/04/2021
Transect 1 – Static 3	07/04/2021	20/04/2021
Transect 2 – Static 1	07/04/2021	20/04/2021
Transect 2 – Static 2	07/04/2021	20/04/2021
Transect 2 – Static 3	07/04/2021	20/04/2021
Transect 3 – Static 1	07/04/2021	20/04/2021
Transect 3 – Static 2	07/04/2021	20/04/2021
Transect 3 – Static 3	07/04/2021	20/04/2021
Transect 4 – Static 1	20/04/2021	30/04/2021
Transect 5 – Static 1	20/04/2021	30/04/2021
Transect 5 – Static 3	20/04/2021	30/04/2021
Transect 6 – Static 2	20/04/2021	30/04/2021
Transect 6 – Static 3	20/04/2021	30/04/2021
Transect 7 – Static 1	20/04/2021	30/04/2021
Transect 7 – Static 2	20/04/2021	30/04/2021
Transect 7 – Static 3	20/04/2021	30/04/2021

Table 7: May Static Deployment Dates

Static Detector ID	Date of Deployment	Date of Collection
Transect 1 – Static 1	11/05/2021	17/05/2021
Transect 1 – Static 2	11/05/2021	17/05/2021
Transect 1 – Static 3	11/05/2021	17/05/2021
Transect 2 – Static 1	11/05/2021	17/05/2021
Transect 2 – Static 2	11/05/2021	17/05/2021
Transect 2 – Static 3	11/05/2021	17/05/2021
Transect 3 – Static 1	11/05/2021	17/05/2021
Transect 3 – Static 2	11/05/2021	17/05/2021
Transect 3 – Static 3	11/05/2021	17/05/2021
Transect 4 – Static 1	18/05/2021	24/05/2021
Transect 5 – Static 1	18/05/2021	24/05/2021
Transect 5 – Static 3	18/05/2021	24/05/2021
Transect 6 – Static 2	18/05/2021	24/05/2021
Transect 6 – Static 3	18/05/2021	24/05/2021
Transect 7 – Static 1	18/05/2021	24/05/2021
Transect 7 – Static 2	18/05/2021	24/05/2021
Transect 7 – Static 3	18/05/2021	24/05/2021

Table 8: June Static Deployment Dates

Static Detector ID	Date of Deployment	Date of Collection
Transect 1 – Static 1	08/06/2021	14/06/2021
Transect 1 – Static 2	08/06/2021	14/06/2021
Transect 1 – Static 3	08/06/2021	14/06/2021
Transect 2 – Static 1	08/06/2021	14/06/2021
Transect 2 – Static 2	08/06/2021	14/06/2021
Transect 2 – Static 3	08/06/2021	14/06/2021
Transect 3 – Static 1	08/06/2021	14/06/2021
Transect 3 – Static 2	08/06/2021	14/06/2021
Transect 3 – Static 3	08/06/2021	14/06/2021
Transect 4 – Static 1	15/06/2021	22/06/2021

Static Detector ID	Date of Deployment	Date of Collection
Transect 5 – Static 1	15/06/2021	22/06/2021
Transect 5 – Static 3	15/06/2021	22/06/2021
Transect 6 – Static 2	15/06/2021	22/06/2021
Transect 6 – Static 3	22/06/2021	29/06/2021
Transect 7 – Static 1	15/06/2021	22/06/2021
Transect 7 – Static 2	15/06/2021	22/06/2021
Transect 7 – Static 3	15/06/2021	22/06/2021

Table 9: July Static Deployment Dates

Static Detector ID	Date of Deployment	Date of Collection
Transect 1 – Static 1	14/07/2021	19/07/2021
Transect 1 – Static 2	14/07/2021	19/07/2021
Transect 1 – Static 3	14/07/2021	19/07/2021
Transect 2 – Static 1	14/07/2021	19/07/2021
Transect 2 – Static 2	14/07/2021	19/07/2021
Transect 2 – Static 3	14/07/2021	19/07/2021
Transect 3 – Static 1	14/07/2021	19/07/2021
Transect 3 – Static 2	14/07/2021	19/07/2021
Transect 3 – Static 3	14/07/2021	19/07/2021
Transect 4 – Static 1	20/07/2021	27/07/2021
Transect 4 – Static 2	20/07/2021	27/07/2021
Transect 4 – Static 3	20/07/2021	27/07/2021
Transect 5 – Static 1	20/07/2021	27/07/2021
Transect 5 – Static 2	20/07/2021	27/07/2021
Transect 5 – Static 3	20/07/2021	27/07/2021
Transect 6 – Static 1	20/07/2021	27/07/2021
Transect 6 – Static 2	20/07/2021	27/07/2021
Transect 6 – Static 3	20/07/2021	27/07/2021
Transect 7 – Static 1	20/07/2021	27/07/2021
Transect 7 – Static 2	20/07/2021	27/07/2021
Transect 7 – Static 3	20/07/2021	27/07/2021

Table 10: August Static Deployment Dates

Static Detector ID	Date of Deployment	Date of Collection
Transect 1 – Static 1	03/08/2021	16/08/2021
Transect 1 – Static 2	03/08/2021	16/08/2021
Transect 1 – Static 3	03/08/2021	16/08/2021
Transect 2 – Static 1	03/08/2021	16/08/2021
Transect 2 – Static 2	03/08/2021	16/08/2021
Transect 2 – Static 3	03/08/2021	16/08/2021
Transect 3 – Static 1	03/08/2021	16/08/2021
Transect 3 – Static 2	03/08/2021	16/08/2021
Transect 3 – Static 3	03/08/2021	16/08/2021
Transect 3 – Static 4	17/08/2021	24/08/2021
Transect 4 – Static 1	17/08/2021	24/08/2021
Transect 4 – Static 2	17/08/2021	24/08/2021
Transect 4 – Static 3	17/08/2021	24/08/2021
Transect 5 – Static 1	17/08/2021	24/08/2021
Transect 5 – Static 2	17/08/2021	24/08/2021
Transect 5 – Static 3	17/08/2021	24/08/2021
Transect 6 – Static 1	17/08/2021	24/08/2021
Transect 6 – Static 2	17/08/2021	24/08/2021
Transect 6 – Static 3	17/08/2021	24/08/2021

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Static Detector ID	Date of Deployment	Date of Collection
Transect 7 – Static 1	17/08/2021	24/08/2021
Transect 7 – Static 2	17/08/2021	24/08/2021
Transect 7 – Static 3	17/08/2021	24/08/2021

Table 11: September Deployment Static Dates

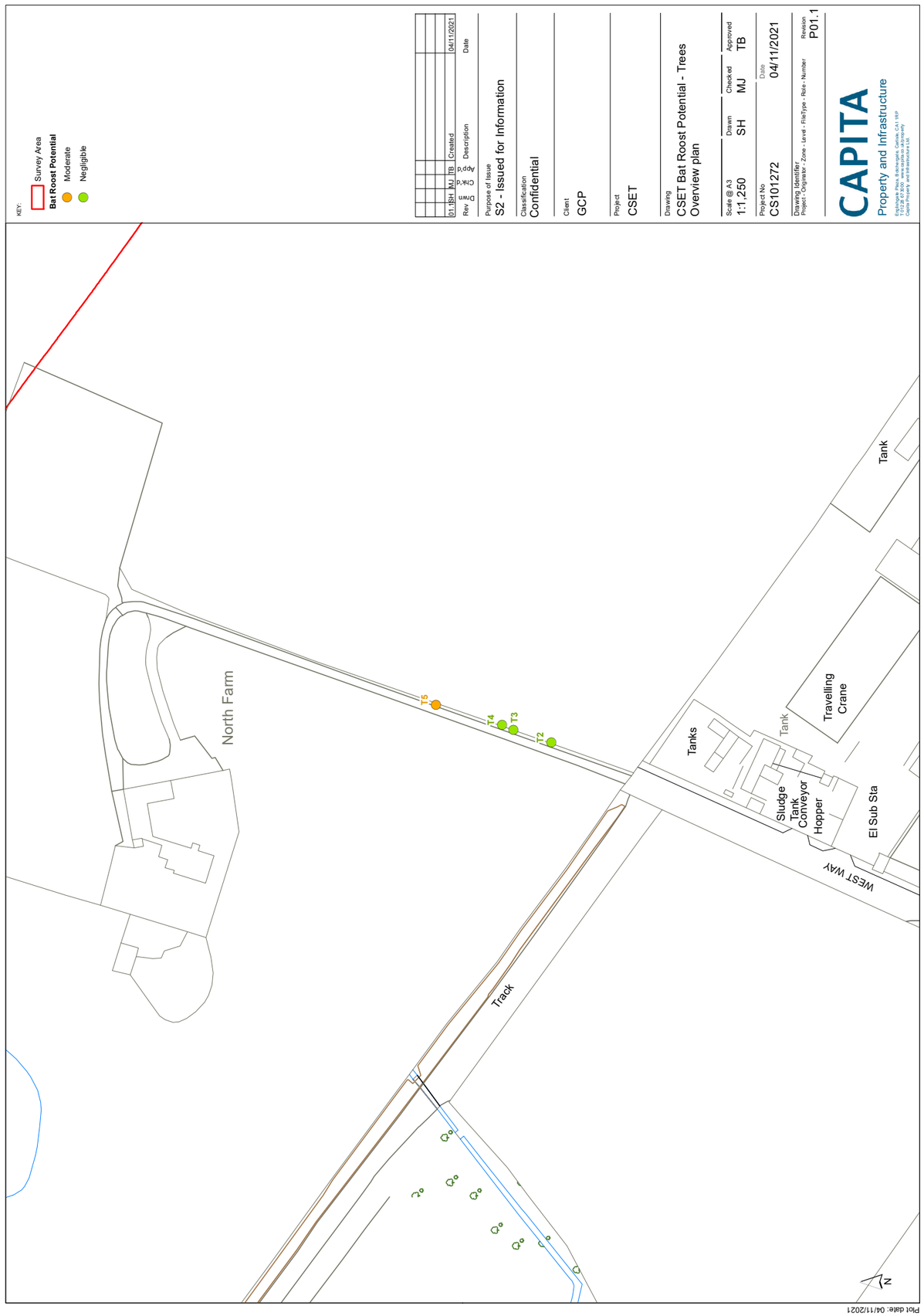
Static Detector ID	Date of Deployment	Date of Collection
Transect 1 – Static 1	01/09/2021	06/09/2021
Transect 1 – Static 2	01/09/2021	06/09/2021
Transect 1 – Static 3	01/09/2021	06/09/2021
Transect 2 – Static 1	01/09/2021	06/09/2021
Transect 2 – Static 2	01/09/2021	06/09/2021
Transect 2 – Static 3	01/09/2021	06/09/2021
Transect 3 – Static 1	01/09/2021	06/09/2021
Transect 3 – Static 2	01/09/2021	06/09/2021
Transect 3 – Static 3	01/09/2021	06/09/2021
Transect 3 – Static 4	07/09/2021	14/09/2021
Transect 4 – Static 1	07/09/2021	14/09/2021
Transect 4 – Static 2	07/09/2021	14/09/2021
Transect 4 – Static 3	07/09/2021	14/09/2021
Transect 5 – Static 1	07/09/2021	14/09/2021
Transect 5 – Static 2	07/09/2021	14/09/2021
Transect 5 – Static 3	07/09/2021	14/09/2021
Transect 6 – Static 1	07/09/2021	14/09/2021
Transect 6 – Static 2	07/09/2021	14/09/2021
Transect 6 – Static 3	07/09/2021	14/09/2021
Transect 7 – Static 1	07/09/2021	14/09/2021
Transect 7 – Static 2	07/09/2021	14/09/2021
Transect 7 – Static 3	07/09/2021	14/09/2021

Table 12: October Static Deployment Dates

Static Detector ID	Date of Deployment	Date of Collection
Transect 1 – Static 1	05/10/2021	11/10/2021
Transect 1 – Static 2	05/10/2021	11/10/2021
Transect 1 – Static 3	11/10/2021	19/10/2021
Transect 2 – Static 1	05/10/2021	11/10/2021
Transect 2 – Static 2	05/10/2021	11/10/2021
Transect 2 – Static 3	05/10/2021	11/10/2021
Transect 3 – Static 1	05/10/2021	11/10/2021
Transect 3 – Static 2	05/10/2021	11/10/2021
Transect 3 – Static 3	05/10/2021	11/10/2021
Transect 3 – Static 4	12/10/2021	19/10/2021
Transect 4 – Static 1	12/10/2021	19/10/2021
Transect 4 – Static 2	12/10/2021	19/10/2021
Transect 4 – Static 3	12/10/2021	19/10/2021
Transect 5 – Static 1	12/10/2021	19/10/2021
Transect 5 – Static 2	12/10/2021	19/10/2021
Transect 5 – Static 3	12/10/2021	19/10/2021
Transect 6 – Static 1	12/10/2021	19/10/2021
Transect 6 – Static 2	12/10/2021	19/10/2021
Transect 6 – Static 3	12/10/2021	19/10/2021
Transect 7 – Static 1	12/10/2021	19/10/2021

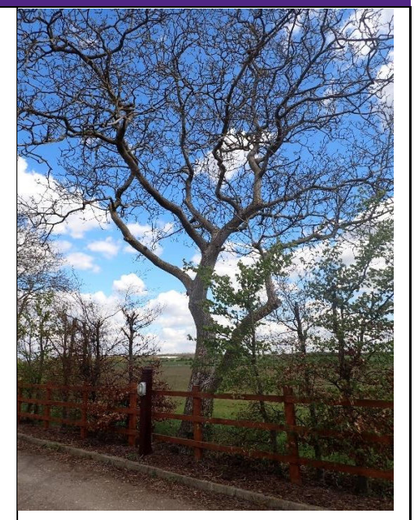
Static Detector ID	Date of Deployment	Date of Collection
Transect 7 – Static 2	12/10/2021	19/10/2021
Transect 7 – Static 3	12/10/2021	19/10/2021

Appendix C - Tree Location Map



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Appendix D - Tree Reference Photos

Tree ID	Grid Reference	Tree species and condition	Overall assessment of roosting potential	Photo
T2	TL 49175 50501	Walnut	Negligible	
T3	TL 49181 50516	Walnut	Negligible	

Tree ID	Grid Reference	Tree species and condition	Overall assessment of roosting potential	Photo
T4	TL 49178 50520	Walnut	Negligible	
T5	TL 49181 50546	Walnut	Moderate	

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Greater Cambridge Partnership

Cambridge South East Transport (CSET) Phase 2

Summer Bat Survey Report



December 2022

Public

Greater Cambridge Partnership

Cambridge South East Transport (CSET) Phase 2

Summer Bat Survey Report

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1

Summary

1 Summary

WSP Real Estate & Infrastructure's (WSP RE&I) Ecologists were commissioned by the Greater Cambridge Partnership (GCP) to undertake studies for bats in relation to the development of the Cambridge South East Transport (CSET) Phase 2.

The surveys have been carried out in 2022 to provide an update of baseline ecological information carried out initially in 2020 and 2021. CSET is now moving forward towards planning submission and update surveys have been commissioned to supplement baseline information with an update from surveys carried out in 2022.

This report describes the methods and results of Preliminary Roost Assessment (PRA) surveys for buildings, ground-level tree assessments, as well as transect surveys and the deployment of static detectors conducted between August and October 2022. These have been carried out to provide additional information on how bats, in particularly barbastelle *Barbastella barbastellus*, are distributed across the Scheme, to inform the design and environmental assessment of the proposals.

Nine of the 12 buildings surveyed in 2020 and within close proximity to the Scheme, were assessed as having 'Negligible' potential to support roosting bats as there were no potential roost features which would support roosting bats and no evidence of bat presence was found during the survey. No further surveys are required. In the unlikely event that bats are found during the works, these must stop immediately, and a bat licensed ecologist be contacted straight away to advise on the management of the scheme and the need for licensing to be in place. The remaining three buildings are residential dwellings on Sawston Road where no access was permitted; therefore, these are categorised as 'Unknown'.

Of the 39 trees surveyed, two were assessed as high and 13 as moderate potential for supporting roosting bats. These trees will require emergence and re-entry surveys to be carried out on them between April to August.

The static detector deployment recorded six species/groups of bat, consisting of barbastelle, common pipistrelle *Pipistrellus pipistrellus*, soprano pipistrelle *Pipistrellus pygmaeus*, noctule *Nyctalus noctula*/serotine *Eptesicus serotinus*/Leisler's *Nyctalus leisleri* (NSL), *Myotis* species *Myotis spp.* and brown long-eared *Plecotus auritus* (BLE).

Barbastelle bats were recorded at all 18 static detector location points.

Barbastelle, common pipistrelle, soprano pipistrelle, noctule/serotine/Leisler's (NSL[1]), brown long-eared bats and, *Myotis* bat species were recorded during the transect surveys.

The farmland, riparian, woodland, and suburban habitats across the survey area provides a range of foraging, commuting and roosting opportunities for bat species.

A series of recommendations are provided in Section 5 of this report that, if adopted, would ensure negative impacts to biodiversity are avoided or limited and the development is managed in line with legislation protecting habitats and species and incorporates positive conservation and enhancement as required to achieve sustainable developments.

[1] A widely used grouping of bat calls for large bats whose calls can overlap in sound analysis

2

Introduction

Public

2 Introduction

2.1 Background

WSP Real Estate & Infrastructure's (WSP RE&I) Ecologists were commissioned by the Greater Cambridge Partnership (GCP) in July 2022 to undertake a series of bat surveys. These surveys were undertaken in relation to the development of the Cambridge South East Transport scheme.

The aim of this bat survey report is to summarise the results of the baseline Preliminary Roost Assessments for buildings, trees and bat activity surveys conducted between August and October 2022 to inform the design of the Scheme. These surveys are required to update surveys undertaken in 2020 and 2021.

2.2 Project Description and Purpose of the Scheme

The Cambridge South East Transport (CSET) aims to create a vital link to ease congestion, offer sustainable travel choices, connect communities, and support growth in the South East of Cambridge. CSET will form part of the Cambridgeshire Autonomous Metro, providing high quality, frequent and affordable public transport.

CSET Phase 2 comprises a segregated public transport route from the A11 (near Babraham) to the Cambridge Biomedical Campus (CBC). This bus route would include new walking, cycling and equestrian links.

2.3 Legislation and Policy

Bats receive protection in the UK as a result of both legislation and planning policies. This section outlines the primary legislation protecting bats. All the information below is relevant to this report and to the work proposed at the development site.

2.3.1 Legislation

Conservation of Habitats and Species Regulations 2017 (as amended)

Bats are protected under Annex II of the EC Council Directive 92/43/EEC 1992 "Conservation of Natural Habitats and Wild Fauna and Flora" (the Habitats Directive) as a European Protected Species (EPS). This legislation has been transposed into UK legislation through the Conservation of Habitats and Species Regulations 2018.

Regulation 43 of the Conservation of Habitats and Species Regulations 2017 (as amended) makes it an offence to:

- Deliberately capture, injure, or kill bats
- Deliberately disturb bats, or

- Damage or destroy a breeding site or resting place of a bat; this applies whether bats are present or not. NB - breeding sites and resting places are generally referred to as roosts.

Purpose of the Legislation

The purpose of the legislation is to maintain and restore bat populations within their natural range. This implies that the habitats on which they rely, and the ecology of their life cycles should not be compromised by human activities. Where activities have the potential to compromise bat populations, measures are required to be put in place to avoid impacts or compensate and mitigate for those impacts.

Wildlife & Countryside Act 1981 (as amended)

In addition to the above protection, all bat species in the UK are protected under Schedule 5 of the Wildlife & Countryside Act 1981 (as amended). In addition to the above, it lists the following as additional offences:

- Disturbance of an animal whilst it is occupying a place which it uses for shelter or protection. NB - places of shelter or protection are generally referred to as roosts
- Obstruct access to any structure or place which an animal uses for shelter or protection.

In order to permit a development where the above offences are likely to be committed a European Protected Species Licence can be obtained from Natural England where appropriate mitigation is offered to offset the negative impacts to local bat populations.

Natural Environment and Rural Communities (NERC) Act 2006

Section 40 of NERC Act 2006 places a statutory duty on public bodies, such as local authorities, that “every public body must, in exercising its functions have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity”.

2.3.2 Planning Policy

National Planning Policy

National Planning Policy is set out by the National Planning Policy Framework (Ministry of Housing, Communities & Local Government, July 2021).

Biodiversity net gains are referenced strongly in terms of developing local planning policy and decision-making for development applications. The environmental test of sustainable development requires planning policy and planning decisions to help to ‘improve biodiversity’ (paragraph 8c).

References to biodiversity net gain elsewhere in the new NPPF (such as paragraph 174d) support the delivery of biodiversity net gain through sustainable development. Net gain for biodiversity is far more prominent than in the previous NPPF and considers a holistic landscape approach to protect, and enhance biodiversity promoting conservation, restoration and enhancement of Priority Habitats (also listed as Habitats of Principal Importance) identified under the NERC Act 2006), ecological networks and the protection and recovery of Priority Species (also listed as Species of Principal Importance) identified under the NERC Act 2006). The NPPF includes requirements for planning authorities to identifying and pursuing opportunities for securing measurable net gains for biodiversity (paragraph 179b).

Protected sites and species are a material consideration in determining planning applications and therefore all information relating to protected sites and species must be submitted with planning submissions for determination of the whole application. The NPPF (paragraph 180) which promotes Local Planning Authorities to assess if significant harm would occur to biodiversity and decide accordingly.

2.3.3 Biodiversity Policy

Section 41 of the NERC Act requires the Secretary of State to draw up a list of Habitats and Species of Principal Importance which should be used to guide decision-makers (which include local authorities) in implementing their duty under Section 40. Several species of bat (listed below) are considered Species of Principal Importance, an important factor when considering proposed developments, in accordance with the NERC Act 2006.

- Soprano pipistrelle *Pipistrellus pygmaeus*
- Brown long-eared *Plecotus auritus*
- Barbastelle *Barbastella barbastellus*
- Bechstein’s *Myotis bechsteinii*
- Noctule *Nyctalus noctula*
- Greater horseshoe *Rhinolophus ferrumequinum*
- Lesser horseshoe *Rhinolophus hipposideros.*

Local Biodiversity Policies

Under the Cambridgeshire and Peterborough Biodiversity Group, four species of bat are recognised as a Local Biodiversity Action Plan (LBAP) Priority Species.

- Soprano pipistrelle
- Brown long-eared bat
- Barbastelle
- Noctule.

2.4 Personnel and Quality Assurance

All ecologists employed by WSP RE&I adopt best practice working methods including the Chartered Institute of Ecology and Environmental Management's (CIEEM) code of professional and all fieldwork is carried out in accordance with current best practice guidelines and under the supervision of senior staff and appropriately licensed ecologists.

The surveys were led by Ecologist, Mark Johnson and assisted by Assistant Ecologist, Tom Norman and Associate Arboriculturist, Gareth Meadows. Surveyors are referred to by their initials in subsequent tables.

Mark Johnson is an Ecologist with five years' experience and is a competent field surveyor. He previously undertook the bat surveys on CSET (2020 and 2021), as well as radio tracking and activity surveys on HS2 and Preliminary Roost Assessments (PRAs) for a range of projects. He has also gained endoscope survey training experience with his local bat group (BrumBats) and is an accredited agent on a Level 2 Natural England Class Licence.

Tom Norman is an Assistant Ecologist with four years' experience as a bat surveyor. He has previously assisted with activity surveys such as emergence/re-entry and transects, as well as static detector deployment on HS2 and on behalf of Highways England.

3

Methodology

3 Methodology

3.1 Survey and Report Objectives

The surveys and report were carried out to fulfil the following objectives:

1. To identify any features on site with the potential to support bats.
2. To identify any evidence of usage of the site by bats.
3. To provide data to inform an assessment of the importance of the site for bats and bat conservation, in particularly barbastelle.

3.2 Data Search

A local records search was obtained from the Cambridgeshire and Peterborough Environmental Records Centre (CPERC) in October 2022 to obtain information on protected or notable species within a 5 km radius of the alignment. This updated the previous data search obtained in 2020.

3.3 Field Survey

3.3.1 Preliminary Roost Assessment Inspection - Buildings

The external inspection survey of the 12 buildings (where access was possible) was undertaken on 15 August 2022 following standard Bat Conservation Trust (BCT) survey guidance (Collins, 2016). Weather conditions on the 15 August were warm (22°C to 30°C) with some periods of intermittent drizzle. A gentle breeze was present throughout the survey (Beaufort scale Force 3). The exterior of the buildings was searched from the ground using a high-powered torch and close-focusing binoculars (where necessary) for:

- Features which could provide bats with access into roosting spaces or provide roosting spaces (such as gaps under roofing tiles, gaps in ridge tiles, gaps in soffit boxes, gaps under lead flashing and cracks and crevices in the stonework); and
- Evidence of the presence of bats such as bat droppings on windows, windowsills, walls and the ground, or scratch marks or staining from bat's fur around possible roost access/egress points.

The building was then assigned a category defining their likelihood to support roosting bats in accordance with Table 3-1 below.

Table 3-1 – Categories of Bat Roosting Suitability of Buildings (adapted from Collins, 2016)

Level of Bat Roosting Suitability	Rationale
Negligible	A structure with no or very limited roosting opportunities for bats and no evidence of use by bats and where the feature is isolated from foraging habitat.
Low	A structure with one or more potential roost sites that could be used by bats opportunistically. However, these potential roost sites do not provide enough space, shelter, protection, appropriate conditions (temperature, humidity etc) and/or suitable surrounding habitat to be used on a regular basis by a larger number of bats (i.e. unlikely to be suitable for maternity or hibernation).
Moderate	A structure 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 of high conservation status (with respect to roost type only i.e. maternity or hibernation roosts).
High	A structure with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions, and surrounding habitat.
Confirmed	Presence of bats or evidence of recent use by bats.

The building numbers used in this report were the same as those assigned in previous reports for ease of reference and to avoid future confusion.

3.3.2 Ground-Level Tree Assessments

An assessment of the likelihood for trees to provide roosting opportunities for bats was also conducted in accordance with current bat survey Good Practice Guidance (Collins, 2016) in August 2022.

The 39 trees were inspected from the ground using binoculars and a high-powered torch as necessary. The following information was recorded for each tree (as required).

- Species of tree
- Description of the tree; and

- A description of any feature(s) with suitability to support roosting bats such as woodpecker holes, rot holes, splits or cracks, dead limbs, ivy cover and/or flaking bark.

Evidence of the use of these features by bats, such as characteristic staining, scratch marks and droppings, was searched for around suitable features, with specific provision for bats (i.e. bat boxes), where present, also recorded.

The Bat Conservation Trust has developed a survey protocol (Collins, 2016) which categorises the suitability for trees to support roosting bats. Using the categories detailed below, an assessment was made of the suitability for each tree/group of trees included within the survey to support roosting bats:

- **Known or Confirmed Roost**: Confirmed bat roost with field evidence of the presence of bats (trees where bat(s), and/or clear evidence of bat use, were found to be present).
- **High Suitability**: Trees with multiple highly suitable features capable of supporting larger roosts.
- **Moderate Suitability**: Trees with definite bat suitability supporting fewer features than high suitability trees.
- **Low Suitability**: Trees with no obvious suitability although the tree is of a size and age that elevated surveys may result in cracks or crevices being found; or the tree supports some features which may have limited suitability to support bats.
- **Negligible Suitability**: Trees with no suitability to support bat roosts (trees with no obvious features with suitability to support a bat roost).

3.3.3 Transect Surveys

Transect Survey Methodology

This report documents the transect surveys conducted in August, September and October 2022. Surveys were undertaken in accordance to BCT guidelines for a site with low/moderate habitat suitability for bats.

Dusk transects commenced at sunset and ended approximately two hours after sunset. Two surveyors walked the predetermined route at a slow, constant speed whist recording observations of bats such as the species, number of bats, location, direction of flight, behaviour and flight height (where bats were clearly visible). Stopping points were implemented at regular intervals along the route at key areas of habitat (shown in Appendix A). Surveyors stopped for five minutes at each stopping point and observed bat activity from a stationary location. The transect direction was reversed for each survey and the starting point was varied.

Anabat Walkabout bat detectors were used to record full-spectrum bat calls. A summary of the survey dates is shown in Table 3-2. Surveys were carried out in appropriate weather conditions and timings, detailed in the Appendix B.

Table 3-2 – Transect Survey Date Summary

Transect number	Month	Date
1	August	08/08/22
	September	01/09/22
	October	05/10/22
2	August	10/08/22
	September	05/09/22
	October	10/10/22
3	August	15/08/22
	September	07/09/22
	October	12/10/22
4	August	17/08/22
	September	08/09/22
	October	17/10/22
5	August	18/08/22
	September	12/09/22
	October	26/10/22
6	August	23/08/22
	September	15/09/22
	October	27/10/22
7	August	31/08/22
	September	20/09/22
	October	20/10/22

Transect Evaluation

Transect Data

Transect sound data was analysed for bat calls using Anabat Insight (version 2.0.6-3-g73846db). All sound files were auto identified using the Bat Classify algorithm in Anabat Insight. A minimum of 10% of files identified as noise by Bat Classify (i.e. those that fell under a 70% probability of being a bat) were manually checked by an experienced ecologist. Calls of rarer bat species, or which were queried by the first checker, were quality assured by a second bat ecologist. Manually checking auto-identification follows best-practice, outlined in (Rydell et al, 2017)[2] and (BCT, 2016).

Species from the *Myotis* genus of bats produce frequency modulated calls with overlapping call parameters and cannot be reliably distinguished to species level on call alone. As such, *Myotis* calls are identified to genus level only.

Bats of the *Nyctalus* and *Eptesicus* genus produce calls with overlapping call parameters, except in open environments. The two *Nyctalus* species found in this region; noctule and Leisler's and the single *Eptesicus* species found in this region; serotine, were therefore grouped together, except where the call could be clearly distinguished as noctule or serotine.

Occasionally, soprano and common pipistrelle calls overlapped, and these calls were identified as *Pipistrellus sp*.

Heat Maps

Geo-referenced sound files were combined with manually mapped non-echolocating bat records from the field surveys, totalling 898 bat data points, to create a heatmap which illustrates the intensity of bat activity for the period August and October 2022.

The kernel density algorithm in QGIS 3.16.4 was used to generate the heatmap with the number of bat data points (kernels) within a 471m radius defining the intensity of bat activity. This was illustrated using seven colour categories, ranging from red (most intense) to green (least intense).

[2] Rydell, J., Nyman, S., Eklöf, J., Jones, G & Russo, D. (2017) Testing the performances of automated identification of bat echolocation calls: A request for prudence. Ecological Indicators 78, pp416-420.

The 471m search radius is the optimal bandwidth for this dataset, calculated using the optimal band with (hopt) equation, as described in (Fotheringham et al, 2000)3 : hopt = [2/3n]1/4σ, where n = 898 data points, and σ = 2856m standard distance4. Additional parameters applied to the kernel density algorithm are a quartic kernel, and a quantile data classification. The selected parameters are considered best fit to the bat point data, following trials with the dataset.

General bat flight lines, behaviour and flight height were also mapped from the transect surveys which, combined with intensity of bat activity (the heatmap), has been used to assess the risk to bats across the scheme.

ESRI's ArcGIS Online World Imagery has been used as the heatmap and other maps satellite base mapping.

3.3.4 Static Detector Surveys

Eighteen static bat detectors (Anabat Swift) were deployed for five consecutive nights once a month in August to October 2022, in the same locations as those used in 2020, with Transect 1 Static 4 added following North Farm access in 2021. These were split into two groups. Transect 1, 2, 3 were deployed together one week, followed by Transects 4, 5, 6 and 7 deployed the following week. Static deployment dates can be found in Appendix C.

Detectors recorded full spectrum sound files from half an hour before sunset to half an hour after sunrise. The sound files were then analysed using Anabat Insight software to identify the species present and indicate the level of bat activity at each deployment location.

Acoustic analysis was completed using the following workflow:

- All sound files were run through the auto-ID plugin BatClassify at a tag certainty threshold of 75%.
- All files labelled as barbastelle, NSL (noctule, serotine, Leisler's), brown long-eared bat and any of the *Myotis* species were manually checked.
- 10% of common pipistrelle, soprano pipistrelle and undetermined pipistrelle species were manually checked or, if they numbered less than 50, all were manually checked.

[3] Fotheringham, A.S., C. Brunsdon, & M. Charlton. (2000) Quantitative Geography: Perspectives on Spatial Data Analysis. Sage Publications Ltd, 2000

[4] Standard distance is a measure of overall dispersion around the mean centre (the mean latitude and longitude coordinates of the dataset). This calculated using the spatial point pattern analysis function in QGIS 3.16.3.

- 10% of unlabelled (noise) files were manually checked or, if they numbered less than 50, all were manually checked. If a high proportion of these unlabelled noise files contained bat passes, more files were checked.

The following principles were followed during manual acoustic analysis. When calls are identified to species level it is confirmed using call parameters which are characteristic of the species with regards to the location of the static detector in both a regional and habitat context. Certain species produce highly similar calls with overlapping parameters and cannot be reliably distinguished to species level using acoustic analysis alone. When a call cannot be reliably distinguished, it has been labelled as one of a group of possible species.

All calls from a species within the *Myotis* genus have been labelled as *Myotis sp*.

Any calls that are unable to be differentiated between noctule and Leisler's bats have been grouped under the *Nyctalus sp.* label. In certain environments, *Nyctalus* bats cannot be reliably distinguished from serotine bats, in which case these calls have been labelled as NSL (noctule, serotine, Leisler's).

Validating the data through manual checks follows the BCT Good Practice Guidelines (2016). A map showing the location of these static detectors can be found in Appendix D and a description in Table 3-3.

Table 3-3 – Static Detector Locations

Static Detector ID	Static Detector Description	Approximate Grid Reference
Transect 1 – Static 1	Narrow hedge line with mature trees heading south-west to north-east between two arable fields. Static detector pointing in north westerly direction.	TL 46904 53206
Transect 1 – Static 2	Narrow hedge line with trees heading south-west to north-east between two arable fields adjacent to Nine Wells Nature Reserve, within 50 m of a ditch fed by a spring within Nine Wells woodland. Static detector pointing north westerly.	TL 46091 54070
Transect 1 – Static 3	Narrow hedge line with mature trees heading north-west to south-east between two arable fields. Static detector pointing north easterly.	TL 46598 53281
Transect 2 – Static 1	Attached to a tree within a line of trees heading north-east to south-west beside a B-road in between two arable fields with a hedge line on the opposite side of the road. Static detector points easterly.	TL 48049 52433
Transect 2 – Static 2	Positioned at the end of a hedge line north-west to south-east dissecting two arable fields. Detector points westerly.	TL 47439 53106
Transect 2 – Static 3	Positioned at the bottom of a hedge line north-west to south-east dissecting two arable fields. Detector points easterly.	TL 47871 52042
Transect 3 – Static 1	Positioned within a small section of unmanaged arable land, bordered by woodland and open arable fields with a ditch running north to south. Static detector points south easterly.	TL 48676 50819
Transect 3 – Static 2	Positioned on the edge of a strip of woodland heading east to west bordering an arable field. Static facing northerly.	TL 47934 51151
Transect 3 – Static 3	Positioned on the edge of a narrow strip of hedge line with trees heading east to west bordering an arable field to the north. A medium sized waterbody is in the adjacent land parcel to the south. Detector facing north.	TL 49302 50371
Transect 3 – Static 4	Attached to wooden fencing along driveway inside entrance to North Farm site. Adjacent to southern woodland boundary and industrial estate, bordering arable land in the east. Detector pointing west.	TL 49156 50479
Transect 4 – Static 1	Within the corner of a field, with tree lines heading south to north and west to east. Detector facing north easterly.	TL 50708 49418
Transect 4 – Static 2	Unable to deploy securely due to high use public footpath. Alternative locations too close to existing detectors or unsecure.	TL 49429 49951
Transect 4 – Static 3	Unable to deploy securely due to high use public footpath. Alternative locations too close to existing detectors or unsecure.	TL 50406 49996
Transect 5 – Static 1	Positioned on an ash tree on a tree line heading east to west. Bordered to the south by arable fields with a ford and river adjacent to the north of the woodland strip. A mature ash and pine woodland are immediately to the north-west. Detector pointing south.	TL 51318 49707
Transect 5 – Static 2	Unable to deploy securely.	TL 50765 49864
Transect 5 – Static 3	Positioned on a tree within a small section of young plantation trees. Detector facing south with a small man-made reservoir to the north-west and arable fields to the south.	TL 51738 49407

Static Detector ID	Static Detector Description	Approximate Grid Reference
Transect 6 – Static 1	Positioned on a beech tree in a short line of 4 trees within a hedge line heading east to west. Arable fields border the hedge line to the north and south. Detector pointing north.	TL 51849 49807
Transect 6 – Static 2	Unable to deploy securely.	TL 52060 50215
Transect 6 – Static 3	Positioned on a tree within a hedge line with trees heading north-east to south-west. An arable field is to the east and west with a farm track running adjacent to the east. Detector facing east.	TL 51430 49989
Transect 7 – Static 1	Positioned on a tree within a woodland strip heading south-east to north-west, between an arable field and an A Road. Detector facing north easterly.	TL 52570 49824
Transect 7 – Static 2	Positioned on a tree beside a farm track. Farm track heading north to south. Arable fields are adjacent to the east and west. Detector facing west.	TL 52901 50072
Transect 7 – Static 3	Positioned on a tree on the edge of a woodland beside a farm track. Farm track heading east to west. An arable field is adjacent to the south. Detector facing south.	TL 52773 50621

3.4 Limitations and Assumptions

WSP Real Estate & Infrastructure's Ecologists were commissioned by the Greater Cambridge Partnership to undertake studies for bats to inform the CSET Scheme in late July 2022. This meant a delay in starting the surveys until August 2022 due to mobilisation. Due to the timing of our commission, dusk/dawn emergence/re-entry surveys were not able to be carried out on High and Moderate potential trees in 2022. Should project programme allow, these surveys should be conducted in the 2023 survey season.

3.4.1 Static Detectors

It was not possible to deploy four static detectors on every transect route due to security and lack of suitable locations as described in Table 3-10. Due to the number and distribution of the remaining static detectors the impact of this on the survey results is considered negligible and the validity and assumptions of this report are not negatively impacted.

The following static deviations occurred:

- August Transect 1 Static 2, Transect 2 Static 2 and Transect 3 Static 1 - recording error resulted in 5 days' worth of files becoming corrupted and unreadable in the analysis software. This is thought to be due to the extreme hot weather experienced at the time.
- October Transect 5 Static 1 - no recordings of bat species occurred. Device appeared to have malfunctioned and was therefore redeployed in the same month (October) for another week.
- October Transect 5 Static 3 - no recordings of bat species occurred. Device appeared to have malfunctioned and was therefore redeployed in the same month (October) for another week.

These deviations whilst not providing fully comparative data, do not impact the validity and accuracy of the data as sufficient data has been collected during the rest of the season and site to provide a sufficient bat assessment of the site.

3.4.2 Buildings

No access was possible to the internal of buildings and only external assessments were conducted.

There were some constraints with regard to the external assessment of three residential dwellings (B9, B10 and B11) on Sawston Road. No access was possible at the time of survey meaning an assessment of likely roosting suitability was not undertaken on these buildings. These are therefore categorised as 'Unknown' but due to the current route realignment, are now beyond the 50m buffer and are not to be directly affected by the proposals.

3.4.3 Transects

Guidance states that one survey visit per month in appropriate weather conditions for bats, with at least one survey comprising a dusk and pre-dawn within one 24-hour period, is the recommended survey effort for moderate suitability habitats for bats within BCT guidance (2016). However, for health and safety reasons, only dusk surveys were carried out, relative to the surveys conducted in 2020.

4

Results

Public

4 Results

4.1 Desk-Based Study

The local ecological records search included the following notable bat records which have been recorded within 5 km of the alignment.

1. Brown long-eared bat *Plecotus auritus*
2. Common pipistrelle *Pipistrellus pipistrellus*
3. Daubenton's bat *Myotis daubentonii*
4. Leisler's bat *Nyctalus leisleri*
5. Nathusius's pipistrelle *Pipistrellus nathusii*
6. Natterer's bat *Myotis nattereri*
7. Noctule bat *Nyctalus noctula*
8. Serotine *Eptesicus serotinus*
9. Soprano pipistrelle *Pipistrellus pygmaeus*
10. Western barbastelle *Barbastella barbastellus*
11. Whiskered bat *Myotis mystacinus.*

4.2 Preliminary Bat Roost Assessment – Buildings

A total of 12 buildings/structures were inspected and assessed in order to determine their likelihood to support roosting bats. These results are summarised below with the detailed results of the external, where accessible, inspection survey provided in Table 4-1. Their locations are shown in Appendix E and photographs of each of the buildings are provided in Appendix F.

The buildings were classified as having the following levels of roosting suitability:

Table 4-1 – Preliminary Roost Assessment building survey results

Building Number	Grid Reference	Building Type and Description	Roost Potential
B1	TL 46144 54556	Recently built scientific/office building. Well-sealed and of metal/glass construction. External inspected conducted from public right of way. No internal access.	Negligible

Building Number	Grid Reference	Building Type and Description	Roost Potential
B2	TL 49167 50418	Steel structure cement factory. Very dusty, well used and dangerous to inspect or approach.	Negligible
B3	TL 49282 50329	Demolished	Negligible
B4	TL 49283 50358	Demolished	Negligible
B5	TL 49318 50311	Demolished	Negligible
B6	TL 49318 50311	Demolished	Negligible
B7	TL 49448 50253	Single sheet steel structure used as commercial units. External is well maintained, some shutters were open and internally the roof was a single sheet with sections of clear plastic.	Negligible
B8	TL 49432 50226	Single sheet steel structure used as commercial units. External is well maintained, some shutters were open and internally the roof was a single sheet with sections of clear plastic.	Negligible
B9	TL 50397 50062	Residential dwelling – No access and shielded from public view by tall boundary trees and fences/gates.	Unknown
B10	TL 50421 50050	Residential dwelling – No access and shielded from public view by tall boundary trees and fences/gates.	Unknown
B11	TL 50460 50032	Residential dwelling – No access and shielded from public view by tall boundary trees and fences/gates.	Unknown
B12	TL 51346 49707	Wooden shed/pump house. Felt covered roof in reasonable condition, internals housed pumping machinery. No suitable areas for roosting bats.	Negligible

None of the buildings surveyed have any suitability for supporting roosting bats.

