

A47 North Tuddenham to Easton Dualling

Scheme Number: TR010038

Volume 6

6.3 Environmental Statement Appendices **Appendix 8.12 - Bat Survey Report**

APFP Regulation 5(2)(a)

Planning Act 2008

Infrastructure Planning (Applications: Prescribed
Forms and Procedure) Regulations 2009

March 2021

Infrastructure Planning

Planning Act 2008

**The Infrastructure Planning
(Applications: Prescribed Forms and
Procedure) Regulations 2009**

The A47 North Tuddenham to Easton
Development Consent Order 202[x]

ENVIRONMENTAL STATEMENT APPENDICES
Appendix 8.12 - Bat Survey Report

Regulation Number:	5(2)(a)
Planning Inspectorate Scheme Reference	TR010038
Application Document Reference	TR010038/APP/6.3
BIM Document Reference	HE551489- GTY-EBD-000-RP-LB-30025
Author:	A47 North Tuddenham to Easton Dualling Project Team, Highways England

Version	Date	Status of Version
Rev 0	March 2021	Application Issue

Table of contents

1.	Scheme introduction	1
2.	Ecological background	2
2.1.	Summary	2
2.2.	Survey and report objectives	4
2.3.	Study area	5
2.4.	Scope of works	5
3.	Methodology	6
3.1.	Desk study	6
3.2.	Field surveys	6
3.3.	Preliminary bat roost assessments	6
3.4.	Dusk emergence and dawn re-entry surveys	9
3.5.	Internal roost inspection	10
3.6.	Resources	10
3.7.	Limitations	10
4.	Survey results	12
4.1.	Desk study	12
4.2.	Preliminary bat roost assessments	13
4.3.	Results summary	61
5.	Evaluation	63
5.1.	Bat roosts	63
6.	Impact assessment	66
7.	Mitigation	75
7.1.	Overview	75
7.2.	Tree work operations	76
8.	References	77
	Annex A – Full emergence/re-entry survey results	78
	Annex B Roost receptors – buildings (map)	142
	Annex C Roost receptors – trees (map)	143
	Annex D Roost survey results (map)	144
	Annex E RSK bat survey report	145
	Annex F April 2020 bat activity surveys	146
	Annex G: April 2020 bat activity transect results	155

1. Scheme introduction

- 1.1.1. In June, July, August, September and October 2019, Sweco undertook bat surveys of a route (Route 2) which was chosen at the options stage, along a stretch of the A47 between North Tuddenham and Easton, hereafter referred to as “the site”, on behalf of Highways England. This report is to inform the Environmental Statement (ES) Ecology Chapter at PCF Stage 3 for the A47 North Tuddenham to Easton Improvement Scheme, hereafter referred to as ‘the proposed scheme’.
- 1.1.2. The North Tuddenham to Easton section of the A47 connects key economic growth areas of Norwich. The current road is unable to cope with high traffic volumes and there are limited opportunities to overtake slower moving vehicles on this single carriageway.
- 1.1.3. In developing the Proposed Scheme, Highways England aim to address these issues by improving the traffic flow, reducing journey times on the route, increasing the route safety and resilience and improving the environment. The proposed Scheme is also intended to support economic growth by making journeys safer and more reliable.
- 1.1.4. The North Tuddenham to Easton section of the A47 lies to the west of Norwich at national grid reference (NGR) TG 05952 13577. This 8km single carriageway section forms a part of the main strategic highway route. The Proposed Scheme includes the partial dualling of the existing road with some deviations along the route.
- 1.1.5. This baseline report provides a summary of the results of bat surveys undertaken at the site in 2019 and specifies any mitigation and/or further survey work which may be required.

2. Ecological background

2.1. Summary

2.1.1. Following work previously undertaken by WYG on behalf of Amey in 2017, bat roost surveys of 10 buildings and 241 trees were carried out in order to better understand the use of the site by bat populations. In addition to the roost surveys, bat activity surveys consisting of eight walked transect surveys and static detector surveys were also required. This work has been updated during 2019 and 2020 by Sweco UK Ltd, MLM Group and subcontractors RSK.

2.1.2. Results from the following surveys can be found in the report herein, provided by Sweco:

- Preliminary bat roost assessments of two building complexes; [REDACTED]
- Preliminary ground-level bat roost assessments of 11 trees on the Easton Estates Lane, nine additional trees and two previously surveyed trees
- Bat roost emergence/re-entry surveys on the following buildings:
 - [REDACTED] (three surveys);
 - [REDACTED] (three surveys);
 - three buildings at [REDACTED], two with high bat roost potential (BRP) and one with moderate BRP; and
 - four buildings at [REDACTED] with high BRP.
- Internal roost inspections of one building at [REDACTED];
- 45 bat emergence/re-entry roost surveys on 23 trees:
 - tree 61 (two of two surveys)
 - tree 62 (two of four surveys)
 - tree 74 (three of three surveys)
 - tree 75 (two of two surveys)
 - tree 76 (two of two surveys)
 - Tree A/tree 77 (one of three surveys)
 - Tree D/tree 78 (one of four surveys)
 - tree 85 (two of two surveys)
 - tree 90 (two of two surveys)
 - tree 91 (two of two surveys)
 - tree 92 (two of two surveys)
 - tree 93 (two of two surveys)

- tree 94 (one of one survey)
- tree 95 (one of one survey)
- tree 98 (one of one survey)
- tree 99 (one of one survey)
- tree 100 (two of two surveys)
- tree 101 (two of two surveys)
- tree B (two of two surveys)
- tree C (three of three surveys)
- tree E (three of three surveys)
- tree F (three of three surveys)
- tree G (three of three surveys)
- Transect activity surveys; eight transects in total, each surveyed twice, in April 2020, undertaken by MLM Group (see Annex F)

Results from the following surveys can be found in the attached report provided by RSK in Annex E:

- Transect activity surveys; eight transects in total, each surveyed twice a month between July – October inclusive with the exception of transect eight which was only surveyed once during July. Transects seven and eight were surveyed once in June 2019.
- Static activity surveys; nine detector locations in total. Detectors were deployed on each transect once per month (July – October inclusive) for a minimum of five days.
- 74 bat emergence/re-entry roost surveys on 33 trees:
 - tree 1 (three of three surveys)
 - tree 4 (two of two surveys)
 - tree 5 (three of three surveys)
 - tree 6 (three of three surveys)
 - tree 9 (two of two surveys)
 - tree 43 (three of three surveys)
 - tree 48 (three of three surveys)
 - tree 49 (two of two surveys)
 - tree 50 (two of two surveys)
 - tree 51 (three of three surveys)
 - tree 62 (two of four surveys)
 - tree 63 (two of two surveys)
 - tree 64 (two of two surveys)

- tree 65 (two of two surveys)
- tree 73 (two of two surveys)
- tree 77 (two of three surveys)
- tree 78 (three of four surveys)
- tree 79 (two of two surveys)
- tree 80 (two of two surveys)
- tree 81 (three of three surveys)
- tree 82 (two of two surveys)
- tree 83 (three of three surveys)
- tree 84 (two of two surveys)
- tree 97 (two of two surveys)
- tree 102 (one of two surveys)
- tree 103 (two of two surveys)
- tree 117 (two of two surveys)
- tree 118 (two of two surveys)
- tree 119 (two of two surveys)
- tree 120 (two of two surveys)
- tree 121 (two of two surveys)
- tree 122 (two of two surveys)
- tree 123 (two of two surveys)

2.2. Survey and report objectives

2.2.1. The aim of the bat surveys was to determine the presence/likely absence of roosting bats that would be impacted by the proposed development. If roosting bats are present, to:

- Identify the species and numbers of bats present.
- Where roosts are identified, to characterise the type of roost (e.g. maternity roost, transitional roost, hibernation site, etc).
- Gain sufficient information to allow the potential impacts on roosting bats of the proposed works to be assessed and for appropriate avoidance, mitigation and/or compensation measures to be designed.

The aim of the report presented is to:

- Outline the legislative protection afforded to bats (Annex F).
- Summarise the findings of the bat surveys and provide an assessment of the potential ecological constraints associated with the Proposed Scheme.

2.3. Study area

- 2.3.1. The study area for trees and buildings that may support roosting bats was within 50m of the proposed works (including indicative temporary works areas).

2.4. Scope of works

The following elements of work were included in the bat survey programme:

- Desk study – a review of recent ecological surveys in the area.
- Field surveys –, preliminary bat roost potential assessments and emergence/re-entry roost surveys of trees and buildings.
- Ecological report – detailing the survey methods and results, implications of the Proposed Scheme, the Proposed Scheme’s anticipated impacts and any further work or additional considerations arising from those impacts.

3. Methodology

3.1. Desk study

This involved a review of all ecology survey reports produced to date which are:

- Preliminary Ecological Appraisal (PEA) in support of PCF Stage 2; and
- Bat survey report (Amey 2017).

3.2. Field surveys

3.2.1. Field surveys were designed with reference to Bat Surveys: Good Practice Guidelines 3rd Edition (Collins, 2016).

3.3. Preliminary bat roost assessments

3.3.1. A daytime preliminary roost assessment (PRA) was undertaken by Sweco on two (2) building complexes identified as being suitable to support bats within the current study area which had not been previously assessed. Oak Farm was assessed on 15 May 2019. Church House Farm was assessed on 01 August 2019.

3.3.2. The preliminary assessments involved an external inspection of buildings with potential roosting features being inspected with a high-powered torch (Clulite CB2) and close focussing binoculars to search for evidence in places that could not be reached. Where safe access was provided, an interior inspection of buildings, including any roof voids, was also carried out.

3.3.3. All our British bat species will make use of buildings on occasion, but for some species, buildings are essential as roost sites. Different types of roost are used by bats throughout the year, and bat species may show preferences for certain types of locations. The broad categories of bat species according to roosting preferences adapted from Collins, (2016) are as follows:

- Crevice dwelling bat species (which tend to be hidden from view): common pipistrelle *Pipistrellus pipistrellus*, soprano pipistrelle *Pipistrellus pygmaeus*, Nathusius' pipistrelle *Pipistrellus nathusii*, Brandt's bat *Myotis brandtii*, whiskered bat *Myotis mystacinus*, Alcathe bat *Myotis Alcathe* and Bechstein's bat *Myotis bechsteinii*.
- Roof-void dwelling bat species (that may or may not be visible on roof timbers): noctule *Nyctalus noctula*, serotine *Eptesicus serotinus*, Leisler's bat *Nyctalus leisleri*, Daubenton's bat *Myotis daubentonii* and Barbastelle *Barbastella barbastellus*.

- Bat species that need flight space in certain types of roost (that may or may not be visible on roof timbers): Natterer's bat *Myotis nattereri*, brown long-eared bat *Plecotus auritus* and grey long-eared bat *Plecotus austriacus*.
- Bat species that need flight space and flying access (and roost hanging freely in the open): greater and lesser horseshoe bats *Rhinolophus ferrumequinum* and *Rhinolophus hipposideros*.

3.3.4. The type of roost used may vary throughout the year. Roost types, as described in Collins, J. (2016) can be:

- Transitional/occasional Roost: Used by a few individuals or occasionally small groups for generally short periods of time on waking from hibernation or in the period prior to hibernation.
- Maternity Roost: Where female bats give birth and raise their young to independence.
- Satellite Roost: An alternative roost found in close proximity to the main nursery colony used by a few individual breeding females to small groups of breeding females throughout the breeding season.
- Mating: Sites Where mating takes place from late summer and can continue through the winter.
- Hibernation Roost: Where bats may be found individually or together during winter. They have a constant cool temperature and high humidity.
- Night Roost: A place where bats rest or shelter in the night but are rarely found in the day. May be used by a single individual on occasion or it could be used regularly by the whole colony.
- Day Roost: A place where individual bats, or small groups of males, rest or shelter in the day but are rarely found by night in the summer.
- Feeding Roost: A place where individual bats or a few individuals rest or feed during the night but are rarely present by day.
- Swarming sites: Where large numbers of males and females gather during late summer to autumn. Appear to be important mating sites.

3.3.5. During the preliminary assessment, features suitable for bats such as weatherboarding, hanging tiles, soffit boxes, gaps in brickwork, cracks and crevices, slipped or broken tiles, gaps around ridge tiles and lead flashing were noted. Any potential access points were identified and inspected for signs of bats such as:

- Bat droppings on the ground or stuck to walls.
- Suitable entry and exit points around eaves, soffits, flashing, under tiles or gaps in mortar.
- Live bats, bat corpses or skeletons.