Access to B9, B10 and B11 was not permitted. However, the buildings are 50m distance from the current proposed scheme and separated by an existing road. Therefore, no further surveys are required on these buildings with the current design.

4.3 Ground-Level Tree Assessment

The Ground Level Tree Assessment (GLTA) survey identified 15 trees with the suitability to support roosting bats. These included two trees assessed as high (T13, and T18) and 13 trees assessed as having moderate suitability to support bat roosts (T09, T10, T11, T12, T14, T15, T22, T23, T24, T25, T26, T27, and NF05).

The locations of these trees/tree groups are shown in Appendix G with full data for each provided in Appendix H. Photographs of trees with high and moderate levels of suitability are included in Appendix I.

4.4 Transect Surveys

The tables below summarise the bat activity recorded along each route per month.

A transect map summarising bat species distribution and activity, as well as a heatmap summarising the relative intensity of bat activity are provided in Appendix J and K.

Table 4-2 – Transect 1 Survey Results Summary

Month	Summary
August	The species recorded during the August visit at Transect 1 were noctule, NSL, soprano pipistrelle and common pipistrelle with first detection of each species occurring in that order. Most bat passes were common pipistrelle and the activity of all bats were loosely grouped along the hedgerows near to Nine Wells Wood in the north, the hedgerows approaching and adjacent to the gardens near listening point 5 and at listening point 6. The first bat recorded was a noctule heard but not seen at 20:39 over listening stop 4. The first soprano pipistrelle was detected at 21:16 with two foraging passes observed along the hedge near listening point 2, west of Nine Wells Wood. One other soprano pipistrelle pass was heard but not seen near to listening point 1. Two detections of NSL bats were recorded and both were heard and not seen. The first was at 21:17 near to listening point 1 and the second was at the hedgerow leading to listening point 5. The first common pipistrelle was detected at 21:32 with over 10 passes heard but not seen near to Nine Wells Wood. Four foraging passes were observed along the hedgerow leading to listening point 5 and five more foraging passes were observed after listening point 5 flying to and from the nearby gardens.

Month	Summary
	The last detections of the survey were more than 10 common pipistrelle foraging passes observed around a streetlight near listing point 6. Common pipistrelle were recorded frequently throughout the southern section of the transect.
September	The species recorded during the September visit at Transect 1 were soprano pipistrelle, common pipistrelle, and an unidentified large bat i.e. NSL with the first detection of each species occurring in that order. Most of the activity during this visit was detected along the hedgerow between listening points 3 and 4 with noticeably higher activity levels of common pipistrelle compared to the rest of the transect. The first bat recorded was a soprano pipistrelle heard but not seen at 19:56 at listening point 5. Soprano pipistrelle were heard but not seen on eight occasions intermittently for the remainder of the transect. Two clusters of four and five passes were detected along the hedgerow between listening points 3 and 4, the remainder of the occurrences were of one or two passes. The first common pipistrelle was observed and detected at 20:14 foraging along the woodland edge north-west of listening point 6. Common pipistrelle were detected eight more times throughout the remainder of the transect with a minimum of two passes and on one occasion, two bats observed foraging together. Two clusters of over ten common pipistrelle foraging passes were detected along the hedgerow between listening points 3 and 4. A further five passes were heard but not seen over listening point 3. The first NSL bat was detected at 20:15 with three passes heard but not seen near to listening point 6. Two further NSL passes were heard but not seen, one at 21:07 at the north of the transect between listening points 1 and 2, and the last near the end of the survey near to listening point 5.
October	The species recorded during the October visit at Transect 1 were noctule, soprano pipistrelle and common pipistrelle with first detection of each species occurring in that order. Activity was associated with Nine Wells Wood, the hedgerow corner at listening point 3 and the line of trees leading to listening point 5. The first bat recorded was a noctule heard but not seen at 18:47 at the northern end of the transect. Two heard only noctule passes and six foraging passes were observed over near Nine Wells Wood. The first soprano pipistrelle was heard but not seen at 18:59, shortly after listening point 1 at the north end of the transect. Further passes from this species were detected throughout the remainder of the survey on three occasions associated with the hedgerows and boundary trees just south of the centre of the transect, west of static 1.

Month	Summary
	The first common pipistrelle was observed and detected at 19:09, foraging at the hedgerow corner above listening point 3 with ten passes recorded. Later, more than ten common pipistrelle passes were heard but not seen foraging along the tree line leading to listening point 5 and again over 10 foraging passes were heard but not seen along the same treeline on the return walk.

Table 4-3 – Transect 2 Survey Results Summary

Month	Summary
August	The species recorded during the August visit at Transect 2 were noctule, common pipistrelle, soprano pipistrelle and NSL with the first detection of each species occurring in that order. The majority of activity occurred along the field boundary hedgerow at listening point 10 and around the streetlighting by garages at the entrance to Gog Magog Way. The first bat recorded was a noctule at 20:54 at the northern end of the transect, seen heading west. Further NSL passes were heard at listening point 9, and along the hedgerow at listening point 10, south of Haverhill Road. The first common pipistrelle was heard but not seen at 21:06 while at listening point 7. A further pass was from this species was heard just prior to listening point 9, and another seen foraging east across the field. Five passes were recorded around streetlighting near the transect mid-point, and foraging behaviour seen along Haverhill Road, close to static 1. The first soprano pipistrelle was seen foraging along the hedgerow near listening point 9 at 21:18. Ten passes were recorded around streetlighting near Gog Magog Way, and again by static 3, just prior to listening point 10.
September	The species recorded during the September visit at Transect 2 were common pipistrelle, NSL and soprano pipistrelle with the first detection of each species occurring in that order. Most of the activity detected was from NSL bats, though common pipistrelle was also recorded throughout. The first bat recorded was a common pipistrelle at 20:16. Another was seen foraging north-east along a hedgerow to listening point 8. A further three passes of this species were heard along the remainder of the transect route. The first NSL was heard not seen at 20:23. Foraging passes were noted just prior to and at listening point 9, along the field boundary hedgerow. A single pass was heard at listening point 7 and a further 5 passes heard in the northern section of the transect near to static 2.

Month	Summary
	A soprano pipistrelle was seen foraging back and forth at 20:24 by the garages off Gog Magog Way. A further 5 passes by this species were heard during the remainder of the transect.
October	The October visit at Transect 2 had low levels of activity throughout. Common pipistrelle, soprano pipistrelle and brown long-eared bat were recorded with the first detection of each species occurring in that order. The first bat record was for a common pipistrelle at 18:56, seen heading north-west towards Haverhill Road. A further 4 passes by common pipistrelle were heard not seen. One brown long-eared and three soprano pipistrelle passes were also heard not seen were the remainder of the transect. The temperature dropped to 11°C by the end point.

Table 4-4 – Transect 3 Survey Results Summary

Month	Summary
August	The species recorded during the August visit at Transect 3 were noctule, common pipistrelle and soprano pipistrelle with the first detection of each species occurring in that order. Two noctule passes were observed commuting south from the River Granta at 20:34 and three soprano pipistrelle passes were heard not seen near to listening point 12. The rest of the activity recorded throughout night was of common pipistrelle with over 10 foraging passes observed along the hedge listening point 12.
September	**A barbastelle bat was detected on two occasions during the September visit at Transect 3.** Both occasions were single passes which were heard and not seen: the first at 20:45 was north of listening point 12 along the line of trees, and the second at 20:54 was west of listening point 11 near the River Granta. The other species recorded during this visit were noctule, common pipistrelle, soprano pipistrelle, and an unidentified NSL bat with the first detection of these species occurring in that order.
October	**A barbastelle bat was detected on two occasions during the October visit at Transect 3.** Both occasions were singles passes which were heard and not seen and both were encountered on the boundary of North Farm, the first at 19:17 west of static 3 and the second at 19:21 en route to listening point 13b. The other species recorded during this visit were noctule, soprano pipistrelle, common pipistrelle and an unidentified NSL bat with the first detection of these species occurring in that order.

Table 4-5 – Transect 4 Survey Results Summary

Month	Summary
August	The species recorded during the August visit at Transect 4 were NSL, soprano pipistrelle and common pipistrelle with the first detection of each species occurring in that order. The first bat recorded was a NSL at 20:24. A further five single passes for this species were heard not seen over the remaining duration of the transect. Two recordings of soprano pipistrelle were picked up during the survey. The first was 10+ passes in the field corner under canopy at listening point 16, and the second was for three passes heard not seen at 22:01. Multiple common pipistrelle recordings were heard during the transect however only one was observed foraging at 21:17, back and forth along the southern edge of Sawston Road.
September	**A barbastelle bat was detected once during the September visit at Transect 4.** The pass was heard but not seen at 20:36 near the linear woodland west of listening point 16. The other species recorded during this visit were NSL, soprano pipistrelle and common pipistrelle with the first detection of these species occurring in that order. All but one of these recordings, with exception of a soprano pipistrelle seen foraging north along High Street near listening point 16, were heard not seen.
October	**A barbastelle bat was detected on two occasions during the October visit at Transect 4.** Both occasions were single passes which were heard and not seen. The first was heard at 19:19 during the stop at listening point 16 and the second was heard north of listening point 16 along High Street at 19:24. The other species recorded during this visit were soprano pipistrelle, NSL, noctule and common pipistrelle with the first detection of these species occurring in that order. High levels of common pipistrelle activity was heard at listening points 15, 16, and north of listening point 16 along High Street heading towards the junction with Sawston Road.

Table 4-6 – Transect 5 Survey Results Summary

Month	Summary
August	The species recorded during the August visit at Transect 5 were common pipistrelle, NSL and soprano pipistrelle with the first detection of each species occurring in that order.

Month	Summary
	The first bat recorded was a common pipistrelle seen foraging north-east along a hedgerow at 20:49. A further two were seen foraging north along High Street and two more were observed foraging back and forth in the north-west section of the transect. NSL and soprano pipistrelle were heard not seen in low numbers during the transect.
September	The September visit at Transect 5 had low activity levels. Only one noctule pass was recorded which was heard and not seen north-west of the start point at listening point 19. Two groups of common pipistrelle passes were detected. The first was a cluster of five passes which were heard and not seen at the field corner near to the off ramp on Newmarket Road. The second was a series of ten foraging passes observed on the track leading from Newmarket Road to the southern end of High Street.
October	**A barbastelle bat was detected once during the October visit at Transect 5.** The bat was heard and not seen at 18:37 near to listening point 17 on the track linking Newmarket Road to the southern end of High Street. The other species recorded during this visit were NSL, soprano pipistrelle and common pipistrelle with the first detection of these species occurring in that order.

Table 4-7 – Transect 6 Survey Results Summary

Month	Summary
August	**A barbastelle bat was detected once during the August visit at Transect 6.** The bat was heard and not seen at 22:03 near to listening point 22, between the listening point and the riparian woodland bordering the River Granta. The other species recorded during this visit were NSL, soprano pipistrelle and common pipistrelle with the first detection of these species occurring in that order.
September	**A barbastelle bat was detected on two occasions during the September visit at Transect 6.** The first was a single pass which was heard and not seen at 20:31 near the field-side edge of the woodland south-west of the Four Went Ways Services roundabout (A11 and Cambridge Road). The second was also heard and not seen at 21:01, this time south-east of the A11 roundabout and near to the smaller roundabout near the services on Newmarket Road. The other species recorded during this visit were soprano pipistrelle, NSL, common pipistrelle and natterer's bat with the first detection of these species occurring in that order.

Month	Summary
October	**A barbastelle bat was detected on two occasions during the September visit at Transect 6.** Both passes were heard and not seen. The first was heard at 18:35 near to listening point 20 at the woodland east of Babraham. The second was heard at listening point 21 near to the rectangular block of woodland in the centre of the arable fields at this location at 18:54. The other species recorded during this visit were noctule, soprano pipistrelle and NSL with the first detection of these species occurring in that order. Overall, the activity levels on this visit were low with the majority of detections resulting from two clusters of soprano pipistrelle foraging passes.

Table 4-8 – Transect 7 Survey Results Summary

Month	Summary
August	The species recorded during the August visit at Transect 7 were noctule, soprano pipistrelle, common pipistrelle and NSL with the first detection of each species occurring in that order. The first bat recorded was a NSL which was heard not seen at 19:52. A further four single passes for this species were heard not seen, as well as a cluster of 10+ passes along Bourn Bridge Road towards listening point 26. Two soprano pipistrelle were seen foraging both south along the farm track and west near at woodland block at Grange Farm. Further foraging activity was also heard near the listening point 25 on the field boundary with Cambridge Road (A1307). One common pipistrelle was seen foraging back and forth along a woodland strip close to static 3. Another was heard not seen just north of listening point 25.
September	**A barbastelle bat was detected on two occasions during the September visit at Transect 7.** Both were single passes which were heard and not seen. The first was heard at 19:51 on the linear woodland on the northern boundary of the field north-west of Four Went Ways Services roundabout. The second was heard at 20:02 on the unnamed track on the eastern boundary of this same field. The other species recorded during this visit were NSL, noctule, soprano pipistrelle, Daubenton's bat and common pipistrelle with the first detection of these species occurring in that order.
October	The species recorded during the October visit at Transect 7 were soprano pipistrelle, common pipistrelle and noctule with the first detection of each species occurring in that order. Overall, the activity levels on this visit were low with the majority of detections resulting from one cluster of common pipistrelle foraging passes.

The August to October transects captured consistent commuting directional trends and foraging areas.

Heatmaps

The heatmaps in Appendix J show the relative intensity of bat activity across the site.

Map 1 highlights three high intensity areas of bat activity in the north of the Scheme, including Nine Wells Wood and adjoining hedgerows, the woodland strip to pinch point north of Great Shelford and the hedgerows along Haverhill Road (all foraging activity).

The old railway corridor which runs over the High Street, Babraham, has a high intensity of bat foraging and is associated with the large mature trees sited along the old railway embankment.

The species distribution map in Appendix K shows similar trends to those found in 2020. The general distribution of each species is summarised in Table 4-9.

Table 4-9 - Transect Species Distribution Summary

Species	Summary
Barbastelle	**Low levels of barbastelle activity were present across the Scheme.** Recordings were noted along North Farm's northern boundary, the hedgerow between listening point 15 and 16, close to the woodland block north of the ford crossing point through the River Granta and along the old railway south of Babraham.
Common pipistrelle	Common pipistrelle were abundant throughout the Scheme. The species was notably present at high density along the adjoining hedgerows south-west of Nine Wells Wood, near to listening point 3. Also, along the woodland strip east of Whitwell Farm, and along the extensive hedgerow between listening point 15 and 16.
Soprano pipistrelle	Soprano pipistrelle were abundant throughout the Scheme. The species was notably present at high / moderate density along the woodland strip east of Whitwell Farm, around the streetlighting by garages at the entrance to Gog Magog Way, and near listening point 25 on the field boundary with Cambridge Road (A1307).
Noctule, Serotine, and Leisler's	Moderate numbers of NSL bats were recorded, scattered from the far north of the Scheme at listening point 1, down to Grange Farm.
Myotis sp.	*Myotis* are present in very low numbers within the southern section of the Scheme, within Transects 6 and 7.
Brown long-eared	A single brown long-eared bat was picked up within Transect 2.

4.5 Static Detector Survey

The results of the data collected from the static detectors is detailed in the sections below with percentage of bat sound recordings per species noted in Table 4-10.

Where the totals of individual bat species or species groups does not equal the total number of files containing bats, this is due to files containing multiple species of bats.

4.5.1 August 2022

Transect 1

- **Static 1** - A total of 1,163 sound files were recorded; however, a fault with the detector thought to be the result of extreme temperatures caused the files to become unreadable by the analysis software.
- **Static 2** - A total of 2,185 sound files were recorded; however, a fault with the detector thought to be the result of extreme temperatures caused the files to become unreadable by the analysis software.
- **Static 3 -** A total of 952 sound files were recorded of which 199 contained bats. These bats were identified as the following species or groups of species.
  - 52 common pipistrelle (26.1%)
  - 109 soprano pipistrelle (54.8%)
  - 37 NSL (18.6%)
  - *1 Myotis* species (<1%)

Transect 2

- **Static 1** - A total of 6,324 sound files were recorded of which 73 contained bats. These bats were identified as the following species or groups of species.
  - **1 barbastelle (1.4%)**
  - 32 common pipistrelle (43.8%)
  - 36 soprano pipistrelle (49.3%)
  - 4 NSL (5.5%)
- **Static 2** - A total of 5,634 sound files were recorded of which 727 contained bats. These bats were identified as the following species or groups of species.
  - **5 barbastelle (<1%)**
  - 440 common pipistrelle (60.5%)
  - 233 soprano pipistrelle (32.0%)
  - 43 NSL (5.9%)
  - *6 Myotis* species (<1%)
- **Static 3** - A total of 645 sound files were recorded of which 301 contained bats. These bats were identified as the following species or groups of species.
  - 202 common pipistrelle (67.1%)
  - 71 soprano pipistrelle (23.6%)

- 27 NSL (9.0%)
- *1 Myotis* species (<1%)

Transect 3

- **Static 1** - A total of 749 sound files were recorded; however, a fault with the detector thought to be the result of extreme temperatures caused the files to become unreadable by the analysis software.
- **Static 2** - A total of 1,620 sound files were recorded of which 471 contained bats. These bats were identified as the following species or groups of species.
  - **1 barbastelle (<1%)**
  - 82 common pipistrelle (17.4%)
  - 204 soprano pipistrelle (43.3%)
  - 181 NSL (38.4%)
  - *2 Myotis* species (1%)
  - 1 BLE (<1%)
- **Static 3** - A total of 4,000 sound files were recorded of which 298 contained bats. These bats were identified as the following species or groups of species.
  - **5 barbastelle (1.7%)**
  - 66 common pipistrelle (22.1%)
  - 189 soprano pipistrelle (63.4%)
  - 19 NSL (6.4%)
  - *18 Myotis* species (6.0%)
  - 1 BLE (<1%)
- **Static 4** - A total of 235 sound files were recorded of which 205 contained bats. These bats were identified as the following species or groups of species.
  - **5 barbastelle (2.4%)**
  - 96 common pipistrelle (46.8%)
  - 62 soprano pipistrelle (30.2%)
  - 36 NSL (17.6%)
  - *5 Myotis* species (2.4%)
  - 1 BLE (<1%)

Transect 4

- **Static 1** - A total of 376 sound files were recorded of which 76 contained bats. These bats were identified as the following species or groups of species.
  - **4 barbastelle (5.3%)**
  - 34 common pipistrelle (44.7%)
  - 35 soprano pipistrelle (46.1%)
  - 3 NSL (3.9%)x

Transect 5

- **Static 1** - A total of 2,113 sound files were recorded of which 236 contained bats. These bats were identified as the following species or groups of species.
  - **6 barbastelle (2.5%)**
  - 83 common pipistrelle (35.2%)
  - 105 soprano pipistrelle (44.5%)
  - 35 NSL (14.8%)
  - *7 Myotis* species (3.0%)
- **Static 3** - A total of 566 sound files were recorded of which 153 contained bats. These bats were identified as the following species or groups of species.
  - 7 common pipistrelle (4.6%)
  - 108 soprano pipistrelle (70.6%)
  - 37 NSL (24.2%)
  - *1 Myotis* species (<1%)

Transect 6

- **Static 1** - A total of 3,569 sound files were recorded of which 150 contained bats. These bats were identified as the following species or groups of species.
  - **2 barbastelle (1.3%)**
  - 32 common pipistrelle (21.3%)
  - 74 soprano pipistrelle (49.3%)
  - 41 NSL (27.3%)
  - *1 Myotis* species (<1%)

- **Static 3** - A total of 10,025 sound files were recorded of which 301 contained bats. These bats were identified as the following species or groups of species.
  - **18 barbastelle (6.0%)**
  - 177 common pipistrelle (58.8%)
  - 88 soprano pipistrelle (29.2%)
  - 16 NSL (5.3%)
  - *1 Myotis* species (<1%)
  - 1 BLE (<1%)

Transect 7

- **Static 1** - A total of 1,562 sound files were recorded of which 374 contained bats. These bats were identified as the following species or groups of species.
  - **1 barbastelle (<1%)**
  - 199 common pipistrelle (53.2%)
  - 162 soprano pipistrelle (43.3%)
  - 12 NSL (3.2%)
- **Static 2** - A total of 3,045 sound files were recorded of which 726 contained bats. These bats were identified as the following species or groups of species.
  - **3 barbastelle (<1%)**
  - 433 common pipistrelle (59.6%)
  - 290 soprano pipistrelle (39.9%)
- **Static 3** - A total of 676 sound files were recorded of which 542 contained bats. These bats were identified as the following species or groups of species.
  - 303 common pipistrelle (55.9%)
  - 233 soprano pipistrelle (43.0%)
  - 5 NSL (<1%)
  - 1 BLE (<1%)

4.5.2 September 2022

Transect 1

- **Static 1** - A total of 537 sound files were recorded of which 504 contained bats. These bats were identified as the following species or groups of species.

- **14 barbastelle (2.8%)**
- 346 common pipistrelle (68.7%)
- 115 soprano pipistrelle (22.8%)
- 21 NSL (4.2%)
- *6 Myotis* species (1.2%)
- 2 BLE (<1%)

- **Static 2** - A total of 592 sound files were recorded of which 558 contained bats. These bats were identified as the following species or groups of species.
  - **1 barbastelle (<1%)**
  - 356 common pipistrelle (63.8%)
  - 168 soprano pipistrelle (30.1%)
  - 33 NSL (5.9%)
- **Static 3** - A total of 772 sound files were recorded of which 270 contained bats. These bats were identified as the following species or groups of species.
  - **5 barbastelle (1.9%)**
  - 68 common pipistrelle (25.2%)
  - 172 soprano pipistrelle (63.7%)
  - 23 NSL (8.5%)
  - *2 Myotis* species (<1%)

Transect 2

- **Static 1** - A total of 13,160 sound files were recorded of which 395 contained bats. These bats were identified as the following species or groups of species.
  - 26 common pipistrelle (6.6%)
  - 366 soprano pipistrelle (92.7%)
  - 2 NSL (<1%)
  - *1 Myotis* species (<1%)
- **Static 2** - A total of 1,660 sound files were recorded of which 258 contained bats. These bats were identified as the following species or groups of species.
  - **5 barbastelle (1.9%)**
  - 150 common pipistrelle (58.1%)
  - 15 soprano pipistrelle (5.8%)

- 86 NSL (33.3%)
- *2 Myotis* species (<1%)

- **Static 3** - A total of 10,364 sound files were recorded of which 262 contained bats. These bats were identified as the following species or groups of species.
  - **6 barbastelle (2.3%)**
  - 202 common pipistrelle (77.1%)
  - 37 soprano pipistrelle (14.1%)
  - 17 NSL (6.5%)

Transect 3

- **Static 1** - A total of 181 sound files were recorded of which 39 contained bats. These bats were identified as the following species or groups of species.
  - **1 barbastelle (2.6%)**
  - 11 common pipistrelle (28.2%)
  - 14 soprano pipistrelle (35.9%)
  - 13 NSL (33.3%)
- **Static 2** - A total of 497 sound files were recorded of which 395 contained bats. These bats were identified as the following species or groups of species.
  - 88 common pipistrelle (22.3%)
  - 243 soprano pipistrelle (61.5%)
  - 62 NSL (15.7%)
  - 2 *Myotis* species (<1%)
- **Static 3** - A total of 1,584 sound files were recorded of which 132 contained bats. These bats were identified as the following species or groups of species.
  - **1 barbastelle (<1%)**
  - 27 common pipistrelle (20.5%)
  - 56 soprano pipistrelle (42.4%)
  - 22 NSL (16.7%)
  - 26 *Myotis* species (19.7%)
- **Static 4** - A total of 476 sound files were recorded of which 378 contained bats. These bats were identified as the following species or groups of species.
  - **28 barbastelle (7.4%)**

- 168 common pipistrelle (44.4%)
- 130 soprano pipistrelle (34.4%)
- 42 NSL (11.1%)
- 7 *Myotis* species (1.9%)
- 3 BLE (<1%)

Transect 4

- **Static 1** - A total of 112 sound files were recorded of which 87 contained bats. These bats were identified as the following species or groups of species.
  - **1 barbastelle (1.1%)**
  - 35 common pipistrelle (40.2%)
  - 49 soprano pipistrelle (56.3%)
  - 2 NSL (2.3%)

Transect 5

- **Static 1** - A total of 123 sound files were recorded of which 106 contained bats. These bats were identified as the following species or groups of species.
  - 70 common pipistrelle (66.0%)
  - 34 soprano pipistrelle (32.1%)
  - 2 NSL (1.8%)
- **Static 3** - A total of 7,107 sound files were recorded of which 536 contained bats. These bats were identified as the following species or groups of species.
  - **1 barbastelle (>1%)**
  - 1 common pipistrelle (>1%)
  - 525 soprano pipistrelle (97.9%)
  - 9 NSL (1.7%)

Transect 6

- **Static 1** - A total of 277 sound files were recorded of which 43 contained bats. These bats were identified as the following species or groups of species.
  - 8 common pipistrelle (18.6%)
  - 31 soprano pipistrelle (72.1%)
  - 4 NSL (9.3%)

- **Static 3** - A total of 970 sound files were recorded of which 38 contained bats. These bats were identified as the following species or groups of species.
  - **2 barbastelle (5.3%)**
  - 12 common pipistrelle (31.6%)
  - 18 soprano pipistrelle (47.4%)
  - 6 NSL (15.8%)

Transect 7

- **Static 1** - A total of 92 sound files were recorded of which 33 contained bats. These bats were identified as the following species or groups of species.
  - 15 common pipistrelle (45.5%)
  - 14 soprano pipistrelle (42.4%)
  - 4 NSL (12.1%)
- **Static 2** - A total of 1,088 sound files were recorded of which 326 contained bats. These bats were identified as the following species or groups of species.
  - **2 barbastelle (<1%)**
  - 155 common pipistrelle (47.5%)
  - 167 soprano pipistrelle (51.2%)
  - 2 NSL (<1%)
- **Static 3** - A total of 1071 sound files were recorded of which 86 contained bats. These bats were identified as the following species or groups of species.
  - **3 barbastelle (3.5%)**
  - 24 common pipistrelle (27.9%)
  - 31 soprano pipistrelle (36.0%)
  - 25 NSL (29.1%)
  - 3 *Myotis* species (3.5%)

4.5.3 October 2022

Transect 1

- **Static 1** - A total of 379 sound files were recorded of which 351 contained bats. These bats were identified as the following species or groups of species.
  - **7 barbastelle (2.0%)**

- 154 common pipistrelle (43.9%)
- 175 soprano pipistrelle (49.9%)
- 13 NSL (3.7%)
- 1 *Myotis* species (<1%)
- 1 BLE (<1%)

- **Static 2** - A total of 551 sound files were recorded of which 514 contained bats. These bats were identified as the following species or groups of species.
  - **2 barbastelle (<1%)**
  - 408 common pipistrelle (79.4%)
  - 99 soprano pipistrelle (19.3%)
  - 5 NSL (1.0%)
- **Static 3** - A total of 1,597 sound files were recorded of which 628 contained bats. These bats were identified as the following species or groups of species.
  - **5 barbastelle (<1%)**
  - 353 common pipistrelle (56.2%)
  - 250 soprano pipistrelle (39.8%)
  - 20 NSL (3.2%)

Transect 2

- **Static 1** - A total of 726 sound files were recorded of which 7 contained bats. These bats were identified as the following species or groups of species.
  - **1 barbastelle (14.3%)**
  - 3 common pipistrelle (42.9%)
  - 1 soprano pipistrelle (14.3%)
  - 2 NSL (28.6%)
- **Static 2** - A total of 1,909 sound files were recorded of which 112 contained bats. These bats were identified as the following species or groups of species.
  - **1 barbastelle (<1%)**
  - 73 common pipistrelle (65.2%)
  - 29 soprano pipistrelle (25.9%)
  - 7 NSL (6.3%)
  - 2 *Myotis* species (1.8%)

- **Static 3** - A total of 1,303 sound files were recorded of which 1195 contained bats. These bats were identified as the following species or groups of species.
  - 978 common pipistrelle (81.9%)
  - 195 soprano pipistrelle (16.3%)
  - 22 NSL (1.8%)

Transect 3

- **Static 1** - A total of 282 sound files were recorded of which 175 contained bats. These bats were identified as the following species or groups of species.
  - 13 common pipistrelle (7.4%)
  - 142 soprano pipistrelle (81.1%)
  - 20 NSL (11.4%)
- **Static 2** - A total of 3,354 sound files were recorded of which 3226 contained bats. These bats were identified as the following species or groups of species.
  - **7 barbastelle (<1%)**
  - 1,244 common pipistrelle (38.6%)
  - 1,911 soprano pipistrelle (59.2%)
  - 63 NSL (2.0%)
  - 1 *Myotis* species (<1%)
- **Static 3** - A total of 613 sound files were recorded of which 484 contained bats. These bats were identified as the following species or groups of species.
  - **8 barbastelle (1.7%)**
  - 232 common pipistrelle (47.9%)
  - 234 soprano pipistrelle (48.3%)
  - 7 NSL (1.4%)
  - 3 *Myotis* species (<1%)
- **Static 4** - A total of 381 sound files were recorded of which 101 contained bats. These bats were identified as the following species or groups of species.
  - **9 barbastelle (8.9%)**
  - 41 common pipistrelle (40.6%)
  - 29 soprano pipistrelle (28.7%)
  - 22 NSL (21.7%)

Transect 4

- **Static 1** - A total of 642 sound files were recorded of which 199 contained bats. These bats were identified as the following species or groups of species.
  - **1 barbastelle (<1%)**
  - 114 common pipistrelle (57.3%)
  - 81 soprano pipistrelle (40.7%)
  - 3 NSL (1.5%)

Transect 5

- **Static 1** - A total of 129 sound files were recorded of which 20 contained bats. These bats were identified as the following species or groups of species.
  - 9 common pipistrelle (45.0%)
  - 11 soprano pipistrelle (55.0%)
- **Static 3** - A total of 228 sound files were recorded of which 26 contained bats. These bats were identified as the following species or groups of species.
  - **1 barbastelle (3.8%)**
  - 2 common pipistrelle (7.7%)
  - 3 soprano pipistrelle (11.5%)
  - 19 NSL (73.1%)
  - 1 *Myotis* species (3.8%)

Transect 6

- **Static 1** - A total of 1,604 sound files were recorded of which 75 contained bats. These bats were identified as the following species or groups of species.
  - 2 common pipistrelle (2.7%)
  - 66 soprano pipistrelle (88%)
  - 7 NSL (9.3%)
- **Static 3** - A total of 302 sound files were recorded of which 139 contained bats. These bats were identified as the following species or groups of species.
  - 117 common pipistrelle (84.2%)
  - 18 soprano pipistrelle (12.9%)
  - 4 NSL (2.9%)

Transect 7

- **Static 1** - A total of 1,687 sound files were recorded of which 5 contained bats. These bats were identified as the following species or groups of species.
  - 1 soprano pipistrelle (20%)
  - 4 NSL (80%)
- **Static 2** - A total of 974 sound files were recorded of which 298 contained bats. These bats were identified as the following species or groups of species.
  - **2 barbastelle (<1%)**
  - 196 common pipistrelle (65.8%)
  - 96 soprano pipistrelle (32.2%)
  - 4 *Myotis* species (1.3%)
- **Static 3** - A total of 384 sound files were recorded of which 65 contained bats. These bats were identified as the following species or groups of species.
  - 32 common pipistrelle (49.2%)
  - 33 soprano pipistrelle (50.8%)

Table 4-10 – Total Counts and Percentages of Bat Sound Recordings per Species or Species Group

Static ID		Barbastelle		Common pipistrelle		Soprano pipistrelle		NSL		*Myotis* species		BLE	
		Total at static location	% of bats at static location	Total at static location	% of bats at static location	Total at static location	% of bats at static location	Total at static location	% of bats at static location	Total at static location	% of bats at static location	Total at static location	% of bats at static location
Transect 1	Static 1	21	2.5	500	58.5	290	34.0	34	4.0	7	<1	2	<1
	Static 2	3	<1	764	71.3	267	24.9	38	3.5	0	0	0	0
	Static 3	10	<1	473	43.1	531	48.4	80	7.3	3	<1	0	0
Transect 2	Static 1	2	<1	401	49.2	403	49.4	8	1.0	1	<1	0	0
	Static 2	11	1.0	663	60.4	277	25.3	136	12.4	10	<1	0	0
	Static 3	6	<1	1382	78.5	303	17.2	66	3.8	1	<1	0	0
Transect 3	Static 1	1	<1	24	11.2	156	72.9	33	15.4	0	0	0	0
	Static 2	8	<1	1569	36.9	2358	55.5	306	7.2	5	<1	1	<1
	Static 3	14	1.5	325	35.6	479	52.4	48	5.3	47	5.1	1	<1
	Static 4	42	6.2	305	44.7	221	32.4	100	14.7	12	1.7	2	<1
Transect 4	Static 1	6	1.7	183	50.6	165	45.6	8	2.2	0	0	0	0
Transect 5	Static 1	6	1.7	162	44.8	150	41.4	37	10.2	7	1.9	0	0
	Static 3	2	<1	10	1.4	636	89.0	65	9.1	2	<1	0	0

Static ID		Barbastelle		Common pipistrelle		Soprano pipistrelle		NSL		*Myotis* species		BLE	
		Total at static location	% of bats at static location	Total at static location	% of bats at static location	Total at static location	% of bats at static location	Total at static location	% of bats at static location	Total at static location	% of bats at static location	Total at static location	% of bats at static location
Transect 6	Static 1	2	<1	42	15.7	171	63.8	52	19.4	1	<1	0	0
	Static 3	20	4.2	306	64.0	124	25.9	26	5.4	1	<1	1	<1
Transect 7	Static 1	1	<1	214	51.9	177	43.0	20	4.9	0	0	0	0
	Static 2	7	<1	784	58.1	553	41.0	2	<1	4	<1	0	0
	Static 3	3	<1	359	51.8	297	42.9	30	4.3	3	<1	1	<1

5

Interpretation and Recommendations

Public

5 Interpretation and Recommendations

5.1.1 Interpretation

Evidence of six species/groups of bat: barbastelle, common and soprano pipistrelle, *Myotis* species, noctule/serotine/Leisler's (NSL) and brown long-eared (BLE) bats were recorded during the surveys and found to be present across the seven transect locations through recordings from the static detectors.

The presence of barbastelle bats is of particular note being an Annex II species and one of the rarer species recorded in the UK particularly with Eversden and Wimpole Woods SAC (which is designated for the colony of barbastelle bats associated with the trees in Wimpole Woods[5]) lying approximately 10 km west of the route.

Barbastelle bats were recorded at all static locations and therefore are present across the entire Scheme. A map showing this can be found in Appendix L. The highest number of barbastelle passes recorded at:

- Transect 3 S4 in September (28)
- Transect 6 S3 in August (18)
- Transect 1 S1 in September (14)
- Transect 3 S4 in October (9)
- Transect 3 S3 in October (8)

The total number of recordings and species found, combined with the presence of habitats suitable of supporting bats including woodlands, open fields, waterbodies, and linear habitat features such as rivers, streams and hedge lines show that the survey route provides suitable habitats for roosting, foraging and commuting bats.

The PRA building survey found no buildings with potential to provide any suitable bat roosting features.

The GLTA found two high suitability trees and 13 moderate suitability trees. Two of the trees identified in 2020 as being suitable for bats have come down during a weather event between these surveys.

[5] JNCC Eversden and Wimpole Woods SAC information sheet. Available: https://sac.jncc.gov.uk/site/UK0030331

5.1.2 Further Surveys

Following the result of the GLTA survey of trees on site, the below surveys, mitigation and enhancement measures will be required prior to the commencement of any works to the trees following the results of the Preliminary Roost Assessments.

Due to the route realignment, further GLTA of trees within 50m of the new route may be required. These will be conducted in Winter 2022/23.

Further survey work in the form of emergence and re-entry surveys will be required on all trees with confirmed bat roost/s or high and moderate suitability for a bat roost prior to the commencement of any works. These surveys would need to be conducted in accordance with current best practice guidance.

Trees with moderate suitability to support bat roosts require one emergence and one re-entry survey. Trees with high suitability or confirmed roosts to support bat roosts require three emergence and re-entry surveys. **Note** – trees with low suitability do not need any further survey work, but any felling or lopping works should be subject to a precautionary methodology to be followed to ensure no impact to roosting bats occurs should they be present.

Should any confirmed roosts, or further roosts, be recorded within a tree to be felled or impacted that would result in damage or loss of a bat roost, an EPS Mitigation Licence will be required from Natural England. This will need to include full survey details and a mitigation strategy to replace the roost lost to ensure that the development does not result in any detriment to the local population of bats.

Full details of the required mitigation will need to be designed and determined following the above surveys, but an example of possible mitigation required is given below:

- Working methodologies to avoid timings of when bats are likely to be using the roosts (i.e. conducting works when bats are least likely to be in these roosts).
- Sensitive lighting schemes to avoid lighting roosts and habitat used for foraging to minimise the development's impacts on local bat populations.
- Ensure foraging and commuting routes around retained roosts or new roost features are protected and enhanced as part of the development or created where new roosts are built.

Compensation for any lost roosts will need to be provided on a like-for-like basis. Examples of suitable features includes:

- Integrated bat boxes within any proposed new buildings.
- Stand-alone bat boxes on poles near connected vegetation (e.g. rocket bat box etc).
- Bat boxes installed on retained trees.

- Veteranisation of retained mature trees to provide naturalised roost features.

Winter static surveys are also being undertaken in 2022-2023 to inform barbastelle activity levels during the hibernation period.

6

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Public

6 References

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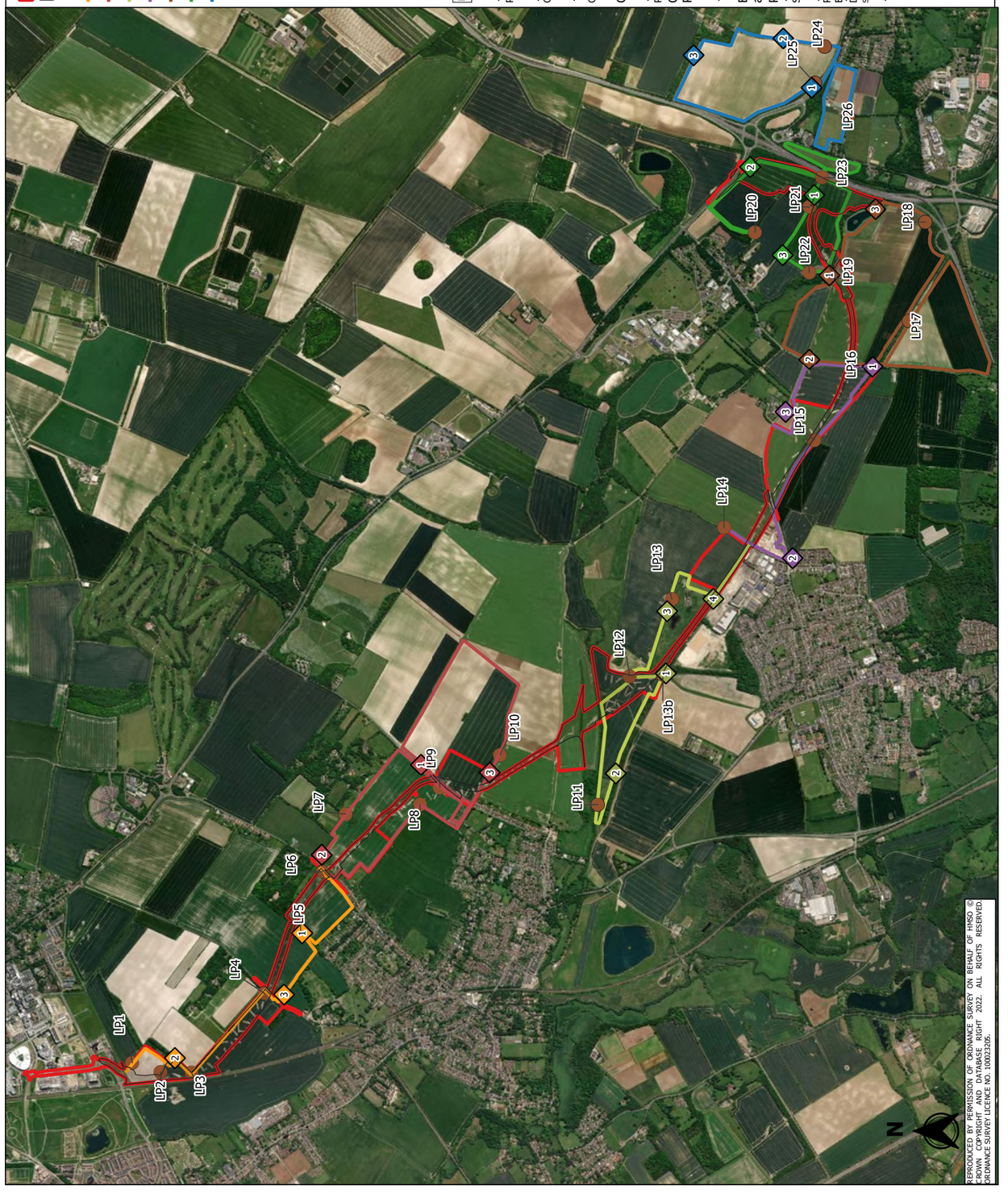
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Appendix A

Transect Route Maps

Public



Appendix B

Transect Survey Details

Public

Table B-1 – Transect 1 Survey Details

Month	Date	Sunset/ Sunrise	Start/ End	Temp (°C)	Rain	Cloud Cover (%)	Humidity (%RH)	Wind (Beaufort scale 1-12)	Personnel
Aug	08/08/22	20:38	20:38	21	N	0	66	3	MJ & TN
			22:38	19	N	5	75	3	
Sep	01/09/22	19:48	19:48	20	N	87	55	3	MJ & TN
			21:48	18	N	85	67	3	
Oct	05/10/22	18:28	18:28	14	N	70	75	4	MJ & TN
			20:38	12	N	0	69	4	

Table B-2 – Transect 2 Survey Details

Month	Date	Sunset/ Sunrise	Start/ End	Temp (°C)	Rain	Cloud Cover (%)	Humidity (%RH)	Wind (Beaufort scale 1-12)	Personnel
Aug	10/08/22	20:33	20:33	24	N	0	51	2	MJ & TN
			22:33	19	N	5	75	3	
Sep	05/09/22	19:38	19:38	20	N	60	78	3	MJ & TN
			21:38	19	N	50	83	2	
Oct	10/10/22	18:16	18:16	13	N	40	55	2	MJ & TN
			20:18	11	N	85	65	3	

Table B-3 – Transect 3 Survey Details

Month	Date	Sunset/ Sunrise	Start/ End	Temp (°C)	Rain	Cloud Cover (%)	Humidity (%RH)	Wind (Beaufort scale 1-12)	Personnel
Aug	15/08/22	20:24	20:24	24	N	45	50	2	MJ & TN
			22:24	22	N	45	65	1	
Sep	07/09/22	19:33	19:33	18	N	30	78	3	MJ & TN
			21:33	16	N	50	83	1	
Oct	12/10/22	18:12	18:12	14	N	80	74	3	MJ & TN
			20:12	14	N	100	76	3	

Table B-4 – Transect 4 Survey Details

Month	Date	Sunset/ Sunrise	Start/ End	Temp (°C)	Rain	Cloud Cover (%)	Humidity (%RH)	Wind (Beaufort scale 1-12)	Personnel
Aug	17/08/22	20:20	20:20	18	N	90	61	3	MJ & TN
			22:20	16	N	70	55	1	
Sep	08/09/22	19:31	19:31	17	N	50	88	2	MJ & TN
			21:31	16	N	50	87	1	
Oct	17/10/22	18:01	18:01	14	N	15	65	2	MJ & TN
			20:01	14	N	70	77	2	

Table B-5 – Transect 5 Survey Details

Month	Date	Sunset/ Sunrise	Start/ End	Temp (°C)	Rain	Cloud Cover (%)	Humidity (%RH)	Wind (Beaufort scale 1-12)	Personnel
Aug	18/08/22	20:17	20:17	23	N	30	53	3	MJ & TN
			22:17	23	N	40	57	2	
Sep	12/09/22	19:21	19:21	22	N	50	51	2	MJ & TN
			21:21	20	N	30	86	1	
Oct	26/10/22	17:42	17:42	16	N	10	71	3	MJ & TN
			19:42	15	N	50	81	3	

Table B-6 – Transect 6 Survey Details

Month	Date	Sunset/ Sunrise	Start/ End	Temp (°C)	Rain	Cloud Cover (%)	Humidity (%RH)	Wind (Beaufort scale 1-12)	Personnel
Aug	23/08/22	20:19	20:19	24	N	70	68	3	MJ & GM
			22;19	22	N	60	74	3	
Sep	15/09/22	19:14	19:14	16	N	60	48	2	MJ & TN
			21:14	15	N	30	57	2	
Oct	27/10/22	17:40	17:40	18	N	30	83	3	MJ & TN
			19:40	17	N	30	84	3	

Table B-7 – Transect 7 Survey Details

Month	Date	Sunset/ Sunrise	Start/ End	Temp (°C)	Rain	Cloud Cover (%)	Humidity (%RH)	Wind (Beaufort scale 1-12)	Personnel
Aug	31/08/22	19:49	19:49	19	N	5	57	3	MJ & TN
			21:49	17	N	5	66	3	
Sep	20/09/22	19:03	19:03	17	N	40	68	2	MJ & TN
			21:03	15	N	25	77	1	
Oct	20/10/22	17:54	17:54	14	N	20	92	2	MJ & TN
			19:54	13	N	10	94	2	

Appendix C

Static Deployment Dates

Table C-1 – August Static Deployment Dates

Static Detector ID	Date of Deployment	Date of Collection
Transect 1 – Static 1	09/08/2022	16/08/2022
Transect 1 – Static 2	09/08/2022	16/08/2022
Transect 1 – Static 3	09/08/2022	16/08/2022
Transect 2 – Static 1	09/08/2022	16/08/2022
Transect 2 – Static 2	09/08/2022	16/08/2022
Transect 2 – Static 3	09/08/2022	16/08/2022
Transect 3 – Static 1	09/08/2022	16/08/2022
Transect 3 – Static 2	09/08/2022	16/08/2022
Transect 3 – Static 3	09/08/2022	16/08/2022
Transect 3 – Static 4	09/08/2022	16/08/2022
Transect 4 – Static 1	17/08/2022	23/08/2022
Transect 5 – Static 1	17/08/2022	23/08/2022
Transect 5 – Static 3	17/08/2022	23/08/2022
Transect 6 – Static 1	17/08/2022	23/08/2022
Transect 6 – Static 3	17/08/2022	23/08/2022
Transect 7 – Static 1	17/08/2022	23/08/2022
Transect 7 – Static 2	17/08/2022	23/08/2022
Transect 7 – Static 3	17/08/2022	23/08/2022

Table C-2 – September Static Deployment Dates

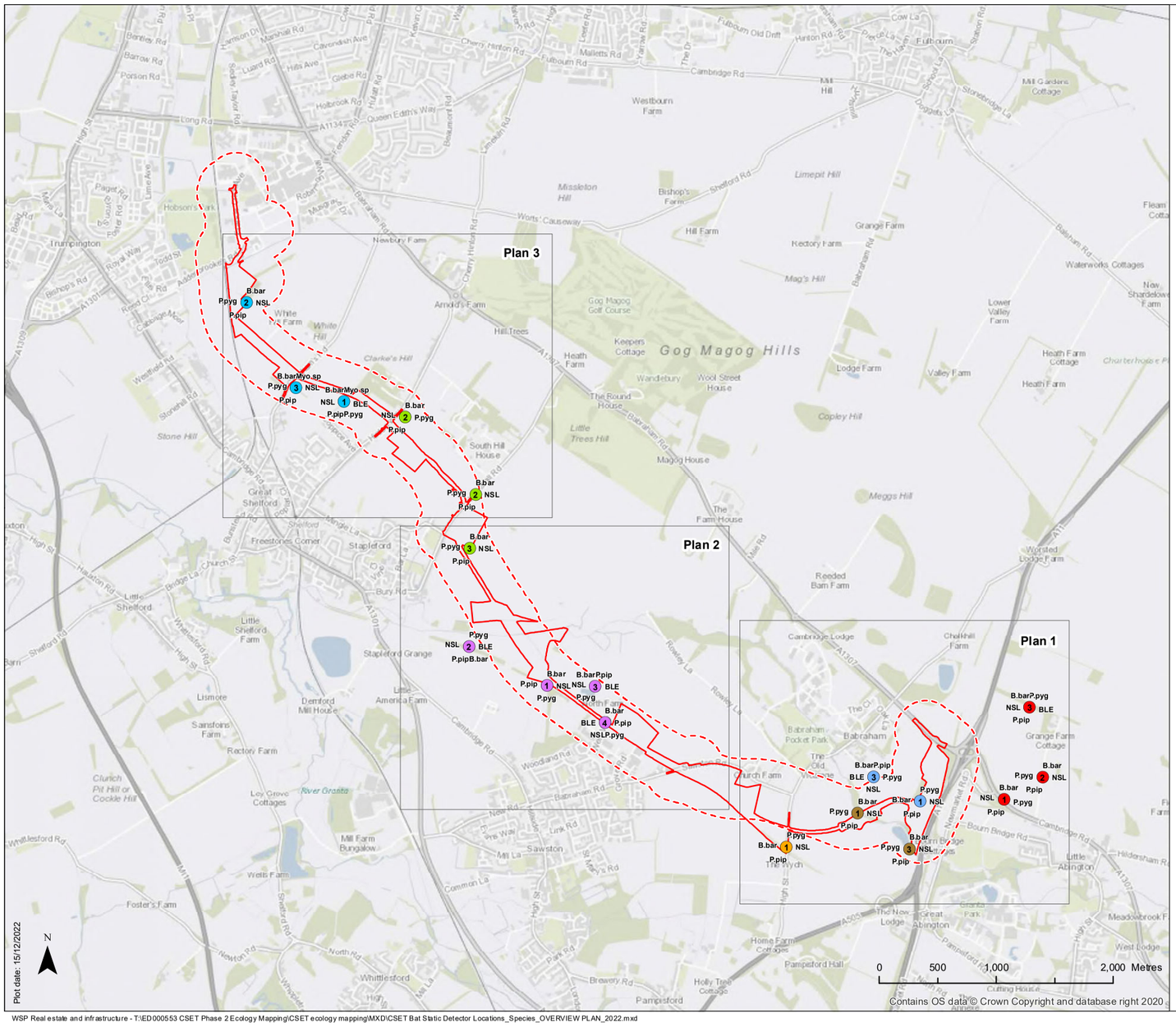
Static Detector ID	Date of Deployment	Date of Collection
Transect 1 – Static 1	06/09/2022	13/09/2022
Transect 1 – Static 2	06/09/2022	13/09/2022
Transect 1 – Static 3	06/09/2022	13/09/2022
Transect 2 – Static 1	06/09/2022	13/09/2022
Transect 2 – Static 2	06/09/2022	13/09/2022
Transect 2 – Static 3	06/09/2022	13/09/2022
Transect 3 – Static 1	06/09/2022	13/09/2022
Transect 3 – Static 2	06/09/2022	13/09/2022
Transect 3 – Static 3	06/09/2022	13/09/2022
Transect 3 – Static 4	06/09/2022	13/09/2022
Transect 4 – Static 1	14/09/2022	21/09/2022
Transect 5 – Static 1	14/09/2022	21/09/2022
Transect 5 – Static 3	14/09/2022	21/09/2022
Transect 6 – Static 1	14/09/2022	21/09/2022
Transect 6 – Static 3	14/09/2022	21/09/2022
Transect 7 – Static 1	14/09/2022	21/09/2022
Transect 7 – Static 2	14/09/2022	21/09/2022
Transect 7 – Static 3	14/09/2022	21/09/2022

Table C-3 – October Static Deployment Dates

Static Detector ID	Date of Deployment	Date of Collection
Transect 1 – Static 1	11/10/2022	18/10/2022
Transect 1 – Static 2	11/10/2022	18/10/2022
Transect 1 – Static 3	11/10/2022	18/10/2022
Transect 2 – Static 1	11/10/2022	18/10/2022
Transect 2 – Static 2	11/10/2022	18/10/2022
Transect 2 – Static 3	11/10/2022	18/10/2022
Transect 3 – Static 1	11/10/2022	18/10/2022
Transect 3 – Static 2	11/10/2022	18/10/2022
Transect 3 – Static 3	11/10/2022	18/10/2022
Transect 3 – Static 4	19/10/2022	25/10/2022
Transect 4 – Static 1	19/10/2022	25/10/2022
Transect 5 – Static 1	25/10/2022	31/10/2022
Transect 5 – Static 3	25/10/2022	31/10/2022
Transect 6 – Static 1	19/10/2022	25/10/2022
Transect 6 – Static 3	19/10/2022	25/10/2022
Transect 7 – Static 1	19/10/2022	25/10/2022
Transect 7 – Static 2	19/10/2022	25/10/2022
Transect 7 – Static 3	19/10/2022	25/10/2022

Appendix D

Static Location Maps



KEY

Red Line Boundary (24/11/2022)

Survey Area (Old)

Static Detector locations

- Transect 1
- Transect 2
- Transect 3
- Transect 4
- Transect 5
- Transect 6
- Transect 7

Bat Species

B.bar – Barbastelle
BLE. – Brown Long-eared
P.pip – Common pipistrelle
P.pyg – Soprano pipistrelle
Myo sp – Myotis species
NSL – Noctule/Serotine/Leislers



Rev	Drwn	Chk'd	App'd	Description	Date
P01.1	AC	NP	JJ	FIRST DRAFT	15/12/2022

Purpose of Issue
S2 - Issued for Information

Classification
Commercial in Confidence

Client
Greater Cambridgeshire Partnership

Project
Cambridge South East Transport (CSET) Phase 2

Drawing
CSET Static detector loctions - Species August – October 2022
Overview plan

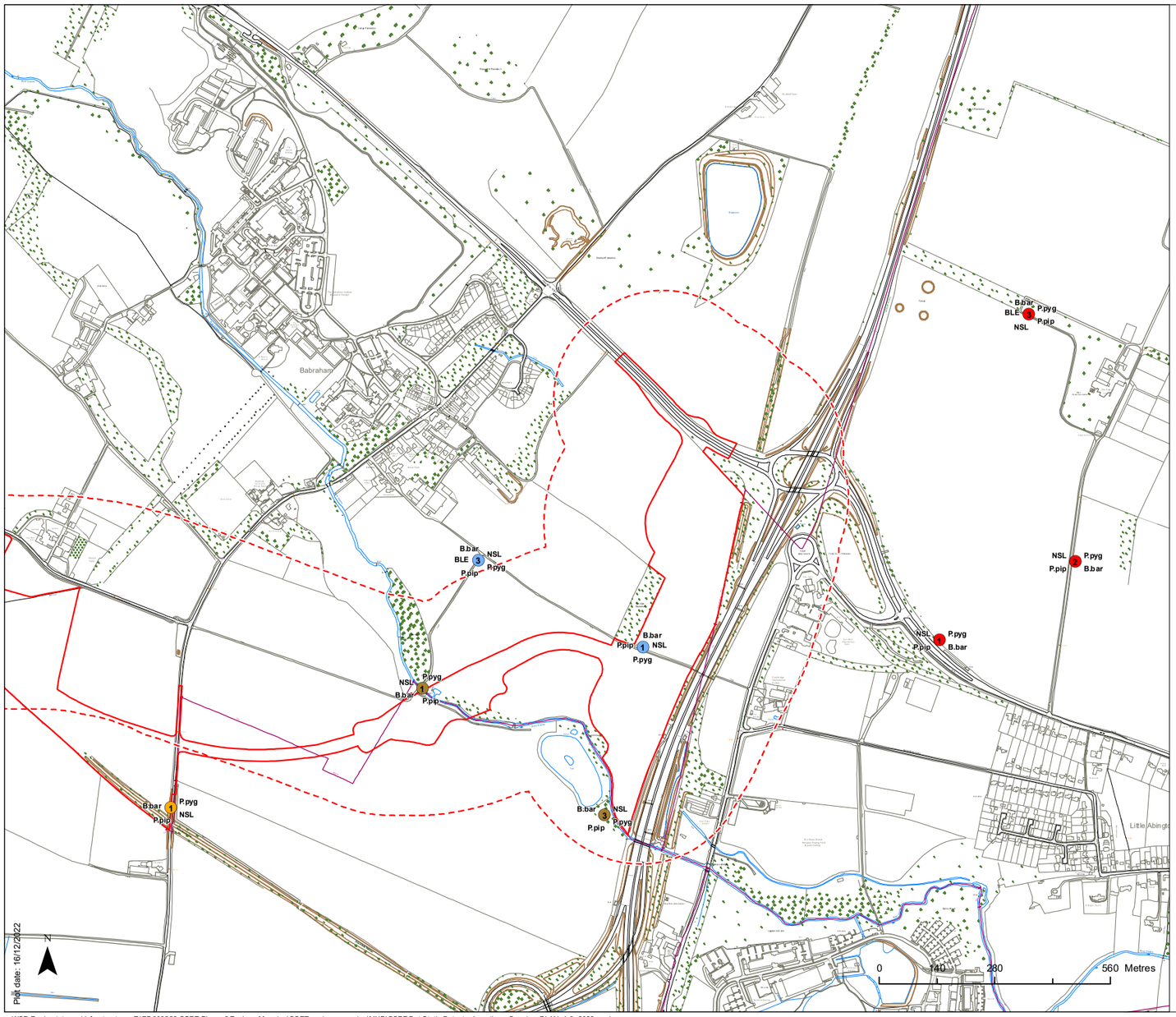
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1:30,000	AC	NP	JJ

Project No: ED000553
Date: 15/12/2022

Drawing Identifier
Project Reference-Author-Volume-Location-Type-Role-File Number
Revision: P01.1

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KEY

Red Line Boundary (24/11/2022)

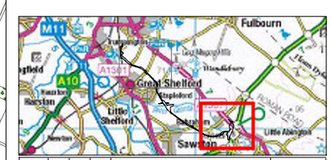
Survey Area (Old)

Static Detector locations

- Transect 4
- Transect 5
- Transect 6
- Transect 7

Bat Species

B.bar – Barbastelle
BLE. – Brown Long-eared
P.pip – Common pipistrelle
P.pyg – Soprano pipistrelle
Myo sp – Myotis species
NSL – Noctule/Serotine/Leislers



Rev	Drwn	Chk'd	App'd	Description	Date
P01.1	AC	NP	JJ	FIRST DRAFT	15/12/2022

Purpose of Issue
S2 - Issued for Information

Classification
Commercial in Confidence

Client
Greater Cambridgeshire Partnership

Project
Cambridge South East Transport (CSET) Phase 2

Drawing
CSET Static detector loctions - Species August – October 2022

Plan 1 of 3

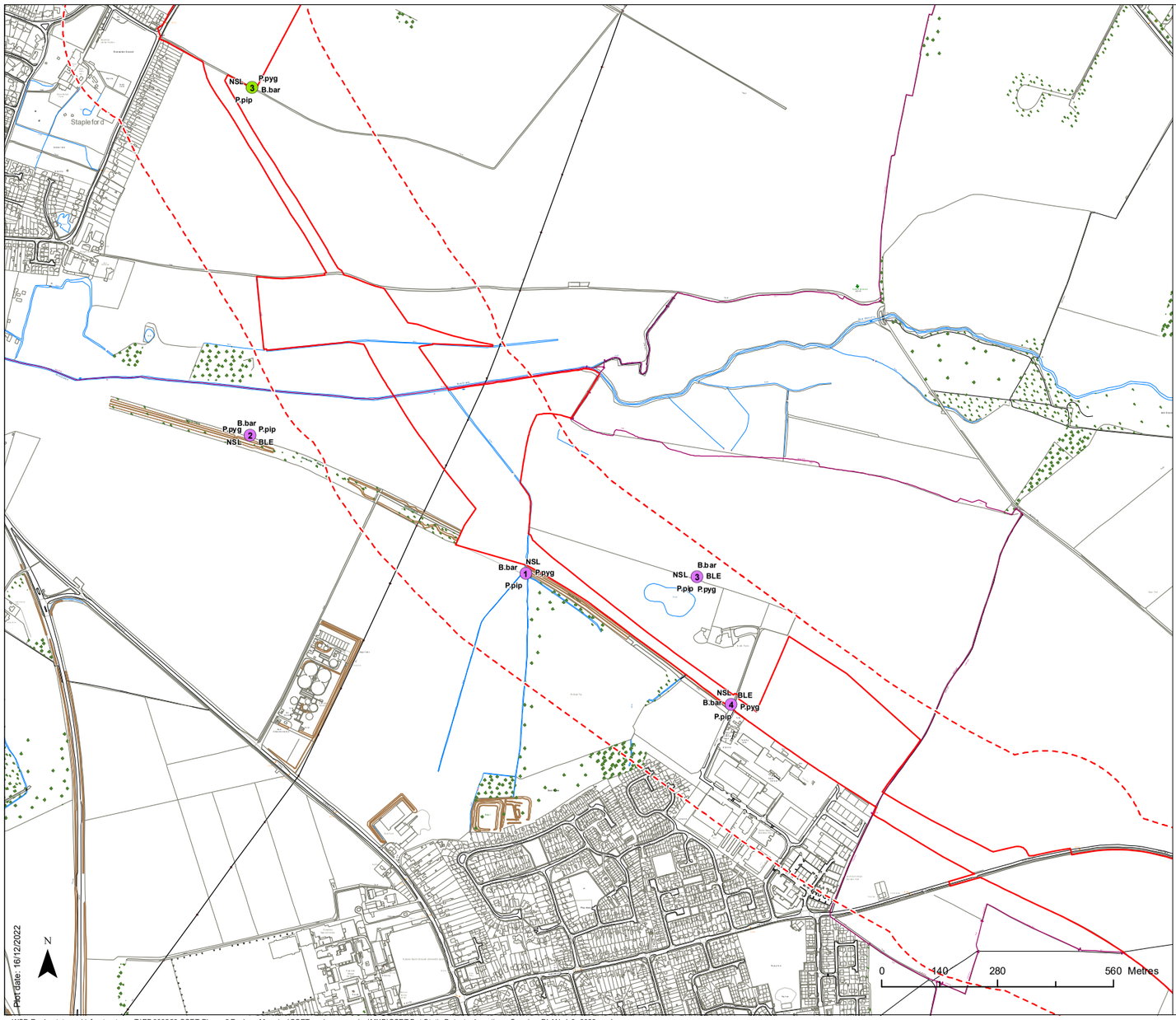
Scale @ A3	Drawn	Checked	Approved
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Project No: ED000553
Date: 16/12/2022

Drawing Identifier
Project Reference-Author-Volume-Location-Type-Role-File Number
Revision: N/A P01.1

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KEY

Red Line Boundary (24/11/2022)

Survey Area (Old)

Static Detector locations

Transect 2

Transect 3

Bat Species

B.bar – Barbastelle
BLE. – Brown Long-eared
P.pip – Common pipistrelle
P.pyg – Soprano pipistrelle
Myo sp – Myotis species
NSL – Noctule/Serotine/Leislers



Rev	Drwn	Chk'd	App'd	Description	Date
P01.1	AC	NP	JJ	FIRST DRAFT	15/12/2022

Purpose of Issue
S2 - Issued for Information

Classification
Commercial in Confidence

Client
Greater Cambridgeshire Partnership

Project
Cambridge South East Transport (CSET) Phase 2

Drawing
CSET Static detector loctions - Species August – October 2022

Plan 2 of 3

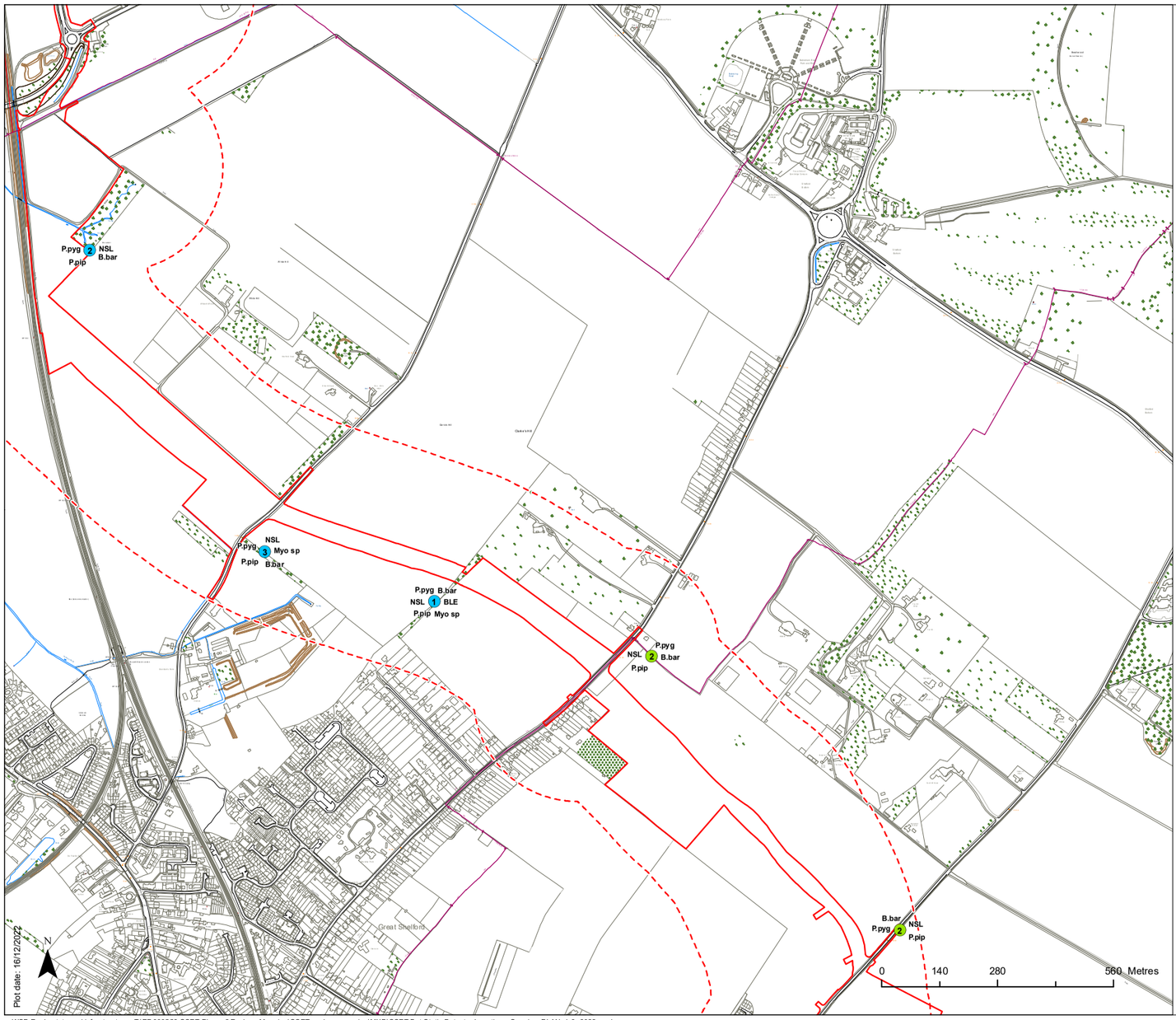
Scale @ A3	Drawn	Checked	Approved
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Project No: ED000553
Date: 16/12/2022

Drawing Identifier
Project Reference-Author-Volume-Location-Type-Role-File Number: N/A
Revision: P01.1

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Plot date: 16/12/2022



KEY

Red Line Boundary (24/11/2022)

Survey Area (Old)

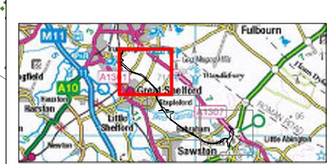
Static Detector locations

Transect 1

Transect 2

Bat Species

B.bar – Barbastelle
BLE. – Brown Long-eared
P.pip – Common pipistrelle
P.pyg – Soprano pipistrelle
Myo sp – Myotis species
NSL – Noctule/Serotine/Leislers



Rev	Drwn	Chk'd	App'd	Description	Date
P01.1	AC	NP	JJ	FIRST DRAFT	15/12/2022

Purpose of Issue
S2 - Issued for Information

Classification
Commercial in Confidence

Client
Greater Cambridgeshire Partnership

Project
Cambridge South East Transport (CSET) Phase 2

Drawing
CSET Static detector loctions - Species August – October 2022

Plan 3 of 3

Scale @ A3	Drawn	Checked	Approved
1:8,500	AC	NP	JJ

Project No: ED000553
Date: 16/12/2022

Drawing Identifier
Project Reference-Author-Volume-Location-Type-Role-File Number: N/A
Revision: P01.1

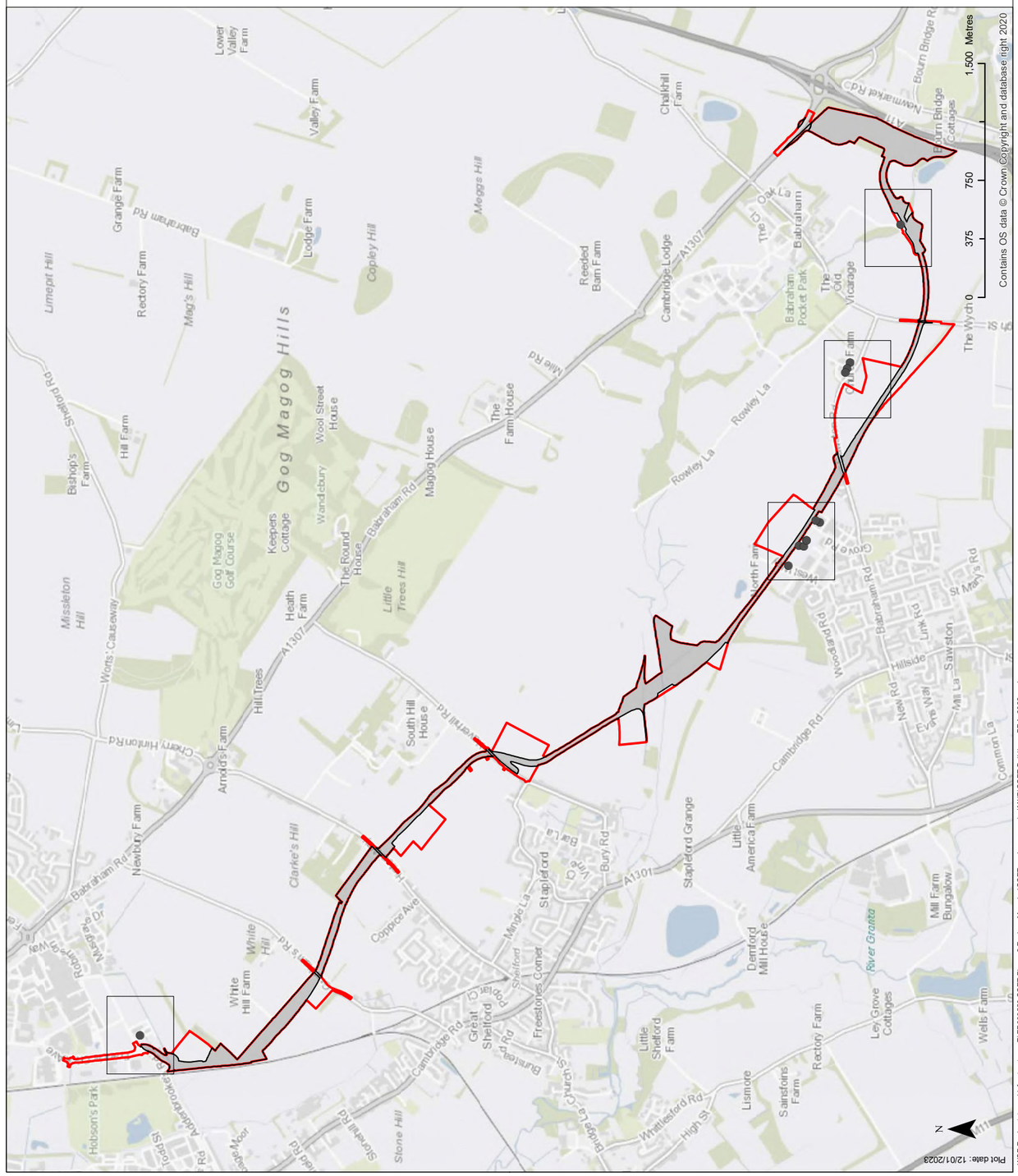
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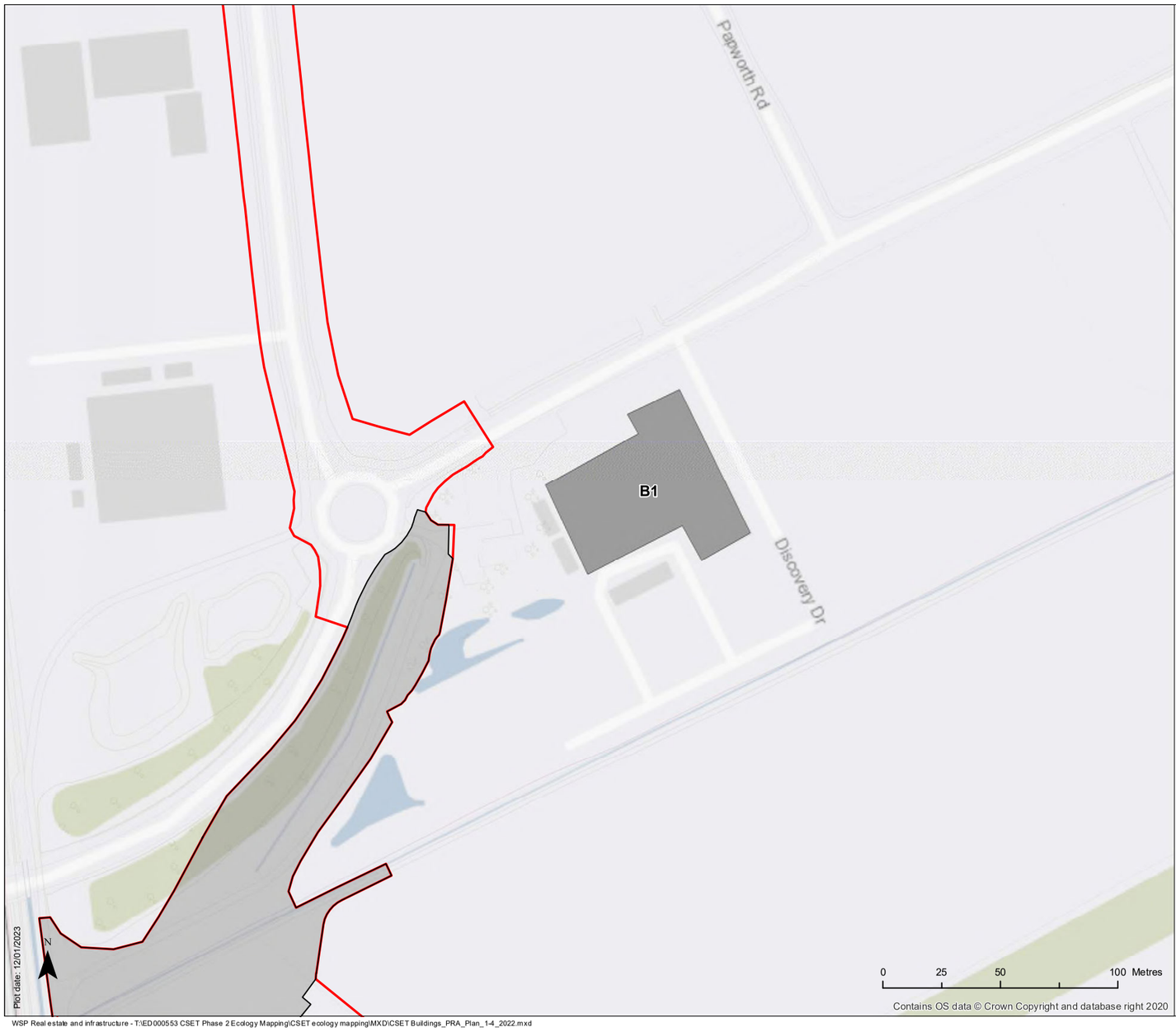
Plot date: 16/12/2022

Appendix E

Building Location Maps

Public





KEY

- Red Line Boundary (24/11/2022)
- Route Alignment
- Buildings within 50m from route alignment
- Permanent Land Take



Rev	Drwn	Chk'd	App'd	Description	Date
P01	AC	MJ	JJ	FOR ISSUE	12/01/2022

Purpose of Issue
S2 - Issued for Information

Classification
Commercial in Confidence

Client
Greater Cambridgeshire Partnership

Project
Cambridge South East Transport (CSET) Phase 2

Drawing
CSET Buildings PRA

Plan 1 of 4

Scale @ A3	Drawn	Checked	Approved
1:1,500	AC	MJ	JJ

Project No: ED000553
Date: 12/01/2023

Drawing Identifier
Project Reference-Author-Volume-Location-Type-Role-File Number: STND-WSP-EBD-XX-GS-LE-1067
Revision: P01

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KEY

- Red Line Boundary (24/11/2022)
- Route Alignment
- Buildings within 50m from route alignment
- Permanent Land Take



Rev	Drwn	Chk'd	App'd	Description	Date
P01	AC	MJ	JJ	FOR ISSUE	12/01/2022

Purpose of Issue
S2 - Issued for Information

Classification
Commercial in Confidence

Client
Greater Cambridgeshire Partnership

Project
Cambridge South East Transport (CSET) Phase 2

Drawing
CSET Buildings PRA

Plan 2 of 4

Scale @ A3	Drawn	Checked	Approved
1:1,500	AC	MJ	JJ

Project No: ED000553
Date: 12/01/2023

Drawing Identifier
Project Reference-Author-Volume-Location-Type-Role-File Number: STND-WSP-EBD-XX-GS-LE-1068
Revision: P01

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WSP Real estate and infrastructure - T:\ED000553 CSET Phase 2 Ecology Mapping\CSET ecology mapping\MXD\CSET Buildings_PRA_Plan_1-4_2022.mxd



KEY

- Red Line Boundary (24/11/2022)
- Route Alignment
- Buildings within 50m from route alignment
- Permanent Land Take



Rev	Drwn	Chk'd	App'd	Description	Date
P01	AC	MJ	JJ	FOR ISSUE	12/01/2022

Purpose of Issue
S2 - Issued for Information

Classification
Commercial in Confidence

Client
Greater Cambridgeshire Partnership

Project
Cambridge South East Transport (CSET) Phase 2

Drawing
CSET Buildings PRA

Plan 3 of 4

Scale @ A3	Drawn	Checked	Approved
1:1,500	AC	MJ	JJ

Project No: ED000553
Date: 12/01/2023

Drawing Identifier
Project Reference-Author-Volume-Location-Type-Role-File Number: STND-WSP-EBD-XX-GS-LE-1069
Revision: P01

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KEY

- Red Line Boundary (24/11/2022)
- Route Alignment
- Buildings within 50m from route alignment
- Permanent Land Take



Rev	Drwn	Chk'd	App'd	Description	Date
P01	AC	MJ	JJ	FOR ISSUE	12/01/2022

Purpose of Issue
S2 - Issued for Information

Classification
Commercial in Confidence

Client
Greater Cambridgeshire Partnership

Project
Cambridge South East Transport (CSET) Phase 2

Drawing
CSET Buildings PRA

Plan 4 of 4

Scale @ A3	Drawn	Checked	Approved
1:1,500	AC	MJ	JJ

Project No: ED000553
Date: 12/01/2023

Drawing Identifier
Project Reference-Author-Volume-Location-Type-Role-File Number: STND-WSP-EBD-XX-GS-LE-1070
Revision: P01

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Appendix F

Building Reference Photographs

Public

Table F-1 – Building Reference Photographs

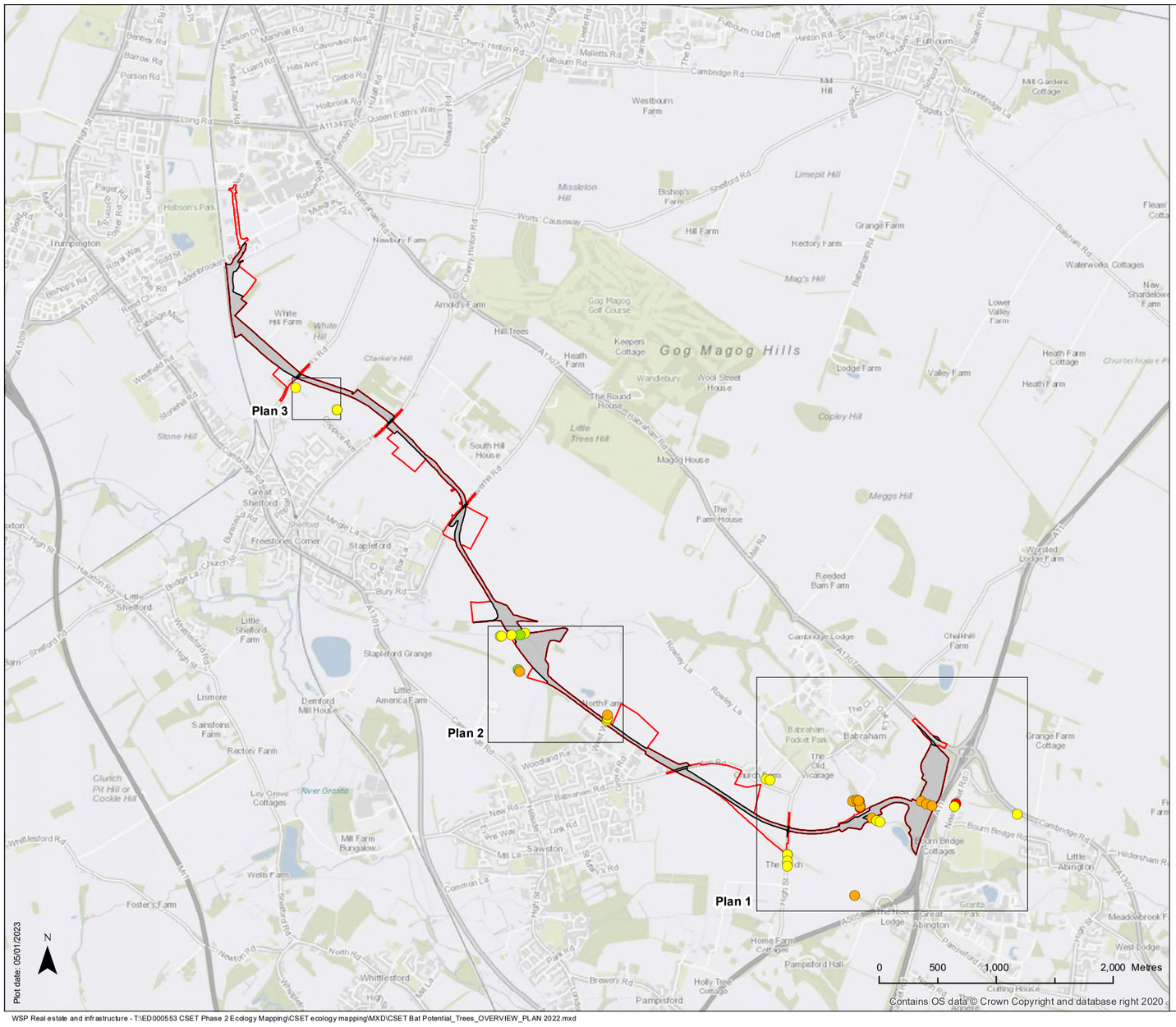
B1	TL 46147 54587	
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B3	TL 49282 50329	
B4	TL 49283 50358	
B5	TL 49318 50311	
B6	TL 49318 50311	