- Oily marks (from fur) or localised clean spots around possible access points and roost areas.
- Lack of cobwebs along beams, roof timbers, or potential access points.
- Feeding remains (such as moth wings).

3.3.6. Buildings were assigned a roost potential of high, medium or low based on the characteristics of its features and capacity to support roosting bats. Tables 3-1 (taken from Collins, 2016) summarise the categories of bat roost potential in buildings (**TR010038/APP/6.1**).

Table 1: Categories of bat roost potential in buildings.

Suitability	Description
Negligible	Negligible habitat features 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 of 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 – the assessments in this table are made irrespective of conservation status, which is established after presence is confirmed).
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 longer periods of time due to their size, shelter, protection, conditions and surrounding habitats.

3.3.7. A daytime preliminary ground level bat roost assessment was also undertaken on nine trees down the access lane to Easton Estates (between TG 10604 12127 and TG 10533 11885) in September 2019. Roost surveys undertaken earlier in the 2019 season on trees 74, 75 and 76, which are situated further north on an adjoining track, identified a high level of pipistrelle activity along the track and the timing of the onset of activity suggested there was a roost nearby.

3.3.8. During the preliminary ground level assessment undertaken on the nine trees features suitable for bats including, but not limited to, woodpecker holes, rot holes, hazard beams, other vertical or horizontal cracks and splits, partially detached platey bark, knot holes, man-made holes, cankers and bat or bird boxes (Collins, 2016). Where features were of height to allow close inspection signs of bat presence, including audible squeaking, bat droppings, odour and staining, were searched for.

Table 3-2 summaries the categories of bat roost potential in trees (**TR010038/APP/6.1**).

Table 2: Categories of bat roost potential in trees (taken from Collins, 2016).

Tree Category	Description
High	Trees with multiple highly suitable features capable of supporting larger roosts.
Moderate	Trees with definite bat potential, supporting fewer suitable features or with potential for use by single bats.
Low	Trees with no obvious potential, 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 potential to support bats.
Negligible	Trees with no potential to support bats. Trees with negligible bat roost potential are not mapped or considered further within this report.

3.4. Dusk emergence and dawn re-entry surveys

- 3.4.1. Dusk emergence and dawn re-entry surveys are used to determine the presence or likely absence of bat roosts in buildings or features when the preliminary roost assessment cannot reasonably rule out the presence of roosting bats. They are also used to identify the type of roost (see section 3.2.5) where a known roost is present (**TR010038/APP/6.1**). Bat surveys should be completed in the season when bats are most active (May to September with optimum bat activity between June and August) although bat activity can be detected and data can still be used to help characterise roosts if surveys are undertaken during peripheral months if weather conditions are appropriate.
- 3.4.2. Dusk emergence and dawn re-entry survey effort is dictated by the category of bat roost potential assigned to a structure or tree during the preliminary bat roost potential assessment (see tables 3-1 and 3-2) (**TR010038/APP/6.1**).
- 3.4.3. Table 3-3 (taken from Collins, J. 2016) summarises the survey effort required for structures to give confidence in a negative result (**TR010038/APP/6.1**). This guidance is also recommended for trees however confidence in negative results is lower for tree roost surveys (Collins, 2016).

Table 3: Recommended minimum number of survey visits for presence/likely absence surveys

Low roost suitability	Moderate roost suitability	High roost suitability
One survey visit. One dusk emergence or dawn re-entry survey (structures). No further surveys required (trees).	Two separate survey visits. One dusk emergence and a separate dawn re-entry survey.	Three separate survey visits. At least one dusk emergence and a separate dawn re-entry survey. The third visit could be either dusk or dawn.

- 3.4.4. Notes were made on the times of bat calls and any bat activity seen or heard (commuting, foraging, roosting or social calls). Bat calls were simultaneously monitored and recorded using Titley Scientific Anabat Walkabout and Elekon Batlogger M detectors. Recorded data were used to verify the survey notes and for analysis, using Analook Insight (for the Walkabouts) and BatSound4 (for the Batloggers) software, of the following information:

- Time and species of first and last bat call.
- Location of bats/proximity to the buildings.
- Number and species of bats present (where identification is possible).
- Number of bats recorded entering/exiting the buildings.
- Bat activity levels (foraging, commuting, social calls).
- Any bat calls recorded that were not identified on field notes.

3.5. Internal roost inspection

3.5.1. Internal roost inspections are used to discern the actual or potential presence of bats within a structure that has potential to be used by roosting bats or has previously been identified as a roost. These inspections attempt to identify evidence of current or previous bat roosting by identifying the presence bat specimens (live or dead), droppings, urine splashes, feeding remains (insect wings), fur-oil staining, squeaking noises, bat-fly (Nycteribiid) pupal cases or odour. Attempts to locate potential or actual access points should also be made during this type of inspection.

3.6. Resources

3.6.1. Bat survey work detailed here was completed by suitably qualified Sweco surveyors. Surveys were led by Diane Wood (Principal Ecologist, Sweco) who holds a level 2 Natural England bat class licence (registration number 2015-13155-CLS-CLS) or Adam West (former Consultant Ecologist, Sweco) who holds a level 2 Natural England bat class licence (registration number 2016-24724-CLS-CLS) and assisted by Ishbel Campbell (Consultant Ecologist, Sweco) Beth Mell (Graduate Ecologist, Sweco) Charlotte Ward (Field Ecologist, Sweco) and Harry Jarvis (Field Ecologist, Sweco).

3.7. Limitations

- 3.7.1. The comprehensiveness of any ecological assessment will be limited by the season in which surveys are undertaken. To determine presence or likely absence of a protected species and their status (i.e. the number of individuals present) usually requires multiple visits at suitable times of the year. The survey conditions and timings were suitable for surveying bats and therefore are not considered to be a limitation to the effectiveness of the surveys.
- 3.7.2. During the dusk emergence survey of St Peter's Church (Location A) on 31/07/19, the bat detector stopped recording forty-three (43) minutes before the end of the survey. The last recording was made at 21:37. Any bats observed by the surveyor after this time cannot be verified. As the purpose of the survey was to observe roosting bats emerging from the church and the detector ceased

recording after the time when bats would likely emerge, this is not seen as a constraint on this survey.

- 3.7.3. During the dawn re-entry survey of Church House Farm (Location D) on 16/08/19, the bat detector stopped recording one (1) hour and twenty (20) minutes before the end of the survey. The last recording was made at 04:18. As the purpose of the survey was to observe roosting bats entering the building and the surveyor did not observe any, this is not seen as a constraint on this survey. Any recordings made would only have been used to verify the species of any bats observed roosting.
- 3.7.4. During the dusk emergence survey of Tree 85 on 11/09/19, the bat detector stopped recording five (5) minutes after the start of the survey. The last recording was made at 19:08. Any bats observed by the surveyor after this time cannot be verified. As the purpose of the survey was to observe roosting bats emerging from the tree and the detector ceased recording, and the surveyor did not visually observe any such emergence, this is not seen as a constraint on this survey. Any recordings made would only have been used to verify the species of any bats observed roosting.
- 3.7.5. Tree 62 is situated to the west of Wood Lane, immediately adjacent to the carriageway. The tree could only be surveyed from within the field to the west.
- 3.7.6. The ecology of a site is subject to change, as mammals are highly mobile. An update survey is to be undertaken eighteen (18) months¹ prior to the first known development start date to update the information collected in this survey. This would allow time for the consideration of further amendments to the development phase or other matters related to planning as required.

¹ CIEEM (2019) *Advice note: On the Lifespan of Ecological Reports and Surveys*

4. Survey results

4.1. Desk study

- 4.1.1. To support PCF Stage 2 assessment, during which four (4) route options were under consideration, a Preliminary Ecological Appraisal (PEA) was undertaken in May 2016, comprising desk study and extended Phase 1 habitat survey.
- 4.1.2. The PEA desk study returned records of ten (10) species of bats together with sixteen (16) records of bats (species not identified) within 10km of the options corridor (Amey, 2017).
- 4.1.3. During the 2017 surveys all accessible land within the footprint of the scheme, plus a 50m buffer, was subject to the following field surveys at the times specified:

Table 4: Surveys undertaken

Survey type	Dates undertaken
Bat roost appraisal	January 2017
Bat emergence/re-entry surveys	May 2017 to September 2017
Bat activity transect surveys (including automated surveys)	Sept / Oct 2016. April to September 2017.



- 4.1.4. Field survey work undertaken in 2017 identified 241 trees/groups of trees with bat roost potential, 33 areas of woodland (amounting to 50.85ha in area) with roosting potential, nine buildings with confirmed bat roosts and four anecdotal bat roosts informed by local residents. As of October 2017, ten buildings had confirmed bat roosts including brown long eared bat *Plecotus auritus*, Natter's bat *Myotis nattereri* and pipistrelle *Pipistrellus* spp. roosts. Roosts had also been identified in 4 trees, with one containing a hibernaculum (winter hibernation roost).
- 4.1.5. Amey (2017) identified bat roosts at [REDACTED], Honingham and [REDACTED] Easton and tree 51 the first two of which were confirmed in the 2019 surveys. In addition, roosts were identified during 2019 surveys at [REDACTED]
- 4.1.6. At PCF stage 2 Amey (2017) identified roosts at [REDACTED]



[REDACTED] These were outside the study area for PCF stage 3 so were not included in the 2019 surveys.


4.2. Preliminary bat roost assessments Structures

4.2.1. Table 4-1 presents the full results of the preliminary bat roost potential assessments of the buildings and Table 4-2 categorises the results (**TR010038/APP/6.1**).

Table 5 Preliminary bat roost potential assessment results.

Building Name	General External Description	Internal Description	Potential Roosting Features	Building Photograph
<p>██████ – B1 guest house</p>	<p>A two-storey, brick-built residential building with pitched pan tile roof. The brickwork on the majority of the house is rendered with small areas of exposed brick close to ground level. Timber weather boarding is present on the northern and southern elevations of the upper storey.</p>	<p>No internal access was gained at the time of the survey. Therefore an internal assessment and survey for evidence of roosting bats could not be undertaken.</p>	<p>One bat box on each of the northern and southern elevations though both boxes appeared unused for some time. Gap in soffit behind bat box on southern elevation. Gap where two fascia boards meet on southern elevation.</p>	
<p>██████ – B2 garage workshop</p>	<p>Garage is a single storey structure constructed of brick and breeze blocks with a pan tile roof. A canopy of sheet metal roofing over a timber frame is present on the southern and western elevations, connecting the garage to the adjoining workshop. The workshop is constructed from breeze blocks with a corrugated sheet asbestos roof.</p>	<p>No internal access was gained to the garage at the time of the survey. Therefore an internal assessment and survey for evidence of roosting bats could not be undertaken. The interior of the workshop is bare breeze blocks and the roof is not lined enclosed. The floor is bare concrete and the space is dominated with woodworking machinery.</p>	<p>Gap above soffit box on south west corner of garage roof. Gap above garage door on northern elevation. Missing soffit on eastern elevation of garage providing access to interior space. Crack in breeze block at roof line on southern elevation of the workshop.</p>	

Building Name	General External Description	Internal Description	Potential Roosting Features	Building Photograph
<p>██████ – B3 main house</p>	<p>A two-storey, brick-built residential building with pitched pan tile roof. The brickwork on the original house is rendered. A modern two storey extension is present to the north.</p> <p>A modern single storey extension is present on the southern and western elevations.</p> <p>A hot tub and outdoor kitchen are present in the garden to the west, both of which have pitched pan tile roofs supported on wooden posts.</p>	<p>No internal access was gained at the time of the survey.</p> <p>Therefore an internal assessment and survey for evidence of roosting bats could not be undertaken.</p>	<p>Gaps under lead flashing on the eastern elevation.</p> <p>Potential access under roof tiles on all elevations (not fully visible from the ground).</p>	
<p>██████ – B4 stable block</p>	<p>A single storey structure constructed of breeze blocks with a pan tile roof.</p>	<p>Comprises 10 individual stalls for horses with an open roof space connecting the stalls.</p>	<p>Two gaps into soffit into eastern elevation of the northern wing of the stable block.</p>	