B7	TL 49448 50253	
B9	TL 50397 50062	
B10	TL 50421 50050	
B11	TL 50460 50032	
B12	TL 51346 49707	

Appendix G

Tree Location Maps

Public



KEY

- Red Line Boundary (24/11/2022)
- Route Alignment (24/11/2022)
- Permanent Land Take (24/11/2022)

Bat Roost Potential

- High Potential
- Moderate Potential
- Low Potential
- Negligible



Rev	Drwn	Chk'd	App'd	Description	Date
P01.2	AC	MJ	JJ	DATA AMENDED	04/01/2022
P01.1	AC	MJ	JJ	FIRST DRAFT	16/12/2022

Purpose of Issue
S2 - Issued for Information

Classification
Commercial in Confidence

Client
Greater Cambridgeshire Partnership

Project
Cambridge South East Transport (CSET) Phase 2

Drawing
CSET Bat Roost Potential - Trees Overview plan

Scale @ A3	Drawn	Checked	Approved
1:30,000	AC	MJ	JJ

Project No: ED000553
Date: 05/01/2023

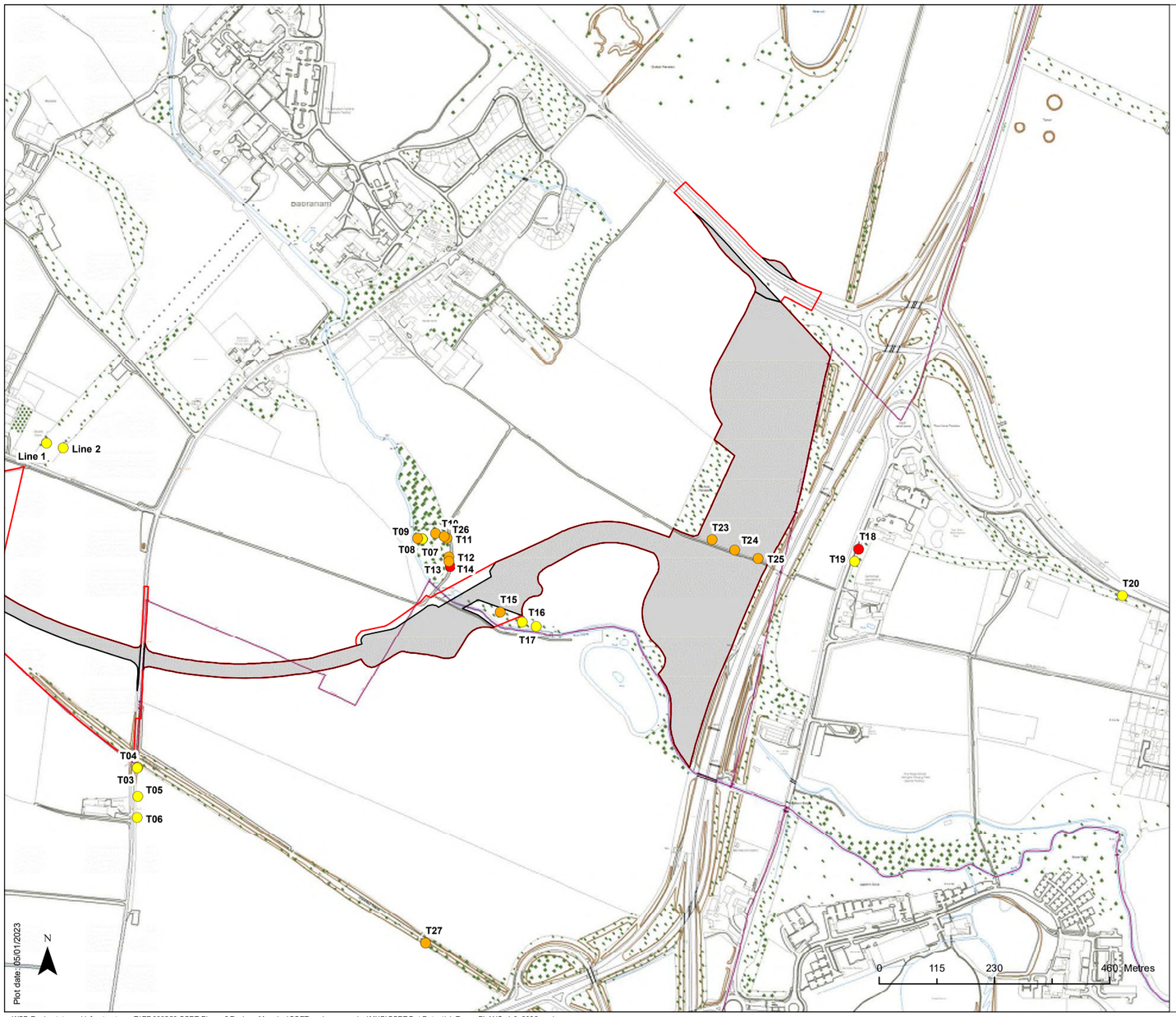
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Project Reference-Author-Volume-Location-Type-Role-File Number
Revision: P01.2

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Plot date: 05/01/2023

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KEY

- Red Line Boundary (24/11/2022)
- Route Alignment)24/11/2022)
- Permanent Land Take (24/11/2022)

Bat Roost Potential

- High Potential
- Moderate Potential
- Low Potential



Rev	Drwn	Chk'd	App'd	Description	Date
P01.2	AC	MJ	JJ	DATA AMENDED	04/01/2022
P01.1	AC	MJ	JJ	FIRST DRAFT	16/12/2022

Purpose of Issue
S2 - Issued for Information

Classification
Commercial in Confidence

Client
Greater Cambridgeshire Partnership

Project
Cambridge South East Transport (CSET) Phase 2

Drawing
CSET Bat Roost Potential - Trees

Plan 1 of 3

Scale @ A3	Drawn	Checked	Approved
1:7,000	AC	MJ	JJ

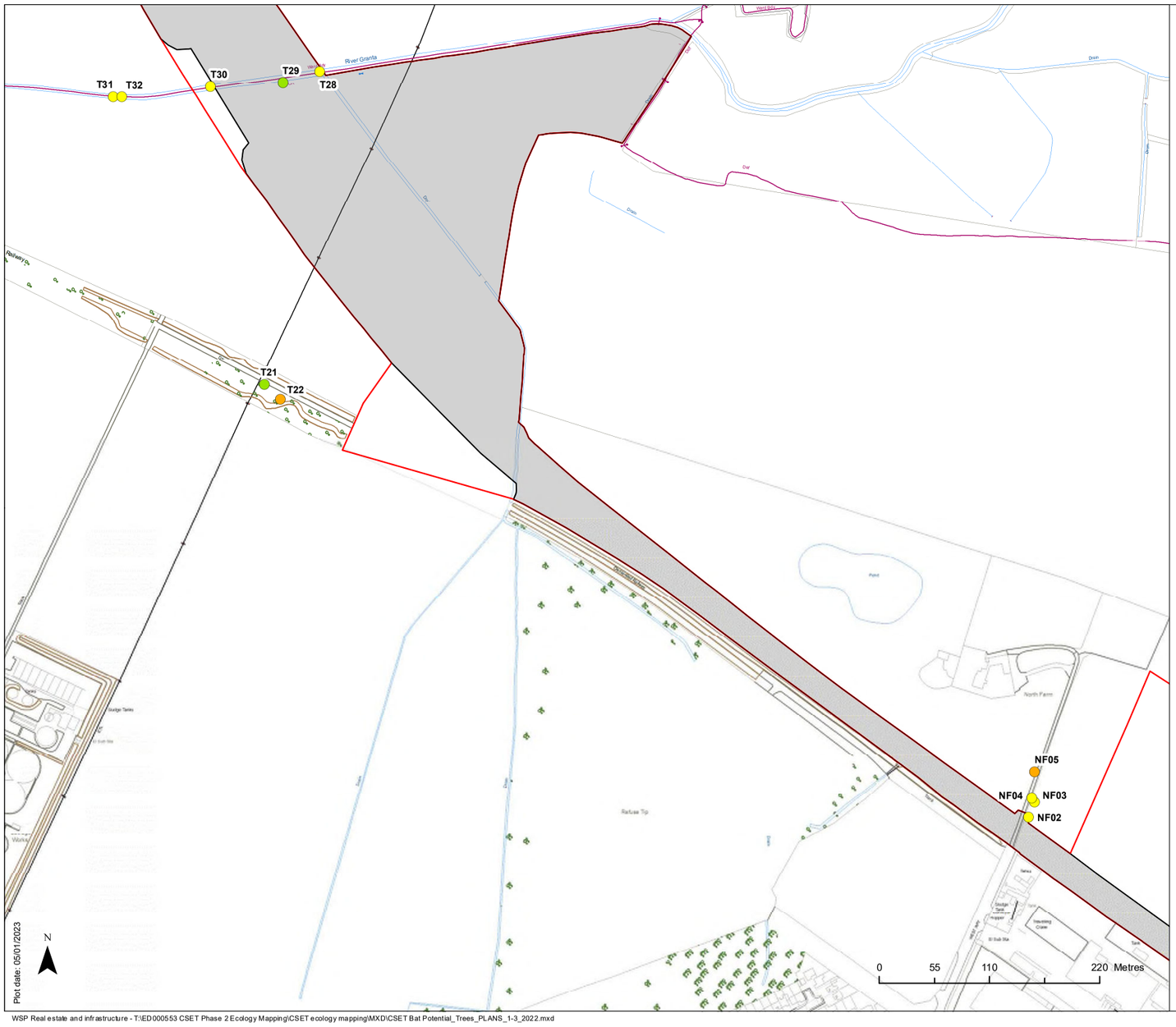
Project No: ED000553
Date: 05/01/2023

Drawing Identifier
Project Reference-Author-Volume-Location-Type-Role-File Number
Revision: N/A P01.2

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Plot date: 05/01/2023

WSP Real estate and infrastructure - T:\ED000553 CSET Phase 2 Ecology Mapping\CSET ecology mapping\MXD\CSET Bat Potential_ Trees_PLANS_1-3_2022.mxd



KEY

- Red Line Boundary (24/11/2022)
- Route Alignment)24/11/2022)
- Permanent Land Take (24/11/2022)

Bat Roost Potential

- Moderate Potential
- Low Potential
- Negligible



Rev	Drwn	Chk'd	App'd	Description	Date
P01.2	AC	MJ	JJ	DATA AMENDED	04/01/2022
P01.1	AC	MJ	JJ	FIRST DRAFT	16/12/2022

Purpose of Issue
S2 - Issued for Information

Classification
Commercial in Confidence

Client
Greater Cambridgeshire Partnership

Project
Cambridge South East Transport (CSET) Phase 2

Drawing
CSET Bat Roost Potential - Trees

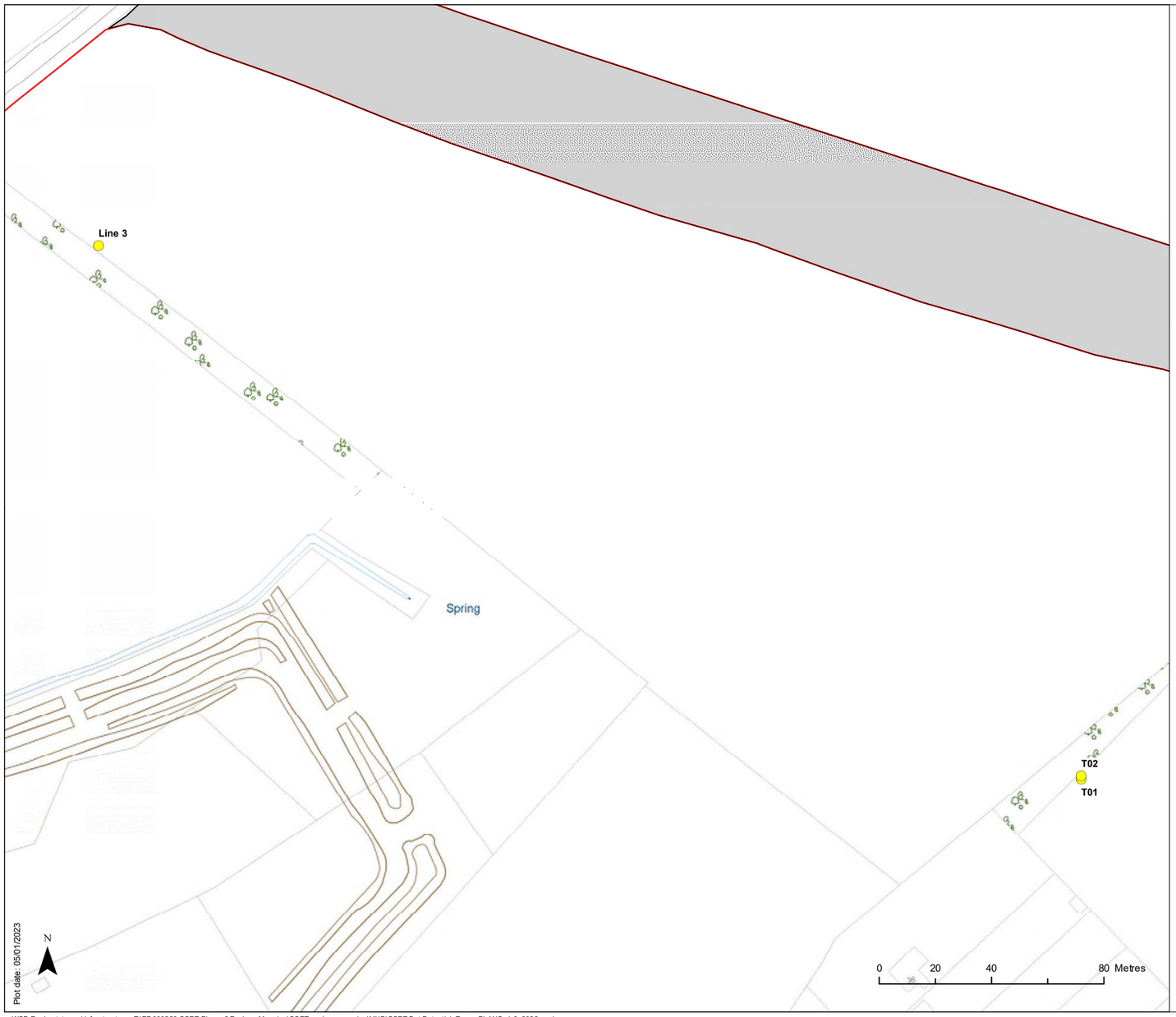
Plan 2 of 3

Scale @ A3	Drawn	Checked	Approved
1:3,500	AC	MJ	JJ

Project No	Date
ED000553	05/01/2023

Drawing Identifier
Project Reference-Author-Volume-Location-Type-Role-File Number: N/A
Revision: P01.2

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KEY

- Red Line Boundary (24/11/2022)
- Route Alignment)24/11/2022)
- Permanent Land Take (24/11/2022)

Bat Roost Potential

- Low Potential



Rev	Drwn	Chk'd	App'd	Description	Date
P01.2	AC	MJ	JJ	DATA AMENDED	04/01/2022
P01.1	AC	MJ	JJ	FIRST DRAFT	16/12/2022

Purpose of Issue
S2 - Issued for Information

Classification
Commercial in Confidence

Client
Greater Cambridgeshire Partnership

Project
Cambridge South East Transport (CSET) Phase 2

Drawing
CSET Bat Roost Potential - Trees

Plan 3 of 3

Scale @ A3	Drawn	Checked	Approved
1:1,250	AC	MJ	JJ

Project No	Date
ED000553	05/01/2023

Drawing Identifier
Project Reference-Author-Volume-Location-Type-Role-File Number: N/A
Revision: P01.2

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Appendix H

Ground-Level Tree Assessment Results

Table H-1 - Ground-level Tree Assessment Results

Tree ID	Grid Reference / Tree tag	Species	Description of surrounding habitat and position in the landscape	Age	Potential Roost Features (PRFs)				Overall Level of Suitability
					Description	Approx. height above ground level (m)	Position on tree	Aspect (compass bearing)	
T01	TL 46865 53157 (Tree tag 487)	European ash	Narrow woodland strip north-west of Hinton Way, Great Shelford. Partially separating two arable fields.	Mature	Limb tear	5	Branch	South	Low
					Woodpecker hole	5	Main stem	South	
T02	TL 46865 53158 (Tree tag 488)	Pedunculate oak	Narrow woodland strip north-west of Hinton Way, Great Shelford. Partially separating two arable fields.	Mature	Limb tear	6	Branch	South	Low

Public

T03	TL 50715 49352 (No tree tag)	Sycamore	Planted tree on south-side verge of High Street, south-west of Babraham.	Mature	Wound	5	Main stem	South-east	Low
T04	TL 50714 49351 (No tree tag)	European ash	Planted tree on south-side verge of High Street, south-west of Babraham.	Mature	Branch cavity	-	Branch	East	Low
					Callus roll	7	Main stem	West	
					Callus roll	8	Main stem	West	
T05	TL 50715 49294 (No tree tag)	European ash	Planted tree on south-side verge of High Street, south-west of Babraham.	Mature	Woodpecker hole	9.5	Main stem	South	Low
					Woodpecker hole	10	Main stem	South	
T06	TL 50714 49252 (No tree tag)	European ash	Planted tree on south-side verge of High Street, south-west of Babraham.	Mature	Branch cavity	3.5	Branch	South-west	Low
					Trunk cavity	4	Main stem	West	
T07	TL 51282 49808 (No tag 495)	Sycamore	Small Woodland block at Home Farm (Cheveley Park Farms). Located north of the River Granta, north-west of ford. Used as a rearing area for gamebirds.	Dead	Woodpecker hole	10	Main stem	East	Low

			west of ford. Used as a rearing area for gamebirds.						
T08	TL 51282 49808 (No tree tag)	Sycamore	Small Woodland block at Home Farm (Cheveley Park Farms). Located north of the River Granta, north-west of ford. Used as a rearing area for gamebirds.	Mature	Woodpecker hole	8	Main stem	South-east	Low
T09	TL 51274 49809 (No tree tag)	European ash	Small Woodland block at Home Farm (Cheveley Park Farms). Located north of the River Granta, north-west of ford. Used as a rearing area for gamebirds.	Mature	Knothole / woodpecker hole	6	Main stem	South	Moderate
T10	TL 51309 49819	European ash	Small Woodland block at Home Farm (Cheveley	Mature	Limb tear	10	Branch	South	Moderate

	(Tree tag 492)		Park Farms). Located north of the River Granta, north-west of ford. Used as a rearing area for gamebirds.						
T11	TL 51332 49810 (No tree tag)	European ash	Small Woodland block at Home Farm (Cheveley Park Farms). Located north of the River Granta, north-west of ford. Used as a rearing area for gamebirds.	Mature	Limb tear	7	Branch	South-east	Moderate
					Woodpecker hole	7	Main stem	South	
					Wound	6	Main stem	North-east	

T12	TL 51336 49772 (No tree tag)	European ash	Small Woodland block at Home Farm (Cheveley Park Farms). Located north of the River Granta, north-west of ford. Used as a rearing area for gamebirds.	Mature	Limb tear	5	Branch	South-east	Moderate
					Woodpecker hole	7	Main stem	South	
T13	TL 51339 49753 (No tree tag)	Scot's pine	Small Woodland block at Home Farm (Cheveley Park Farms). Located north of the River Granta, north-west of ford. Used as a rearing area for gamebirds.	Mature	Split	8	Main stem	South	High
					Woodpecker hole	8	Main stem	South	

T14	TL 51336 49763 (No tree tag)	European ash	Small Woodland block at Home Farm (Cheveley Park Farms). Located north of the River Granta, north-west of ford. Used as a rearing area for gamebirds.	Mature	Knothole	7	Main stem	North	Moderate
					Woodpecker hole	6	Main stem	South-east	
					Wound	7	Main stem	South-east	
T15	TL 51439 49662 (No tree tag)	Crack willow	Woodland strip running along northern bank of the River Granta. East of ford, west of reservoir.	Mature	Rot hole	5	Main stem	North-east	Moderate
					Rot hole	5	Main stem	North-east	
					Rot hole	6	Main stem	North-east	
					Knothole	7	Main stem	North	
T16	TL 51482 49642 (No tree tag)	Sycamore	Woodland strip running along northern bank of the River Granta. East of ford, west of reservoir.	Mature	Trunk cavity	5.5	Main stem	South	Low
					Woodpecker hole	5	Main stem	South	

T17	TL 51509 49633 (No tree tag)	Crack willow	Woodland strip running along northern bank of the River Granta. East of ford, west of reservoir.	Mature	Hazard beam	2	Branch	East	Low
					Trunk cavity	3	Main stem	North	
T18	TL 52154 49788 (Tree tag 496)	Pedunculate oak	Small Woodland block on east-side of Newmarket Road, Little Abington.	Mature	Lifted bark	8.5	Branch	North-west	High
					Split branch	7.5	Branch	North	
T19	TL 52146 49763 (Tree tag 497)	Pedunculate oak	Small Woodland block on east-side of Newmarket Road, Little Abington.	Mature	Branch cavity	6	Branch	-	Low
					Limb tear	6	Branch	North	
					Wound	6	Main stem	South	
T20	TL 52679 49695 (Tree tag 491)	European ash	Woodland strip running along southern side of A1307 Cambridge Road; north-west of Little Abington.	Mature	Knothole	8	Main stem	North	Low

T21	TL 48413 50933 (No tree tag)	Crack willow	Woodland strip at Deal Farm, south of River Granta. Partially separating two arable fields.	Mature	N/A	N/A	N/A	N/A	Negligible (Fallen down)
T22	TL 48429 50918 (No tree tag)	Crack willow	Woodland strip at Deal Farm, south of River Granta. Partially separating two arable fields.	Mature	Woodpecker hole	2	Main stem	East	Moderate
					Woodpecker hole	2.5	Main stem	East	
					Woodpecker hole	3.5	Main stem	East	
					Woodpecker hole	4.5	Main stem	East	
T23	TL 51861 49806 (No tree tag)	Pedunculate oak	Tree along hedgerow and Public Right of Way (PRoW), separating two arable fields. Part of Home Farm (Cheveley Park Farms), west of A11.	Mature	Branch collar	9	Branch	South	Moderate
					Knothole	5	Main stem	South	
					Knothole	5	Main stem	North	
					Split	9	Main stem	West	
					Wound	9	Branch	North	
T24	TL 51906 49786	Pedunculate oak	Tree along hedgerow and	Mature	Split / deadwood	8	Main stem	North-west	Moderate

	(No tree tag)		PRoW, separating two arable fields. Part of Home Farm (Cheveley Park Farms), west of A11.						
T25	TL 51953 49769 (No tree tag)	Pedunculate oak	Tree along hedgerow and PRoW, separating two arable fields. Part of Home Farm (Cheveley Park Farms), west of A11.	Mature	Knothole	3	Main stem	South	Moderate
					Lifted bark	6	Main stem	East	
					Split / deadwood	7	Main stem	North-west	
T26	TL 51326 49813 (No tree tag)	European ash	Small Woodland block at Home Farm (Cheveley Park Farms). Located north of the River Granta, north-west of ford. Used as a rearing area for gamebirds.	Mature	Dead limb	5	Branch	South-east	Moderate
					Knothole	7	Main Stem	North	
					Split / tear	8.5	Main Stem	North / south	
					Wound	8	Main Stem	South	

T27	TL 51290 49002 (No tree tag)	Sycamore	Tree along field hedge boundary. Part of Home Farm (Cheveley Park Farms), north of Newmarket Road (A505).	Dead	Split / woodpecker hole	3	Main stem	North-west	Moderate
T28	TL 48468 51245 (No tree tag)	Crack willow	Mature tree along southern bank of River Granta. Part of Deal Farm.	Mature	Split / deadwood	3	Secondary stem	West	Low
T29	TL 48431 51234 (No tree tag)	Crack willow	Mature tree along southern bank of River Granta. Part of Deal Farm, Sawston	Dead	-	-	-	-	Negligible (Fallen down)

T30	TL 48359 51230 (No tree tag)	European ash	Mature tree along southern bank of River Granta. Part of Deal Farm, Sawston	Mature	Ivy-clad	5	Main stem	-	Low
T31	TL 48262 51220 (No tree tag)	Crack willow	Mature tree along southern bank of River Granta. Part of Deal Farm, Sawston.	Mature	Limb tear	2	Branch	West	Low
T32	TL 48271 51220 (No tree tag)	Crack willow	Mature tree along southern bank of River Granta. Part of Deal Farm, Sawston.	Mature	Limb tear	0.5	Branch	West	Low
					Hazard beam	9	Branch	North-west	
					Wound	8	Branch	South-east	
Line 1	TL 50533 49999 (No tree tag)	Common lyme	Line of planted trees, north of Sawston Road. Part of Cheveley Park Farms.	Mature	Dense foliage	-	-	-	Low

Line 2	TL 50566 49990 (No tree tag)	Common lyme	Line of planted trees, north of Sawston Road. Part of Cheveley Park Farms.	Mature	Dense foliage	-	-	-	Low
Line 3	TL 46515 53347 (No tree tag)	Mixed	Woodland strip, south of Granham's Road, Great Shelford. Part of Whitwell's Farm.	Mature	Limb tear	8	Branch	East	Low
NF02	TL 49175 50501 (No tree tag)	Walnut	Planted tree along driveway of North Farm, Sawston. Arable to the north and west, Dales Manor Business Park to the south.	Mature	Broken limb	4	Branch	South	Low
					Knothole	2.5	Main stem	East	

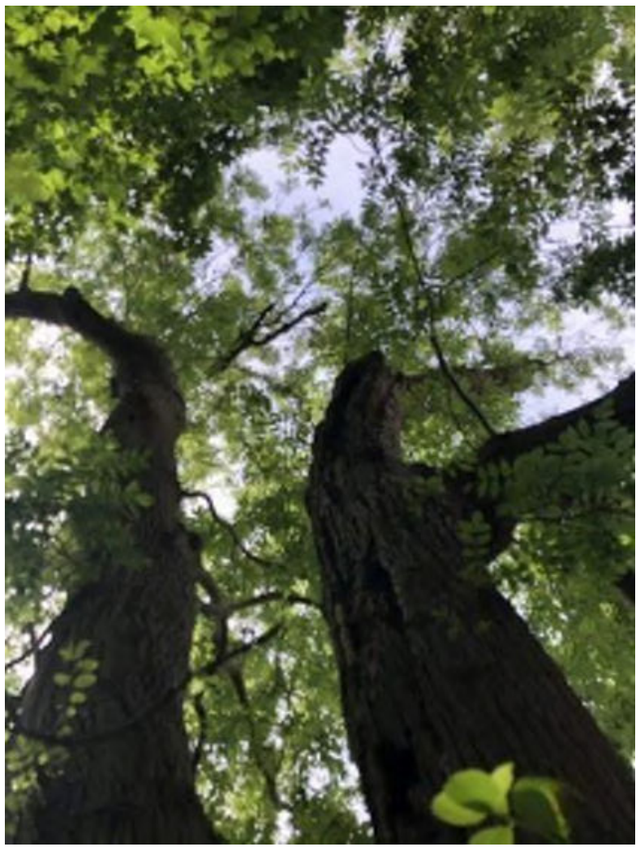
NF03	TL 49181 50516 (No tree tag)	Walnut	Planted tree along driveway of North Farm, Sawston. Arable to the north and west, Dales Manor Business Park to the south.	Mature	Knothole	3.5	Main stem	South-east	Low
NF04	TL 49178 50520 (No tree tag)	Walnut	Planted tree along driveway of North Farm, Sawston. Arable to the north and west, Dales Manor Business Park to the south.	Mature	Ivy-clad	0.5	Main stem	-	Low
NF05	TL 49181 50546 (No tree tag)	Walnut	Planted tree along driveway of North Farm, Sawston. Arable to the north and west, Dales Manor Business Park to the south.	Mature	Woodpecker hole	4.5	Main stem	South	Moderate
					Woodpecker hole	6	Main stem	South-east	

	Wound	5	Branch	South	

Appendix I

Tree Reference Photographs

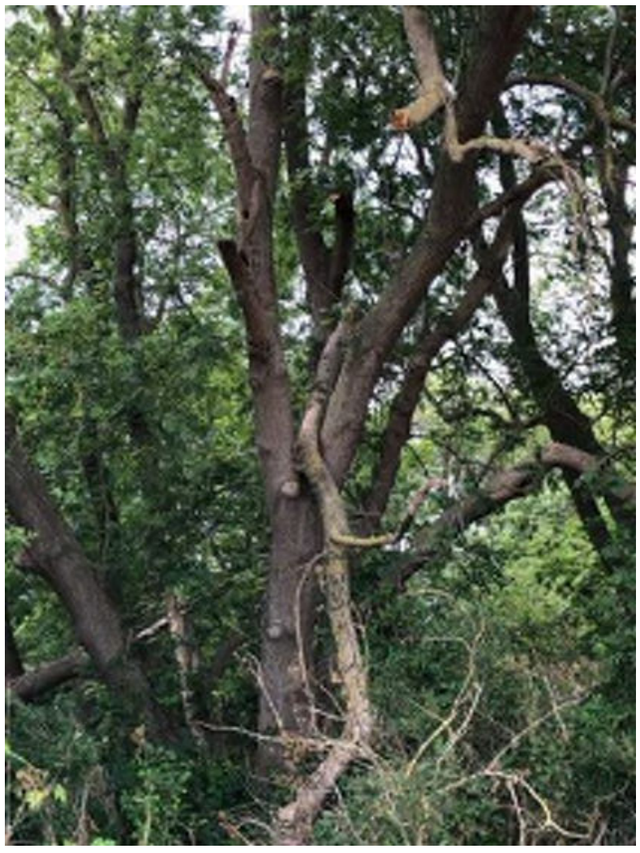
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Photograph 1: T09 (Moderate roosting suitability)



Photograph 2: T10 (Moderate roosting suitability)



Photograph 3: T11 (Moderate roosting suitability)



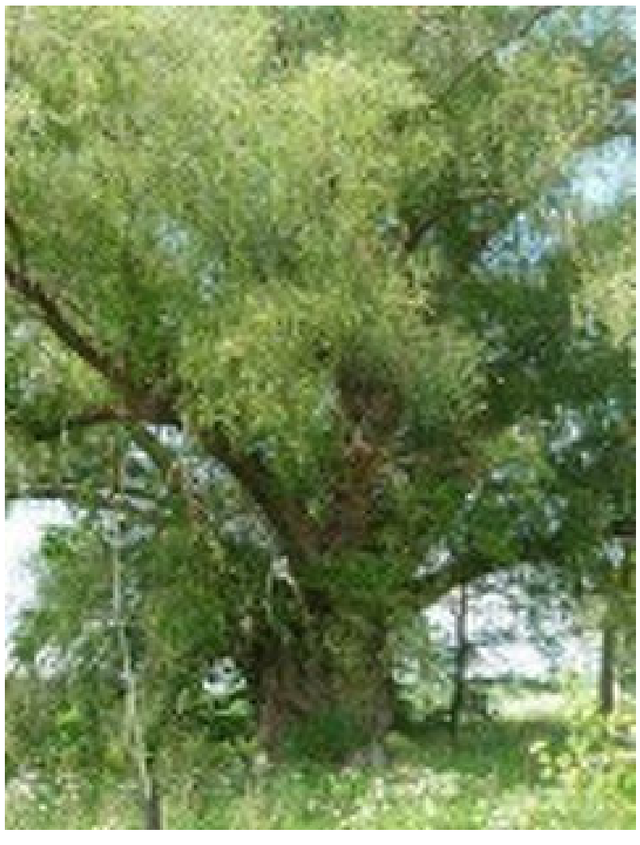
Photograph 4: T12 (Moderate roosting suitability)



Photograph 5: T13 (High roosting suitability)



Photograph 6: T14 (Moderate roosting suitability)



Photograph 7: T15 (Moderate roosting suitability)



Photograph 8: T18 (High roosting suitability)



Photograph 9: T22 (Moderate roosting suitability)



Photograph 10: T23 (Moderate roosting suitability)



Photograph 11: T24 (Moderate roosting suitability)



Photograph 12: T25 (Moderate roosting suitability)



Photograph 13: T26 (Moderate roosting suitability)



Photograph 14: T27 (Moderate roosting suitability)

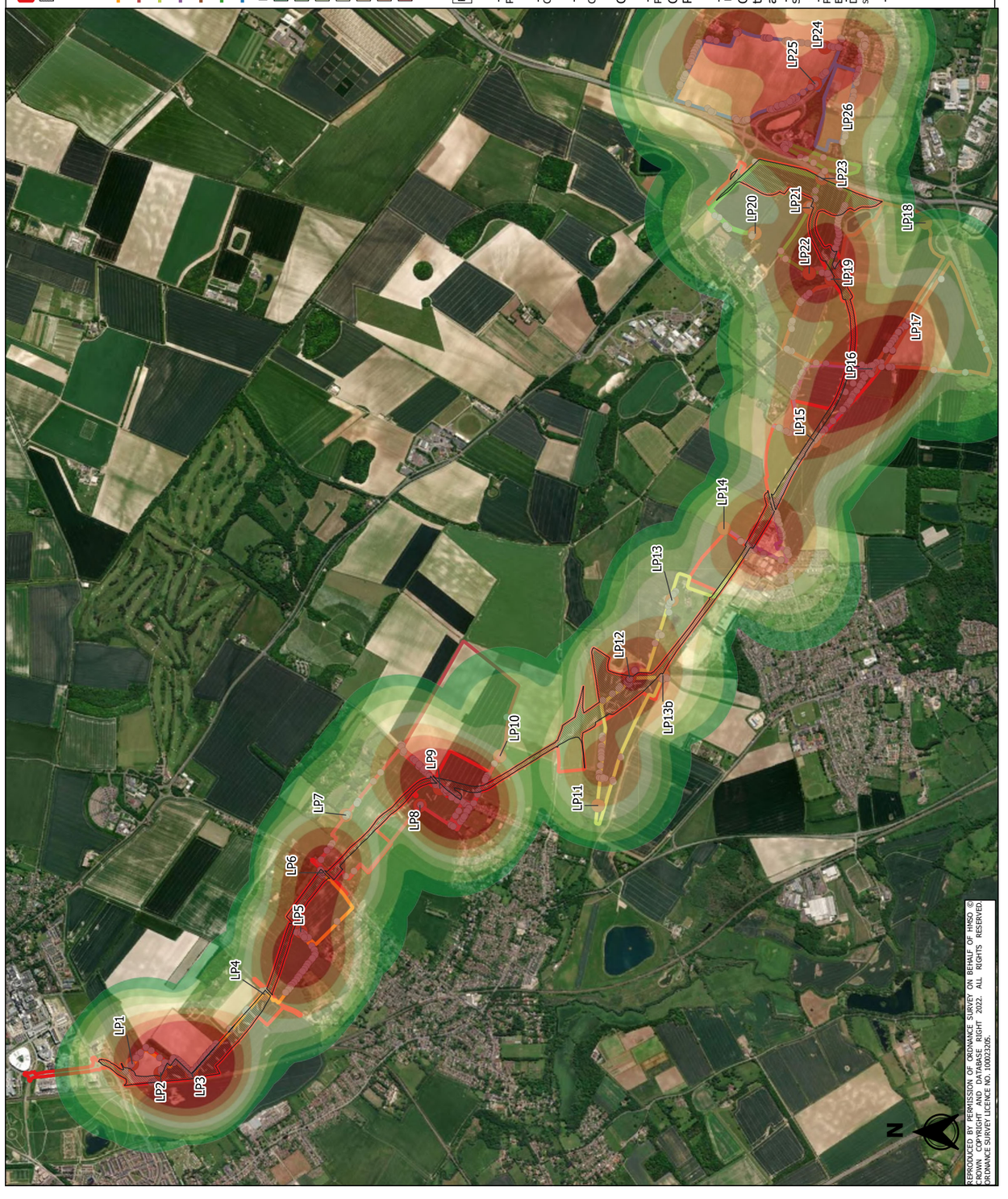


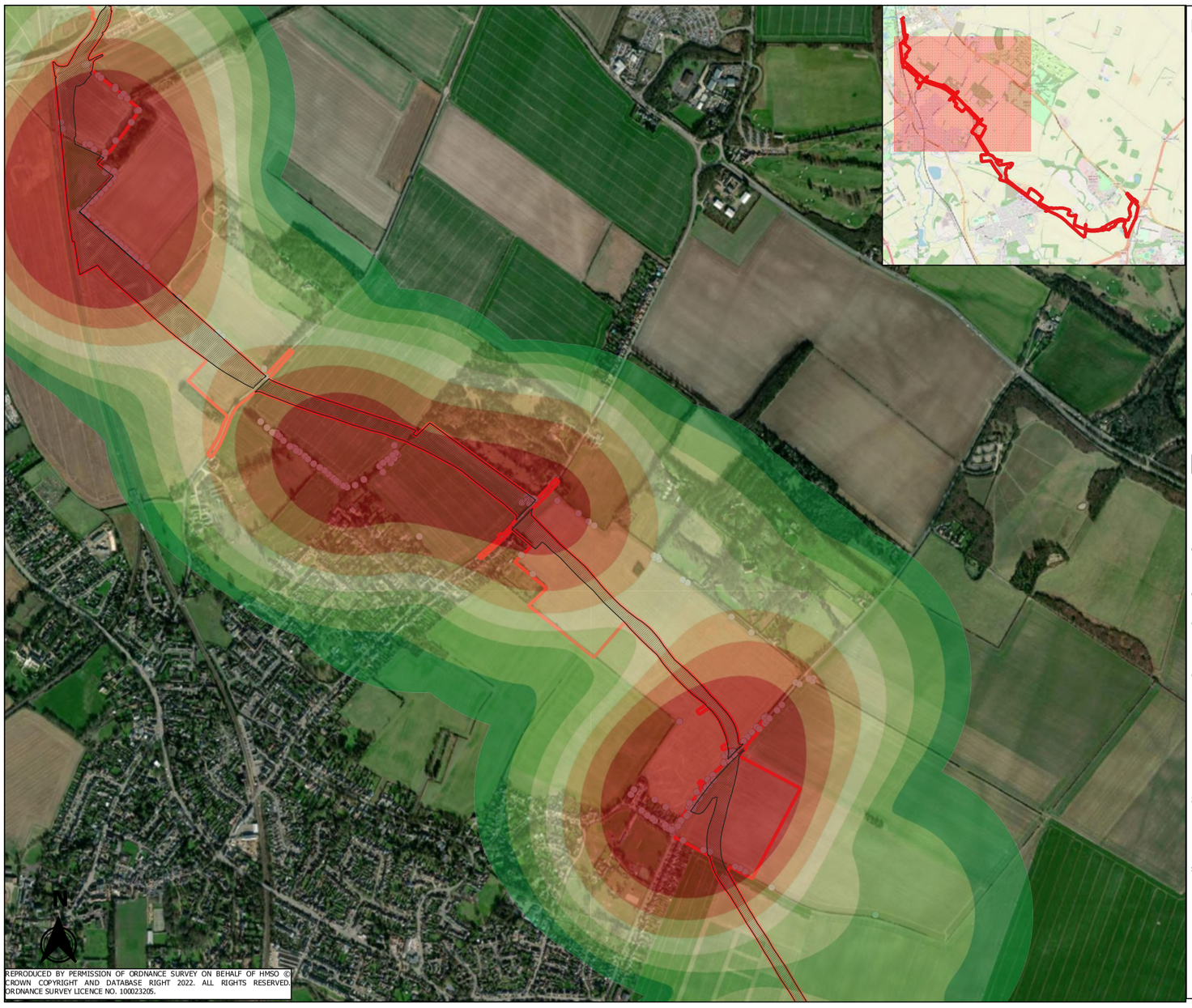
Photograph 15: NF05 (Moderate roosting suitability)

Appendix J

Transect Heat Maps

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Purpose of Issue
S2 - Issued for Information

Classification
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Client
Greater Cambridgeshire Partnership

Project
Cambridge South East Transport (CSET) Phase 2

Drawing
Heatmap, illustrating relative intensity of bat activity across the scheme
Page 1 of 3