Building Name	General External Description	Internal Description	Potential Roosting Features	Building Photograph
<p>██████████ (farmhouse)</p>	<p>A two storey residential building. The building is an old farmhouse built from brick with plaster rendering with modern two storey exposed brick extensions on the southern and western elevations. The whole house is covered by pitched pan tile roof, with the older sections showing signs of deterioration.</p> <p>There is one small, single storey outbuilding immediately to the north west of the house. The smaller of the two outbuildings has a pitched, gable-ended roof covered with pan tiles.</p>	<p>No internal access was gained at the time of the survey.</p> <p>Therefore an internal assessment and survey for evidence of roosting bats could not be undertaken.</p>	<p>Gaps under tiles on eastern elevation.</p> <p>Gap under lead flashing at junction of two roofs on the eastern elevation.</p> <p>Possible gap between soffit box and wall on south west corner.</p> <p>Gaps under tiles on either side of dormer window on the eastern elevation.</p> <p>Gap under tile next to chimney on the northern elevation of modern extension.</p> <p>Lead flashing lifted around base of chimney on western elevation.</p>	



Building Name	General External Description	Internal Description	Potential Roosting Features	Building Photograph
<p>█ (garage/workshop)</p>	<p>A single storey brick built structure with pan tile roof, comprising a garage section in the west and workrooms in the east of the building. A small extension is present on the north elevation connected to the garage section of the building through an interior door.</p>	<p>No internal access was gained to the workrooms at the time of the survey. Therefore an internal assessment and survey for evidence of roosting bats could not be undertaken. Bat droppings and feeding remains (insect wings) were found throughout the garage portion of the building. The roof space is enclosed by a ceiling. A hole in the ceiling was found to have a concentration of bat droppings below it. An inspection within the roofspace, which extends the full length of the building, identified approximately 25 long-eared bats present.</p>	<p>Gaps under fascia board affording internal access of the building on northern elevation. Broken tiles on both elevations of the roof. Open garage door affording internal access of the building on southern elevation.</p>	
<p>█ holiday accommodation)</p>	<p>A two storey brick built converted barn with pan tile roof and two modern single storey extensions on the southern aspect.</p>	<p>No internal access was gained at the time of the survey. Therefore an internal assessment and survey for evidence of roosting bats could not be undertaken.</p>	<p>Broken roof tile on southern elevation. One slipped and one cracked roof tile on northern elevation.</p>	

Table 4-2 Bat Roost Potential categorisation of building assessed.

Building	Bat Roost Potential
██████████ (guest house)	High
██████████ (garage and workshop)	High
██████████ (main house)	High
██████████ (stable block)	High
██████████ (house)	High
██████████ (garage/workshop)	High
██████████ (holiday accommodation)	Moderate

4.2.2. Buildings assessed as having high bat roost potential require one dusk emergence survey, one dawn re-entry survey and a third survey which can be either dusk emergence survey or dawn re-entry survey. Buildings assessed as having moderate bat roost potential require one dawn re-entry survey and dusk emergence survey on separate days.

Trees

4.2.3. Table 4-3 below details the results of the preliminary ground level roost assessments undertaken on the trees on Easton Estates lane in September 2019 (TR010038/APP/6.1).

Table 4-3: Preliminary ground level roost assessment

Tree number, species and approximate grid reference	Potential roost features	Bat roost potential
Additional tree 1 Group of three elms TG10569 11943	Dense epicormic growth around bases and dense ivy <i>Hedera helix</i> . No visible cavities.	Low
Additional tree 2 Standing deadwood TG 10576 11949.	Potential feature on western aspect.	Low
Tree A/T77 Oak TG 10589 11958	Likely cavity within included bark on the southern aspect at approximately 11.5m high. This tree was subject to two roost surveys during 2019. No roosts were identified.	Moderate
Tree B Horse chestnut TG 10577 11962	Cavity on stub of dropped limb on the southern aspect at approximately 9.5m high.	Moderate
Tree C Oak TG 10603 12029	Small cavity on the south-facing aspect of a west-facing branch.	Moderate

Tree number, species and approximate grid reference	Potential roost features	Bat roost potential
Tree D/T78 Oak TG 10580 11978	Upward-facing vertical cavity on the main stem at approximately 12m high. This tree was subject to three roost surveys during 2019. A common pipistrelle roost was identified during one of these surveys.	High
Tree E Oak TG 10604 12061	West-facing cavity approximately 2m high on right-most trunk viewing from the lane. North-west-facing cavity approximately 5m high on middle trunk viewing from lane. A third north-west-facing cavity was identified on the middle trunk approximately 2m high during surveys undertaken in 2020.	High
Additional tree 6 Standing deadwood TG 10582 11993	A circular cavity on the south-facing side of a limb approximately 5m high and 3m out from the main stem.	Low
Additional tree 8 Oak TG 10606 12130	Circular cavity on west-facing branch overhanging the track, approximately 8m high and 4m out from the main trunk.	Low
Tree F Oak TG 10591 12034	A roost was incidentally observed whilst Tree C was being surveyed. Two bats were seen emerging.	High
Tree G Maple sp. TG 10593 12049	A roost was incidentally observed whilst Tree C was being surveyed. One bat was seen emerging. A cavity beneath where branch splits into two on north-facing aspect.	High

4.2.4. Trees assessed as high potential require three surveys, one dusk survey, one dawn survey and a third survey as either a dusk or dawn. Trees assessed as moderate potential require one dusk survey and one dawn survey on separate nights. Trees assessed as low potential do not require further survey (Collins, 2016) however, should they be felled, require sensitive felling techniques.

Weather conditions during surveys

4.2.5. The weather conditions recorded during each emergence/re-entry survey are summarised in Table 4-3 (**TR010038/APP/6.1**). Ideal weather conditions are for temperatures above 10 degrees, no more than light rain and low-moderate breeze. In harsher conditions than these bat activity is severely reduced or absent and there can be less confidence in a negative result.

Table 4-3 Weather conditions recorded during surveys.

Date and Time	Sunset/sunrise time	Weather conditions	Surveyors
25/06/19	21:23	Rain: none	Adam West

Date and Time	Sunset/sunrise time	Weather conditions	Surveyors
21:03-22:55		Cloud cover: 100% Wind (Beaufort): 2 Temperature: 16°C	Beth Mell Harry Jarvis Charlotte Ward
30/07/19 20:37-22:22	20:52	Rain: none Cloud cover: 100% Wind (Beaufort): 2 Temperature: 20°C	Adam West Beth Mell Ishbel Campbell Diane Wood
31/07/19 03:43-05:13	05:13	Rain: none Cloud cover: 100% Wind (Beaufort): 3 Temperature: 18°C	Adam West Beth Mell Ishbel Campbell Diane Wood
01/08/19 03:43-05:13	05:13	Rain: none Cloud cover: 100% Wind (Beaufort): 1 Temperature: 17°C	Adam West Beth Mell Ishbel Campbell Diane Wood
01/08/19 20:40-22:18	20:48	Rain: none Cloud cover: 90% Wind (Beaufort): 1 Temperature: 19°C	Adam West Beth Mell Ishbel Campbell Diane Wood
13/08/19 20:10-21:55	20:25	Rain: none Cloud cover: <5% Wind (Beaufort): 1 Temperature: 19°C	Adam West Beth Mell Ishbel Campbell Harry Jarvis
14/08/19 03:57-05:35	05:35	Rain: none Cloud cover: 100% Wind (Beaufort): 0 Temperature: 9°C	Adam West Beth Mell Ishbel Campbell Harry Jarvis
14/08/19 20:08-21:53	20:23	Rain: none Cloud cover: 100% Wind (Beaufort): 1 Temperature: 16°C	Adam West Beth Mell Ishbel Campbell Harry Jarvis
15/08/19 04:06-05:36	05:36	Rain: none Cloud cover: 0% Wind (Beaufort): 1 Temperature: 15°C	Adam West Beth Mell Ishbel Campbell Harry Jarvis
15/08/19 20:04-21:51	20:21	Rain: none Cloud cover: 40% Wind (Beaufort): 2 Temperature: 17°C	Adam West RSK (3 people)
16/08/19 04:08-05:38	05:38	Rain: none Cloud cover: 100% Wind (Beaufort): 0 Temperature: 11°C	Adam West Beth Mell Ishbel Campbell Harry Jarvis
19/08/19 19:58-21:43	20:13	Rain: none Cloud cover: 100% Wind (Beaufort): 1 Temperature: 18°C	Ishbel Campbell Harry Jarvis

Date and Time	Sunset/sunrise time	Weather conditions	Surveyors
20/08/19 04:20-05:45	05:45	Rain: none Cloud cover: 0% Wind (Beaufort): 0 Temperature: 10°C	Ishbel Campbell Harry Jarvis
20/08/19 19:56-21:41	20:11	Rain: none Cloud cover: 30% Wind (Beaufort): 0 Temperature: 17°C	Ishbel Campbell Harry Jarvis
21/08/19 04:16-05:46	05:46	Rain: none Cloud cover: 100% Wind (Beaufort): 0 Temperature: 12°C	Ishbel Campbell Harry Jarvis
21/08/19 19:54-21:39	20:09	Rain: none Cloud cover: 100% Wind (Beaufort): 0 Temperature: 11°C	Ishbel Campbell Harry Jarvis
22/08/19 19:51-21:36	20:06	Rain: none Cloud cover: 20% Wind (Beaufort): 0 Temperature: 22°C	Ishbel Campbell Harry Jarvis
23/08/19 04:20-05:50	05:50	Rain: none Cloud cover: 0% Wind (Beaufort): 0 Temperature: 14°C	Ishbel Campbell Harry Jarvis
28/08/19 04:41-05:58	05:58	Rain: none Cloud cover: 100% Wind (Beaufort): 1 Temperature: 18°C	Adam West Beth Mell Ishbel Campbell Charlotte Ward
28/08/19 19:34-21:23	19:53	Rain: none Cloud cover: 100% Wind (Beaufort): 1 Temperature: 23°C	Adam West Beth Mell Ishbel Campbell Charlotte Ward
29/08/19 04:30-06:00	06:00	Rain: Light rain Cloud cover: 100% Wind (Beaufort): 1 Temperature: 13°C	Adam West Beth Mell Ishbel Campbell Charlotte Ward
29/08/19 19:28-21:21	19:51	Rain: none Cloud cover: 10% Wind (Beaufort): 0 Temperature: 21°C	Adam West Beth Mell Ishbel Campbell Charlotte Ward
30/08/19 04:30-06:01	06:01	Rain: none Cloud cover: 70% Wind (Beaufort): 0 Temperature: 15°C	Adam West Beth Mell Ishbel Campbell Charlotte Ward
03/09/19 04:38-06:08	06:08	Rain: none Cloud cover: 0%	Adam West Beth Mell

Date and Time	Sunset/sunrise time	Weather conditions	Surveyors
		Wind (Beaufort): 1 Temperature: 14°C	Ishbel Campbell Charlotte Ward
03/09/19 19:24-21:09	19:39	Rain: none Cloud cover: 90% Wind (Beaufort): 1 Temperature: 20°C	Adam West Beth Mell Ishbel Campbell Charlotte Ward
04/09/19 19:22-21:07	19:37	Rain: none Cloud cover: 100% Wind (Beaufort): 2 Temperature: 17°C	Adam West Beth Mell Ishbel Campbell Charlotte Ward
09/09/19 19:11-20:56	19:26	Rain: none Cloud cover: 100% Wind (Beaufort): 1 Temperature: 13°C	Beth Mell Ishbel Campbell
10/09/19 04:55-06:20	06:20	Rain: none Cloud cover: 100% Wind (Beaufort): 1 Temperature: 12°C	Beth Mell Ishbel Campbell
10/09/19 19:12-20:53	19:23	Rain: none Cloud cover: 60% Wind (Beaufort): 0 Temperature: 20°C	Beth Mell Ishbel Campbell
11/09/19 04:57-06:22	06:22	Rain: none Cloud cover: 100% Wind (Beaufort): 2 Temperature: 13°C	Beth Mell Ishbel Campbell
11/09/19 19:03-20:51	19:21	Rain: none Cloud cover: 5% Wind (Beaufort): 1 Temperature: 20°C	Beth Mell Ishbel Campbell
12/09/19 04:57-06:24	06:24	Rain: none Cloud cover: 0% Wind (Beaufort): 0 Temperature: 13°C	Beth Mell Ishbel Campbell
01/10/19 05:25-06:55	06:55	Rain: none Cloud cover: 100% Wind (Beaufort): 1 Temperature: 14°C	Adam West Harry Jarvis
8/6/2020 21:08/11 = 22:47	21:17	Rain: none Cloud cover: 100 Wind (Beaufort): 0/1 Temperature: 9°C	Beth Mell Ishbel Campbell Lydia Waite
9/6/2020 3:02/08 – 4:32	4:32	Rain: none Cloud cover: 40% Wind (Beaufort): 0 Temperature: 7°C	Beth Mell Ishbel Campbell Lydia Waite