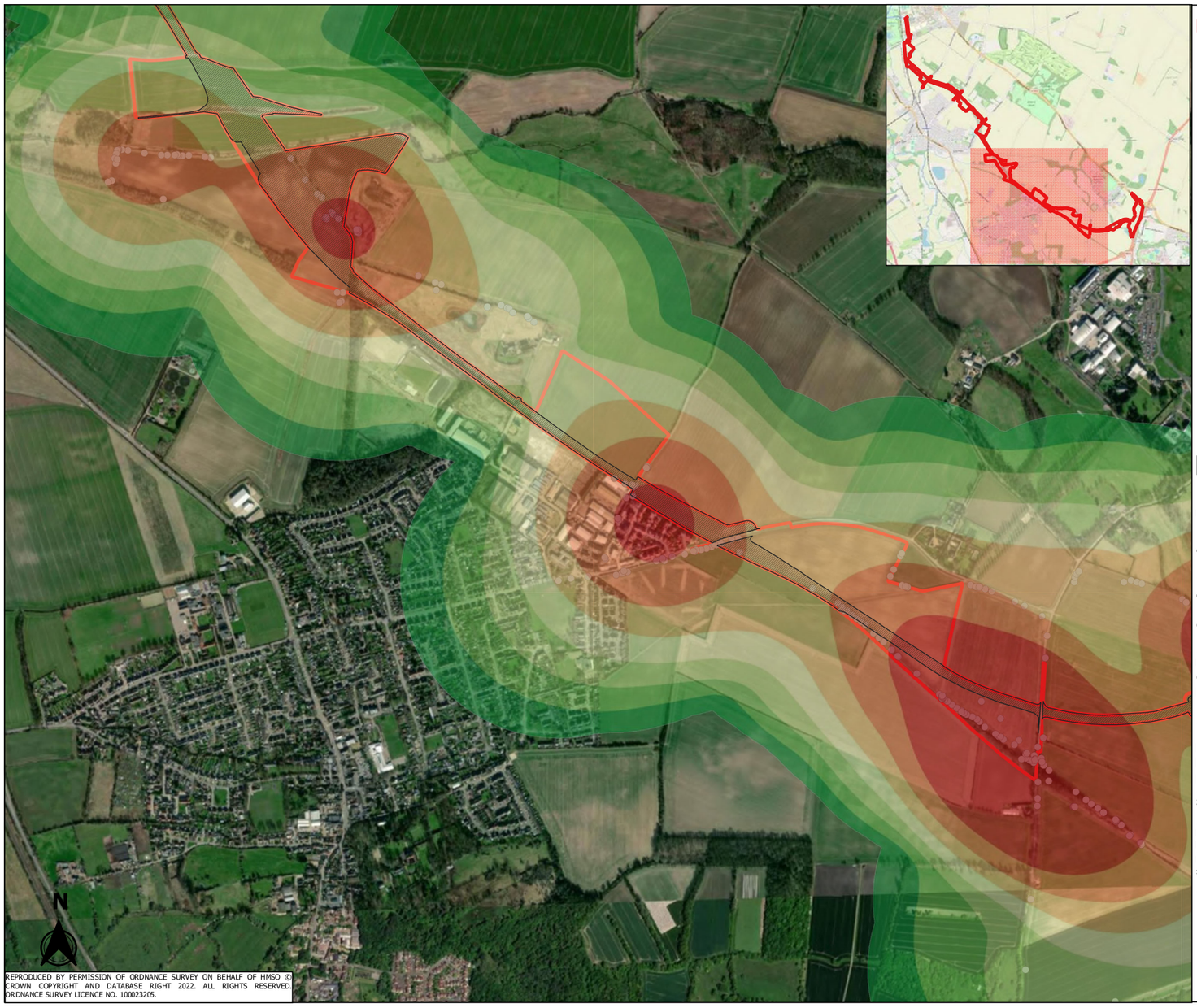
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Classification
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Project
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Drawing
Heatmap, illustrating relative intensity of bat activity across the scheme
Page 2 of 3

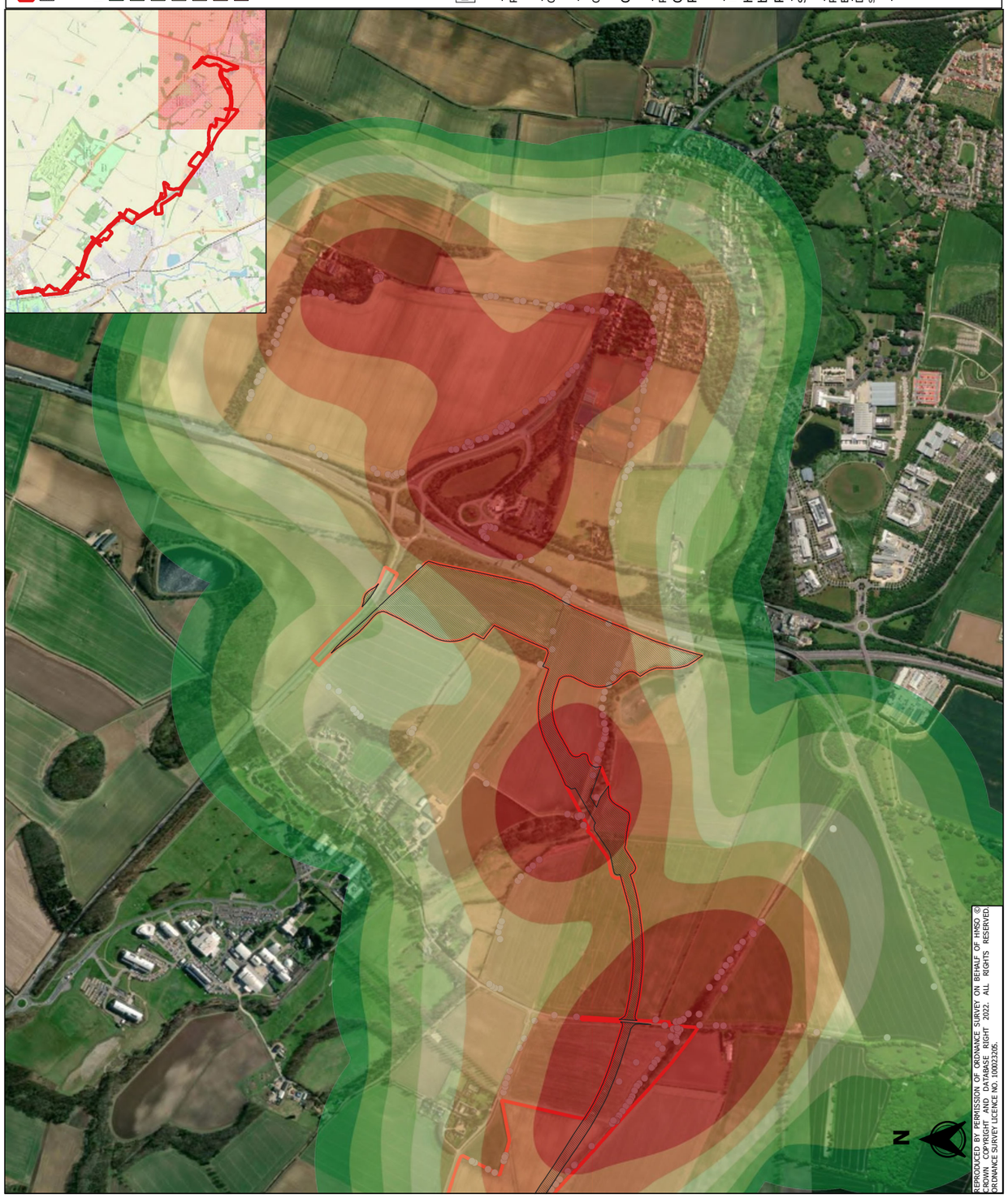
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Client
Greater Cambridgeshire Partnership

Project
Cambridge South East Transport (CSET)
Phase 2

Drawing
Heatmap, illustrating relative intensity of bat activity across the scheme
Page 3 of 3

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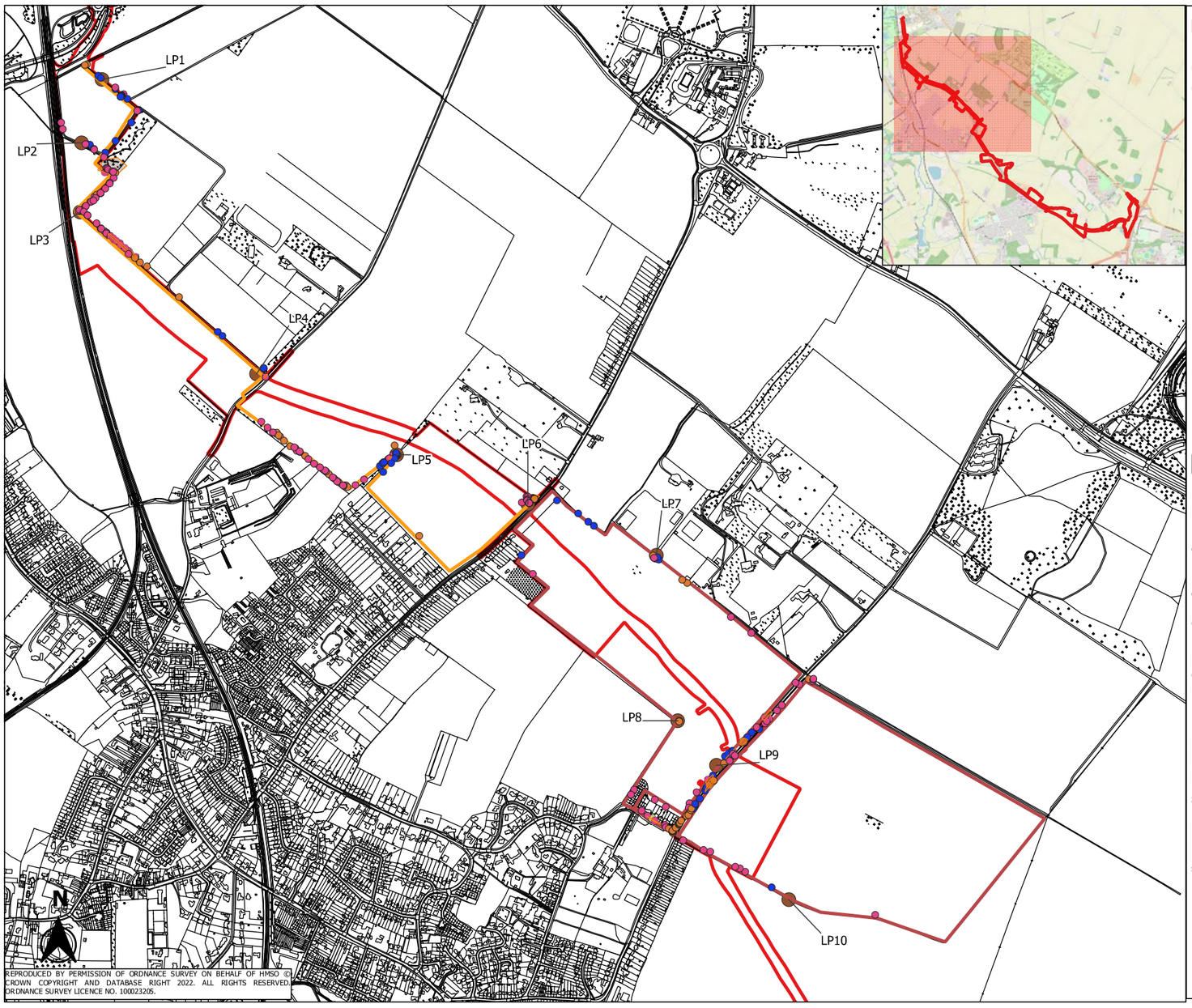
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Appendix K

Species Distribution Maps

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Red line boundary on 24.11.22
Listening points (LPs)
Transect 1 route
Transect 2 route
Foraging area

Bat Species

- Myotis species
- Noctule
- Brown long-eared
- Common pipistrelle
- Soprano pipistrelle
- Pipistrelle species
- Noctule/Serotine/Leisler's
- Barbastelle

Rev	Drwn	Chkd	Appd	Date
P01.1	TR	MJ	TB	5/12/2022

Purpose of Issue: S2 - Issued for Information

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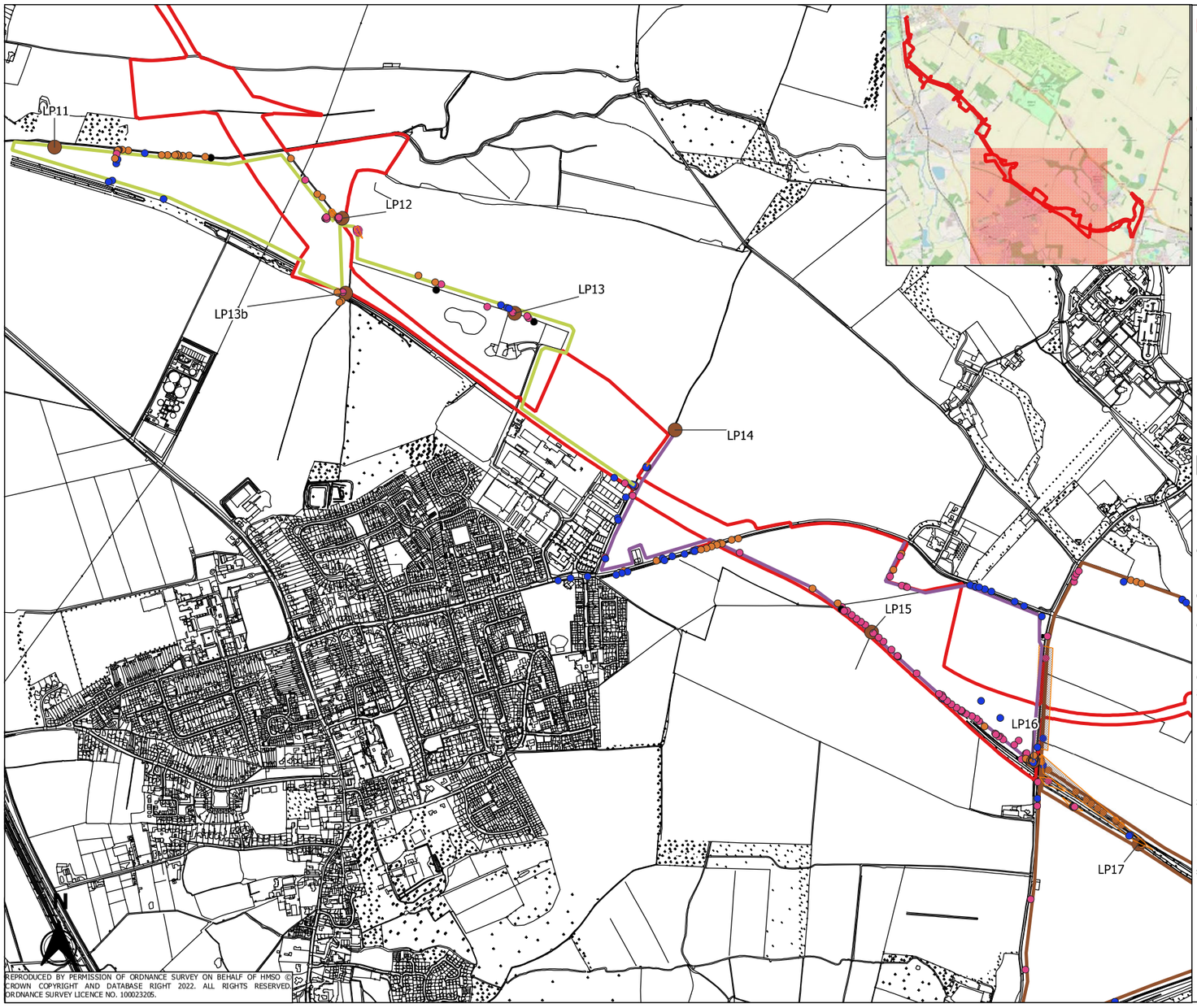
Client: Greater Cambridgeshire Partnership

Project: Cambridge South East Transport (CSET) Phase 2

Drawing: Bat transect routes August to October 2022 with bat species distribution
Page 1 of 3

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Red line boundary on 24.11.22
Listening points
Foraging area
Transect 3 route
Transect 4 route
Transect 5 route

Bat species

- Myotis species
- Noctule
- Brown long-eared
- Common pipistrelle
- Soprano pipistrelle
- Pipistrelle species
- Noctule/Serotine/Leisler's
- Barbastelle

Rev	Drwn	Chkd	Appd	Date
P01.1	TR	MJ	TB	5/12/2022

Purpose of Issue: S2 - Issued for Information

Classification: Commercial in Confidence

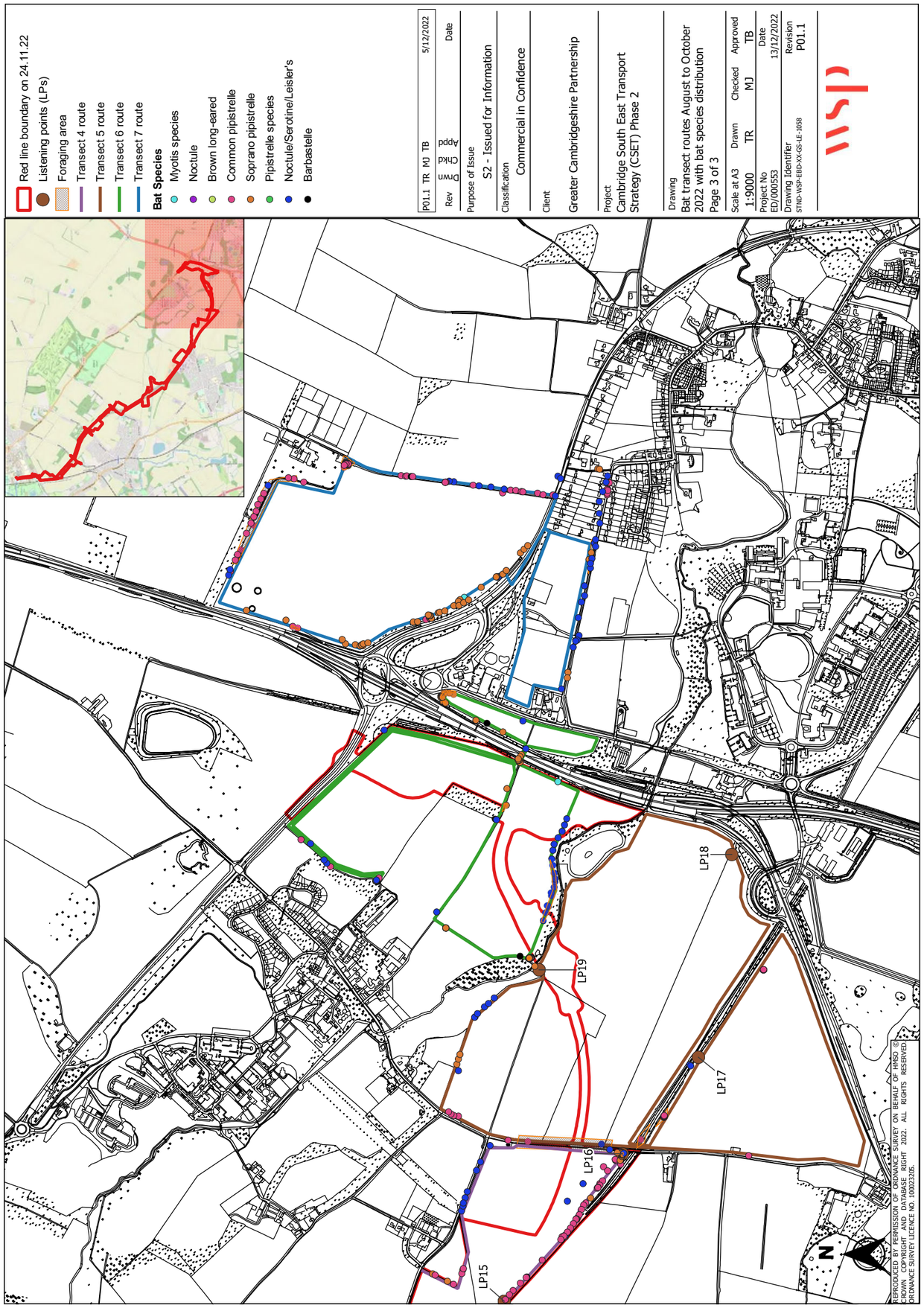
Client: Greater Cambridgeshire Partnership

Project: Cambridge South East Transport Strategy (CSET) Phase 2

Drawing: Bat transect routes August to October 2022 with bat species distribution
Page 2 of 3

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Project No: ED/000553
Date: 13/12/2022
Drawing Identifier: STND-WSP-EBD-XX-GS-LE-1057
Revision: P01.1



Appendix L

Barbastelle Distribution Map

wsp

Public



Rev	Drwn	Chkd	Appd	Date
P01.1	TR	MJ	TB	13/12/2022

Purpose of Issue
S2 - Issued for Information

Classification
Commercial in Confidence

Client
Greater Cambridgeshire Partnership

Project
Cambridge South East Transport (CSET)
Phase 2

Drawing
Barbastelle bat distribution 2022 (static detector and transect data combined)

Scale at A3	Drawn	Checked	Approved
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Project No	Date
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Drawing Identifier	Revision
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Public

Wimpole

RADIO-TRACKING REPORT

For and on behalf of

East West Railway Company

Revision 2

Date of report	14th December 2020
Date of Revision	5th March 2021
Date of surveys	August 2020
Author	Bea Davies Helen Lucking Paul Spencer
Client name	BSG Ecology Ltd
Corylus reference	20080

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1.0 EXECUTIVE SUMMARY

1.1 A scheme involving the construction of phase 3 of the Cambridge to Oxford railway from Bedford to Cambridge is subject to an Environmental Assessment. This report summarises the radio-tracking study undertaken in 2020.

1.2 The radio-tracking study had the following objectives:

- Trapping and radio-tracking up to 15 barbastelle bats post maternity to locate roosts and roost areas for barbastelle bats;
- Try to determine if there are separate maternity colonies or a single colony with sub-groups to help assess the likely impacts of the proposals in the event that sub-groups are identified which could be fragmented;
- Trapping and radio-tracking up to 5 serotine bats post maternity to determine whether there are any maternity roosts close to the proposed scheme of this species;
- Determine core foraging areas and commuting routes for these two species specifically to assess whether the proposals will result in fragmentation or loss of core foraging habitat for bats from the maternity colony/colonies.

1.3 In the licence application, it was also requested that the licence should include radio-tracking serotine, if trapped. The aim of tracking these species would be to find the maternity roost(s) of these species (thought to be off-site) and determine the extent of their foraging areas within the zone of influence of the proposals.

1.4 A total of 77 bats were caught during four nights of trapping (17th, 18th, 20th and 22nd August 2020). Trapping locations were in two areas, Wimpole Estate including the Belts and Eversden Woods) and woodlands to the west (Hayley Wood and Waresley Wood). Trapping and radio-tracking was disrupted by bad weather (as highlighted in paragraph 3.3.5) conditions including high winds and lightning which resulted in some surveys being cancelled and others to be restricted as woodlands could not be entered in high winds.

1.5 A total of 12 barbastelles were radio-tagged. Two tags either failed or the bats moved out of the survey area as no records were made of these bats after being released (bat 4 and 10). A third bat (bat 3) was heard only sporadically during the day time in woodland to the south of Hayley Wood.

1.6 A total of 21 roost trees and a further three approximate roosts have been recorded. A single building roost has also been found.

1.7 No serotine bats were caught.

2.0 INTRODUCTION

2.1 Project Background and Purpose

2.1.1 East West Rail is a major transport infrastructure project that will establish a strategic railway connecting East Anglia with Central, Southern and Western England. It will link Oxford and Cambridge and eventually on to Norwich and Ipswich.

2.1.2 The railway is being planned and built in three sections; Western, Central and Eastern sections. The first phase of the Western section between Oxford and Bicester has been completed and planning for the next stage of the western section between Bicester and Bedford is well advanced. The next section is the Central section between Bedford and Cambridge which has been through a public consultation process from which a preferred route corridor has been selected.

2.1.3 Work is currently on-going to select the detailed route alignment of the central section within the preferred route corridor. The preferred route corridor passes at it nearest point approximately 3 km to the north of Eversden and Wimpole Woods Special Area of Conservation (SAC) (EU Code: UK0030331), which has been designated for its colony of barbastelle bats, one of the UK's rarest bat species for which site protection is required through the designation of SAC's.

2.1.4 Past radio tracking studies have shown that bats from the SAC are travelling up to 10.5km from the roost across and within the preferred route corridor and thus it is essential to inform the detailed design of the railway, mitigation measures and the environmental impact assessment that up to date information on the use of the preferred route corridor by barbastelle bats is gathered over the 2020 season and also the 2021 season before planning consent is applied for.

2.1.5 Bat surveys at Wimpole have been undertaken over many years, the site is a SAC for its population of barbastelle bats. Bat surveys including trapping and tracking in 2001/2002 by the Cambridgeshire and Bedfordshire Bat Groups and others recorded breeding barbastelle bats in trees within the estate and found bats flying quite widely to a variety of foraging areas to the north and east of Wimpole.

2.1.6 Further radio-tracking in 2004 recorded foraging areas similar to that in 2002 but with another area to the west also used for foraging.

2.1.7 Through discussion with stakeholders, concerns have been raised about impacts of the proposed new railway on serotine bat which are known to roost at Wimpole. Serotine is a rare bat in Cambridgeshire and as with barbastelle it is considered serotine are at risk if they regularly use land within the preferred route corridor.

2.1.8 The proposals for the 2020 radio-tracking surveys included:

- Trapping and radio-tracking up to 15 barbastelle bats post maternity to locate roosts and roost areas for barbastelle bats;
- Try to determine if there are separate maternity colonies or a single colony with sub-groups to help assess the likely impacts of the proposals in the event that sub-groups are identified which could be fragmented;
- Trapping and radio-tracking up to 5 serotine bats post maternity to determine whether there are any maternity roosts close to the proposed scheme of this species;
- Determine core foraging areas and commuting routes for these two species specifically to assess whether the proposals will result in fragmentation or loss of core foraging habitat for bats from the maternity colony/colonies.
- Locate roosts for serotine bats.

2.1.9 There are four key risks to be addressed in relation to barbastelles (and other bat assemblages that might be present and potentially impacted by the Proposed Scheme):

- Severance and/or loss of flight paths;
- Collision risk;
- Loss of roosts; and
- Loss of foraging habitat.

3.0 METHODOLOGY

3.1 Trapping and Tagging

3.1.1 A licence for the trapping and radio-tracking study was granted to Helen Lucking of Corylus Ecology by Natural England [licence number 2020-48225-SCI-SCI]. The project was undertaken following the conditions set out in this project licence.

3.1.2 The licence allowed for the tagging of 15 barbastelle (excluding juveniles) and five serotine bats using Salts Latex Adhesive Solution 833005. The licence also included the ringing of the same number of bats. Ringing followed guidance set out in the Bat Workers Manual (2004).

Trapping

3.1.3 The capture of bats was undertaken by experienced and licensed bat consultants and follows guidance set out by Natural England's guidance (2013) and details set out in the Bat Workers Manual 3rd Edition (2004) and used both harp traps and mist nests. The trapping was undertaken between 17th and 22nd August 2020 in suitable weather conditions (sunset temperate 10°C or above, no rain or strong winds). Five woodland sites were chosen for trapping; Hayley Woods SSSI, Waresley Wood SSSI Northern Belts, Eversden Wood, and Eastern Belts that are located within the Eversden and Wimpole Woods SAC. Repeat trapping was undertaken at Hayley Wood and Eversden Wood. The selection of trapping locations was determined by known presence of barbastelle and successful pas trapping in the Eversden and Wimpole Woods SAC and early barbastelle activity in Hayley Wood and Waresley Wood during woodland transects undertaken in July 2020 by BSG Ecology on behalf of East West Rail Ltd.

3.1.4 Biometric data were recorded from all bats caught including gender, forearm length and weight. Every bat was also examined to ascertain its breeding status, where possible. Only bats which were in healthy condition and of suitable weight were considered for tracking/ringing. Bats were tagged with radio-transmitters provided by Holihill. Tags weighed 0.47g, 0.35g or 0.28g, and the licence granted from Natural England allowed tags to be used on bats up to a maximum of 5% body weight.

3.1.5 To aid in trapping, acoustic lures (Sussex Autobat) were used during the trapping exercise. The lures played either a synthesised barbastelle social call and were used near to harp traps on a number of evenings specifically to attract those subject bats.

Tracking

3.1.6 Night time tracking of bats was undertaken between dusk and dawn or until they were lost by surveyors. Bats were also tracked by surveyors during the day who attempted to find their roosting locations.

3.1.7 Between two and eight surveyors were used to radio-track the bats, using both close-tracking and synchronised triangulation techniques to produce joint bearings. Surveyors used long-range MITEK radio-sets and mobile phones to allow contact to be maintained while synchronised joint bearings were taken. A series of safe observation points for the radio-tracking surveyors were pre-planned to allow for safe working and to provide the best receiver locations for joint bearings to be taken.

3.1.8 Bats were radio-tracked using Australis and Sika radio-tracking scanning receivers with Yagi rigid directional aerials to track bats on foot. Whip omni-directional antennas were employed when searching for bats by vehicle. Hand-held sighting compasses were used to take bearings and both detailed maps and handheld GPS units were used to provide locations for both surveyors and bats. More detail on the specifics of tracking is included in **Appendix 2.**

Personnel

3.1.9 The key night-time radio-tracking surveyors used were experienced in multi-bat tracking studies for development and road schemes, each having a minimum of seven years' experience of similar, sustained trapping and tracking survey. Experienced day-time surveyors were used to track bats back to day roosts. The main accredited agents used were: Paul Spencer and Alex Watkinson of Corylus Ecology; Geoff Billington of Greena Ecology and Alison Johnston of Johnston Ecology and Dr Elizabeth Bradshaw of Helix Ecology. A number of other surveyors employed by Corylus Ecology were used as accredited agents during the trapping and for radio-tracking. All radio-trackers were experienced in such work.

Data Analysis

3.1.10 Detailed description of the analysis used for this tracking project are outlined in **Appendix 3**, however a summary is provided here. For each tagged bat, the triangulation points obtained have allowed habitat areas to be identified. Detailed statistical analysis relating to variation in home ranges (an area over which an animal or group of animals regularly travels in search of food or mates, and which may overlap with those of neighbouring animals or groups of the same species) or core areas (the area where the animal spends the majority of its time) has not been undertaken as the same level of survey effort was not carried out for each bat. Wherever sufficient information has been gathered, analysis of home ranges has been undertaken.

3.1.11 The data presented in this report are based on all available triangulation points. In addition, where a bat was known to be present in a given location at a given time, a data point was also generated. Where a bat was closely radio-tracked (for example, a bat foraging for a sustained period within a specific area), a triangulation point was generated for the approximate centre of the foraging area.

3.1.12 Bat fixes were transferred to digital geo-referenced maps using AutoCAD and coordinates for triangulation points were determined; the extent of bat activity for each bat was plotted independently and the data were carefully scrutinised and any obviously false bearings were discarded. The coordinates of the plotted triangulation points were then transferred into Ranges 7 software (Anatrack) and analysed to produce minimum convex polygons[1] (MCPs), neighbour linkage[2] (or clusters) and kernel contours[3]. These are all methods of showing home ranges. Where roosts were found, the roost sites were included within the home ranges. The analysis was carried out using 95% of the locations closest to the home range centre (for polygons produced by MCP analysis) or the 95% nearest to each other for the contour analysis (the cluster and kernel contours).

3.1.13 Within each data set, the trapping locations were specified as the focal sites and all coordinates from the night-time tracking and roost locations were inputted as location qualifying variables (LQVs) within Ranges (LQV's are time, activity, habitat, values associated with the *x*,*y* coordinates). The activities of the bats were assigned a numerical value for their activity, either roosting, flying or night-roosting for analysis within Ranges. Typically a focal site might consist of a static, repeatedly-used location such as a den or nest, but in the case of bats where roosts change regularly, the trapping location is the most appropriate focal point to use.

3.2 Emergence surveys of barbastelle roost trees

3.2.1 During the surveys, evening emergence surveys of tree roosts R4 in The Belts and R7 in Hayley Woods were undertaken on 19th and 26th August. Emergence surveys commenced at sunset and latest until approximately an hour after sunset or until the roost feature could no longer be seen. Emergence surveys were undertaken by two surveyors who were positioned where they had clear sight of potential roost features in each tree.

3.3 Survey Limitations

Covid-19 Pandemic

3.3.1 The Covid-19 pandemic resulted in a number of issues with respect to radio-tracking bats. These fall into two categories:

1) protecting the surveyors from the potential risks of catching and spreading Covid-19, and
2) protecting bats as it is considered possible that the virus could potentially be passed between humans and bats.

[1] The MCP enables the creation of a boundary around all fixes using the smallest possible convex polygon. This is commonly used but may overestimate the size of home ranges.

[2] A type of multivariate analysis that uses records or measurements of a number of characteristics or features to group individuals into clusters or classes, so that individuals within each cluster/class are as alike each other as possible and as unlike individuals in other clusters/classes as possible.

[3] Kernel methods quantitatively determine areas which are intensively used by animals by converting position coordinates into lines or areas with varying probabilities of use and present these graphically.

3.3.2 As a result a number of precautions were observed following the most up to date Defra advice at the time which was advice provided by Defra on 28th May 2020. Details of the specific precautions are set out in **Appendix 1** but the main constraint was the inability to work in a team and being restricted to having specific bubbles to avoid cross contamination. Prior to the radio-tracking work starting 11 surveyors were tested for Covid-19 and all were negative for the virus. Post radio-tracking the 11 surveyors were again tested for Covid-19 and those that were tested returned negative results. Of the remainder, two had tests but no results were forthcoming and two were unable to get tests due to a national shortage in early September. None of the surveyors have developed Covid 19 symptoms or had positive test results.

3.3.3 Guidance set out by Eurobats (April 2020) on handling of bats during the pandemic was also followed. This resulted in handling of bats being undertaken using nitrile gloves and face masks with regular sanitising of hands and undergloves. Holding bags were only used once for an individual bat any given night and washed at temperatures above 60°C before being used again. Survey equipment and PPE was disinfected after each bat was processed.

3.3.4 The guidance set out by Eurobats and Defra also takes a precautionary approach in relation to handling bats and the decision was made not to trap bats from the tree roosts. Trapping from tree roosts would entail direct and closer contact with roost sites and potentially more bats than necessary to fulfil the objectives of the study and the survey licence.

Trapping and Radio-tracking

3.3.5 During the radio-tracking session, the UK experienced a turbulent spell of weather with a strong jet stream bringing deep areas of low pressure. This resulted in storms Ellen (19th to 21st) and Francis (25th) which brought periods of heavy rain and gusts of 40 to 50Kt (Met Office 2020) across the region. As a result, two evenings of trapping was cancelled due to rain on 19th August and 21st August and one evening tracking session had to be cancelled. For health and safety concerns, searches for tree roosts during the day on the 21st August were also abandoned and curtailed on 25th and 28th August due to winds, rain and lightning.

3.3.6 Access was limited to certain areas around Wimpole and the woodlands of Hayley Wood and Waresley Wood. Only limited access was permitted for the night time tracking which was largely restricted to safe stopping places adjacent to public roads. As a result, it was not possible to access large swathes of land at night which resulted in some bats not being tracked as widely as others. This also meant that in some areas surveyors were often too far apart to stay in radio contact making joint bearings more difficult. Only safe stopping locations, away from houses were used. Consideration had to be given to not disturbing local residents late at night when radio-tracking. This caused difficulties obtaining joint bearings as the radio tag reception would often be lost and on occasion the bat being tracked could not be picked up for some time.

4.0 RESULTS

4.1 Trapping Results

4.1.1 Full details of all bats caught are provided in **Appendix 4**. None of the bats caught had previously been ringed. A summary of the species and the breeding status of caught bats are provided in **Table A1** with trapping location in **Table A2**. Twenty barbastelles were caught and ringed with 12 fitted with radio tags. A summary of bats caught is shown in **Table A3.** Vantage points for taking bearings are shown in **Figure A1.** The trapping and roost locations are shown in **Figure A2**.

Table A1 - Summary of species and breeding status of bats caught during trapping August 2020

Species	Female			Male		Unknown	Grand Total
	Adult breeding	Adult non-breeding	Juvenile	Adult	Juvenile		
Barbastelle	6	4	1	5	4	0	20
Brown long-eared	6	3	0	3	0	0	12
Daubenton's	0	1	0	0	0	0	1
Natterer's	4	2	0	8	0	0	14
Common pipistrelle	0	0	6	2	6	0	14
Soprano pipistrelle	2	1	1	7	4	1 (escaped)	16
Grand Total	**18**	**11**	**8**	**25**	**14**	**1**	**77**

4.2 Trapping Overview

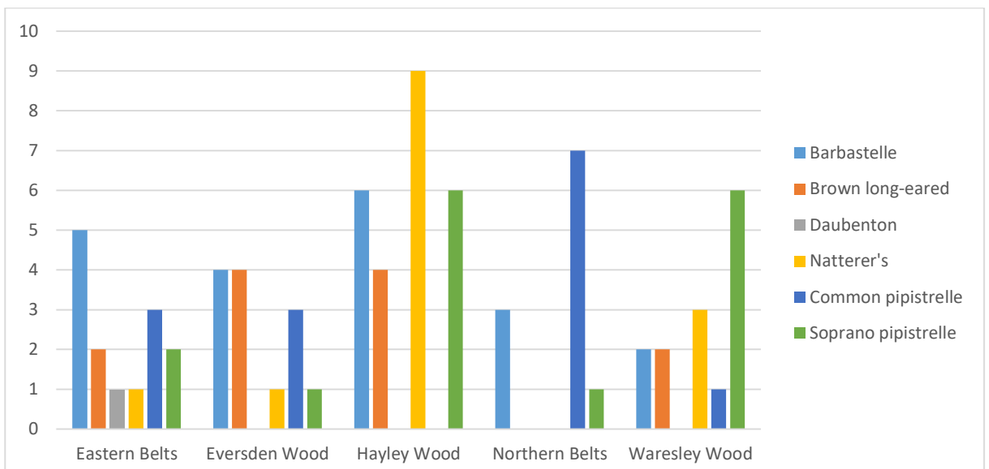
4.2.1 In total, 77 bats were caught during the trapping exercise and this included 20 barbastelles. This includes a single soprano pipistrelle that escaped the nets before it could be processed. Six species were caught across the five trapping areas. Barbastelle were caught at each trapping location with six breeding females caught at the five trapping locations; Eversden Wood, North Belts, Waresley Wood and Hayley Wood. Half of these breeding females were caught in Eversden Wood.

Table A2 - Summary of species of bats caught at each trapping location

Trapping Location	Barbastelle	Brown long-eared	Daubenton	Natterer's	C. pip	S. pip	Grand Total
Eastern Belts	5	2	1	1	3	2	14
Eversden Wood	4	4		1	3	1	13
Hayley Wood	6	4		9		6	25
Northern Belts	3				7	1	11
Waresley Wood	2	2		3	1	6	14
Grand Total	**20**	**12**	**1**	**14**	**14**	**16**	**77**

4.2.2 In addition to breeding barbastelle, post lactating (bred this season) brown long-eared, Natterer's and soprano pipistrelle bats were also caught. Male brown long-eared and soprano pipistrelle bats were found in breeding condition in Eversden Wood, the Eastern Belts and Waresley Wood.

Chart A1 – Numbers of bats caught per species at each trapping location



4.2.3 Twelve of the 20 barbastelle bats were tagged with radio transmitters. These comprised ten female (six post lactating) and two male bats. A summary of barbastelle trapping and tagging are given in **Table A3**.

4.3 Movement of Tagged Barbastelles (see Figures B1-B12)

Wimpole Bats

4.3.1 A total of seven barbastelles were caught and tagged in the woods around the Wimpole Estate: The Belts, The Gloucesters and Eversden Wood. These were bats 5, 6, 7, 8, 10, 11 and 12, and the majority of these bats were subsequently recorded roosting in trees within the Belts with the exception of bat 10 which was not recorded again after the evening it was tagged and bat 11 which roosted south in the Wimpole Estate on the days it was found. A total of 179 joint bearings were taken on this group of bats and 309 single bearings.

4.3.2 With the exception of bat 10 and 11, the remaining five bats followed a similar pattern in their activity during the tracking period. All five bats roosted in The Belts and all used Eversden Wood initially after emergence and before returning to roost. However, their activity pattern took them north and north-eastwards with several joint bearings recorded over the fields, woodland fragments and networks of ditches and brooks between Eversden Wood and the villages of Great Eversden, Toft and Comberton. On occasion, bat 7 and 8 were recorded in fields to the north of Comberton with bat 7 also being recorded further to the east around the River Cam at Grantchester a distance of 10.2km from its tree roost.