Date and Time	Sunset/sunrise time	Weather conditions	Surveyors
9/6/2020 20:59/21:03 – 22:48	21:18	Rain: none Cloud cover: 5% Wind (Beaufort): 0 Temperature: 12°C	Beth Mell Lydia Waite
10/6/2020 20:55/21:02 – 22:47	21:17	Rain: none Cloud cover: 100% Wind (Beaufort): 0 Temperature: 12°C	Ishbel Campbell Lydia Waite
22/6/2020 21:09 – 22:24	21:24	Rain: none Cloud cover: 0% Wind (Beaufort) – 0/1 Temperature: 18/17	Beth Mell Lydia Waite
23/6/2020 3:02 – 4:32	4:32	Rain: none Cloud cover: 0 Wind (Beaufort): 0 Temperature: 14°C	Beth Mell Lydia Waite
30/6/2020 21:08 – 22:53	21:23	Rain: none Cloud cover: 100% Wind (Beaufort): 0 Temperature: 17°C	Beth Mell Lydia Waite

4.2 Field survey results

28/8/19 Internal roost inspection [REDACTED] garage

4.2.6. Approximately twenty-five (25) bats were identified in the loft above the garage. Brown long-eared bat was the only species present. No bats appeared to be in torpor and at any one time there was approximately five (5) bats in flight within the loft. A large quantity of droppings was present in the section of the loft above the garage, showing this space has been used as a roost for a number of years. Access to the loft space above the workshop portion of the building was available to the bats, via an opening in the brick partition between the two sections of the loft, but no bats or droppings were identified here. Feeding remains (butterfly wings) were identified within the roost. One (1) access point was found: a hole in the ceiling adjacent to the interior of the southern wall of the garage.


Incidental findings

4.2.7. During the dawn survey undertaken on 23 June 2020 on tree [REDACTED] on Easton Estates at 3:23 a barn owl *Tyto alba* was observed roosting in a tree before flying eastwards. Barn owl is protected under Schedule 1 of the WCA 1981 (as amended).


-
- 4.2.8. During the same survey undertaken on 23 June 2020 a brown hare *Lepus europaeus* was observed on the Easton Estates lane. Brown hare are listed as a priority species for conservation on Section 41 of the NERC Act 2006.

Table 4-3. Detailed emergence/re-entry survey results (buildings)

Date and Time	Sunset/sunrise time	Survey 1	Survey 2	Survey 3
[REDACTED]	Location A	25/6/19 (DUSK) The first bat was noted at 21:14, nine (9) minutes before sunset. A total of thirty (30) bat passes were recorded, with the final bat detected at 22:52. Commuting, foraging and roosting behaviour was observed. Three (3) species were identified in this survey: brown long-eared bat, soprano pipistrelle and common pipistrelle. Three (3) bats of the genus <i>Pipistrellus</i> were also recorded but could not be identified to species level	31/7/19 (DUSK) The first bat was noted at 20:40, ten (10) minutes before sunset. A total of twenty-three (23) bat passes were recorded, with the final bat detected at 22:12. Commuting and foraging behaviour was observed. Three (3) species were identified in this survey: noctule, soprano pipistrelle and common pipistrelle.	14/08/19 (DAWN) The last bat was noted at 05:15, twenty (20) minutes before sunrise. A total of ten (10) bat passes were recorded. Commuting behaviour only was observed. One (1) species was identified in this survey: soprano pipistrelle
	Location B	25/6/19 (DUSK) The first bat was noted at 21:13, ten (10) minutes before sunset. A total of thirty-three (33) bat passes were recorded, with the final bat detected at 22:54. Commuting and foraging behaviour was observed. Two (2) species were identified in this survey: soprano and common pipistrelle. One (1) bat of the genus <i>Pipistrellus</i> was also recorded but could not be identified to species level	31/7/19 (DUSK) The first bat was noted at 20:39, eleven (11) minutes before sunset. A total of fourteen (14) bat passes were recorded, with the final bat detected at 22:11. Commuting, foraging and roosting behaviour was observed. Five (5) species were identified in this survey: noctule, Leisler's bat, brown long-eared bat, soprano pipistrelle and common pipistrelle	14/08/19 (DAWN) The last bat was noted at 05:15, twenty (20) minutes before sunrise. A total of nineteen (19) bat passes were recorded. Commuting behaviour only was observed. Two (1) species were identified in this survey: soprano pipistrelle and common pipistrelle.
	Location C	25/6/19 (DUSK) The first bat was noted at 21:29, six (6) minutes after sunset. A total of twenty-three (23) bat passes were recorded, with the final bat detected at	31/7/19 (DUSK) The first bat was noted at 20:46, four (4) minutes before sunset. A total of thirty-two (32) bat passes were recorded, with the final bat detected at 22:20. Commuting and foraging behaviour was observed.	14/08/19 (DAWN) The last bat was noted at 05:01, thirty-four (34) minutes before sunrise. A total of six (6) bat passes were recorded. Commuting and foraging behaviour was

Date and Time	Sunset/sunrise time	Survey 1	Survey 2	Survey 3
		<p>22:51. Commuting and foraging behaviour was observed. Four (4) species were identified in this survey: noctule, brown long-eared bat, soprano pipistrelle and common pipistrelle. Five (5) bats of the genus Pipistrellus were also recorded but could not be identified to species level</p>	<p>Three (3) species were identified in this survey: noctule, soprano pipistrelle and common pipistrelle. One (1) bat of the genus Pipistrellus was also recorded but could not be identified to species level</p>	<p>observed. Two (1) species were identified in this survey: soprano pipistrelle and common pipistrelle. One (1) bat of the genus Myotis was also recorded but could not be identified to species level</p>
	Location D	<p>25/6/19 (DUSK) The first bat was noted at 21:57, thirty-four (34) minutes after sunset. A total of twelve (12) bat passes were recorded, with the final bat detected at 22:52. Commuting and foraging behaviour was observed. Three (3) species were identified in this survey: brown long-eared bat, soprano pipistrelle and common pipistrelle.</p>	<p>31/7/19 (DUSK) The first bat was noted at 20:47, four (4) minutes before sunset. A total of nineteen (19) bat passes were recorded, with the final bat detected at 22:19. Commuting and foraging behaviour was observed. Three (3) species were identified in this survey: noctule, soprano pipistrelle and common pipistrelle. One (1) bat of the genus Myotis was also recorded but could not be identified to species level.</p>	<p>14/08/19 (DAWN) The last bat was noted at 05:01, thirty-four (34) minutes before sunrise. A total of eleven (11) bat passes were recorded. Commuting behaviour only was observed. Two (1) species were identified in this survey: soprano pipistrelle and common pipistrelle.</p>
	Location A	<p>1/08/19 (DUSK) The first bat was noted at 21:10, twenty-two (22) minutes after sunset. A total of thirty-one (31) bat passes were recorded, with the final bat detected at 22:18. Commuting, foraging and roosting behaviour was observed. Four (4) species were identified in this survey: brown long-eared bat, noctule, soprano pipistrelle and common pipistrelle</p>	<p>16/08/19 (DAWN) The last bat was noted at 05:20, eighteen (18) minutes before sunrise. A total of forty-two (42) bat passes were recorded. Commuting and roosting behaviour was observed. Two (1) species were identified in this survey: soprano pipistrelle and brown long-eared bat</p>	<p>21/08/19 (DUSK) The first bat was noted at 20:25, sixteen (16) minutes after sunset. A total of eleven (11) bat passes were recorded, with the final bat detected at 21:36. Commuting and foraging behaviour was observed. Four (4) species were identified in this survey: brown long-eared bat, noctule, soprano pipistrelle and common pipistrelle</p>
	Location B	<p>1/08/19 (DUSK) The first bat was noted at 21:04, sixteen (16)</p>	<p>16/08/19 (DAWN) The last bat was noted at 05:28, twenty-six (26) minutes before</p>	<p>23/08/19 (DAWN) The last bat was noted at 05:47, three (3)</p>

Date and Time	Sunset/sunrise time	Survey 1	Survey 2	Survey 3
		<p>minutes after sunset. A total of thirty-three (33) bat passes were recorded, with the final bat detected at 22:18. Commuting, foraging and roosting behaviour was observed. Four (4) species were identified in this survey: brown long-eared bat, noctule, soprano pipistrelle and common pipistrelle</p>	<p>sunrise. A total of eleven (11) bat passes were recorded. Commuting and foraging behaviour was observed. Four (4) species were identified in this survey: brown long-eared bat, noctule, soprano pipistrelle and common pipistrelle</p>	<p>minutes before sunrise. A total of twenty-four (24) bat passes were recorded. Commuting, foraging and roosting behaviour was observed. Four (4) species were identified in this survey: brown long-eared bat, noctule, soprano pipistrelle and common pipistrelle.</p>
	Location C	<p>1/08/19 (DUSK) The first bat was noted at 20:52, three (3) minutes after sunset. A total of twenty-seven (27) bat passes were recorded, with the final bat detected at 22:17. Commuting, foraging and roosting behaviour was observed. Four (4) species were identified in this survey: brown long-eared bat, noctule, soprano pipistrelle and common pipistrelle.</p>	<p>16/08/19 (DAWN) The last bat was noted at 05:19, seventeen (17) minutes before sunrise. A total of twenty-seven (27) bat passes were recorded. Commuting and roosting behaviour was observed. Five (5) species were identified in this survey: barbastelle, noctule, brown long-eared bat, soprano pipistrelle and common pipistrelle.</p>	<p>21/08/19 (DUSK) The first bat was noted at 20:18, nine (9) minutes after sunset. A total of thirty-eight (38) bat passes were recorded, with the final bat detected at 21:35. Commuting and foraging behaviour was observed. Four (4) species were identified in this survey: brown long-eared bat, noctule, soprano pipistrelle and common pipistrelle.</p>
	Location D	<p>1/08/19 (DUSK) The first bat was noted at 20:57, eight (8) minutes after sunset. A total of twenty-seven (27) bat passes were recorded, with the final bat detected at 22:17. Commuting and foraging behaviour was observed. Five (5) species were identified in this survey: Leisler's bat, brown long-eared bat, noctule, soprano pipistrelle and common pipistrelle.</p>	<p>16/08/19 (DAWN) The last bat was noted at 05:20, eighteen (18) minutes before sunrise. A total of twenty-two (22) bat passes were recorded. Commuting and foraging behaviour was observed. One (1) species were identified in this survey: brown long-eared bat. The bat detector in use at this location ceased recording shortly after the survey began, with the last recording being made at 04:18. Any bats observed by the surveyor after this time cannot be verified (see section 3.4) (Dusk emergence and dawn re-entry surveys) (TR010038/APP/6.1).</p>	<p>23/08/19 (DAWN) The last bat was noted at 05:35, fifteen (15) minutes before sunrise. A total of twenty-two (22) bat passes were recorded. Commuting and foraging behaviour was observed. Four (4) species were identified in this survey: brown long-eared bat, noctule, soprano pipistrelle and common pipistrelle.</p>