Table A3 - Barbastelle Trapping and Tagging Summary

Date	Bat tag no	Trapping Location	Time Caught	Sex	Age	Breeding status	Forearm (mm)	Weight (grms)	Ring number
17.08.20	1	Hayley Wood	20:55	F	A		38.3	8.5	J3516
17.08.20	4	Hayley Wood	23:40	F	A		38.4	9	J3521
17.08.20	3	Hayley Wood	22:20	F	A	Post lactating	39.3	9	J3520
17.08.20	2	Hayley Wood	20:55	M	A		36.7	7.5	J3517
17.08.20		Hayley Wood	20:55	M	Juvenile		37.6	9	J3518
17.08.20		Hayley Wood	01:25	M	Juvenile		38.4	8.5	J3522
17.08.20	6	Northern Belts	01:13	F	A	Post lactating	40.1	10	A2240
17.08.20	5	Northern Belts	00:32	M	A		37.4	9	A2210
17.08.20		Northern Belts	02:16	M	Juvenile		37	9	A2249
18.08.20	7	Eversden Wood	21:05	F	A	Post lactating	39.9	10	A2248
18.08.20	8	Eversden Wood	21:10	F	A	Post lactating	39	8.1	A2247
18.08.20		Eversden Wood	21:10	M	A		38	8	A2246
18.08.20	9	Waresley Wood	20:49	F	A	Post lactating	39.3	9.5	J3523
18.08.20		Waresley Wood	22:00	M	A		37.9	8.5	J3524
20.08.20	10	Eastern Belts	21:00	F	A		37.9	8.0	A2245
20.08.20	11	Eastern Belts	22:05	F	A		39.0	8.0	A2243
20.08.20		Eastern Belts	00:11	F	Juvenile		38.0	7.5	A2241
20.08.20		Eastern Belts	21:00	M	A		38.4	7.5	A2242
20.08.20		Eastern Belts	21:00	M	Juvenile		37.5	8.0	A2244
22.08.20	12	Eversden Wood	01:25	F	A	Post lactating	39.2	10.7	A2219

4.3.3 A cluster of single and joint bearings for bat 7 shows the importance of distinctive habitat features such as Bourn Brook which flows through the centre of its home range from Toft to Grantchester. This is also noted with bats 6 and 8.

4.3.4 The maximum distances recorded by the other bats in this group were less than bat 7 ranging between 3.65km for bat 12 to 6.97km for bat 6 (refer to **Table A4**).

4.3.5 Bat 11 was the only bat in this group with a home range to the south of the Wimpole Estate with several joint bearings recorded in fields around Wimpole Avenue and the River Cam and in fields to the west of the A1198. It was also recorded in woodland to the south of its trapping location, in Nurseries Wood (also known as Cobbs Wood on Ordnance Survey) and Four Acre Wood (also known as Four Acre Covert) where it was recorded roosting, although no roost tree was confirmed due to initial access constraints and then adverse weather constraints.

Hayley Wood Bats

4.3.6 Four bats; 1, 2, 3 and 4 were caught and tagged from Hayley Woods on the 17th August. Bat 2 was an adult male whilst bat 3 was a post-lactating female. Bats 1 and 4 were both non-breeding adult female bats. No

record was made of bat 4 after the night when it was trapped. The tag was working on its release but was it was not picked up again during either the day time roost tracking or the night time activity tracking. Bat 3 was only heard occasionally during the day time tracking with an approximate roosting location found to the south-east of Hayley Wood. No records were taken of this bat during the night tracking, access in the area to the south of Hayley Wood was very limited and there is a large area of open countryside between the road to the north of Hayley Wood and the nearest roads to the south, east and west. It is considered likely that this bat remained in this area during the night time. There were also fairly large areas to the north where there were large areas of countryside with limited locations for access.

4.3.7 A total of 26 joint bearings for bat 1 and 37 for bat 2 were made. Bats 1 and 2 both emerged from roosts in Hayley Wood and after foraging in the wood after emergence would leave the wood and head north. The bats were tracked as best as possible in this area but often only single bearings could be taken of these bats. It is thought they used the ditch and stream network around the Gransden Lodge Airfield (home to the Cambridge Gliding Centre).

4.3.8 Obtaining joint bearings of bats 1 and 2 was made more difficult due to road network in that part of the survey area as well as the local topography. Therefore, the assessment had to focus more on single bearings which were 79 for bat 1 and 110 for bat 2. However, the tracking has shown that both bats roosted in Hayley Wood only and both spent their time during the project predominately to the north of Hayley Wood. No single or joint bearings were recorded to the south of the wood. Bats 1 and 2 were often recorded roosting together and favoured tree roost R7 in the south-west section of the woodland.

4.3.9 Bat 1 was tracked to the south-west of the village of Cambourne with a good number of joint bearings around Caxton. Bat 1 was recorded as far north as Pastures Farm 7.53km north from its roost tree (R7) on that day and as far west as Little Gransden on the same night.

4.3.10 Bat 2 spent more time further to the west with several joint bearings to the south-west of the village of Eltisley. Joint bearings were recorded in Eltisley Wood, Turtlow Plantation and South Lodge Plantations to the south and west of Eltisley with the most northern triangulation recorded on the 25th August 7.12km from its roost tree (R7) on that day. A cluster of single bearings on 20th August suggest it may use Gransden Brook south of Great Gransden and Little Gransden.

Waresley Wood Bats

4.3.11 Bat 9, a post lactating female, was the only bat caught and tagged at Waresley Wood although a second barbastelle (a male was caught) but it was decided not to track it because the focus of the survey was to find breeding roosts and foraging areas used by female bats. The female that was tagged was caught on the 18th August and was recorded foraging within Waresley Wood on the 19th and 20th August. On 21st

August it was recorded more extensively to the north-east of Waresley Wood. It was recorded roosting in Waresley Wood only where it used six tree roosts. Bat 9 stayed very much in the same location on consecutive nights. It was difficult to get many joint bearings on this bat as it foraged along Gransden Brook to the south of Great Gransden and Little Gransden where there are few safe stopping locations or places away from dwellings for the surveyors to be able to get bearings. The majority of the activity has been recorded by single bearings from Great Gransden Mill. It was noted that when it became more blustery the bat appeared to move towards the lane at Great Gransden Mill and would fly up and down the ley side of the hedgerow. It was also recorded to the south on the road towards Hayley Wood west of Gransden Lodge foraging along the road and in the shelter between two tall parallel hedgerows.

4.3.12 Due to the difficulties tracking this bat only five joint bearings and 41 single bearings were taken. This data showed that the fields and ditch network immediately to the south and east of Little Gransden were important. Particularly Gransden Brook. The home range of this bat was fairly small and it is considered that this maybe fairly accurate although not many bearings were recorded as it was not recorded in other areas such as in foraging grounds of bats 1 and 2.

Table A4 - Distance travelled from roost

Bat No	Date	Distance in km	Roost	Joint Bearing number
Breeding Females				
Bat 3	N/A	N/A	N/A	N/A
Bat 6	27/08/2020	4.43	R12	6.26
Bat 7	24/08/2020	10.2	R12	7.20
Bat 8	26/08/2020	5.22	Unknown but likely R12	8.27
Bat 9	22/08/2020	2.34	R10	9.5
Bat 12	27/08/2020	3.65	R12	12.9
Mean distance		**5.17**		
Non-breeding female				
Bat 1	24/08/2020	7.53	R7	1.1
Bat 4	N/A	N/A	N/A	N/A
Bat 10	N/A	N/A	N/A	N/A
Bat 11	27/08/2020	4.76	R12	11.29
Mean distance		**6.15**		
Male				
Bat 2	25/08/2020	7.12	R7	2.29
Bat 5	24/08/2020	6.97	R12	5.25
Mean distance		**7.05**		

Distances travelled

4.3.13 The distances travelled from roosts are presented in **Table A4**. The distances measured are straight-line distances between the furthest recorded location and the roost used during the daytime beforehand. The maximum distance recorded from a roost in this study was by a breeding female (bat 7), travelling 10.2km,

nearly twice as far as the next longest distance by bat 8. The mean maximum distance for breeding females was 5.17km (excluding bats 3 and 4), slightly less to that of non-breeding females of 6.15km. The mean maximum distance for the male bats was 7.05km (range 6.79 to 7.12km).

4.4 Roost Information

4.4.1 The tracking survey confirmed a total of 21 tree roosts and a single barn. Roosts were found in the following locations:

The Belts – 12 tree roosts recorded supporting bats 5, 6, 7, 8 and 12;
Hayley Wood – three tree roosts recorded supporting bats 1 and 2;
Waresley Wood – six tree roosts supporting bat 9 only;
Wimpole Home Farm Barn (grounds of Wimpole House) – single roost used by bat 5 only.

4.4.2 In addition, several unconfirmed roosts were recorded. A roost supporting bat 3 was recorded in a tree belt to the south-east of Hayley Wood; the precise roost location could not be identified due to constraints with landowner consent. Roosts supporting bat 11 were identified in two woodlands in the Wimpole Estate area, Nurseries Wood and Four Acre Wood, for which access was later agreed but the roosts could not be precisely located; the locations of these two roosts are therefore listed as being approximate (denoted by AR). The roosts of bats 4 and 10 were not found during the radio-tracking study.

4.4.3 Of the 21 tree roosts that were confirmed in 2020, 13 were in ash trees, seven in oak and one in beech. Of these, nine were in trees with dense ivy cover, three were behind loose/lifted or flaking bark, and five were in large splits or cavities. A combined list of the tree roosts and their descriptions is provided in **Appendix 5,** whilst information regarding which tree roost was used per day by each bat is given in **Appendix 6 and 7**. Distances of each roost from the woodland edge are provided in **Table A5**.

The Belts

4.4.4 The Belts is a narrow band of planted deciduous woodland on the northern side of the main Wimpole Estate. The woodland is contiguous with The Gloucesters in the east and with woodland on the Wimpole Way to the west. It is understood the woodland was planted as part of the historic landscape design for the Wimpole Estate and as such the trees are mainly large mature specimens.

4.4.5 Twelve trees within The Belts were identified as roosts, comprising ash *Fraxinus excelsior* (10 trees) and oak *Quercus* sp. (2 trees). Five of the 12 tagged barbastelle roosted within this woodland with a peak of four bats (bats 6, 7, 8 and 12) roosting in the same roost (R12) on a single day. The roosts varied in their distance from the edge of the woodland with trees noted between 9m and 81m into the woodland; the mean distance of these trees from the edge of the woodland was 38m.

Hayley Wood

4.4.6 This is an area of ancient woodland and Site of Special Scientific Interest (SSSI) measuring approximately 46ha and located to the west of the Wimpole Estate. The woodland is classified as lowland mixed deciduous and is designated due being one of the largest oxlip *Primula elaitor* woods in Britain. Structurally, the wood is coppice-with-standards of field maple *Acer campestre*, ash, hazel *Corylus avellana* and hawthorn *Crataegus monogyna* with a canopy of oak.

4.4.7 Three tree roosts were identified in the woodland and these were used by bats 1 and 2. The trees were ash and oak, located between 13m and 68m from the woodland edge; the mean distance of these trees from the woodland edge was 47m.

Waresley Wood

4.4.8 This wood is located 2.6km north-west of Hayley Wood and is an area of ancient woodland and SSSI that measures approximately 62ha. It is designated due to its ancient origin and the ash-maple community which has a national distribution restricted to lowland England. The tree species are similar to that of Hayley Wood but sections of the wood are now dominated by invasive species birch *Betula pendula*, aspen *Populus tremula* with regenerating English elm *Ulmus procera*.

4.4.9 Six tree roosts were found within Waresley Wood and all were used by bat 9 only. Tree roosts included oak (three trees), ash (two trees) and a single beech *Fagus sylvatica*. This wood had the most variation in the distance of the roosts from the woodland edge, ranging from R13 located at 0m, on the very edge of the woodland, to R18 located 192m into the wood; the mean distance from the edge was 78m, significantly higher than the other two woodlands.

Wimpole Barn

4.4.10 Bat 5 was the only bat recorded roosting in a barn within the main Wimpole Estate. The barn is a thatched tithe barn and the roosting location was under a lintel above the western double barn doors.

Use of Tree Roosts and Movement Between Roosts

4.4.11 Barbastelles are known to move roost regularly, and one key aim of this study was to establish if there was interaction between bats in the west of the study area, around Hayley Wood and Waresley Wood, and bats from the Wimpole Estate in the east. Of the 21 confirmed tree roosts, 12 were located in The Belts, six in Waresley Wood and three in Hayley Wood. The only non-tree roost recorded during the survey was the tithe barn at Wimpole Home Farm. A summary of bats recorded in each tree per day is shown in **Appendix 7**.

Table A5 - Distance from the nearest woodland edge of known roost trees used in 2020

The Belts		Hayley Wood		Waresley Wood	
Tree roost no.	**Distance from nearest edge (m)**	**Tree roost no.**	**Distance from nearest edge (m)**	**Tree roost no.**	**Distance from nearest edge (m)**
R1	36	R7	13	R9	53
R2	9	R8	68	R10	75
R3	30	R19	60	R11	33
R4	53			R13	0
R6	57			R15	113
R12	41			R18	192
R16	51				
R17	55				
R20	81				
R21	22				
R23	12				
R24	11				
Mean	**38**	**Mean**	**47**	**Mean**	**78**

4.4.12 Roost R12 in The Belts was used by the highest number of tagged bats, with four post lactating females (bats 6, 7, 8 and 12) recorded on 27th August. This is a large oak located 41m from the woodland edge and covered in dense ivy but with signs of die-back from the crown; the precise roosting feature could not be confirmed as there are multiple roosting features. The next highest number of tagged bats were recorded in R12 again (bats 6, 7 and 8) on 23rd August and R17 (bats 6, 7 and 12) on 28th August. Several other trees were used on the same occasion by two bats.

4.4.13 The straight line distances between roost switches between consecutive days was measured. For example, Bat 1, a non-breeding female, roosted in R7 on 19th August but on 20th August it had moved to R19. The straight line distance between these two trees is 72m. The distances between each tree roost switch recorded are given in **Table A6**. There are significant numbers of trees and clusters of trees with potential for supporting barbastelles in these woodland blocks, particularly within The Belts which has a very even age structure due to the history of this woodland which was planted as part of the designed landscape for the Wimpole Estate.

4.4.14 Bats 5, 6, 10 and 11 were caught in The Belts and bats 7, 8 and 12 were caught in Eversden Wood. The roosts of bats 10 and 11 were not confirmed during the survey, but the remaining bats were all recorded using tree roosts within The Belts. No roosts were recorded in Eversden Wood. On numerous occasions the tagged bats from these two woodlands were recorded roosting together in various combinations in different trees: bats 6, 7, 8 and 12 in R12 (27th August); bats 6, 7 and 8 in R12 (23rd August); bats 6, 7 and 12 in R17 (28th August); bats 6 and 7 in R2 (19th August) and in R21 (20th August); bats 6 and 12 in R6 (24th August); bats 7 and 8 in R12 (24th August); and bats 5 and 8 in R3 (19th August). The distance between the roosts in

which bats were recorded on successive nights within The Belts is: 15m (R2 to R21), 187m (R4 to R20), 105m (R23 to R12), 102m (R24 to R12), 156m (R12 to R6), 92m (R12 to R17) and 113m (R1 to R3). Two bats were recorded moving roost during the day: bats 5 and 8 were recorded together in R3 in the afternoon and subsequently moved, bat 5 to R5 and bat 8 to R4 prior to a planned emergence survey of R3.

Table A6 – Distances between barbastelle roost switches between consecutive days in 2020

Roosts	Distance (m)	Location of trees	Status and number of bats
R2 - R21	15	The Belts	Breeding females x2
R4 - R20	187	The Belts	Breeding female
R23 - R12	105	The Belts	Breeding female
R24 - R12	102	The Belts	Breeding female
R12 - R6	156	The Belts	Breeding female
R12 - R17	92	The Belts	Breeding females x2
R1 - R3	113	The Belts	Male
R3 - R5	979	The Belts/Wimpole Barn	Male
R5 - R16	1,069	The Belts/Wimpole Barn	Male
R8 - R7	322	Hayley Wood	Non-breeding female & male
R7 - R19	72	Hayley Wood	Non-breeding female
R10 - R11	133	Waresley Wood	Breeding female
R11 - R13	318	Waresley Wood	Breeding female
R13 - R18	383	Waresley Wood	Breeding female
R18 - R15	301	Waresley Wood	Breeding female
R15 - R13	471	Waresley Wood	Breeding female

4.4.15 Although the roosts of bat 11 could not be confirmed, joint bearings identified approximate roost locations as being within Nurseries Wood (AR25) and Four Acre Wood (AR22) in the Wimpole Estate. Movement between these locations was not recorded on successive evenings so it cannot be confirmed whether the distance between the approximate roosts (1,614m) was travelled on any particular evening.

4.4.16 Bat 5 was the only bat during the survey period to roost in both trees and a structure, being recorded in trees in The Belts (R1, R3 and R16) and in the Wimpole Home Farm barn (R5). This bat was recorded in each of the tree roosts only once and in the barn on nine occasions, seven of which were consecutive from 19th to 25th August inclusive, followed by a further two consecutive evenings on 27th and 28th August. The distance between the roosts in The Belts and the barn in which bat 5 was recorded on successive nights is: 979m (R3 to R5) and 1,069m (R5 to R16); this is the furthest any bat was recorded travelling to a roost. Bat 5 shared a roost on only one occasion, roost R3 which it shared with bat 8 on 19th August, however both bats moved away from this roost during the day before the evening emergence.

4.4.17 Bats 1 and 2 were caught in Hayley Wood and were consistently recorded roosting in the same area; these bats did not venture to any other wood to roost. Bat 1 was recorded roosting in three different trees, whilst bat 2 was found in two. On the majority of evenings bats 1 and 2 were recorded together in R7 and on a

single occasion (18th August) these two bats were recorded together in R8. Roost R19 was only used on one occasion (20th August) and only by bat 2. An emergence survey of R7 was undertaken and a total of five barbastelle emerged including bats 1 and 2. Bat 1 was not found on 20th August, it was not in the same roost as bat 2. The signal within Hayley Wood was often dampened by the dense understorey in the woodland. The distance between the roosts in which these bats were recorded on successive nights is 322m (R8 to R7) for both bats and 72m (R7 to R19) for bat 2 only. Bats 3 and 4 were also caught in Hayley Wood but were not recorded roosting within this woodland: bat 3 was consistently recorded roosting in a tree belt to the south-east of Hayley Wood and the roost of bat 4 was not found during the survey period.

4.4.18 Bat 9 was trapped in Waresley Wood and, as with bats 1 and 2, was only recorded roosting in the same wood. This bat was recorded in six different trees, five of which it was only recorded in on a single occasion. During the period between 19th to 28th August, bat 9 shifted roost on a daily basis with the exception of 27th and 28th August when it remained in roost R13; this was the only roost bat 9 was recorded in more than once. The distance between the roosts in which bat 9 was recorded on successive nights is: 133m (R10 to R11), 318m (R11 to R13), 383m (R13 to R18), 301m (R18 to R15) and 471m (R15 to R13).

4.4.19 Bat 6 from The Belts and bat 9 from Waresley Wood were recorded using the greatest number of roosts of all the tagged bats, each moving between six different roosts within their respective woodlands. Bat 8, caught in Eversden Wood, used the next highest number of roosts and moved between five different roosts in The Belts. The three bats recorded using the greatest number of roosts were all breeding females. In contrast the two male bats and one of the non-breeding females were more faithful to their roosts: bat 5, caught in The Belts, was recorded in R5 on nine out of the 11 evenings it was recorded; and bats 1 and 2, both caught in Hayley Wood, were recorded together in R7 on eight occasions. Regarding confirmed roosts, each of the other bats was recorded using an individual roost on no more than four occasions through the survey period.

4.4.20 The greatest distances between roosts of any bats were by bat 5, one of the two tagged males, which travelled 1,069m and 979m between tree roosts in The Belts and Wimpole Home Farm barn on consecutive nights. The greatest distance between two confirmed roosts used by breeding female bats within the study area was 471m (bat 9). The smallest distance between roost switches of breeding females in 2020 was 15m between R2 and R21 in The Belts. The mean distance between roost switches of breeding females was 176m, although there was a significant difference between the mean distances travelled by breeding females between roosts within The Belts (95m) and Waresley Wood (321m).

4.5 Foraging Areas and Home Ranges of Barbastelle Bats

4.5.1 Bats were recorded over a range of areas during the radio-tracking surveys. The areas used are summarised in **Figures B1** to **B12** which illustrate triangulation points, extent of ranges and the MCP, neighbourhood

linkage (clusters) and kernels for each bat radio-tracked. The total number of bearings achieved (including night and day roosts used) have also been shown. These data are set out in **Table A7**.

4.5.2 Whilst the radio-tracking undertaken followed the bats for only a relatively short period of time, the data collected shows some patterns to barbastelle behaviour. The bats roosting in Eversden and Wimpole Woods SAC demonstrated a similar use of the landscape as shown by the Cambridgeshire Bat Group tracking studies between 2000 and 2002. However, there appears to have been no overlap in bats moving between the Wimpole colony to the east and the Hayley/Waresley Wood area.

Table A7 - 95% Home Range Analysis (areas in ha)

Breeding females					
Bat number	No. bearings achieved	MCP Ha	Cluster		Kernel
			Ha	No of nuclei	
6	117	1439.1	1293.1	2	1720.1
7	70	3474.9	284.7	5	4120.4
8	115	1964.7	1239.6	2	1830.5
9	45	306.2	122.9	3	289.6
12	65	632.3	328.3	2	620.6
Mean	-	1563.44	653.72	2.8	1716.24
Non-breeding females					
Bat number	No. bearings achieved	MCP Ha	Cluster		Kernel Ha
			Ha	No of nuclei	
1	104	1682	490.7	9	1429.1
11	53	347.3	48.9	5	289.2
Mean	-	1014.65	269.8	7	859.15
Males					
Bat number	No. bearings achieved	MCP	Cluster		Kernel
2	67	2400.8	687.99	4	2335.5
5	62	1528.2	331.3	4	1747.8
Mean	-	1964.5	509.645	4	2041.65

4.5.3 Of the Hayley Wood/Waresley Wood bats, no records were made of the bats from these respective woodlands visiting the other woodland, however, there is some overlap in foraging areas/home ranges between these bats. Obviously only a single breeding female bat was tracked from Waresley Wood and one non-breeding female from Hayley Wood. One of the tagged breeding female bats (bat 3) from Halyey Wood was not recorded during night time tracking and no access was possible to the area where an approximate

roost was found. The non-breeding bat 4 was not recorded again once it was released from being tagged.. When looking for the bats, regular checks were made of the woodlands in case any of the bats had returned during the night. Bat 9 was regularly recorded along the Gransden Brook.

4.5.4 Millspaugh and Marzluff (ed 2001) suggests that more than 100 fixes are required to obtain reliable estimates of home range size using minimum convex polygon (MCP) analysis, while the kernel analysis is useful when a smaller sample size is obtained and, along with cluster analysis, are useful at identifying multiple centres of activity, particularly in heterogeneous environments. A 95% MCP analysis was carried out instead of a 100% MCP as this eliminates outliers. **Figure C1** shows the MCPs for adult breeding female barbastelles. The sample size was good for two of the six tagged breeding female bats, 6 and 8 with 117 and 115 bearings achieved respectively: this includes single as well as joint bearings, roosts and night roosts. Of the other three, where the sample size was smaller, bat 9 appeared to have a smaller home range with a restricted area for foraging. Regular checks of the area where it had been found around Gransden were made and whilst it did not appear to move into any of the areas which may be affected by the proposals it was considered that sufficient effort had been made to determine the foraging areas for this bat. A total of 46 bearings was achieved.

4.5.5 Bat 3, the sixth breeding female tagged, which was trapped in Hayley Wood, appeared to remain to the south or south-east of Hayley Wood with only occasional records being made during the day or early in the evening towards an area of woodland to the south-east of Hayley Wood. No joint bearings were possible and therefore no home range analysis could be undertaken. The remaining bats all had over 60 locations, with Bat 7 recording 70 points and 12 recording 65 points.

4.5.6 The MCP areas for bat 12 (breeding female) measured 632.3ha but this does not represent the full home range of this bat. This is because on occasions it was not recorded in the Eversden Woods/Belts area nor in the area of the Bourn Brook south of Toft and it could not be recorded elsewhere.

4.5.7 The average MCP area for all the breeding females was 1,563.44ha. The greatest MCP area was generated by Bat 7 with a home range of 3,474.9ha. Bat 7 was recorded foraging to the south-west of Cambridge around Grantchester some 10.2km from the Belts where it was recorded roosting. It also appeared to show some fidelity to the Bourn Brook. Bats 6 and 8 also roosting in the Belts had home ranges smaller than bat 7 with 1,439.1ha and 1,239.6ha respectively were also found to use the Bourn Brook particularly between Comberton, Great Eversden and Kingston.

4.5.8 Two non-breeding female adult bats were tracked; Bats 1 and 11, a further two non-breeding females (bats 4 and 10) were not recorded after being released and it is thought that their tags failed. However, as bat 4 was not caught until 23:40hrs it is possible that it roosted further away to the south where access was limited.

The average MCP area recorded for the two non-breeding female bats was 1,014.65ha ranging from 347.3ha (bat 11) to 1,682ha (bat 1). Bat 1 was caught shortly after sunset in Hayley Wood and roosted within the wood, it was not found on several nights after it left Hayley Wood despite surveyors searching widely. It was then recorded west of Cambourne on three consecutive nights foraging widely around The Moats and Pastures Farm up as far north as the A428 and east of the A1198 over an area which is a mix of farmland and a construction site. On one of the windier nights it was found around the fishing lakes to the south-west of Cambourne just north of Bourn Road. It also spent some time foraging around Bourn airfield. It is thought that it may have been in Longstowe Park but the stopping points along the Old North Road were constrained by overhead powerlines producing electrical interference.

4.5.9 Bat 11 was caught in The Belts but its actual roosting tree was not located. Access into the wider Wimpole Estate had to be arranged and due to weather constraints the surveyors did not enter woodlands to search for tree roosts. The bat was recorded possibly roosting in Cobb's Wood and then down in Four Acre Covert. The 95% MCP of Bat 11 was 347.3ha and was recorded mainly south of The Belts with one particular period of sustained activity in the southern part of Wimpole around the River Cam.

4.5.10 For the male bats (2 and 5), the mean 95% MCP recorded was 1,964.5ha with bat 2 recording 2,400.8ha and bat 5,1,528.2ha. It is thought that the full extent of the home range of bat 2 was not found as it was not recorded on a number of nights after leaving Hayley Wood. It left the roost woodland heading north and spent some time around Gransden Lodge airfield but could then not be found on several nights despite searches in all directions. It was then found foraging extensively around Eltisley and the southern site of Croxton Park. Given the access restrictions and the large area between the roads around Eltisley and Caxton, it is possible that the bat was in this area but the signal was not strong enough to carry to the surveyors.

4.5.11 Bat 5 was recorded regularly in the woodlands of The Belts and Eversden Wood and regularly along the Bourn Brook to the south-east of Toft. It is likely that the full range of this bat was not fully recorded, it was recorded further north to the east of Comberton and hadn't been recorded in the Bourn Brook area prior to that so is thought to have ranged further north.

4.5.12 The 95% kernel analysis (see **Figure C3**) recorded home range sizes of the breeding female bats of between 4,120.4ha and 122.8ha with a mean of 1,716.22ha. The non-breeding female bats resulted in kernel home range sizes from 289.2ha to 1,429.1ha with a mean of 859.15ha.

4.5.13 The 95% kernel analysis of the adult male barbastelle bats recorded home ranges between 1,747.8ha and 1,747.8ha and a mean of 2,041.65ha.

4.5.14 The core area size (based on a 95% cluster analysis) of the breeding female barbastelles ranged from 122.8ha to 1,293.1ha, with the number of core areas per bat ranging from 2 to 5 **Figure C2**.

Habitat Use

4.5.15 During the 2020 study, barbastelles have been recorded using a variety of habitats for foraging and commuting. The core foraging zones tend to consist of woodland blocks close to or within their roosting areas, but also open fields of mainly arable land which is the main habitat type to the north and north-east of Eversden Woods. These fields do, on occasion, have broad hedgerows with pockets of fragmented woodland. The fields are crossed by a network of ditches and the streams, such as Bourn Brook, seem to be an important feature in the landscape for this maternity colony. The golf course at Toft provides barbastelle with a fairly sheltered foraging environment with lines of mature vegetation but also ponds.

4.5.16 Habitats to the east within the home range of bats 1, 2 and 9 are also similar with open fields of arable with small fragments of woodland. Here too, streams in the local landscape are a key feature as are the ditch networks.

4.6 Interchange Between Eversden and Wimpole SAC and Eastern Woods

4.6.1 During the 2020 surveys, there were no bats that roosted outside of the area where they were caught. Certain bats such as bats 7, 8 and 11 that were trapped in Eversden Wood, roosted fairly close by in The Belts and Nurseries Wood respectively. No bats from the SAC roosted in Hayley or Waresely or other woods to the east and likewise neither did bats from these woodlands roost in Wimpole.

4.6.2 In addition, there was no overlap of activity with bats from Everley/Waresley Wood with bats from The Belts or Eversden Wood. The furthest west a bat from the Wimpole area was recorded was around Kingston Wood located to the east of the A1198 and likewise bats from the east ventured northwards rather than toward the Wimpole colony. A similar distribution of bats was recorded by the Cambridgeshire Bat Group 2004/5, although one bat was recorded west of the A1198 within 1 km of Hayley Wood.

4.7 Emergence Surveys of Barbastelle Roost Trees

4.7.1 Three emergence surveys were undertaken of two trees in The Belts, R4 and R17, and one tree in Hayley Wood, R7, on 19th and 26th August. No simultaneous combined emergence survey of all trees was undertaken as the emphasis was on the radio-tracking to ascertain habitat use. The emergence surveys assisted with determining where bats were roosting for trapping purposes and provided information on whether tagged bats were roosting with untagged barbastelles or other bat species. The results of the three emergence surveys were:

Tree R4 – three barbastelle emerged including bat 8;

Tree R7 – five barbastelle emerged including bats 1 and 2;

Tree R17 – bat 7 emerged and it could not be confirmed if any other barbastelle emerged.

4.7.2 No other bat species were recorded roosting in the same trees with the barbastelles during the emergence surveys.

4.8 Breeding Status

4.8.1 The bats during the 2020 survey were tracked in the post-lactation period. Of the 10 adult female barbastelle caught and tagged, six (60%) had bred in 2020; however, the sample size was too small to be other than indicative. Juvenile barbastelle bats that were caught but not tagged appeared to be well-developed.

4.8.2 Three of the post lactating female bats were caught from trapping locations in Eversden Wood, with one caught in each of the three other trapping woods (The Belts, Hayley Wood and Waresley Wood). The single juvenile female and two of the non-breeding females were caught in The Belts, and the remaining two non-breeding females in Hayley Wood. Of the five adult males, two were caught in The Belts and one from each of the other trapping woods (Eversden Wood, Hayley Wood and Waresley Wood). The four juvenile males were caught in The Belts and Hayley Wood, with two bats caught in each.

4.9 Other Species Trapping Information

4.9.1 In addition to the 20 barbastelles caught, 14 common pipistrelles, 16 soprano pipistrelles, 14 Natterer's bats, 12 brown long-eared bats and a single Daubenton's bat were trapped. Common pipistrelle and Daubenton's were the only species that no breeding females were caught although 11 of the 14 common pipistrelle were juvenile. Of all species, roughly equal numbers of male and females were caught (37 female and 39 male) with a single soprano pipistrelle escaping from the net before sexing.

4.9.2 In total 17 post lactating females were caught; six brown long-eared, four Natterer's, two soprano pipistrelle and the six barbastelle. Juvenile bats were recorded for all species with the exception of brown long-eared and Natterer's.

4.9.3 The largest number of bats was trapped in Hayley Wood with 25 and then fairly equal numbers ranging between 11 at the Northern Belts, 13 at Eversden Wood and 14 at the Eastern Belts and Waresley Wood.

5.0 EVALUATION

5.1 Barbastelle Tracking

5.1.1 The trapping and tagging project has shown that the woods at the Eversden and Wimpole Woods SAC and the SSSIs of Hayley Wood and Waresley Wood support breeding colonies of barbastelle bats. The radiotracking has shown that there was no interchange in roosting between bats from the Wimpole Area and the woods (Hayley and Waresley wood) to the west.

5.1.2 The tracking has shown that the bats caught in the east of the study area, in the Eversden and Wimpole SAC, and the west of the study area, in Hayley or Waresley woods, do not have home ranges that overlap. All bats tagged cover ground rapidly and continuously within foraging areas. The bats that were being tracked were rarely recorded as static, bat 1 was recorded possibly static on two nights for a short period of time. As the bats were not all recorded continuously it cannot be certain whether they used night roosts but only limited amount of night roosting appeared to have been recorded for those bats that were tracked at any given time.

Habitat Use

5.1.3 The main foraging areas for bats from the Wimpole Estate was primarily the areas to the north and east, with the exception of bat 11, which foraged over the Wimpole parkland and habitats to the south to the River Cam. The woodland areas within the SAC are obviously extremely important to the colony and are generally the only substantial broadleaved woodland habitat within their home range. The study has shown that the females use the woodlands in the early evening and prior to returning to roost but also in periods of inclement weather. This correlates to studies undertaken by Zeale *et al* (2012) where their study of barbastelles in Devon and Mottisfont SAC in Hampshire found that all their study bats foraged within woodland roost sites before commuting to core foraging areas. Both studies show the importance of managing woodland roost sites carefully by maintaining the canopy layer to provide cover from predatory birds and allowing bats to emerge and feed earlier (Jones and Rydell 1994; Russo et al. 2007). Similarly, the use of tree lines, such as The Belts, by bats when close to roost sites highlights the importance of preserving canopy connectivity beyond the borders of woodlands (Hillen et al. 2010).

5.1.4 The landscape to the north and north-east of the SAC is far more open than some of the other SAC's designated for barbastelle within the UK: Ebernoe Common SAC and the Exmoor and Quantock Oakwoods SAC which have breeding colonies in large woodland sites surrounded by a network of extensive woodland and other suitable habitat which are widely considered as optimal barbastelle habitat. The habitats surrounding Wimpole and Hayley/Waresley Woods are more agricultural and interspersed with hedgerows of varying degree of structure and small pockets of isolated woodland. Zeale *et al* (2012) found that arable habitats were least selected by their study bats due to the low prey populations over arable fields resulting from pesticide use. However, this 2020 study has shown the reliance on those arable habitats to the north

of the SAC by the colony. Within these areas is a network of hedgerows but also ditches and watercourse which have been confirmed as being used for foraging and also as a commuting link through the landscape.

5.1.5 Bat 11 was the only bat from the Wimpole Estate to forage to the south of its roosting area. It also roosted in different woodlands to the main colony. However, the foraging habitats were not too dissimilar with areas of open arable dominating the landscape. Tracking confirmed the importance of the River Cam/Rhee as a foraging area and commuting route.

5.1.6 A similar pattern emerged from bats from Hayley Wood and Waresley Wood showing the importance of woodland roost sites. The habitats in the home ranges of these bats are similar to the Wimpole colony of arable fields, hedgerows, ditches and watercourses.

Roost Selection

5.1.7 The 2020 study recorded 22 confirmed roosts, of which all but one (R5) were trees, and these were predominantly ash and oak with a single beech. Tree R19 could not be confirmed as the tag signal suggested either an oak or ash that were very close to each other. Some features confirmed as roosting sites included raised bark and large splits which is similar to that found in other radio-tracking research of this species in Italy (Russo *et al.* 2004), Germany (Kerth & Melber, 2009) and England (Billington, 2002; Greenaway 2008; Greenaway & Hill, 2004) where barbastelle nursery roosts tended to be within splits in trees or under loose bark. Russo *et al* 2004 found 20 out of 27 tree roosts of breeding female bats were under raised bark.

5.1.8 Other research has found that breeding roosts are found in quiet locations well away from the woodland edges and surrounded by dense cover (Russo *et al* 2004; Greenaway 2008) but this was not necessarily the case in this radio-tracking survey. In 2020, seven of the 21 confirmed tree roosts were found within 30m of a woodland edge: with 14 recorded beyond this. Roost R12 was found to support the largest number of bats and this was located 41m from the edge of The Belts. It was also noticed that there are a number of well used footpaths through The Belts which is a fairly narrow block of woodland. None of the trees were immediately adjacent to any of the footpaths but several were in view of the footpaths. The roost R3 was one of the closer roosts to a footpath and it was from this roost that bats 5 and 8 moved between after being found during the day and before the emergence survey that night.

Movements Between Roosts

5.1.9 Barbastelle are known to move roosts regularly even during the period when their young cannot fly (Russo *et al*., 2004). The mean distance moved between trees by female bats in central Italy ranged between 31m and 626m, with distances contracting during the main lactating period (Russo *et al*., 2004). This suggests that female barbastelles, in order to continue to move roosts regularly, need a large number of suitable roost trees relatively close to each other during the whole breeding season, but particularly during the main

lactating period. Russo *et al.* also found that barbastelle roosts were most frequently found within unmanaged woodland where the dead trees occurred most frequently, in comparison with managed woodland and pasture woodland, and where clusters of larger trees occurred. Greenaway and Hill (2004) found that the roosts tended to be located within a distinct area which they refer to as a "loyalty area". Loyalty areas will gradually change over time as woodlands develop, and Greenaway and Hill (2004) suggest that management plans for nursery roosting sites should include areas of five to ten times the area that bats are presently using.

5.1.10 The distances between roost-switches (movements between roosts located in the two woodlands in which roosts of breeding females were recorded) in 2020 are summarised in **Table A8**.

5.1.11 Russo *et al.* (2004) found during the late lactation/post lactation phase that the range for distances between roost switches was between 0 (sic) and 352m with a mean of 89m. During this 2020 study 12 of the 14 combinations of roost switches fell within the distance range found by Russo *et al.* (2004) during the late lactation/post lactation phase; the remaining two roost switches, both from Waresley Wood, were greater. The mean distance of switches within The Belts was very similar to that found by Russo *et al.* (2005), whilst the mean distance moved between roosts within Waresley Wood was higher; however, it should be noted that the results from Waresley Wood relate only to one bat. Overall, tracked barbastelles at this site switched roosts on a regular basis, as found in other studies, but over larger distances than reported in some. However, a study in Germany found that female barbastelles could cover much larger distances (up to 9.0km between consecutive day roost locations: Kerth & Melber, 2009), and it seems likely that there is a great deal of variation between colonies, probably reflecting the relative availability of roost sites. The breeding females moved roosts the most. The males travelled furthest on average between roosts but were much more faithful to their roosts.

Table A8 – Summary of distances between roost-switches by breeding females in 2020

	Minimum (m)	Maximum (m)	Mean (m)	Number of switches	Number of bats	Mean switches per bat
Overall	15	471	176	14	5	2.8
The Belts	15	187	95	9	4	2.25
Waresley Wood	133	471	321	5	1	5

5.1.12 The difference between the mean distances moved by breeding females in The Belts and Waresley Wood could be for a number of reasons which have not yet been determined. The shape and size of Waresley Wood is very different to that of the Belts. Both are well used woods by walkers but due to the shape of the two woods the effect of disturbance by walkers is likely to be greater in The Belts than at Waresley. However,

at this stage an assessment of number of trees within the two woodlands has not been made and the distances moved within the two woodlands may be related to the distribution of trees within the woodland.

5.1.13 There was no overlap in bats roosting together from the different trapping locations. The study shows that the colony located in the Eversden and Wimpole SAC are separate to those colonies found in woodlands to the west. In addition, home ranges of bats in the eastern colony do not overlap with those of bats in the western colonies and there is a clear distinction in areas of the main foraging and commuting habitats. There was some overlap in home ranges between the Hayley Wood and Waresley Wood colonies but that is not considered significant due to the close proximity of those woodlands.

Colony Structure and Size

5.1.14 Barbastelle maternity colony sizes are difficult to estimate (as discussed in Greenaway, 2008), largely due to the numerous roost changes. Although simultaneous emergence surveys of all known tree roosts were not undertaken in 2020, as data on bat activity took priority, the results of the emergence surveys carried out recorded the tagged bats roosting with other barbastelles in both woodlands. A peak of five barbastelles were recorded emerging from tree R7 in Hayley Wood on 19th August, including bats 1 (a non-breeding female) and 2 (a male). However, on the days during which more than half of the tagged bats were tracked to a day roost in 2020 at least four, and up to seven, different day roosts were being used on any one day. All of these counts are therefore likely to have represented only a proportion of the population in the wider area.

5.1.15 Russo *et al. (*2004) found the number of bats in a maternity colony over seven different counts throughout July and August was 16.7 bats ± 4.2 (range 12-23 bats). Billington (pers. comm.) counted 26 bats within a single tree roost in Somerset. Greenaway (2008) studied two maternity colonies in Sussex, and estimated counts of at least 64 breeding females in one maternity colony and at least 80 breeding females in the other. Counts of a single tree near Norwich in August 2009 (BSG 2010) recorded between 55 and 59 bats from a single tree (these would be a mixture of female and juvenile bats). These colonies were further divided into sub-groups of 16-25 breeding females (Greenaway, 2008, Greenaway & Hill, 2004). Bats have been recorded changing sub-groups between different years, but never changing nursery colonies (Greenaway, 2004; Greenaway, 2008; Greenaway & Hill, 2004). It is not known whether the colonies in this study support the sub-group theory; those papers discussing sub-groups generally are of high-quality habitats covering larger areas such as the Ahringsbachtal Special Area of Conservation (SAC) in Germany and the Mens and Ebernoe Common SACs in England.

5.1.16 During the 2020 radio-tracking surveys, one non-breeding female bat (bat 1) was recorded within the same roost trees as one of the two male bats (bat 2) and appeared to move with this bat into different tree roosts. These two bats were recorded emerging from one of their roost trees with three other barbastelles, however,

the breeding status of the additional bats could not be confirmed and it is not possible to know the movements of the untagged bats. Three other non-breeding female barbastelles were tagged, one of which (bat 11) was recorded roosting within two woodlands to the south of the wood in which it was caught but it was not possible to ascertain the precise roost trees or whether this bat was roosting with other barbastelles. This bat did not appear to move with any of the other tagged bats that were roosting in this area. The roost locations of the final two non-breeding female bats were not recorded during the study period. Non-breeding females have been recorded roosting within maternity colonies (Greenaway, 2008), but have also been recorded roosting with small groups of males (Parsons *et al*., 2003).