Date and Time	Sunset/sunrise time	Survey 1	Survey 2	Survey 3
	Location A	14/08/19 (DUSK) The first bat was noted at 20:19, four (4) minutes before sunset. A total of twenty (20) bat passes were recorded, with the final bat detected at 21:37. Commuting, foraging and roosting behaviour was observed. Four (4) species were identified in this survey: barbastelle, noctule, soprano pipistrelle and common pipistrelle.	20/8/19 (DAWN) The only recorded bat was noted at 04:56, forty-nine (49) minutes before sunrise. A total of one (1) bat pass was recorded. Commuting behaviour only was observed. One (1) species was identified in this survey: soprano pipistrelle.	30/08/19 (DAWN) The last bat was noted at 05:38, twenty-three (23) minutes before sunrise. A total of twenty (20) bat passes were recorded. Commuting and foraging behaviour was observed. Four (4) species were identified in this survey: barbastelle, brown long-eared bat, soprano pipistrelle and common pipistrelle.
	Location B	14/08/19 (DUSK) The first bat was noted at 20:19, four (4) minutes before sunset. A total of fourteen (14) bat passes were recorded, with the final bat detected at 21:41. Commuting and roosting behaviour was observed. Four (4) species were identified in this survey: brown long-eared bat, noctule, soprano pipistrelle and common pipistrelle. One (1) bat of the genus Myotis was also recorded but could not be identified to species level	19/08/19 (DUSK) The first bat was noted at 20:14, one (1) minute after sunset. A total of eighteen (18) bat passes were recorded, with the final bat detected at 21:38. Commuting and foraging behaviour was observed. Four (4) species were identified in this survey: brown long-eared bat, noctule, soprano pipistrelle and common pipistrelle.	30/08/19 (DAWN) The last bat was noted at 05:35, twenty-six (26) minutes before sunrise. A total of seventeen (17) bat passes were recorded. Commuting behaviour only was observed. Three (3) species were identified in this survey: brown long-eared bat, soprano pipistrelle and common pipistrelle.
	Location C	14/08/19 (DUSK) The first bat was noted at 20:29, six (6) minutes after sunset. A total of thirteen (13) bat passes were recorded, with the final bat detected at 21:10. Commuting and foraging behaviour was observed. Three (3) species were identified in this survey:	19/08/19 (DUSK) The first bat was noted at 20:20, seven (7) minutes after sunset. A total of forty-three (43) bat passes were recorded, with the final bat detected at 21:43. Commuting, foraging and roosting behaviour was observed. Four (4) species were identified in this survey: brown long-eared bat, noctule, soprano pipistrelle and common pipistrelle. One (1) bat	30/08/19 (DAWN) The last bat was noted at 05:48, thirteen (13) minutes before sunrise. A total of seventeen (17) bat passes were recorded. Commuting, foraging and roosting behaviour was observed. Four (4) species were identified in this survey: barbastelle, brown long-

Date and Time	Sunset/sunrise time	Survey 1	Survey 2	Survey 3
		noctule, soprano pipistrelle and common pipistrelle.	of the genus Myotis was also recorded but could not be identified to species level.	eared bat, soprano pipistrelle and common pipistrelle
	Location D	14/08/19 (DUSK) The first bat was noted at 20:25, two (2) minutes after sunset. A total of twenty-six (26) bat passes were recorded, with the final bat detected at 21:39. Commuting and foraging behaviour was observed. Four (4) species were identified in this survey: barbastelle, noctule, soprano pipistrelle and common pipistrelle. One (1) bat of the genus Myotis was also recorded but could not be identified to species level.	20/08/19 (DAWN) The last bat was noted at 04:56, forty-nine (49) minutes before sunrise. A total of two (2) bat passes were recorded. Commuting behaviour only was observed. Two (2) species were identified in this survey: brown long-eared bat and soprano pipistrelle.	30/08/19 (DAWN) The last bat was noted at 05:40, twenty-one (21) minutes before sunrise. A total of twenty-four (24) bat passes were recorded. Commuting and foraging behaviour was observed. Four (4) species were identified in this survey: barbastelle, brown long-eared bat, soprano pipistrelle and common pipistrelle.
Building 1	Surveyor 1	15/08/19 (DAWN) The last bat was noted at 05:21, fifteen (15) minutes before sunrise. A total of three (3) bat passes were recorded. Commuting and foraging behaviour was observed. Two (1) species were identified in this survey: soprano pipistrelle and common pipistrelle.	N/A	N/A
	Surveyor 2	15/08/19 (DAWN) The last bat was noted at 05:21, fifteen (15) minutes before sunrise. A total of two (2) bat passes were recorded. Commuting behaviour only was observed. Two (1) species were identified in this survey: soprano pipistrelle and common pipistrelle.	N/A	N/A

Date and Time	Sunset/sunrise time	Survey 1	Survey 2	Survey 3
	Surveyor 3	15/08/19 (DAWN) The last bat was noted at 05:21, fifteen (15) minutes before sunrise. A total of seven (7) bat passes were recorded. Commuting behaviour only was observed. Two (1) species were identified in this survey: soprano pipistrelle and common pipistrelle.	N/A	N/A
[REDACTED] – Building 2	Surveyor 1	15/08/19 (DAWN) The last bat was noted at 05:23, twelve (12) minutes before sunrise. A total of six (3) bat passes were recorded. Commuting, foraging and roosting behaviour was observed. Two (2) species were identified in this survey: soprano pipistrelle and common pipistrelle.	10/09/19 (DAWN) No bats were recorded during this survey.	N/A
	Surveyor 2	15/08/19 (DAWN) The first bat was noted at 20:39, eighteen (18) minutes after sunset. A total of twenty (20) bat passes were recorded, with the final bat detected at 21:47. Commuting behaviour only was observed. Two (2) species were identified in this survey: soprano pipistrelle and common pipistrelle. One (1) bat of the genus Myotis was also recorded but could not be identified to species level.	10/09/19 (DAWN) No bats were recorded during this survey.	N/A
[REDACTED] – Building	Location A	(RSK)	03/09/19 (DUSK) The first bat was noted at 20:08, fifty (50) minutes after sunset. A total of eleven (11) bat passes were	N/A

Date and Time	Sunset/sunrise time	Survey 1	Survey 2	Survey 3
3			recorded, with the final bat detected at 20:55. Commuting and foraging behaviour was observed. Two (2) species were identified in this survey: soprano pipistrelle and common pipistrelle.	
	Location B	(RSK)	03/09/19 (DUSK) The first bat was noted at 19:38, two (2) minutes after sunset. A total of six (6) bat passes were recorded, with the final bat detected at 20:57. Commuting and foraging behaviour was observed. One (1) species were identified in this survey: common pipistrelle.	N/A
	Location C	(RSK)	03/09/19 (DUSK) The first bat was noted at 19:50, eleven (11) minutes after sunset. A total of fifteen (15) bat passes were recorded, with the final bat detected at 20:59. Commuting and foraging behaviour was observed. One (1) species was identified in this survey: common pipistrelle. One (1) bat was observed in flight, but the species cannot be determined as the bat detector did not detect any calls from this bat.	N/A
	Location D	(RSK)	03/09/19 (DUSK) The first bat was noted at 19:38, two (2) minutes after sunset. A total of nineteen (19) bat passes were recorded, with the final bat detected at 21:08. Commuting and foraging behaviour was observed. Two (2) species were identified in this survey: soprano pipistrelle and common pipistrelle. One (1) bat of the genus Pipistrellus was also recorded but could not be identified to species level as only social calls were detected.	N/A

Date and Time	Sunset/sunrise time	Survey 1	Survey 2	Survey 3
<p>█ – Building 4</p>	Surveyor 1	<p>20/08/19 (DUSK) The first bat was noted at 20:38, twenty-seven (27) minutes after sunset. A total of eight (8) bat passes were recorded, with the final bat detected at 21:39. Commuting, foraging and roosting behaviour was observed. Two (2) species were identified in this survey: soprano pipistrelle and common pipistrelle. One (1) bat of the genus Pipistrellus was also recorded but could not be identified to species level as only social calls were detected.</p>	<p>21/08/19 (DAWN) The only recorded bat was noted at 04:48, fifty-eight (58) minutes before sunrise. A total of one (1) bat pass was recorded. Commuting behaviour only was observed. One (1) species was identified in this survey: common pipistrelle.</p>	<p>28/08/19 (DUSK) The first bat was noted at 20:04, eleven (11) minutes after sunset. A total of eleven (11) bat passes were recorded, with the final bat detected at 21:18. Commuting and foraging behaviour was observed. Four (4) species were identified in this survey: brown long-eared bat, noctule, soprano pipistrelle and common pipistrelle. One (1) bat of the genus Myotis was also recorded but could not be identified to species level.</p>
	Surveyor 2	<p>20/08/19 (DUSK) The first bat was noted at 20:17, six (27) minutes after sunset. A total of eleven (11) bat passes were recorded, with the final bat detected at 21:35. Commuting and foraging behaviour was observed. One (1) species was identified in this survey: common pipistrelle. One (1) bat of the genus Pipistrellus was also recorded but could not be identified to species level as only social calls were detected.</p>	<p>21/08/19 (DAWN) No bats were recorded during this survey.</p>	<p>28/08/19 (DUSK) The first bat was noted at 20:14, twenty-one (21) minutes after sunset. A total of twenty-one (21) bat passes were recorded, with the final bat detected at 21:22. Commuting and foraging behaviour was observed. Four (4) species were identified in this survey: brown long-eared bat, noctule, soprano pipistrelle and common pipistrelle.</p>
	Surveyor 3	RSK	RSK	<p>28/08/19 (DUSK) The first bat was noted at 20:14, twenty-one (21) minutes after sunset. A total of sixteen (16) bat passes were recorded, with the final bat detected at 21:17. Commuting and</p>

Date and Time	Sunset/sunrise time	Survey 1	Survey 2	Survey 3
				foraging behaviour was observed. Five (5) species were identified in this survey: barbastelle, brown long-eared bat, noctule, soprano pipistrelle and common pipistrelle.
	Surveyor 4	RSK	RSK	28/08/19 (DUSK) The first bat was noted at 20:09, fourteen (14) minutes after sunset. A total of twenty-four (24) bat passes were recorded, with the final bat detected at 21:22. Commuting and foraging behaviour was observed. Four (4) species were identified in this survey: brown long-eared bat, noctule, soprano pipistrelle and common pipistrelle. One (1) bat of the genus Myotis was also recorded but could not be identified to species level.

Table 4-4 Detailed emergence/re-entry survey results (trees)

Tree reference	Surveyor position	Survey 1	Survey 2	Survey 3
Tree A/77	Surveyor 1	08/06/20 (DUSK) The first bat, a common pipistrelle, was noted foraging by the surveyor at 21:17 (sunset). A total of 29 bat detections were recorded by the surveyor during the survey and three species were identified: common and soprano pipistrelle, and the rarer barbastelle, the latter of which was detected four times. A high amount of pipistrelle foraging behaviour was recorded throughout the survey. Activity was recorded throughout the entire survey with the last bat detected at 22:46 within one minute of the end of the survey. Roosting behaviour was recorded. when at 21:32, 15 minutes after sunset, a common pipistrelle emerged from the tree canopy. This roost has been characterised as a day roost.		
Tree B*	Surveyor 1	09/06/20 (DAWN) No roosting behaviour was recorded during the survey. The last bat, a common pipistrelle was recorded at 4:02 30 minutes before sunrise. In total six bat passes were recorded by the surveyor,	22/06/20 (DUSK) No roosting behaviour was confirmed during the survey, however potential common pipistrelle roosting behaviour was recorded. At 21:22, two minutes before sunset, a common pipistrelle was detected (the first bat) and seen flying behind the	

Tree reference	Surveyor position	Survey 1	Survey 2	Survey 3
		<p>all of which were common pipistrelle. One instance of a feeding buzz was detected.</p>	<p>limb with the PRF and appeared to fly into the tree. It cannot be confirmed whether this bat may have re-entered a roost or whether the bat merely seemed to fly into the tree from the surveyor's vantage point. It is certain that the bat did not enter the one PRF identified within the preliminary ground level assessment (see Table 4-3) (TR010038/APP/6.1). As such this is considered a potential common pipistrelle roost*.</p> <p>Almost constant pipistrelle commuting and foraging activity, with at least one pass most minutes, was recorded throughout the majority of the survey with a marked decrease in activity from 22:35 onwards. The majority of the calls detected were attributable to common and soprano pipistrelle, with one barbastelle call, one noctule call and one unidentified call also detected.</p>	
Tree C	Surveyor 1	<p>09/06/20 (DAWN) No roosting behaviour was observed during the survey. One bat, a common pipistrelle, was recorded at 3:50 42 minutes before sunrise.</p>	<p>10/06/20 (DUSK) Roosting behaviour was observed by surveyor one during the survey. At 21:27, 10 minutes after sunset, a pipistrelle species emerged from Tree C and flew north up the Easton Estates lane. No call has been automatically recorded for this emergence and as such the identification was made by the surveyor. This roost is characterised as a day roost.</p> <p>In addition the surveyor made observations of bat emergence behaviour at trees F and G as noted below.</p>	<p>22/06/20 (DUSK) Potential roosting behaviour was recorded; at 21:33, 24 minutes after sunset, a common pipistrelle potentially emerged from an east-facing branch on the tree.</p> <p>The surveyor notes a high level of common pipistrelle activity above the tree canopy and along the lane itself. Seven bat passes were recorded by the surveyor identifying common and soprano pipistrelle, noctule and a potential barbastelle pass. Analysis</p>

Tree reference	Surveyor position	Survey 1	Survey 2	Survey 3
	Surveyor 2	09/06/20 (DAWN) No roosting behaviour was observed by surveyor two during the survey. Common pipistrelle was detected and recorded seven times, the latest of which was 30 minutes before sunrise at 4:02. No other species were identified.	<p>In total 21 bat passes were recorded by the surveyor identifying common and soprano pipistrelle and noctule.</p> <p>10/06/20 (DUSK) Potential roosting behaviour was observed by surveyor two during the survey. The following instances of potential roosting behaviour in tree C were recorded:</p> <ul style="list-style-type: none"> • At 21:36 a common pipistrelle potentially emerged from the top of tree C. • At 21:53 a common pipistrelle potentially emerged, travelling in a south-west direction. • At 22:28 a common pipistrelle potentially emerged from an east-facing branch. <p>4.1.122.4.1.21. Common and soprano pipistrelle were identified during the survey in addition to one barbastelle pass, one big bat species (NSL) pass and one unidentified bat pass. Surveyor two recorded a significant amount of pipistrelle activity between 21:29 and 22:11, with many bats travelling along the lane corridor at approximately 5m height. A marked decrease in activity after 22:11 was noted however pipistrelles were still present.</p>	further revealed a Myotis sp. pass and one unidentified bat pass.
Tree D/78*	Surveyor 1	08/06/20 (DUSK) No confirmed roosting behaviour was observed by surveyor one during the survey. Surveyor one did note that there was some doubt as to whether bat/s had emerged from the tree at 21:28, 17		

Tree reference	Surveyor position	Survey 1	Survey 2	Survey 3
		<p>minutes after sunset, as bats were seen foraging around the canopy of the tree. Between 21:30 and 21:33 two common pipistrelles were recorded foraging around and between the canopy of the tree, however as no bats were seen to clearly emerge from the tree or a specific feature this survey cannot confirm a roost however tree D/T78 is considered a potential common pipistrelle roost*. A high level of common and soprano pipistrelle (almost constant passes) was recorded throughout the survey. Barbastelle were also recorded five times by the surveyor and analysis revealed one further barbastelle pass during the survey.</p>		
	Surveyor 2	<p>08/06/20 (DUSK) No roosting behaviour was recorded by surveyor two. As with surveyor one a high level of common and soprano pipistrelle activity was recorded in addition to one barbastelle pass.</p>		
Tree E	Surveyor 1	<p>09/06/20 (DUSK) Potential roosting activity was recorded however not confirmed. At 21:11 surveyor one recorded a common pipistrelle potentially</p>	<p>23/06/20 (DAWN) Potential roosting behaviour was recorded during the survey. At 3:53, 39 minutes before sunrise, a soprano pipistrelle flew from the south and appeared to fly into the tree. However, as the bat was not seen</p>	<p>30/06/20 (DUSK) The surveyor recorded five potential emergences from tree E during this survey; at approximately 21:53 a common pipistrelle, at 22:18 a common pipistrelle and at 22:18 and 22:42 Myotis sp. These bats were</p>

Tree reference	Surveyor position	Survey 1	Survey 2	Survey 3
		<p>emerging from the south-west aspect of the tree.</p> <p>Common and soprano pipistrelle activity was recorded throughout the survey with social calls often detected in addition to a barbastelle pass and a big bat species (NSL) pass.</p>	<p>to definitely enter any of the three identified PRFs, this re-entry cannot be confirmed and is considered as a potential re-entry only. No other confirmed or potential roosting behaviour was recorded.</p> <p>Species identified during the survey include common and soprano pipistrelle, noctule, barbastelle, one pass of a big bat species (NSL) and one potential brown long-eared pass.</p>	<p>observed flying away from the tree north up the Easton Estates Lane. At 21:51 a soprano pipistrelle potentially emerged and flew south. However, as none of these potential emergences were seen to definitely come from a PRF on the tree they cannot be confirmed as emergences.</p> <p>A high amount of pipistrelle activity was recorded throughout the survey. Common and soprano pipistrelle, barbastelle, serotine and a minimum of one Myotis sp. were identified. The serotine echolocation call recorded was one which might suggest it had emerged from a roost (Russ, 2012), however the surveyor observed the bat flying northwards up the lane only and did not witness an emergence.</p> <p>At the start of the survey the surveyor noted a cobweb over the 2m high west-facing cavity on the right trunk from the lane view, the cavity out of which six bats had emerged and one bat had potentially emerged during the dusk survey undertaken on 9 June 2020 (see Section 4.1.118) (Survey results) (TR010038/APP/6.1).</p>
	Surveyor 2	<p>09/06/20 (DUSK) Surveyor two recorded the following potential and confirmed roosting behaviour:</p> <ul style="list-style-type: none"> At 21:30 a common pipistrelle potentially emerged from the 5m high north-west facing cavity on 		

Tree reference	Surveyor position	Survey 1	Survey 2	Survey 3
		<p>the central trunk from the lane view.</p> <ul style="list-style-type: none"> • At 21:46 a soprano pipistrelle potentially emerged from the west-facing cavity approximately 2m high on the right-most trunk from the lane view. • At 21:51 an unidentified bat potentially emerged from the 5m high north-west facing cavity on the central trunk from the lane view. Six soprano pipistrelle calls and four common pipistrelle calls were automatically recorded during this minute and as such it is considered likely the bat was one of these species', however this cannot be definitively confirmed. • At 21:55 a common pipistrelle emerged (confirmed) from the west-facing cavity approximately 2m high on the right-most trunk from the lane view. The bat flew north-west after emerging. • At 21:57 a soprano pipistrelle emerged (confirmed) from the west-facing cavity approximately 2m high on the right-most trunk from the lane view. The bat flew south-west after emerging. • At 21:57 a soprano pipistrelle emerged 		

Tree reference	Surveyor position	Survey 1	Survey 2	Survey 3
		<p>(confirmed) from the west-facing cavity approximately 2m high on the right-most trunk from the lane view. The bat flew south-west after emerging.</p> <ul style="list-style-type: none"> • At 21:59 a soprano pipistrelle emerged (confirmed) from the west-facing cavity approximately 2m high on the right-most trunk from the lane view. The bat flew south-west after emerging. • At 22:00 a soprano pipistrelle emerged (confirmed) from the west-facing cavity approximately 2m high on the right-most trunk from the lane view. The bat flew south-west after emerging. • At 22:03 a common pipistrelle emerged (confirmed) from the west-facing cavity approximately 2m high on the right-most trunk from the lane view. The bat flew south after emerging. • At 22:08 an unidentified bat emerged from the 2m high cavity facing north-west on the central trunk from the lane view. Six soprano pipistrelle calls were automatically recorded during this minute. No other species were recorded during this minute. As such it is 		

Tree reference	Surveyor position	Survey 1	Survey 2	Survey 3
		<p>considered likely that the bat was a soprano pipistrelle however this cannot be definitively confirmed.</p> <p>The surveyor noted a high amount of common pipistrelle activity between 21:11 and 22:13. Common and soprano pipistrelle bats were almost constantly automatically recorded with numerous social calls recorded throughout the survey. In addition, brown long-eared, barbastelle, Myotis sp. and big bat (NSL) sp. were identified.</p>		
Tree F and G		<p>10/06/20 (DUSK)</p> <p>In addition to this roosting behaviour observed in Tree C, which was the focus of the survey, surveyor one also incidentally observed bats emerging from two trees (an oak Quercus sp. (tree F) and a maple Acer sp. (tree G)) on the opposite side of the lane. The following emergences from trees F and G occurred:</p> <ul style="list-style-type: none"> At 21:20 two unidentified pipistrelle bats emerged from tree F and flew north. These bats were identified in the field as pipistrelle species, but no detection was recorded. 	<p>23/06/20 (DAWN) Potential roosting behaviour was noted during the survey. At 3:52, 40 minutes before sunrise, a common pipistrelle potentially re-entered either tree F or G. The bat was observed flying towards trees F and G (which are situated close together) at approximately 10m high, although the surveyor could not be certain the bat re-entered a roost. This roost would be characterised as a day roost. Other species identified include soprano pipistrelle and barbastelle.</p>	<p>30/06/20 (DUSK) Roosting behaviour was recorded during the survey. At 21:56, 48 minutes after sunset, a common pipistrelle emerged from the north aspect of tree G (the maple tree) and flew east. This roost is characterised as a day roost. In addition, at 21:35 a common pipistrelle was seen to fly towards tree G. Whether this bat may have re-entered a roost in tree G cannot be confirmed.</p> <p>A high level of pipistrelle activity was recorded during the survey, as has been typically found at this location on the Easton Estates lane. All of the visual observations of pipistrelle bats, which were recorded between the start of the survey and 22:04, reported bats travelling northbound only the lane except for the two instances</p>

Tree reference	Surveyor position	Survey 1	Survey 2	Survey 3
		<ul style="list-style-type: none"> • At 21:28 one unidentified pipistrelle bat emerged from tree F and flew north. These bats were identified in the field as pipistrelle species, but no detection was recorded. • At 21:29 one unidentified pipistrelle bat emerged from tree G and flew north. These bats were identified in the field as pipistrelle species, but no detection was recorded. <p>4.1.118. • At 21:31 two unidentified pipistrelle bats emerged from tree F and flew north. These bats were identified in the field as pipistrelle species, but no detection was recorded.</p> <p>4.1.119.4.1.18. Five pipistrelles in total emerged from tree F, two at 21:20 and 21:31, and one bat at 21:28. At 21:29 one pipistrelle emerged from tree G. These roosts are characterised as day roosts.</p> <p>4.1.120.4.1.19. In total 21 bat passes were recorded by the surveyor identifying common and soprano pipistrelle and noctule.</p>		discussed above. Common and soprano pipistrelles were identified in addition to serotine and one Myotis species.
Tree 61	Surveyor 1	04/09/19 (DUSK) The first bat was noted at 20:28, fifty-one (51) minutes after sunset. A total of two (2) bat passes were recorded, with the	11/09/19 (DAWN) The last bat was noted at 06:01, twenty-one (21) minutes before sunrise. A total of two (2) bat passes were recorded. Commuting behaviour only was	

Tree reference	Surveyor position	Survey 1	Survey 2	Survey 3
		final bat detected at 20:40. Commuting behaviour only was observed. Two (2) species were identified in this survey: brown long-eared bat and common pipistrelle.	observed. Two (2) species was identified in this survey: barbastelle and noctule.	
	Surveyor 2	04/09/19 (DUSK) No bats were detected during this survey.	11/09/19 (DAWN) The last bat was noted at 06:01, twenty-one (21) minutes before sunrise. A total of two (2) bat passes were recorded. Commuting behaviour only was observed. Two (2) species was identified in this survey: barbastelle and noctule.	
Tree 62	Surveyor 1	01/08/19 (DAWN) A single bat – a noctule – was recorded flying overhead at 05.03.	04/09/19 (DUSK) The first bat was noted at 20:04, twenty-seven (27) minutes after sunset. A total of eight (8) bat passes were recorded, with the final bat detected at 21:05. Commuting and foraging behaviour was observed. Three (3) species were identified in this survey: barbastelle, soprano pipistrelle and common pipistrelle. One (1) bat was observed in flight, but the species cannot be determined as the bat detector did not detect any calls from this bat.	RSK undertook an additional two dusk emergence surveys at Tree 62. No bat emergence was recorded. (see Annex E).
	Surveyor 2	01/08/19 (DAWN) The last recorded activity was from two commuting bats; a common and a soprano pipistrelle, recorded at 03.53. No other species were recorded during the survey.	04/09/19 (DUSK) The only recorded bat was noted at 20:28, fifty-one (51) minutes after sunset. A total of one (1) bat pass was recorded. Commuting behaviour only was observed. One (1) species was identified in this survey: noctule.	RSK undertook an additional two dusk emergence surveys at Tree 62. No bat emergence was recorded. (see Annex E).