5.2 Foraging Areas and Home Ranges

Foraging Areas

5.2.1 As described above, the main foraging areas for the breeding females appear to extend out from the woodland areas of Wimpole and Hayley/Waresley Wood and extend over the habitats particularly to the north which is criss-crossed with streams and ditches. The landscape is dominated by arable farmland, which grassland restricted to small fields associated with the edge of the settlements and along watercourses or in larger blocks in golf courses, Gransden Lodge airfield, parkland (old and new) or institutional grounds. Fragments of ancient woodlands are present as are more recent blocks of plantation woodland. The field boundaries support a wide variety of hedgerow habitat or linear woodland/scrub often associated with watercourses.

5.2.2 Radio-tracking has been carried out at Wimpole in the past with an initial survey between 2000 and 2002 (Cambridgeshire Bat Group). This previous study recorded bats foraging to 6.5km from Wimpole with one bat foraging 11km to the west of Cambridge. This bat was found south of High Cross on one night, which is approximately 3km north of the Grantchester area where bat 7 was recorded in 2020. Some information provided by Cambridgeshire Bat Group of radio tracking studies in 2000, 2002, 2004 and 2005 showed home ranges of bats from the Wimpole Estate which largely covers the same areas as found during this 2020 survey including a bat foraging in the Grantchester area. The sex or breeding status of these bats is not known.

Home Ranges: Breeding Females MCP and Kernel Analyses

5.2.3 Home Range Analysis was undertaken for all bats where sufficient bearings were collected. These can be compared with data from other radio-tracking studies. The other studies typically used 100% MCPs, rather than (as here) 95% MCPs to eliminate outliers. The data for this tracking survey are similar to the ranges recorded for adult female barbastelles in the Mens (range 260-2,928ha; mean: 1,236ha); and are greater than the mean recorded in Germany (222ha; Kerth & Melber, 2009) and at Ebernoe Common (range: 45 - 2,521ha; mean: 779.5ha; [4]Greenaway, 2008). Previous radio-tracking studies by Corylus Ecology have

[4] Note the MCP% analysis is not given in Greenaway 2008 but given as 100% MCP in Kerth and Melber 2009)

recorded a lower mean home range area for other sites in East Anglia although with similar range for the 95% MCP and kernels recorded from radio-tracking at this same time of year (mid-August).

5.2.4 The home range kernel analysis results are greater than the home ranges recorded for 12 female barbastelle bats at the site in Germany, although a wider range of values were recorded (kernel 95%: range: 125-2551ha; median: 403ha; Hillen *et al*., 2009). Another site in Germany recorded a smaller mean home range (90% kernel mean: 108.6ha) (Kerth & Melber, 2009)

Table A9 – Mean Home Ranges for breeding females (all areas in ha)

Status	Year	2020
Breeding females	95% MCP Mean (range)	1563.44 (306.2-3474.9)
	95% Kernel Mean (range)	1716.22 (289.5 – 4120.4)
	95% Cluster mean (range) No. of nuclei/cluster	653.7 (122.8 – 1293.1) 1 - 4

Home Ranges recorded in other studies							
Status	**Analysis Type**	**Mens**	**Ebernoe**	**Hillen *et al.***	**Kerth *et al.***	**Norwich NDR**	**Suffolk**
Breeding females	100% MCP Mean (range)	1,236 (260 – 2928)	779.5 (45 – 2521)	-	222		
	95% MCP Mean (range)					904 (393 – 1637)	714 (329-2020)
	95% Kernel Mean (range)			403 (125 – 2551)	108.6 (90% Kernel)	884 (460 – 2119)	582 (309 - 1275

Core Areas Defined Through Kernel Analyses

5.2.5 Core areas are those where an animal spends the majority of its time. Hillen's radio-tracking study of barbastelle (Hillen *et al*., 2009) looked at core areas used within each bat's home range. In that study, the core area was defined as 50% and home range was defined as 95% of the kernel density estimate. On that basis, the median number of core areas per bat was two with a range of one to five core areas per bat tracked per year. The core area size ranged from 5ha to 285ha. They found that all the home ranges of radio-tracked females (breeding and non-breeding) overlapped with at least one other home range but that only 41% of the core areas overlapped with another female's core area, suggesting a degree of partitioning.

Although the sample size for the study was small (19 data sets from 12 female bats), Hillen *et al.* 2009 determined that female barbastelles partition foraging areas and keep individual hunting areas constant over time.

5.2.6 The same analysis was undertaken of the 2020 Wimpole data (the Waresley Wood bat has been excluded), using the 50% kernel area of five breeding female barbastelle bats. This resulted in 66% of core areas having no overlap and therefore 34% being overlapped by at least one other core area, a very similar result to the Hillen study. **Figure C7** shows the 50% kernel areas of the breeding female barbastelle bats.

5.2.7 It should be noted that for both studies it is not known how many untagged bats were foraging in these core areas. Therefore it is possible that there is a greater degree of overlap in individual foraging areas than is otherwise indicated by the data presented here. The Hillen and East West Rail studies differ because at EWR the bats were radio-tracked over the same time period with multiple surveyors allowing the bats to be tracked simultaneously, whilst the Hillen study tracked either single bats or pairs of bats at any one time. The Hillen study did, however, track the same bat over different years with one bat tracked in each of the four years of the study, one during three of the four years and three during two of the four years. The researchers concluded that fidelity between years appeared to be more important in determining home range than intraspecific competition. None of the bats at EWR have been knowingly caught and tracked over different years as ringing has not previously taken place.

Cluster Analyses: Breeding Females

5.2.8 Cluster analysis creates a number of nuclei or clusters for each bat. The cluster area size defined by a 95% cluster analysis of breeding female barbastelle ranged from 122.8 to 1293.1ha with the number of nuclei ranging from 2 to 5 (as shown on **Figure C2)**. Whilst a number of these cluster core areas overlap, there may be some partitioning of foraging habitat. It should be noted that only a subset of the population of barbastelle bats is tracked at any given time and it is not known how many other non-tagged bats may have been foraging in these areas. The main clusters for bats 6 and 8 largely overlap, both covering a wide area from Kingston to Toft and Comberton. Two smaller clusters to the east are close to each other either side of Wimpole Road south of Barton. Two of the five clusters of bats 7 overlap with the clusters recorded for bat 12. Three of bat 7's clusters overlap with the large areas of bats 6 and 8 whilst the fifth cluster towards Grantchester does not overlap with any of the others.

Non-breeding Female Barbastelles (MCP, Kernel and Cluster Analysis)

5.2.9 Two non-breeding female bats were successfully radio-tracked in 2020: Bat 1 from Hayley Wood and Bat 11 from Wimpole. Given the small sample size (two bats) comparisons on the average sizes of home ranges cannot be made. The 95% MCP home ranges for the non-breeding females ranged from 347.3 to 1,682ha (bat 1), the range of bat 1 being within the range of those recorded by the breeding female bats. The home

range of bat 1 is considered to potentially be an underestimate as it could not be found on several nights during the tracking, similarly bat 11 was not tracked as extensively as it tended to fly south and away from any potential areas of impact with the proposals. The 95% cluster analysis for bat 1 as 490.7ha compared to the mean size for breeding females of 653.7ha although the number of nuclei recorded was highest for this bat (9) compared to all other bats tracked. Bat 11 had five nuclei whilst all bar one of the breeding females had either two or three nuclei. One possible theory for this is the non-breeding female bats use a greater number of foraging areas than the breeding female bats. Bat 7 a breeding female had 5 nuclei with a small cluster size of 284.7ha which suggests this specific breeding bat used a greater number of nuclei.

5.2.10 The kernel analysis recorded a smaller overall kernel size for the non-breeding females compared to the breeding females. Bat 1 for example with an MCP of 1,682ha has a kernel of 1,429.1ha compared to bats 6 and 8 which had kernels of 1,720.1 and 1,830.5ha respectively despite the MCP being smaller than that of bat 1.

5.2.11 Greenaway (2008) found that there was greater variability in MCP size for non-breeding barbastelles (both male and female). The lower metabolic demands of non-breeding bats mean that they do not require such large foraging areas; conversely a tendency to 'wander' in the late summer to find mating opportunities means they can also have quite large ranges as defined by MCP. For example, it was determined that non-lactating female noctules used more marginal and less preferred habitats significantly more than lactating bats (Mackie & Racey, 2007), although there was little difference in timing of foraging activity or distances travelled.

Male Barbastelles (MCP)

5.2.12 Two male barbastelle bats were tracked in 2020, one from Hayley Woods and one from the Wimpole Estate. As with the non-breeding females the sample size is too small to assess differences based on average home ranges. The two bats had 95% MCPs ranging between 1528.2ha and 2400.8ha. These are the second and fifth largest out of the nine bats tracked with usable data. The breeding female bats recorded the largest and third largest MCPs. Male bats tend to range over much greater distance and tend not to be associated with the core breeding habitat monopolised by the females. Greenaway (2004) proposed that the foraging areas used by the male may more frequently be in sub-optimal habitats when compared to those used by the females; however, in this instance, there appears to be a greater degree of overlap for the male bats at this site than occurs in the Sussex sites. During the 2020 surveys, five adult male barbastelles were caught, compared to 10 adult female bats and in both instances the male bats were recorded roosting in the woodland where the breeding female bats were roosting. The male barbastelles were recorded flying in the areas of habitat used by the female tracked bats: male bat 2, for example, roosted in Hayley Wood often with bat 1 (a non-breeding female) and was recorded regularly in around the Great Gransden Mill area. Male bat 5 was caught in Wimpole and was regularly recorded foraging in Eversden Wood and over the Bourn

Brook. Its usual roost was the barn at Wimpole but it was recorded roosting with bat 12 (a breeding female) on one occasion and in tree roosts in The Belts on two other occasions.

Distances Travelled

5.2.13 Barbastelle bats radio-tracked from The Mens Woodland SAC ranged widely (range: 2.64-11.98km; mean: 7.1km), as did those from Ebernoe Common SAC (range: 1.17-10.46; mean: 5.1) (Greenaway, 2008). The average flight distances for pregnant or lactating females at the same locations were 7.67km and 5.09km respectively (Greenaway, 2008). From Paston Barn near Cromer (Norfolk), female barbastelles flew a maximum of 2.75km to their foraging site, while males were tracked 4.75km (Parsons *et al*., undated). At two sites in southern England, the home ranges varied considerably with bats travelling between 1 and 20km to reach foraging areas with the average range span being 6.8km (Zeale *et al.,* 2012). In Norfolk, the maximum distance travelled by a breeding female bat was 9.4km (average 5.84km), whilst for a male it was 13km (BSG 2010). During this survey, the maximum distance recorded from a roost was 10.2km for bat 7 (a breeding female) whilst the mean maximum distance from a roost for breeding females was 5.17km. The mean maximum distance for the non-breeding female bats in 2020 was 6.15km whilst the mean maximum distance for the male bats was 7.05km

5.2.14 The 2020 distances recorded are consistent with the results of previous studies (Greenaway, 2004; 2008 and Zeale *et al.*, 2012) despite the differences in the extent of woodland habitat found at the subject site compared to the habitat availability at the other study sites.

5.2.15 Research in Sussex suggested that breeding females dispersed from the roost area along established flight lines to foraging areas often several kilometres away; the female repeatedly using the same flight line, and juveniles following the mothers out along the flight lines to become familiarised with the routes and foraging zones (Greenaway 2004). Whilst the flight lines may be shared, they were generally found to end in a section used by a single bat to access the most distant foraging area (Greenaway 2004). The radio-tracking surveys to date have not found this, with bats flying widely within the landscape: that is, the tracked barbastelle did not tend to follow singular linear features rather they used the ditch, stream and hedgerow features within the landscape extensively. They appeared to be less reliant on linear features to commute to foraging areas than has been suggested for other studies. As stated above, the habitats at Ebernoe and the Mens are more extensive than at Wimpole or Hayley Wood/Waresley Wood. In Suffolk (Arcadis 2020) and in Norfolk (BSG, 2010), foraging over less high-quality foraging habitat has been recorded, with foraging over arable land being recorded in both instances. The prevalence of arable habitat surrounding the roost woodlands does not restrict the movement of the bats, and they do not appear to use singular linear corridors to move between the areas of higher quality habitat. However, certain water courses appear to be of significant importance, specifically the Bourn Brook which was used extensively for foraging and commuting, the Gransden Brook and associated water courses and ditches around the Gransdens and the water courses and ditches around the Cambridge Gliding Club and north around Caxton and Cambourne.

5.2.16 During the summer season, Greenaway (2004) records that male barbastelle tend to be active for fairly short periods of the night, and appeared to forage entirely in woodlands within 1km of their roost site. In the present study, although the male bats were not continuously followed, they were regularly recorded throughout the night, and were clearly foraging further from their roost than the Greenaway study. Bat 5, which roosted in The Belts/tithe barn, was recorded at least 6.97km from its roost whilst bat 2 was recorded 7.12km from its roost areas, and in all cases appeared to be spending considerable periods of time foraging. It is likely that there are a number of factors affecting the distances the male bats move including breeding. The trapping and tracking was undertaken in the latter part of August when mating may be starting. However, neither of the male bats were noted as being in breeding condition (with enlarged testes), although both were recorded roosting with female bats.

5.2.17 There could be some seasonal variations to habitat use for foraging due to temperature/food availability. Seasonal diet changes in barbastelle have been researched and it has been found that they selectively predate larger moth species even during periods when smaller moth species are more abundant (Andreas *et al.,* 2012). It was found that, whilst there were generally no abrupt seasonal changes in their diet within season, the exception is in autumn, when the larger moths are replaced by smaller moths. It is considered that this is due to prey availability as most moth species cease to fly and only the smaller species are still flying during this time. Larger moths are still present but display limited flying activities. This autumn period is reported as being into November in the study area within the Czech Republic. The radio-tracking of barbastelles particularly at Hayley Wood/Waresley Wood has only been undertaken in summer, and it is likely that there will be seasonal and weather-related changes to key foraging areas throughout the year.

6.0 CONCLUSION

Barbastelle Bats

6.1 The radio-tracking undertaken in 2020 largely achieved the four objectives set out in para 1.2, for barbastelle bats. No serotine bats were caught and therefore no information relating to their foraging areas or commuting routes has been gathered.

6.2 Bats were caught post maternity with roosts and roost areas for barbastelle bats recorded in Wimpole, at Hayley Woods and Waresley Wood. A total of 12 barbastelle bats were tagged, two of the tagged bats were not recorded after the evening they were caught. One of these (bat 4) from Hayley Wood was caught late at night and it is possible that this bat did not roost within Hayley Wood but used habitat to the south over which there was little access. Bat 3 was also caught in Hayley Wood was rarely recorded and usually only during the daytime in the direction of a small section of woodland to the south-east of Hayley Wood. It could not be recorded during the night time flying period and it is thought it remained within this area between Hayley Wood, Hatley St George and Croydon. Foraging areas and home ranges were tracked for the remaining nine bats.

6.3 No cross-over between bats from Wimpole and bats from the western woodlands of Hayley Wood and Waresley Wood was recorded. No interchange of roosts between Hayley Wood and Waresley Wood was recorded although there was some overlap in home ranges and foraging areas between bats from these two woodlands.

6.4 The main foraging areas for the breeding females appear to extend out from the woodland areas of Wimpole and Hayley/Waresley Wood and extend over the habitats particularly to the north which is criss-crossed with brook's streams and ditches. The habitats are a mixture of arable, golf courses, and an air field. Of most significance for foraging was the Bourn Brook through to Grantchester east of Cambridge and the various ditch and water courses around Gransden (Gransden Brook and Mandean Brook) and water courses in the north around Caxton and Cambourne including Eastern Brook, Haydean and Gascote Dean. If the proposed railway passes through these areas there is an increased risk of loss of a proportion of foraging habitat, severance of flight lines and interaction between bats and trains than areas away from the Bourn Brook corridor and the water courses and mixed landscapes around Great and Little Gransden.

Other Bat Species Caught

6.5 Over four nights of trapping, 77 bats of six species were caught. Barbastelle was the most frequently caught species with 20 with soprano pipistrelle being the second most numerous species caught (16). Fourteen common pipistrelle and Natterer's bats were caught and 12 brown long-eared bats. A single adult non-breeding female Daubenton's bats was caught in the eastern belts.

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Appendix 1 – COVID-19 Survey Protocols

The Covid-19 pandemic resulted in a number of precautions the following guidance set out by Defra dated 28th May 2020 which includes the following:

1) For each trapping location three surveyors will work together, there will be one experienced tagger capable of tagging and ringing the target bats, a second licenced bat handler capable of removing bats from harp traps and mist nets, the third will be the recorder. This will prevent the potential cross-contamination of several handlers/surveyors using equipment whilst also ensuring the safety of bats caught in the traps and being tagged. It will also limit the number of people coming into close proximity/handling bats.

2) The following PPE and precautions will be used:
    a. Face masks – these will be worn at all times when handling bats and for any occasions where a 2m social distance between surveyors cannot be maintained;
    b. Gloves will be used as matter of course for handling bats and prior to handling any bats the gloves will be sanitised using hand sanitiser and then dried. They will be washed between trapping nights.
    c. Animals will be kept separate from other individuals as much as reasonably possible with adequate trapping bags taken to site to ensure 1 bat per bag and if at all possible re-use of bags kept to a minimum.

3) All equipment will be cleaned and disinfected before and after use.

4) Water and soap will be carried in all cars to allow proper handwashing as well as using hand sanitiser between washes.

Appendix 2 –Detailed Radio Tracking Methodology

If a bat was recorded, then attempts were made to take synchronised, also referred to as 'joint', bearings, with another surveyor. This meant that surveyors frequently had to change locations in order to get joint bearings. It is recognised that gathering regular, accurate and triangulated fixes for foraging bats is difficult. This is because bats forage in flight and at speed, continually twisting and turning, causing fluctuations in transmitter pulse amplitude which can impede interpretation of distance and direction (Mackie & Racey, 2007). In addition, the barbastelle is a wide-ranging, fast-flying species which switches roosts frequently. Care also had to be taken to ensure that the surveyors were positioned away from overhead cables and electric fences to avoid disturbance to the compasses and radio-signals.

All surveyors were mobile, with each surveyor able to drive to new locations and were in contact with each other with long-range radios. Due to access arrangements with private landowners, not all areas of the landscape could be fully surveyed. Surveyors were allowed access to land within Wimpole Estate, Eversden Woods, Hayley Wood and Waresley Wood for trapping and tracking. However, access for vantage points (VPs) in order to take bearings were restricted to public highways and footpaths. As a result, varying numbers of triangulation points were taken for each bat, and not all bats were followed as closely as others. However, omni-directional aerials on cars allowed the presence of bats in certain areas to be determined even if there were no public road laybys to allow a bearing to be taken.

Collecting tracking data on female bats was prioritised over data collection from male bats when male bats were not present within the areas where most bats were being recorded. The receivers used allowed easy scrolling between the frequencies of the different tags/bats and the surveyors were constantly checking for the presence of all bats including the male tagged bats. As well as recording bats that were within range, surveyors also noted which bats were not recorded.

Appendix 3 – Data Analysis Methodology

The aim was to obtain a fix for at least every ten-minute interval. However, in real terms, this has not been possible for every radio-tracked bat. This is because barbastelles have a tendency to move through the landscape quickly, resulting in the transmitter not being detected by the receiver. In addition, survey constraints outlined in paragraph 3.3 meant that it was often difficult to get joint bearings

Therefore, once a radio-tagged barbastelle had been re-located it was imperative to obtain as much data as possible to establish a pattern of range use. If during the night time active tracking a number of similar fixes were achieved within a short period time, i.e. 10 minutes, then multiple fixes were discarded to correct for autocorrelation. Millspaugh and Marzluff (2001) conclude that for home range analysis adequate sampling of animal locations throughout the duration of the study is more important than determining a time interval between sampling that is statistically independent.

It is important therefore that the study incorporates biological traits of the animal into the sampling schedule: for example, studying nocturnal animals in both day and night locations to prevent bias towards a particular behaviour or activity. The data was checked to make sure there were no duplicates/clumping of fixes at the roosts during the night-time tracking to eliminate overestimate of habitat use around roosts due to swarming. Selection of a sampling interval less than that required for "time to independence" (TTI – the time at which autocorrelation is non-existent in successive observations) will not invalidate kernel or minimum convex polygons[1] (MCP) analysis, provided that the time frame of the study is adequate (Swihart and Slade 1997; Millspaugh and Marzluff, 2001).

Bat fixes were transferred to digital geo-referenced maps using AutoCAD and coordinates for triangulation points were determined; the extent of bat activity for each bat was plotted independently and the data were carefully scrutinised and any obviously false bearings were discarded. The coordinates of the plotted triangulation points were then transferred into Ranges 7 software (Anatrack) and analysed to produce MCPs, neighbour linkage[2] (or clusters) and kernel contours[3]. These are all methods of showing home ranges. Where roosts were found, the roost sites were included within the home ranges. The analysis was carried out using 95% of the locations closest to the home range centre (for polygons produced by MCP analysis) or the 95% nearest to each other for the contour analysis (the cluster and kernel contours).

Within each data set, the trapping locations were specified as the focal sites and all coordinates from the night-time tracking and roost locations were inputted as location qualifying variables (LQVs) within Ranges (LQV's are time, activity, habitat, values associated with the *x*,*y* coordinates). The activities of the bats were assigned a numerical value for their activity, either roosting, flying or night-roosting for analysis within Ranges. Typically a focal site might consist of a static, repeatedly-used location such as a den or nest, but in the case of bats where roosts change regularly, the trapping location is the most appropriate focal point to use.

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1 The MCP enables the creation of a boundary around all fixes using the smallest possible convex polygon. This is commonly used but may overestimate the size of home ranges.

2 A type of multivariate analysis that uses records or measurements of a number of characteristics or features to group individuals into clusters or classes, so that individuals within each cluster/class are as alike each other as possible and as unlike individuals in other clusters/classes as possible.

3 Kernel methods quantitatively determine areas which are intensively used by animals by converting position coordinates into lines or areas with varying probabilities of use and present these graphically.

Appendix 4 – Full Trapping Results

Date	Trapping Location	Number	Time Caught	Species	Sex	Age	Breeding status	Forearm (mm)	Weight (grms)	Bat tag no	Ring number	Comments
17.08.20	Hayley Wood	1	20:55	Barbastelle	M	Juvenile		37.6	9		J3518	
17.08.20	Hayley Wood	2	20:55	Barbastelle	F	A		38.3	8.5	1	J3516	
17.08.20	Hayley Wood	3	20:55	Soprano pipistrelle	M	Juvenile		29.2	4			
17.08.20	Hayley Wood	4	20:55	Barbastelle	M	A		36.7	7.5	2	J3517	
17.08.20	Hayley Wood	5	21:06	Brown long-eared	F	A		39.1	9			
17.08.20	Hayley Wood	6	21:13	Soprano pipistrelle	M	A		30.9	4.5			
17.08.20	Hayley Wood	7	22:00	Natterer's	M	A		38.2	7			
17.08.20	Hayley Wood	8	22:00	Natterer's	M	A		38.6	7.5			
17.08.20	Hayley Wood	9	22:20	Barbastelle	F	A	Post lactating	39.3	9	3	J3520	
17.08.20	Hayley Wood	10	22:30	Brown long-eared	F	A		40	10.9			
17.08.20	Hayley Wood	11	23:40	Barbastelle	F	A		38.4	9	4	J3521	
18.08.20	Hayley Wood	12	01:10	Natterer's	F	A		40.8	7.5			
18.08.20	Hayley Wood	13	01:25	Barbastelle	M	Juvenile		38.4	8.5		J3522	
17.08.20	Northern Belts	14	21:18	Common pipistrelle	M	Juvenile		32.8	4.76			
17.08.20	Northern Belts	15	22:00	Common pipistrelle	F	Juvenile		31.2	4.7			
17.08.20	Northern Belts	16	22:20	Common pipistrelle	F	Juvenile		32.1	4.9			
17.08.20	Northern Belts	17	22:41	Common pipistrelle	F	Juvenile		32.8	5			
17.08.20	Northern Belts	18	22:55	Common pipistrelle	M	Juvenile		30.9	4.7			
17.08.20	Northern Belts	19	23:35	Common pipistrelle	F	Juvenile		32	4			
17.08.20	Northern Belts	20	23:38	Soprano pipistrelle	M	Juvenile		31.1	4.7			
18.08.20	Northern Belts	21	00:30	Common pipistrelle	M	Juvenile		32.4	4.9			
18.08.20	Northern Belts	22	00:32	Barbastelle	M	A		37.4	9	5	A2210	eartag on each side
18.08.20	Northern Belts	23	01:13	Barbastelle	F	A	Post lactating	40.1	10	6	A2240	eartag on each side
18.08.20	Northern Belts	24	02:16	Barbastelle	M	Juvenile		37	9		A2249	
18.08.20	Eversden Wood	25	21:05	Barbastelle	F	A	Post lactating	39.9	10	7	A2248	eartag on each side
18.08.20	Eversden Wood	26	21:10	Barbastelle	M	A		38	8		A2246	eartag on each side
18.08.20	Eversden Wood	27	21:10	Barbastelle	F	A	Post lactating	39	8.1	8	A2247	
18.08.20	Eversden Wood	28	21:34	Common pipistrelle	F	Juvenile		30.5	4.8			
18.08.20	Eversden Wood	29	22:05	Common pipistrelle	M	Juvenile		30.5	4.3			
19.08.20	Eversden Wood	30	00:25	Soprano pipistrelle	M	A		31.2	4.7			
18.08.20	Waresley Wood	31	20:35	Brown long-eared	F	A	Post lactating	38.4	7.5			
18.08.20	Waresley Wood	32	20:49	Barbastelle	F	A	Post lactating	39.3	9.5	9	J3523	
18.08.20	Waresley Wood	33	21:35	Natterer's	M	A		40.0				
18.08.20	Waresley Wood	34	22:00	Brown long-eared	F	A		38.8	7.5			
18.08.20	Waresley Wood	35	22:00	Soprano pipistrelle	M	A	large testes	30.3	5.0			
18.08.20	Waresley Wood	36	22:00	Barbastelle	M	A		37.9	8.5		J3524	
18.08.20	Waresley Wood	37	22:30	Soprano pipistrelle	M	A		30.7	4.5			
18.08.20	Waresley Wood	38	22:30	Natterer's	M	A		39.7	8.0			
18.08.20	Waresley Wood	39	23:05	Common pipistrelle	F	Juvenile		32.5	5.5			
18.08.20	Waresley Wood	40	23:05	Soprano pipistrelle	N/A			N/A				Escaped
18.08.20	Waresley Wood	41	23:40	Soprano pipistrelle	M	Juvenile		30.3	4.5			
19.08.20	Waresley Wood	42	00:15	Soprano pipistrelle	F	Juvenile		31.2	4.5			
19.08.20	Waresley Wood	43	01:00	Natterer's	F	A	Post lactating	38.2	7.5			
19.08.20	Waresley Wood	44	01:35	Soprano pipistrelle	M	A	large testes, black epids	30.8	5.5			
20.08.20	Eastern Belts	45	21:00	Barbastelle	M	Juvenile		37.5	8.0		A2244	
20.08.20	Eastern Belts	46	21:00	Daubenton	F	A		37.8	6.8			
20.08.20	Eastern Belts	47	21:00	Barbastelle	F	A		37.9	8.0	10	A2245	eartag on each side
20.08.20	Eastern Belts	48	21:00	Barbastelle	M	A		38.4	7.5		A2242	eartag on each side
20.08.20	Eastern Belts	49	21:05	Common pipistrelle	M	Juvenile		30.5	4.3			
20.08.20	Eastern Belts	50	21:35	Common pipistrelle	M	A		32.3	5.0			
20.08.20	Eastern Belts	51	22:05	Soprano pipistrelle	F	A	Post lactating	32.7	5.5			
20.08.20	Eastern Belts	52	22:05	Barbastelle	F	A		39.0	8.0	11	A2243	eartag on each side
20.08.20	Eastern Belts	53	22:08	Common pipistrelle	M	Juvenile		29.1	4.0			
20.08.20	Eastern Belts	54	23:25	Brown long-eared	M	A	large testes	37.3	5.0			
20.08.20	Eastern Belts	55	23:35	Soprano pipistrelle	M	A	large testes	32.4	5.1			
20.08.20	Eastern Belts	56	23:56	Brown long-eared	F	A	Post lactating	40.8	8.4			
21.08.20	Eastern Belts	57	00:11	Barbastelle	F	Juvenile		38.0	7.5		A2241	
21.08.20	Eastern Belts	58	01:26	Natterer's	M	A		40.1	8.2			
20.08.20	Hayley Wood	59	20:30	Soprano pipistrelle	M	A		30.8	4.0			
20.08.20	Hayley Wood	60	21:15	Natterer's	M	A		37.2	7.5			
20.08.20	Hayley Wood	61	21:40	Brown long-eared	F	A	Post lactating	39.3	-			
20.08.20	Hayley Wood	62	21:40	Natterer's	M	A		39.8	7.0			
20.08.20	Hayley Wood	63	22:00	Natterer's	F	A	Post lactating	38.1	8.0			

20.08.20	Hayley Wood	64	22:00	Natterer's	F	NB		39.5	8.0			
20.08.20	Hayley Wood	65	23:10	Natterer's	F	A	Post lactating	39.3	8.0			
20.08.20	Hayley Wood	66	23:10	Soprano pipistrelle	M	Juvenile		30.0	4.5			
20.08.20	Hayley Wood	67	23:40	Natterer's	F	A	Post lactating	4.2	8.5			
21.08.20	Hayley Wood	68	00:05	Soprano pipistrelle	F	NB		31.1	5.0			
21.08.20	Hayley Wood	69	00:15	Soprano pipistrelle	F	A	Post lactating	31.1	5.0			
21.08.20	Hayley Wood	70	00:55	Brown long-eared	F	A	Post lactating	39.1	8.5			
22.08.20	Eversden Wood	71	21:05	Common pipistrelle	M	A	large testes	29.0	4.7			
22.08.20	Eversden Wood	72	21:35	Brown long-eared	M	A	early breeding condition	36.8	7.0			
22.08.20	Eversden Wood	73	21:35	Brown long-eared	M	A	large testes, black epids	37.1	8.0			
22.08.20	Eversden Wood	74	22:36	Brown long-eared	F	A	Post lactating	40.1	8.5			Mole on nipple
22.08.20	Eversden Wood	75	23:29	Brown long-eared	F	A	Post lactating					Recapture - recognised by mole on nipple
22.08.20	Eversden Wood	76	23:58	Natterer's	M	A		39.3	6.5			
23.08.20	Eversden Wood	77	01:25	Barbastelle	F	A	Post lactating	39.2	10.7	12	A2219	

Appendix 5 - Description of Roosts

Roost Number	Bat Number	Area	Tree/Building	Species of Tree	dbh (cm)	Description of Roost Feature	Distance from Woodland Edge (m)	Count Information	Grid Reference
1	5	The Belts	Tree	Ash	50-100	Ash tree or possibly in sycamore leaning into the ash tree - trees covered in ivy.	36	-	TL 34068 52484
2	6, 7	The Belts	Tree	Ash	80-100	Difficult to see due to canopy but on E side there is a fungus and splits and cavities. On S side larger cavity just below fork in tree high up.	9	-	TL34185 52484
3	5, 8	The Belts	Tree	Oak	1m+	Large split low down to 3m. Several dead branches higher up and dense ivy	30	-	TL34124 52386
4	8	The Belts	Tree	Ash	40	Dense ivy cover and splits	53	3 bats including bat 8 emerged	TL 33935 52510
5	5	Wimpole Barn	Barn	-	-	Above lintel of door	-	-	TL 34062 51408
6	6, 12	The Belts	Tree	Ash	100	Ivy covered tree with snags at the top but no specific feature visible	57	-	TL 33926 52504
7	1, 2	Hayley Wood	Tree	Ash	50	Trunk cavity, large WP hole and split down stem	13	5 bats incl. bat 1 and 2 emerged	TL 28746 52697
8	1,2	Hayley Wood	Tree	Oak	50	Dying, stag headed tree with raised bark and a large section is missing revealing heartwood beneath	68	-	TL 28767 53018
9	9	Waresley Wood	Tree	Ash	200+	Twin stemmed ash, loose bark	53	-	TL 26491 55173
10	9	Waresley Wood	Tree	Beech	100	No obvious features visible however is a mature tree of substantial size and suitable to support a bat roost higher up	75	-	TL 26403 55051
11	9	Waresley Wood	Tree	Oak	50-100	1m vertical split in main limb and rotten branch	33	-	TL 26362 54924
12	6, 7, 8	The Belts	Tree	Oak	100	Dense ivy cover but stag headed tree with likely numerous features	41	-	TL 34080 52478
13	9	Waresley Wood	Tree	Oak	50	Numerous features - tree covered with lifted, cracked and raised bark	0	-	TL 26569 55166

Roost Number	Bat Number	Area	Tree/Building	Species of Tree	dbh (cm)	Description of Roost Feature	Distance From Woodland Edge (m)	Count Information	Grid Reference
AR14	3	Unnamed wood	Unknown		Unknown	Unknown	Unknown	-	Approximate direction of roost based on joint bearings
15	9	Waresley Wood	Tree	Oak	50 - 99	Trunk cavity, twin stemmed tree and trunk interview to create cavity	113	-	TL 26293 54784
16	5	The Belts	Tree	Ash	50 - 99	Group of ivy covered trees - actual tree could not be determined	51		TL 33954 52472
17	7	The Belts	Tree	Ash	50 - 99	Dense ivy cover with WP hole and broken limb on northern elevation	55	Bat 7 emerged	TL 34006 52533
18	9	Waresley Wood	Tree	Ash	30	Can't confirm - survey aborted due to high winds	192		TL 26198 55070
19	2	Hayley Wood	Tree	Oak (or ash adjacent)	80	Not sure which feature. If oak it has a lost top and has splits and snagged ends. Ash has wounds and holes. Probably in oak	60	-	TL 28768 52766
20	8	The Belts	Tree	Ash	50 - 100	Dense ivy cover	81	-	TL 34111 52446
21	6, 7	The Belts	Tree	Ash	50 - 100	Dense ivy cover	22	-	TL 34173 52475
AR22	11	Four Acre Wood	Unknown	Unknown	Unknown	Unknown	Unknown	-	Approximate direction of roost based on 2 single bearings
23	6	The Belts	Tree	Ash	-	-	12	-	TL 34182 52482
24	8	The Belts	Tree	Ash	-	Large ivy stem on east side and ivy growth halfway up	11	-	TL 34183 52476
AR25	11	Nurseries Wood	Unknown	Unknown	Unknown	Unknown	Unknown	-	Approximate direction of roost based on 2 single bearings

Appendix 6 - Roosts by Day

Bat no	Species	Sex	Breeding or Non-breeding	17/08/2020	18/08/2020	19/08/2020	20/08/2020	21/08/2020	22/08/2020	23/08/2020	24/08/2020	25/08/2020	26/08/2020	27/08/2020	28/08/2020
1	Barb	F	Non-breeding	Caught Hayley Wood	8	7	-	high winds	7	7	7	7	7	7	7
2	Barb	M	-	Caught Hayley Wood	8	7	19	high winds	7	7	7	7	7	7	7
3	Barb	F	Breeding	Caught Hayley Wood	-	-	-	high winds	-	AR14 Tree belt to south-east of Hayley woods	AR14 Tree belt to south-east of Hayley woods	AR14 Tree belt to south-east of Hayley woods	AR14 Tree belt to south-east of Hayley woods	AR14 Tree belt to south-east of Hayley woods	-
4	Barb	F	Non-breeding	Caught Hayley Wood	-	-	-	high winds	-	-	-	-	-	-	
5	Barb	M	-	Caught The Belts	1	Roost R3 in day and roost R5 in evening	5	5	5	5	5	5	16	5	5
6	Barb	F	Breeding	Caught The Belts	-	2	21	The Belts	23	12	6	The Belts	-	12	17
7	Barb	F	Breeding	-	Caught Eversden	2	21	The Belts	12	12	12	The Belts	17	12	17
8	Barb	F	Breeding	-	Caught Eversden	Roost R3 in day and roost R4 in evening	20	The Belts	24	12	12	The Belts	-	12	-
9	Barb	F	Breeding	-	Caught Waresley	9	-	high winds	10	11	13	18	15	13	13
10	Barb	F	Non-breeding	-	Caught The Belts	-	-	high winds	-	-	-	high winds	-	-	-
11	Barb	F	Non-breeding	-	Caught The Belts	-	-	AR25	Tree not found	-	-	high winds	AR22	AR22	-
12	Barb	F	Breeding	-	-	-	-	-	Caught in Eversden Wood	-	6	The Belts	12	12	17

Appendix 7 – Summary of Roost Occupancy by Day in August 2020

Bat Number	Roost Number																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1							19,22-28	18																
2							19,22-28	18											20					
3														19,20,23-27										
4	Roost not found																							
5	18		19		19-25,27,28											26								
6		19				24						23,27					28				20		22	
7		19										22-24,27					26,28				20			
8			19	19								23,24,27								20				22
9									19	22	23		24,27,28		26			25						
10	Roost not found																							
11	Roost not found																							
12						24						26,27					28							

The Belts Wimpole Barn Hayley Wood Waresely Wood Unamed wood

Key

32 Vantage Point Location - Position 32

revision	description	date	checked by

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Project:

20080 East West Rail Project

Title:

Vantage Point Location Plan

status		drawing no.		
		Figure A1		
scale	size	date	drawn	checked
NTS	A3	05.03.2021	AW	HL

CAD filename

Figure_1.dwg

Appendix I.2 CSET-073

Great Gransden
Little Gransden
Waresley Wood
Hayley Wood
Kingston
Everseden and Wimpole Wood SAC
Everseden Wood
The Belts
Cobbs Wood
National Trust Wimpole

R18 R9 R13 R10 R11 R15 T5
T3 T4 R8 R19 R7
AR14
T2 T5 R16 R17 R6 R2 T1 T3 T4
R5
AR25
AR22

Key

- R10 — Roost Location 1
- R10 — Approximate Roost Location
- T1 — Trapping Area
- Eversden and Wimpole Woods SAC

revision	description	date	checked by

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Project: 20080 East West Rail Project

Title: Trapping and Roost Location Plan

status		drawing no.		
		Figure A2		
scale	size	date	drawn	checked
NTS	A3	05.03.2021	AW	HL

CAD filename: Figure_1.dwg

Appendix I.2 CSET-073

Key

- Roost 9
- Approximate Location of Roost 9
- Roost used by Bat
- Trapping Location - Bat caught here
- Bat 1 joint bearing point 21
- Bat 1 single bearing point 21
- 95% kernel analysis
- 95% cluster analysis
- 95% MCP analysis

revision	description	date	checked by

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Project:
20080 East West Rail Project

Title:
Bat 1 NB Female Barbastelle - Triangulation Points

status		drawing no.		
		Figure B1		
scale	size	date	drawn	checked
NTS	A3	08.12.2020	AW	HL

CAD filename
Figure_1.dwg

Appendix I.2 CSET-073

Key

- Roost 9
- Approximate Location of Roost 9
- Roost used by Bat
- Trapping Location - Bat caught here
- Bat 2 joint bearing point 21
- Bat 2 single bearing point 21
- 95% kernel analysis
- 95% cluster analysis
- 95% MCP analysis

revision	description	date	checked by

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Project:
20080 East West Rail Project

Title:
Bat 2 Male Barbastelle - Triangulation Points

status		drawing no.		
		Figure B2		
scale	size	date	drawn	checked
NTS	A3	08.12.2020	AW	HL

CAD filename
Figure_1.dwg

Appendix I.2 CSET-073

Key

- R9 — Roost 9
- R9 — Approximate Location of Roost 9
- R1 — Roost used by Bat
- T1 — Trapping Location - Bat caught here