Tree reference	Surveyor position	Survey 1	Survey 2	Survey 3
Tree 65	Surveyor 1	01/08/19 (DAWN) The only recorded bat was noted at 05:03, eleven (11) minutes before sunrise. A total of one (1) bat pass was recorded. Commuting behaviour only was observed. One (1) species was identified in this survey: noctule.	RSK undertook two additional surveys at Tree 65 (see Annex E). No emergence was recorded.	RSK undertook two additional surveys at Tree 65 (see Annex E) No emergence was recorded.
	Surveyor 2	01/08/19 (DAWN) The last bat was noted at 03:53, one (1) hour and fifteen (15) minutes before sunrise. A total of five (5) bat passes were recorded. Commuting behaviour only was observed. One (1) species was identified in this survey: soprano pipistrelle.		
74, 75, 76	Surveyor 1	30/07/19 (DUSK) The first bat was noted at 20:57, five (5) minutes after sunset. A total of thirty-five (35) bat passes were recorded, with the final bat detected at 21:55. Commuting, foraging and roosting behaviour was observed. Four (4) species were identified in this survey: noctule, brown long-eared bat, soprano pipistrelle and common pipistrelle. Two (2) bats of the genus Myotis were also recorded but could not be identified to species level. Common pipistrelle was observed emerging from the tree.	03/09/19 (DAWN) The last bat was noted at 05:54, fourteen (14) minutes before sunrise. A total of thirty-four (34) bat passes were recorded. Commuting and foraging behaviour was observed. Three (3) species was identified in this survey: brown long-eared bat, soprano pipistrelle and common pipistrelle. One (1) bat of the genus Pipistrellus was also recorded but could not be identified to species level as only social calls were detected.	10/09/19 (DUSK) Tree 74 only. The first bat was noted at 19:44, nineteen (19) minutes after sunset. A total of seventeen (17) bat passes were recorded, with the final bat detected at 20:51. Commuting, foraging and roosting behaviour was observed. Four (4) species were identified in this survey: brown long-eared bat, noctule, soprano pipistrelle and common pipistrelle. One (1) bat was observed emerging from the tree being surveyed, but the species cannot be determined as the bat detector did not detect any calls from this bat.

Tree reference	Surveyor position	Survey 1	Survey 2	Survey 3
	Surveyor 2	30/07/19 (DUSK) The first bat was noted at 21:23, thirty-one (31) minutes after sunset. A total of ten (10) bat passes were recorded, with the final bat detected at 22:09. Commuting and foraging behaviour was observed. Four (4) species were identified in this survey: barbastelle, noctule, soprano pipistrelle and common pipistrelle.	03/09/19 (DAWN) The last bat was noted at 05:54, fourteen (14) minutes before sunrise. A total of twenty-one (21) bat passes were recorded. Commuting and foraging behaviour was observed. Three (3) species was identified in this survey: brown long-eared bat, soprano pipistrelle and common pipistrelle.	10/09/19 (DUSK) – Tree 74 only The first bat was noted at 19:33, ten (10) minutes after sunset. A total of thirty-five (35) bat passes were recorded, with the final bat detected at 20:52. Commuting and foraging behaviour was observed. Six (6) species were identified in this survey: barbastelle, serotine, brown long-eared bat, noctule, soprano pipistrelle and common pipistrelle. One (1) bat of the genus Pipistrellus was also recorded but could not be identified to species level.
	Surveyor 3	30/07/19 (DUSK) The first bat was noted at 21:23, thirty-one (31) minutes after sunset. A total of three (3) bat passes were recorded, with the final bat detected at 22:03. Commuting behaviour only was observed. Two (2) species were identified in this survey: soprano pipistrelle and common pipistrelle.	03/09/19 (DAWN) The last bat was noted at 05:39, forty-eight (48) minutes before sunrise. A total of fifteen (15) bat passes were recorded. Commuting and foraging behaviour was observed. Three (3) species was identified in this survey: barbastelle, soprano pipistrelle and common pipistrelle.	N/A
	Surveyor 4	30/07/19 (DUSK) The first bat was noted at 21:03, eleven (11) minutes after sunset. A total of twenty-two (22) bat passes were recorded, with the final bat detected at 21:42. Commuting and foraging behaviour was observed. Three (3) species were identified in this survey: barbastelle, soprano pipistrelle and common pipistrelle. Two	03/09/19 (DAWN) The last bat was noted at 05:48, twenty (20) minutes before sunrise. A total of two (2) bat passes were recorded. Commuting behaviour only was observed. One (1) species was identified in this survey: soprano pipistrelle. One (1) bat of the genus Pipistrellus was also recorded but could not be identified to species level as only social calls were detected.	N/A

Tree reference	Surveyor position	Survey 1	Survey 2	Survey 3
		(2) bats of the genus Myotis were also recorded but could not be identified to species level.		
Tree 85	Surveyor 1	01/08/19 (DAWN) The last bat was noted at 04:59, fourteen (14) minutes before sunrise. A total of twenty-two (22) bat passes were recorded. Commuting and foraging behaviour was observed. Three (3) species were identified in this survey: noctule, soprano pipistrelle and common pipistrelle.	11/09/19 (DUSK) The first bat was noted at 19:53, thirty-two (32) minutes after sunset. A total of eleven (11) bat passes were recorded, with the final bat detected at 20:44. Commuting and foraging behaviour was observed. Two (2) species were identified in this survey: soprano pipistrelle and common pipistrelle. One (1) bat of the genus Myotis was also recorded but could not be identified to species level. One (1) bat was detected but could not be identified in the field by the surveyor. The species could not be determined during data analysis as the bat detector had ceased recording by this point in the survey (see Section 3.4) (Dusk emergence and dawn re-entry surveys) (TR010038/APP/6.1) .	
	Surveyor 2	01/08/19 (DAWN) The last bat was noted at 04:40, thirty-three (33) minutes before sunrise. A total of four (4) bat passes were recorded. Commuting behaviour only was observed. Two (2) species were identified in this survey: noctule and common pipistrelle.	11/09/19 (DUSK) The first bat was noted at 19:32, eleven (11) minutes after sunset. A total of forty-eight (48) bat passes were recorded, with the final bat detected at 20:50. Commuting and foraging behaviour was observed. Five (5) species were identified in this survey: barbastelle, brown long-eared bat, noctule, soprano pipistrelle and common pipistrelle. Eight (8) bats of the genus Myotis were also recorded but could not be identified to species level. Two	

Tree reference	Surveyor position	Survey 1	Survey 2	Survey 3
			(2) bats were observed in flight but at too great a distance to be detected by the bat detector. Therefore, species identification is not possible.	
Tree 90, Tree 91	Surveyor 1	31/07/19 (DAWN) The only recorded bat was noted at 03:54, one (1) hour and nineteen (19) minutes before sunrise. A total of one (1) bat pass was recorded. Commuting behaviour only was observed. One (1) species was identified in this survey: barbastelle.	22/08/19 (DUSK) The first bat was noted at 20:28, twenty-two (22) minutes after sunset. A total of eight (8) bat passes were recorded, with the final bat detected at 21:15. Commuting and foraging behaviour was observed. Two (2) species were identified in this survey: noctule and common pipistrelle.	
	Surveyor 2	31/07/19 (DAWN) The last bat was noted at 04:31, forty-one (41) minutes before sunrise. A total of twelve (12) bat passes were recorded. Commuting and foraging behaviour was observed. Three (3) species were identified in this survey: barbastelle, soprano pipistrelle and common pipistrelle.	22/08/19 (DUSK) The first bat was noted at 20:28, twenty-two (22) minutes after sunset. A total of eleven (11) bat passes were recorded, with the final bat detected at 21:14. Commuting and foraging behaviour was observed. Roosting behaviour was observed at Tree 90. Two (2) species were identified in this survey: noctule and common pipistrelle. The bat which was observed emerging from Tree 90 was not detected by the bat detector used by surveyor 2, nor was it observed or recorded by surveyor 1. As a result, no species determination can be made.	
Tree 92, Tree 93	Surveyor 1	31/07/19 (DAWN) No bats were detected during this survey.	29/08/19 (DUSK) The first bat was noted at 20:11, twenty (20) minutes after sunset. A total of three (3) bat passes were recorded, with the final bat detected at 20:27. Commuting behaviour only was observed. One (1) species was	

Tree reference	Surveyor position	Survey 1	Survey 2	Survey 3
			identified in this survey: noctule. One (1) bat was observed flying low along the hedge line between Tree 92 and Tree 93 but was not recorded by the bat detector. As a result, species identification is not possible.	
	Surveyor 2	31/07/19 (DAWN) The last bat was noted at 04:26, forty-six (6) minutes before sunrise. A total of ten (10) bat passes were recorded. Commuting and foraging behaviour was observed. Three (3) species were identified in this survey: barbastelle, soprano pipistrelle and common pipistrelle.	29/08/19 (DUSK) The first bat was noted at 20:10, nineteen (19) minutes after sunset. A total of eleven (11) bat passes were recorded, with the final bat detected at 21:22. Commuting and foraging behaviour was observed. Two (2) species were identified in this survey: barbastelle and noctule.	
Tree 94, Tree 95	Surveyor 1	13/08/19 (DUSK) The first bat was noted at 20:50, twenty-five (25) minutes after sunset. A total of seventeen (17) bat passes were recorded, with the final bat detected at 21:49. Commuting and foraging behaviour was observed. Four (4) species were identified in this survey: barbastelle, noctule, soprano pipistrelle and common pipistrelle.		
	Surveyor 2	13/08/19 (DUSK) The first bat was noted at 21:08, forty-three (43) minutes after sunset. A total of eight (8) bat passes were recorded, with the final bat detected at 21:49. Commuting behaviour only was observed. Five (5) species		

Tree reference	Surveyor position	Survey 1	Survey 2	Survey 3
		were identified in this survey: Leisler's bat, barbastelle, noctule, soprano pipistrelle and common pipistrelle.		
Tree 98	Surveyor 1	29/08/19 (DUSK) The first bat was noted at 20:10, nineteen (19) minutes after sunset. A total of nine (9) bat passes were recorded, with the final bat detected at 21:06. Commuting and foraging behaviour was observed. Four (4) species were identified in this survey: barbastelle, noctule, soprano pipistrelle and common pipistrelle. One (1) bat of the genus Myotis was also recorded but could not be identified to species level. One (1) bat of the genus Pipistrellus was also recorded but could not be identified to species level as only social calls were detected.		
	Surveyor 2	29/08/19 (DUSK) The first bat was noted at 20:10, nineteen (19) minutes after sunset. A total of eleven (11) bat passes were recorded, with the final bat detected at 20:52. Commuting and foraging behaviour was observed. Three (3) species were identified in this survey: noctule, soprano pipistrelle and common pipistrelle.		

Tree reference	Surveyor position	Survey 1	Survey 2	Survey 3
Tree 99	Surveyor 1	09/09/19 (DUSK) The first bat was noted at 19:43, seventeen (17) minutes after sunset. A total of sixteen (16) bat passes were recorded, with the final bat detected at 20:36. Commuting and roosting behaviour was observed. A soprano pipistrelle emerged from the tree at 19:53 and a second soprano pipistrelle emerged at 19:57. Four (4) species were identified in this survey: brown long-eared bat, noctule, soprano pipistrelle and common pipistrelle.		
	Surveyor 2	09/09/19 (DUSK) The first bat was noted at 19:44, eighteen (18) minutes after sunset. A total of two (2) bat passes were recorded, with the final bat detected at 19:49. Commuting behaviour only was observed. One (1) species was identified in this survey: noctule.		
Tree 100, Tree 101*	Surveyor 1	13/08/19 (DUSK) The first bat was noted at 20:50, twenty-five (25) minutes after sunset. A total of sixteen (16) bat passes were recorded, with the final bat detected at 21:54. Commuting and foraging behaviour was observed. Four (4) species were identified in this survey: barbastelle,	12/09/19 (DAWN) The last bat was noted at 05:47, thirty-seven (37) minutes before sunrise. A total of twelve (12) bat passes were recorded. Commuting behaviour only was observed. Two (2) species was identified in this survey: barbastelle and soprano pipistrelle. One (1) bat of the genus Pipistrellus was also recorded but could not be identified to species level.	