Little Gransden

Little Gransden

Waresley Wood

Hayley Wood

H12 RL1 H11 H13 H14 H17 H18 H16 72

RD3 R13 R9 R18 R10 R11 R15 T5

RL2 2 1 36 4

T3 T4 R8 R19 R7 AR14

revision	description	date	checked by

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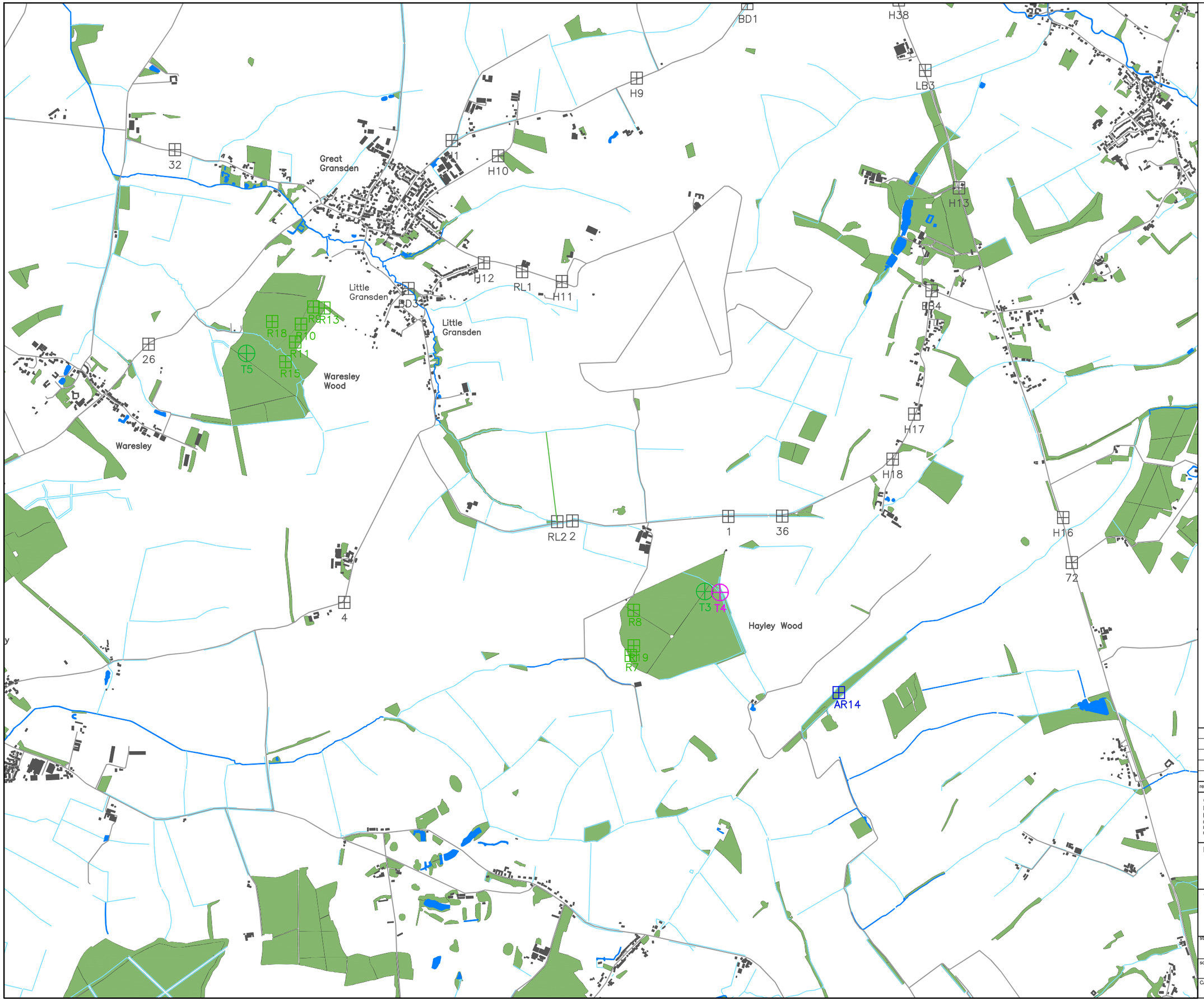
Title:

Bat 3 breeding Female Barbastelle - Triangulation Points

status		drawing no.		
		Figure B3		
scale	size	date	drawn	checked
NTS	A3	08.12.2020	AW	HL

CAD filename

Figure_1.dwg



Key

- R9 — Roost 9
- R9 — Approximate Location of Roost 9
- R1 — Roost used by Bat
- T1 — Trapping Location - Bat caught here

revision	description	date	checked by

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Project: 20080 East West Rail Project

Title: Bat 4 NB Female Barbastelle - Triangulation Points

status		drawing no.		
		Figure B4		
scale	size	date	drawn	checked
NTS	A3	08.12.2020	AW	HL

CAD filename: Figure_1.dwg

Appendix I.2 CSET-073

Key

- Roost 9
- Approximate Location of Roost 9
- Roost used by Bat
- Trapping Location - Bat caught here
- Bat 5 joint bearing point 21
- Bat 5 single bearing point 21
- 95% kernel analysis
- 95% cluster analysis
- 95% MCP analysis

revision	description	date	checked by

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Project:
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Title:
Bat 5 NB female Barbastelle - Triangulation Points

status	drawing no.			
	Figure B5			
scale	size	date	drawn	checked
NTS	A3	08.12.2020	AW	HL

CAD filename
Figure_1.dwg

Appendix I.2 CSET-073

Key

- Roost 9
- Approximate Location of Roost 9
- Roost used by Bat
- Trapping Location - Bat caught here
- Bat 6 joint bearing point 21
- Bat 6 single bearing point 21
- 95% kernel analysis
- 95% cluster analysis
- 95% MCP analysis

revision	description	date	checked by

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Project:
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Title:
Bat 6 Breeding female Barbastelle - Triangulation Points

status	drawing no.			
	Figure B6			
scale	size	date	drawn	checked
NTS	A3	08.12.2020	AW	HL

CAD filename
Figure_1.dwg

Appendix I.2 CSET-073

Key

- R9 — Roost 9
- R9 — Approximate Location of Roost 9
- R1 — Roost used by Bat
- T1 — Trapping Location - Bat caught here
- 7.21 — Bat 7 joint bearing point 21
- 7.21 — Bat 7 single bearing point 21
- 95% kernel analysis
- 95% cluster analysis
- 95% MCP analysis

revision	description	date	checked by

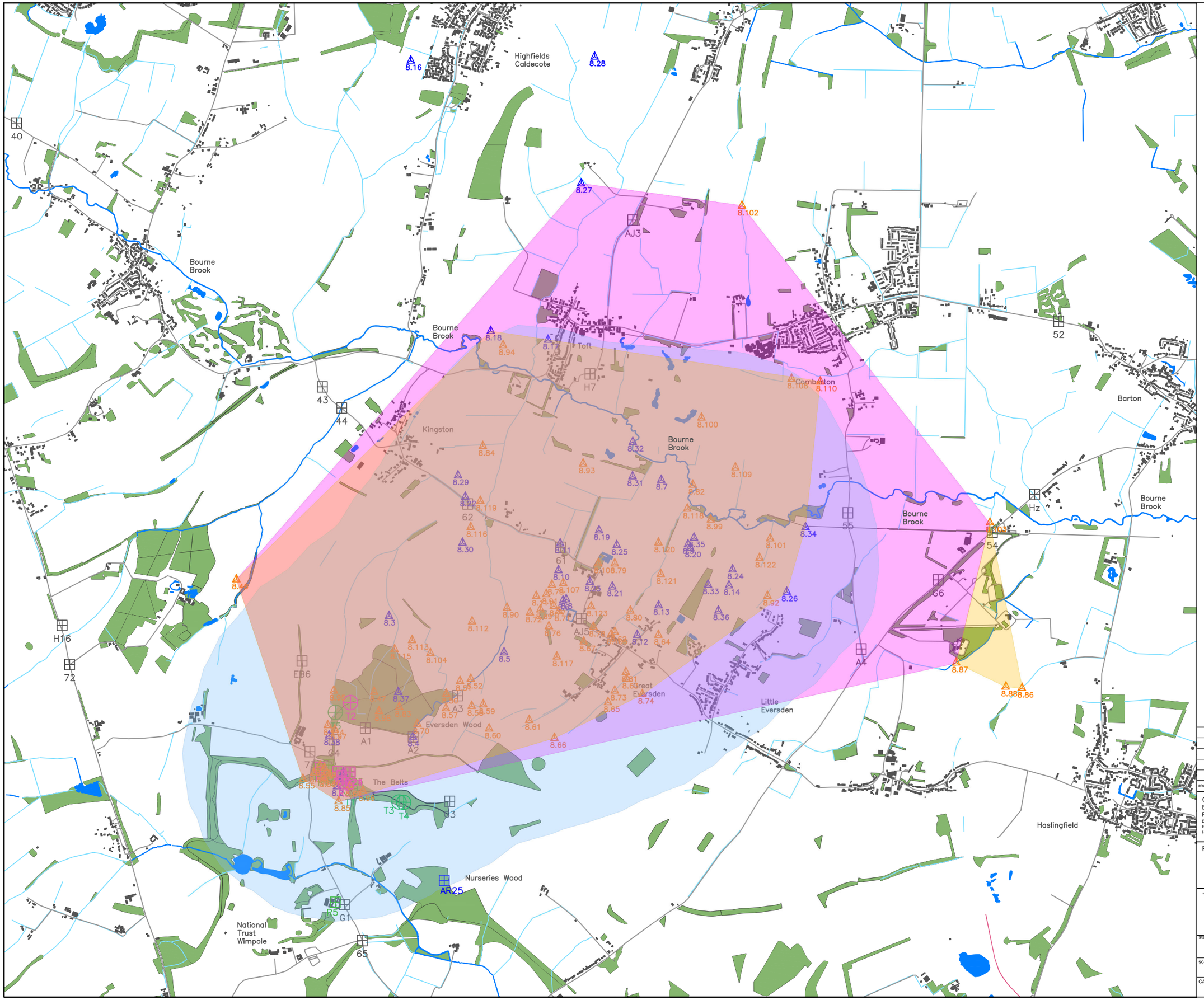
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Project:
20080 East West Rail Project

Title:
Bat 7 Breeding female Barbastelle - Triangulation Points

status	drawing no.			
	Figure B7			
scale	size	date	drawn	checked
NTS	A3	11.12.2020	AW	HL

CAD filename
Figure_1.dwg



Key

- Roost 9 (R9)
- Approximate Location of Roost 9 (R9)
- Roost used by Bat (R1)
- Trapping Location - Bat caught here (T1)
- Bat 8 joint bearing point 21 (8.21)
- Bat 8 single bearing point 21 (8.21)
- 95% kernel analysis
- 95% cluster analysis
- 95% MCP analysis

revision	description	date	checked by

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Project:
20080 East West Rail Project

Title:
Bat 8 breeding female Barbastelle - Triangulation Points

status		drawing no.		
		Figure 1		
scale	size	date	drawn	checked
NTS	A3	08.12.2020	AW	HL

CAD filename
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Appendix I.2 CSET-073

Key

- Roost 9
- Approximate Location of Roost 9
- Roost used by Bat
- Trapping Location - Bat caught here
- Bat 9 joint bearing point 21
- Bat 9 single bearing point 21
- 95% kernel analysis
- 95% cluster analysis
- 95% MCP analysis

Great Gransden
Little Gransden
Waresley Wood
Waresley
Hayley Wood

revision	description	date	checked by

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Project:
20080 East West Rail Project

Title:
Bat 9 breeding female Barbastelle - Triangulation Points

status		drawing no.	
		Figure B9	
scale	size	date	drawn	checked
NTS	A3	08.12.2020	AW	HL

CAD filename
Figure_1.dwg

Key

- Roost 9
- Approximate Location of Roost 9
- Roost used by Bat
- Trapping Location - Bat caught here

Everseden Wood

The Belts

Cobbs Wood

National Trust Wimpole

EB6

A1

A2

A3

AJ5

AR25

G1

G3

G4

T1

T2

T3

T4

T5

R3

R5

65

revision	description	date	checked by

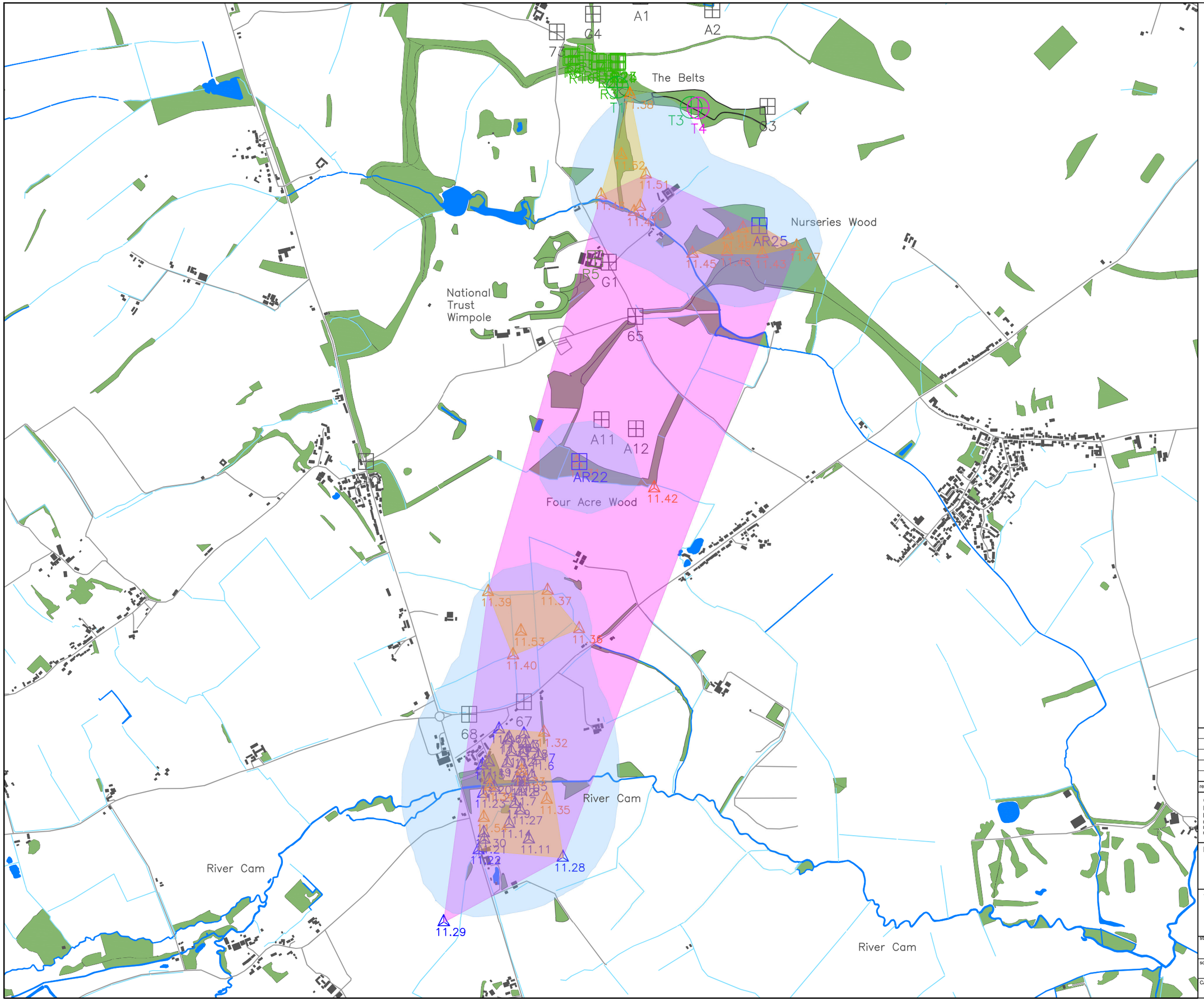
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Project:
20080 East West Rail Project

Title:
Bat 10 NB Female Barbastelle - Triangulation Points

status		drawing no.		
		Figure B10		
scale	size	date	drawn	checked
NTS	A3	08.12.2020	AW	HL

CAD filename
Figure_1.dwg



Key

- Roost 9 (R9)
- Approximate Location of Roost 9 (R9)
- Roost used by Bat (R1)
- Trapping Location - Bat caught here (T1)
- Bat 11 joint bearing point 21 (11.21)
- Bat 11 single bearing point 21 (11.21)
- 95% kernel analysis
- 95% cluster analysis
- 95% MCP analysis

revision	description	date	checked by

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Project:
20080 East West Rail Project

Title:
Bat 11 NB female Barbastelle - Triangulation Points

status		drawing no.		
		Figure B11		
scale	size	date	drawn	checked
NTS	A3	08.12.2020	AW	HL

CAD filename
Figure_1.dwg

Key

- Roost 9
- Approximate Location of Roost 9
- Roost used by Bat
- Trapping Location - Bat caught here
- Bat 12 joint bearing point 21
- Bat 12 single bearing point 21
- 95% kernel analysis
- 95% cluster analysis
- 95% MCP analysis

revision	description	date	checked by

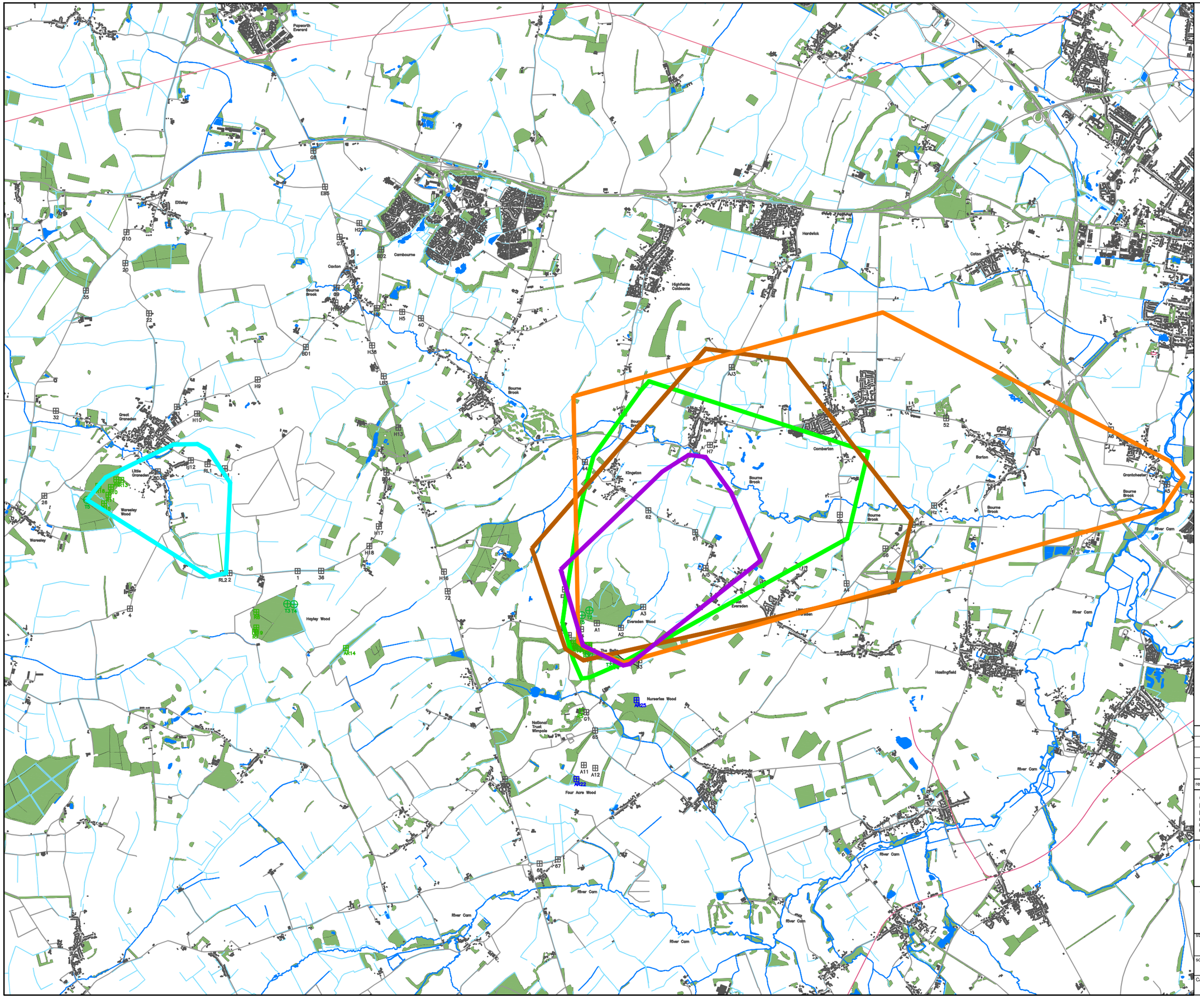
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Project:
20080 East West Rail Project

Title:
Bat 12 breeding female Barbastelle - Triangulation Points

status	drawing no.			
	Figure B12			
scale	size	date	drawn	checked
NTS	A3	08.12.2020	AW	HL

CAD filename
Figure_1.dwg



revision	description	date	checked by

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Project:
20080 East West Rail Project

Title:
Adult breeding female Barbastelle MCP 95% analysis

status		drawing no.		
		Figure C1		
scale	size	date	drawn	checked
NTS	A3	11.12.2020	AW	HL

CAD filename
Figure_1.dwg

Appendix I.2 CSET-073

Key

- Bat 6 95% Cluster analysis
- Bat 7 95% Cluster analysis
- Bat 8 95% Cluster analysis
- Bat 9 95% Cluster analysis
- Bat 12 95% Cluster analysis

revision	description	date	checked by

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Project:

20080 East West Rail Project

Title:

Adult breeding female barbastelle Cluster 95% analysis

status		drawing no.		
		Figure C2		
scale	size	date	drawn	checked
NTS	A3	08.12.2020	AW	HL

CAD filename

Figure_1.dwg

Appendix I.2 CSET-073

Key

- Bat 6 95% Kernel analysis
- Bat 7 95% Kernel analysis
- Bat 8 95% Kernel analysis
- Bat 9 95% Kernel analysis
- Bat 12 95% Kernal analysis

revision	description	date	checked by

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Project:

20080 East West Rail Project

Title:

Adult breeding female barbastelle Kernel 95% analysis

status		drawing no.		
		Figure C3		
scale	size	date	drawn	checked
NTS	A3	08.12.2020	AW	HL

CAD filename

Figure_1.dwg

Appendix I.2 CSET-073

Key

Bat 1 95% MCP analysis

Bat 11 95% MCP analysis

revision	description	date	checked by

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Project:

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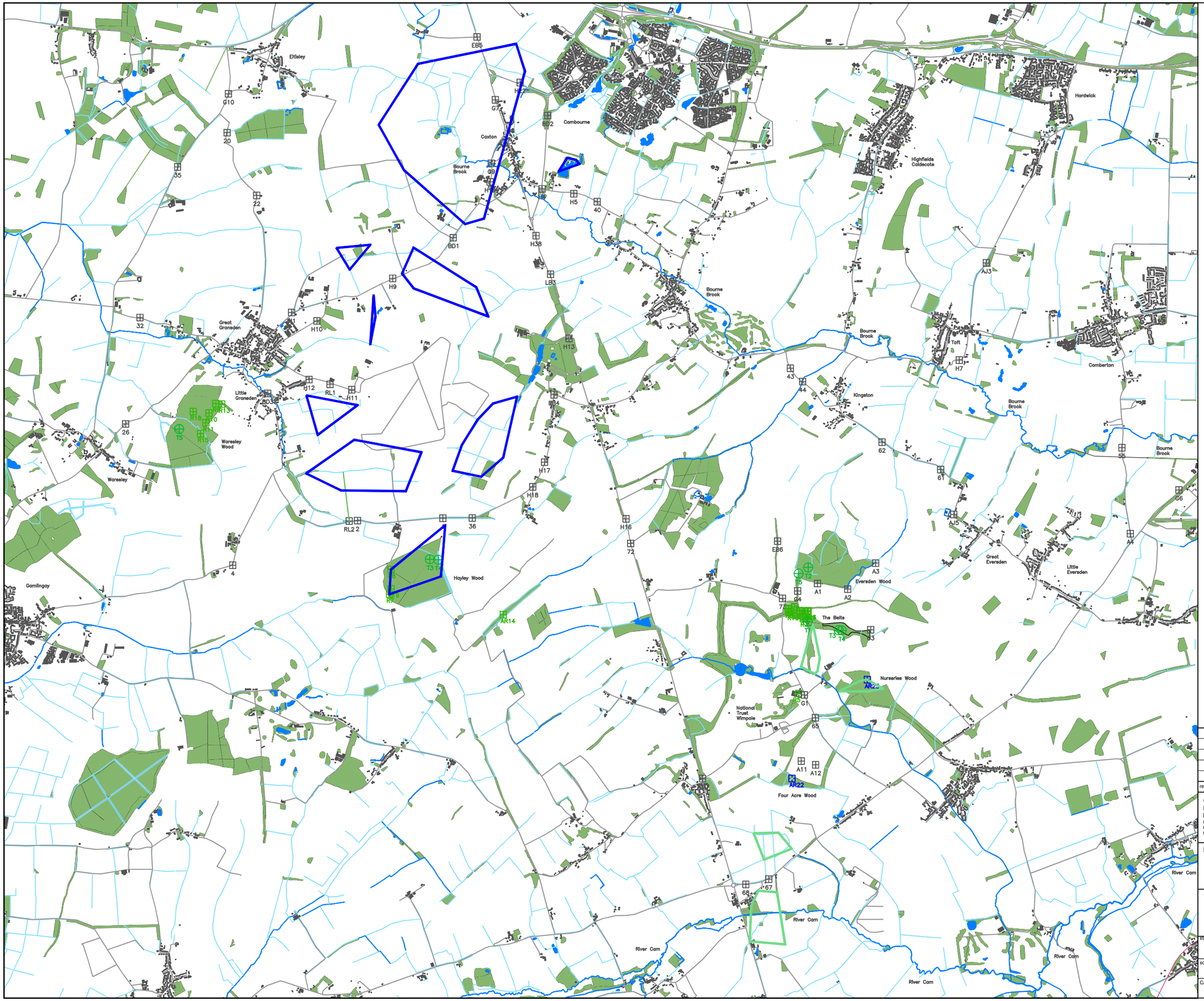
Title:

Non-breeding female barbastelle MCP 95% analysis

status		drawing no.		
		Figure C4		
scale	size	date	drawn	checked
NTS	A3	08.12.2020	AW	HL

CAD filename

Figure_1.dwg



Appendix I.2 CSET-073

revision	description	date	checked by

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Project:
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Title:
Non-breeding female barbastelle Cluster 95% analysis

status		drawing no.		
		Figure C5		
scale	size	date	drawn	checked
NTS	A3	08.12.2020	AW	HL

CAD filename
Figure_1.dwg

Key

Bat 1 95% Kernel analysis

Bat 11 95% Kernel analysis

revision	description	date	checked by

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Project:

20080 East West Rail Project

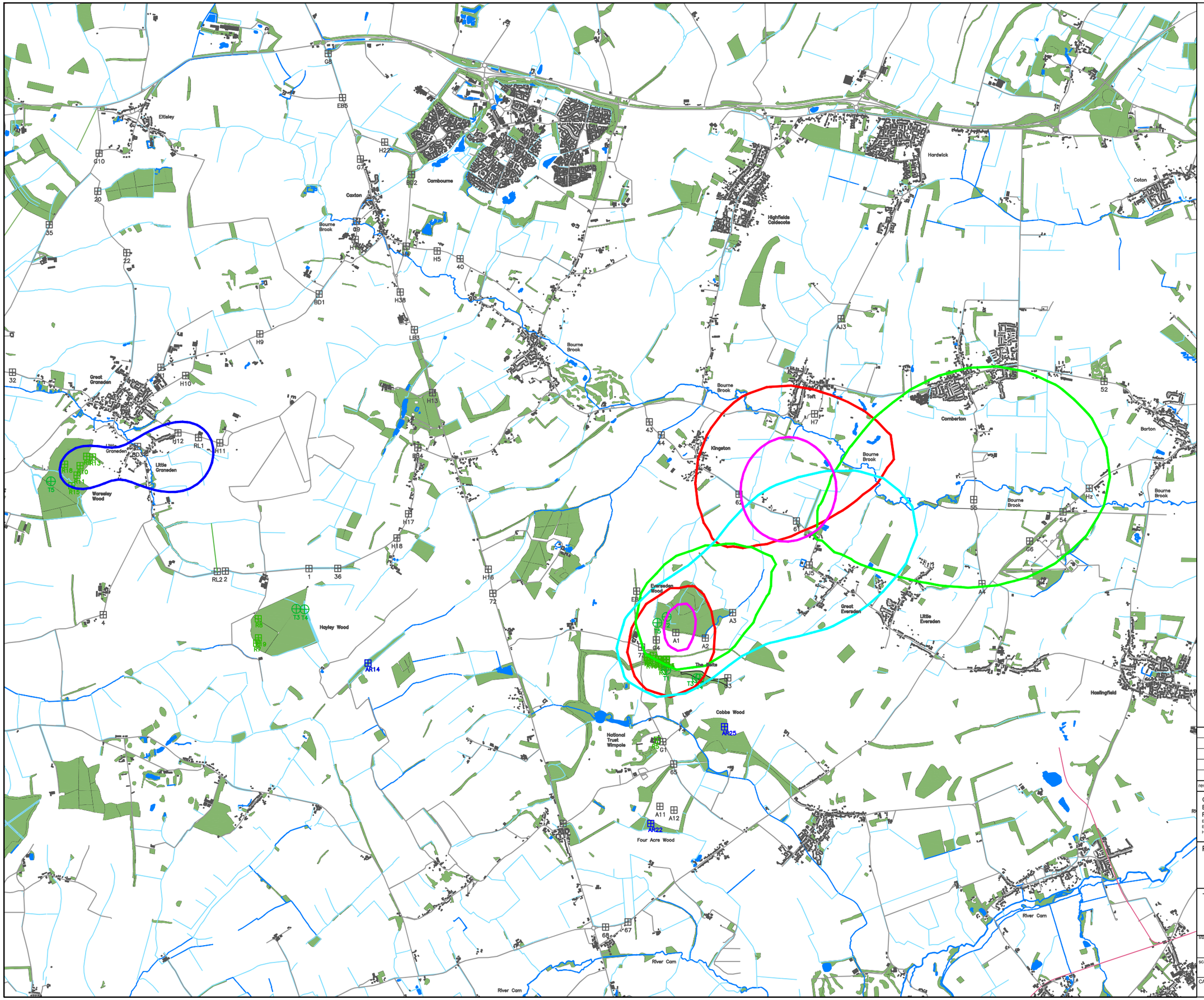
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Non-breeding female barbastelle Kernel 95% analysis

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revision	description	date	checked by

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Project:
20080 East West Rail Project

Title:
Breeding Female Barbastelle 50% Kernel analysis

status		drawing no.		
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scale	size	date	drawn	checked
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Figure_1.dwg

TECHNICAL NOTE

Cambridge South East Transport

SUBJECT	PROJECT NO.	DATE
River Granta Bat Activity Surveys 2024	5229170	4th November 2024

Notice

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This document does not purport to provide legal advice.

This document has 7 pages including the cover.

Document history

Revision	Purpose description	Originated	Checked	Reviewed	Authorised	Date
1.0	Draft for comment	SNF	SW	NC	AW	04/11/2024

Client signoff

Client	Cambridgeshire County Council		
Project	Cambridge South East Transport	**Project No.**	5229170
Client signature/ date			

1. Introduction

1.1 Terms of Reference

AtkinsRéalis was commissioned by Greater Cambridgeshire Partnership to undertake bat activity surveys on the River Granta where it is crossed by the A11 in connection with the Cambridge South East Transport (CSET) Scheme (hereafter referred to as the Proposed Scheme).

The Proposed Scheme is located approximately 3.3 km southeast of Cambridge City Centre as shown in **Appendix A** (hereafter referred to as the Site).

This technical note has been undertaken with reference to current good practice[1] and provides the results of the specific bat surveys undertaken to inform the Proposed Scheme.

All UK bat species are protected under European and UK legislation. These species are also protected under the Wildlife and Countryside Act 1981 (as amended) and the surveys have been undertaken to inform appropriate mitigation should these species be found (see relevant ecological legislation in **Appendix B**).

This report is intended to inform design development and site layout in relation to bats and their habitats.

1.2 The Site and Proposed Scheme

The Greater Cambridge Partnership (GCP) is the local delivery body for a City Deal signed by central Government to bring powers and investment to the region, including improvements to critical infrastructure. The GCP comprises four partners:

- Cambridge City Council;
- Cambridgeshire County Council;
- South Cambridgeshire District Council; and
- University of Cambridge.

Through the City Deal, funding has been secured to develop a series of transport infrastructure improvements to address the problems of congestion. One of the projects being put forward is the CSET2 scheme, herein referred to as the Proposed Development.

The Proposed Development is a mostly new, segregated, guided bus route, travel hub, and active travel path located to the south east of the city. The Site comprises all of the land within the red line boundary which coincides with the proposed Order Limits as defined in the draft Transport and Works Act Order (TWAO) accompanying the application.

[1] Collins, J. (ed.) (2023) Bat Surveys for Professional Ecologists: Good Practice Guidelines (4th edition).

TECHNICAL NOTE

The Site begins at Ordnance Survey National Grid Reference (OSNGR) TL 45981 55041 and ends at OSNGR TL 52090 50137 (refer to **Appendix A** for the Site Location Plan). The bridge carrying the A11 over the River Granta is located at OSNGR TL 51854 49333.

1.3 Background Information

A suite of bat surveys of the site have been undertaken between 2019 – 2022. Following consultation with Natural England in 2023 it was agreed to undertake a bat activity survey of the River Granta where it is crossed by the A11 to ascertain how bats currently forage/ commute along the River Granta at this location, specifically to see if bats commute beneath the A11 road bridge.

1.4 Scope of the Assessment

This technical note presents ecological information obtained during two bat activity surveys of the River Granta and A11 bridge structure which were undertaken on 12th August 2024 and 2nd September 2024. These surveys aimed to record general bat activity at the river, and whether bats pass through the bridge structure.

2. Methods

The bat activity surveys were undertaken on 12th August 2024 and 2nd September 2024 below the A11 on the River Granta by two ecologists. Each survey was led by a surveyor of accomplished level for bat survey following the Chartered Institute of Ecology and Environmental Management (CIEEM) competency framework[2].

The activity surveys were carried out in optimal weather conditions[3], commencing at least 15 minutes before sunset and ending 1.5 hours after sunset.

To facilitate the identification of bats during the surveys, a full spectrum Batlogger M2 bat detectors were used. During the surveys, bat calls were identified to genus or species-level through a combination of auditory identification and/ or the visual representation of the spectrogram of the call shown on the screen of the detector. Where possible, bat behaviour and flight characteristics were also recorded by the surveyors. Night vision aids in the form of one Infra-red (IR) camera (Canon XA11) were also used to assist with identifying any bat activity at the river, or bats passing through the bridge structure.

The camera footage was reviewed in full at 2x speed to identify any bats commuting below the bridge. Sound files recorded by the bat detectors were analysed using bat sound analysis software (Kaleidoscope software[4]) and summary data tables and statistics were presented where appropriate.

Manual identification of species was completed by sound analysts of at least capable experience for all bat species following the CIEEM competency framework[5]. This involved initially checking 100% of all files. The files were then reviewed by sound analysts of at least accomplished experience for all bat species. 10% of files labelled common pipistrelle and soprano pipistrelle and 10% of all other bat species/ genus were checked. If bats were identified within more than 10% of the sample, then the amount analysed was increased incrementally until the sample contained less than 10% bats.

The survey details are summarised in **Error! Reference source not found.** below, along with weather conditions.

Table 2-1 – Survey timings

Date	Sunset time	Start – End time	Start – End Temperature (°C)	Start – End Humidity (%)	Start – End Wind speed[6] and direction	Start – end precipitation[7]	Start – End Cloud cover[8]
12th August 2024	20:29	21:01 – 22:00	26 – 20	74 – 81	2 NE – 2 NE	0 – 0	2 – 2
2nd September 2024	19:43	19:27 – 21:13	20 - 17	82 - 100	1 E – 2 S	0 – 0	7 - 5

2.1 Limitations

Access to the bridge was limited for both surveys due to dense vegetation. This is not considered a significant limitation as although surveyors did not have a view under the bridge cameras were used during the survey and provided a suitable view of under the bridge.

The survey on the 12th August 2024 commenced approximately 30 minutes after sunset due to access restriction. This is not considered a significant limitation as the focus was on activity not emergence.

Bat surveys offer only ‘snapshots’ of the location being assessed and do not take account of potential future changes in abundance or diversity of bats at a given site. Moreover, ecological surveys are limited by factors which affect the presence of bat species, such as the time of year, migration patterns and behaviour. Therefore, the absence of evidence of any bat species should not be taken as conclusive proof that the species is not present or that it will not be present in the future. However, by completing surveys following good practice, the risks of providing unrepresentative assessments diminish.

[2] https://www.cieem.net/competency-framework

[3] Sunset temperature of 10°C of above, and no rain or strong wind.

[4] Kaleidoscope – Wildlife Acoustics – Version 5.6.5.

[5] https://www.cieem.net/competency-framework

[6] Wind speed score of 0-12 against Beaufort scale: 0 = calm, 2 = light breeze, 4 = Moderate breeze, 6 = strong breeze, 7 = High wind, 9 = Strong gale, 12 = Hurricane.

[7] Precipitation intensity on scale of 0-5: 0 = Dry, 1 = Light drizzle, 2 = Light rain, 3 = Moderate rain, 4 = Heavy rain, 5 = Torrential rain.

[8] Cloud cover on a scale of 0-8: 0 = Sky completely clear, 4 = Sky half cloudy, 8 = Sky completely cloudy.

3. Results

At the time of the survey, no bats were observed emerging or re-entering the bridge by the surveyors and no emergences or re-entries were recorded on the IR camera.

Soprano pipistrelle, common pipistrelle, pipistrelle sp., noctule and *Myotis* sp. were identified commuting along the River Granta and passing underneath the bridge structure, as seen in Table 2.

Table 2 - Survey bat species counts at bridge structure

Date	Species	Count[9]
12th August 2024	Soprano pipistrelle	97
	Common pipistrelle	7
	Pipistrelle sp.	9
	Myotis sp.	9
2nd September 2024	Soprano pipistrelle	71
	Common pipistrelle	2
	Pipistrelle sp.	88
	Myotis sp.	14

4. Discussions and Recommendations

No bat roosts have been identified within the bridge structure during the survey undertaken on the 12th August 2024, and 2nd September 2024.

Bats were recorded commuting along the River Granta beneath the A11 bridge and therefore it can be expected that any bridges created by the scheme would be used in the same manner.

The below is recommended to avoid indirect impacts to foraging/ commuting bats:

- No night-time working should be undertaken to ensure temporary increases in lighting and noise do not disturb nocturnal species. If night-time working or night-time security lighting is required, lighting should be directional and downward facing to illuminate the temporary works area and avoid light spillage into adjoining habitats;
- Should lighting need to be added this will be designed in correspondence with a suitably experienced bat ecologist and in line with the Bat Conservation Trust (BCT) and Institute for Lighting Professionals (ILP) guidance[10]. Dark corridors should be maintained, and upward light spill should be avoided. Artificial lighting on surrounding trees and watercourses should be avoided as far as possible.

4.1 Report Validity

In the event of scope or programme changes or if works do not commence within 12 months of the date of this report, then updates to the surveys may be required to ensure the validity of the data, as per CIEEM guidance[11].

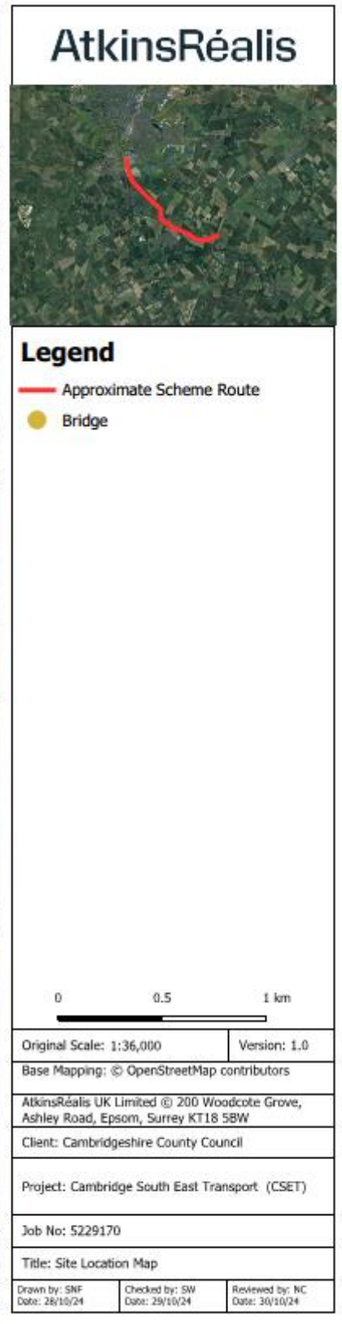
[9] Count is taken as 1 recording of 1 bat species. If 2 bats are identified on 1 recording this would be 2 counts.

[10] Bat Conservation Trust (2023) Guidance Note 08/23 – bats and Artificial Lighting at Night. [Accessed February 2024].

[11] CIEEM (2019) Advice Note on the Lifespan of Ecological Reports and Surveys. Available from Advice note on the Lifespan of Ecological Reports and Surveys | CIEEM

Appendix A. Site Location Plan





Appendix B. Relevant Ecological Legislation

Species	Legislation	Relevant offences	Licensing procedures and guidance
Bats *European protected species*	Conservation of Habitats and Species Regulations 2017 (as amended) Reg 43.	Deliberately[12] capture, injure or kill a bat; deliberate disturbance[13] of bats; or damage or destroy a breeding site or resting place used by a bat. [The protection of bat roosts is considered to apply regardless of whether bats are present.]	Mitigation licences issued for development by Natural England (NE). Guidance documents: *NE Standing Advice for protected species 2022* *European Protected Species: Mitigation Licensing - How to get a licence* (NE 2013) *Bat Mitigation Guidelines* (Natural England 2004) *Bat Workers Manual* (JNCC 2004)
	Wildlife and Countryside Act 1981 (as amended) Schedule 5, Section 9.	Intentionally kill, injure or take a bat; intentionally or recklessly damage, destroy or obstruct access to any structure or place used for shelter or protection or disturb[14] a bat in such a place.	Licence from NE is required for surveys (scientific purposes) that would involve disturbance of bats or entering a known or suspected roost site.

[12] Deliberate capture or killing is taken to include “accepting the possibility” of such capture or killing.

[13] Deliberate disturbance of animals includes in particular any disturbance which is likely a) to impair their ability (i) to survive, to breed or reproduce, or to rear or nurture their young, or (ii) in the case of animals of hibernating or migratory species, to hibernate or migrate; or b) to affect significantly the local distribution or abundance of the species to which they belong.

[14] Lower levels of disturbance not covered by the Conservation of Habitats and Species Regulations 2017 (as amended) remain an offence under the Wildlife and Countryside Act 1981 (as amended) although a defence is available where such actions are the incidental result of a lawful activity that could not reasonably be avoided.