Tree reference	Surveyor position	Survey 1	Survey 2	Survey 3
	Surveyor 2	<p>noctule, soprano pipistrelle and common pipistrelle.</p> <p>13/08/19 (DUSK) The first bat was noted at 20:52, twenty-three (23) minutes after sunset. A total of sixteen (16) bat passes were recorded, with the final bat detected at 21:51. Commuting and foraging behaviour was observed. Three (3) species were identified in this survey: barbastelle, soprano pipistrelle and common pipistrelle.</p>	<p>12/09/19 (DAWN) The last bat was noted at 05:43, forty-one (41) minutes before sunrise. A total of three (3) bat passes were recorded. Commuting behaviour only was observed and potential roosting behaviour was observed. One bat was seen flying between trees 100 and 101 and then appearing to disappear into tree 101. However as it is not certain the bat entered the tree, this is considered a potential roost only of an unidentified species*. One (1) species was identified in this survey: barbastelle. Two (2) bats were observed in flight but at too great a distance to be detected by the bat detector. Therefore, species identification is not possible.</p>	
	Location B	<p>14/08/19 (DUSK) The first bat was noted at 20:19, four (4) minutes before sunset. A total of fourteen (14) bat passes were recorded, with the final bat detected at 21:41. Commuting and roosting behaviour was observed. Four (4) species were identified in this survey: brown long-eared bat, noctule, soprano pipistrelle and common pipistrelle. One (1) bat of the genus Myotis was also recorded but could not be identified to species level</p>	<p>19/08/19 (DUSK) The first bat was noted at 20:14, one (1) minute after sunset. A total of eighteen (18) bat passes were recorded, with the final bat detected at 21:38. Commuting and foraging behaviour was observed. Four (4) species were identified in this survey: brown long-eared bat, noctule, soprano pipistrelle and common pipistrelle.</p>	<p>30/08/19 (DAWN) The last bat was noted at 05:35, twenty-six (26) minutes before sunrise. A total of seventeen (17) bat passes were recorded. Commuting behaviour only was observed. Three (3) species were identified in this survey: brown long-eared bat, soprano pipistrelle and common pipistrelle.</p>

Tree reference	Surveyor position	Survey 1	Survey 2	Survey 3
	Location C	14/08/19 (DUSK) The first bat was noted at 20:29, six (6) minutes after sunset. A total of thirteen (13) bat passes were recorded, with the final bat detected at 21:10. Commuting and foraging behaviour was observed. Three (3) species were identified in this survey: noctule, soprano pipistrelle and common pipistrelle.	19/08/19 (DUSK) The first bat was noted at 20:20, seven (7) minutes after sunset. A total of forty-three (43) bat passes were recorded, with the final bat detected at 21:43. Commuting, foraging and roosting behaviour was observed. Four (4) species were identified in this survey: brown long-eared bat, noctule, soprano pipistrelle and common pipistrelle. One (1) bat of the genus Myotis was also recorded but could not be identified to species level.	30/08/19 (DAWN) The last bat was noted at 05:48, thirteen (13) minutes before sunrise. A total of seventeen (17) bat passes were recorded. Commuting, foraging and roosting behaviour was observed. Four (4) species were identified in this survey: barbastelle, brown long-eared bat, soprano pipistrelle and common pipistrelle
	Location D	14/08/19 (DUSK) The first bat was noted at 20:25, two (2) minutes after sunset. A total of twenty-six (26) bat passes were recorded, with the final bat detected at 21:39. Commuting and foraging behaviour was observed. Four (4) species were identified in this survey: barbastelle, noctule, soprano pipistrelle and common pipistrelle. One (1) bat of the genus Myotis was also recorded but could not be identified to species level.	20/08/19 (DAWN) The last bat was noted at 04:56, forty-nine (49) minutes before sunrise. A total of two (2) bat passes were recorded. Commuting behaviour only was observed. Two (2) species were identified in this survey: brown long-eared bat and soprano pipistrelle.	30/08/19 (DAWN) The last bat was noted at 05:40, twenty-one (21) minutes before sunrise. A total of twenty-four (24) bat passes were recorded. Commuting and foraging behaviour was observed. Four (4) species were identified in this survey: barbastelle, brown long-eared bat, soprano pipistrelle and common pipistrelle.
	Surveyor 3	15/08/19 (DAWN) The last bat was noted at 05:21, fifteen (15) minutes before sunrise. A total of seven (7) bat passes were recorded. Commuting behaviour only was observed. Two (1) species were identified in this survey: soprano	N/A	N/A

Tree reference	Surveyor position	Survey 1	Survey 2	Survey 3
		pipistrelle and common pipistrelle.		

4.2.9. *the potential roosts in Tree B, Tree D/T78 and Tree 101 (see Table 4.4. above) are being treated as confirmed roosts throughout this report. They are displayed on the following figures (TR010038/APP/6.2) as potential roosts; in Annex C: 2020 Bat Roost Survey Receptors – Trees and in Annex D: Bat Roosts Survey Results 2020 and 2017.

Table 4-5. Summary of bat survey data

Receptor	Bat Roost Potential	No. of surveys	Survey date	Survey type	Roost confirmed/potential/no	Roost classification	Notes
[REDACTED]	Confirmed roost	3	25 June 2019	Dusk emergence	Confirmed – one BLE emerged from the north aspect.	Day roost	
			31 July 2019	Dusk emergence	Confirmed – one P55 emerged from the north aspect and one unidentified emerged from the south-east corner	Day roost	
			14 August 2019	Dawn re-entry	No	N/A	
[REDACTED]	Confirmed roost	3	14 August 2019	Dusk emergence	Confirmed – from the eaves on the south-west corner of the main body [REDACTED] emerged one P45 and potentially another p45. From the eaves on the south aspect of the main body of the church emerged three P55s and one P45.	Day roost x2	
			19 August 2019	Dusk emergence	Confirmed – one P45 emerged from south-east corner of [REDACTED]	Day roost	
			30 August 2019	Dawn re-entry	Confirmed – one P55 re-entered the north aspect of the main body [REDACTED]	Day roost	
[REDACTED]	High	3	15 August 2019	Dawn re-entry	No	N/A	

Receptor	Bat Roost Potential	No. of surveys	Survey date	Survey type	Roost confirmed/potential/no	Roost classification	Notes
█: B1 guesthouse			Awaiting data from RSK		No		
					No		
█: B2 garage and workshop	High/confirmed roost	3	15 August 2019	Dawn re-entry and dusk emergence	Confirmed – five P45s re-entered a roost through a crack at the top of the west wall of the workshop at dawn.	Day roost	
			10 September 2019	Dawn re-entry	No	N/A	
█ B3 main house	High	3	3 September 2019	Dusk emergence	No	N/A	
			Awaiting data from RSK				
			Awaiting data from RSK				
█ B4 stable block	High	3	20 August 2019	Dusk emergence	Confirmed – a P45 emerged from the south-west corner roof	Day roost	
			21 August 2019	Dawn re-entry	No	N/A	
			28 August 2019	Dusk emergence	No	N/A	
█ Farm: house	High	3	1 August 2019	Dusk emergence	Confirmed – one P45 emerged from the northernmost extension on the west aspect. One P55 emerged from between the extensions on the west aspect.	Day roosts x2	
			16 August 2019	Dawn re-entry	No	N/A	
			21 August 2019 23 August 2019	Dusk emergence Dawn re-entry	Confirmed – on the 21 August 2019 one P45 emerged from the	Day roost	

Receptor	Bat Roost Potential	No. of surveys	Survey date	Survey type	Roost confirmed/potential/no	Roost classification	Notes
					northern extension on the west aspect.		
█ garage/workshop	High	3	1 August 2019	Dusk emergence	Confirmed – approximately 20 BLEs emerged from an open door on the southern aspect.	Potential maternity	
			16 August 2019	Dawn re-entry	Confirmed – approximately 12 BLEs re-entered the same roost. One BLE potentially re-entered from the north aspect under the eaves	Potential maternity	
			21 August 2019 23 August 2019	Dusk emergence Dawn re-entry	No	N/A	
			28 August 2019	Internal inspection	Confirmed – approximately 25 BLEs were present.	Potential maternity	
█ holiday accommodation	Moderate	2	1 August 2019	Dusk emergence	No	N/A	
			16 August 2019	Dawn re-entry	No	N/A	
Tree A/T77	Moderate/ confirmed roost	1	8 June 2020	Dusk emergence	Confirmed – one P45 emerged	Day roost	Two surveys were undertaken in 2019 by RSK (see Annex E)
Tree B	Moderate	2	9 June 2020	Dawn re-entry	No	N/A	
			22 June 2020	Dusk emergence	Potential – one P45 flew behind the limb with the PRF and appeared to fly into the tree.	Potential day roost	
Tree C	Moderate/	3	9 June 2020	Dawn re-entry	No	N/A	

Receptor	Bat Roost Potential	No. of surveys	Survey date	Survey type	Roost confirmed/potential/no	Roost classification	Notes
	confirmed roost		10 June 2020	Dusk emergence	Confirmed – one pipistrelle species emerged. Potential – three P45s potentially emerged, one from the top of the tree and one from an east-facing branch.	Confirmed day roost x1 Potential day roost x2	
			22 June 2020	Dusk emergence	Potential – one P45 potentially emerged from east-facing branch	Potential day roost	
Tree D/T78	High	1	8 June 2020	Dusk emergence	Potential – two P45s were observed foraging around and between canopy and it is considered they may have emerged	Potential day roost	Three surveys undertaken in 019 by RSK (see Annex E).
Tree E	High/ confirmed roost	3	9 June 2020	Dusk emergence	2 confirmed, one potential. From the cavity 2m high on the central trunk – one unidentified bat emerged. From the cavity 2m high on the right-most trunk – two P45s and four P55s emerged, in addition to one P55 which potentially emerged. From the cavity 5m high on the central trunk – one P45 and one unidentified bat potentially emerged. Additionally, a second surveyor noted a P45 which potentially emerged from the south-west aspect of the tree.	Day roosts x3 – two confirmed, one potential	
			23 June 2020	Dawn re-entry	Potential – one P55 appeared to fly from the south into the tree	Potential day roost	
			30 June 2020	Dusk emergence	Potential – two P45s and two Myotis sp. appeared to fly north away from the tree and one	Potential day roost	

Receptor	Bat Roost Potential	No. of surveys	Survey date	Survey type	Roost confirmed/potential/no	Roost classification	Notes
					soprano pipistrelle appeared to fly south away from the tree		
Tree F	Confirmed roost	3	10 June 2020	Dusk emergence	Confirmed – five pipistrelle species emerged	Day roost	
			23 June 2020	Dawn re-entry	Potential – one P45 potential re-entered either tree F or G	Potential day roost	The bat potentially re-entered either tree F or G, which are directly adjacent to each other
			30 June 2020	Dusk emergence	No	N/A	
Tree G	Confirmed roost	3	10 June 2020	Dusk emergence	Confirmed – one pipistrelle species emerged	Day roost	
			23 June 2020	Dawn re-entry	Potential – one P45 potential re-entered either tree F or G	Potential day roost	The bat potentially re-entered either tree F or G, which are directly adjacent to each other
			30 June 2020	Dusk emergence	Confirmed – one P45 emerged from the north-aspect	Day roost	
Tree 61	High	2	4 September 2019	Dusk emergence	No	N/A	
			11 September 2019	Dawn re-entry	No	N/A	
Tree 62	Moderate	2	1 August 2020	Dawn re-entry	No	N/A	Two additional dusk surveys of this tree

Receptor	Bat Roost Potential	No. of surveys	Survey date	Survey type	Roost confirmed/potential/no	Roost classification	Notes
							were undertaken by RSK (23/07/19 and 13/08/19). No emergence/re-entry recorded
			4 September 2019	Dusk emergence	No	N/A	
Tree 65	Moderate	1	01 August 2019	Dusk emergence	No	N/A	Two additional dusk surveys of this tree were undertaken by RSK (24/07/19 and 28/08/19). No emergence/re-entry recorded
Tree 74	High/ confirmed roost	3	30 July 2019	Dusk emergence	Confirmed – one P45 emerged	Day roost	
			3 September 2019	Dawn re-entry	No	N/A	
			10 September 2019	Dusk emergence	Confirmed – one unidentified bat emerged	Day roost	The emerging bat was not echo-locating

Receptor	Bat Roost Potential	No. of surveys	Survey date	Survey type	Roost confirmed/potential/no	Roost classification	Notes
Tree 75	Moderate	2	30 July 2019	Dusk emergence	No	N/A	
			3 September 2019	Dawn re-entry	No	N/A	
Tree 76	Moderate	2	30 July 2019	Dusk emergence	No	N/A	
			3 September 2019	Dawn re-entry	No	N/A	
Tree 85	Moderate	2	1 August 2019	Dawn re-entry	No	N/A	
			11 September 2019	Dusk emergence	No	N/A	
Tree 90	High/ confirmed roost	2	31 July 2019	Dawn re-entry	No	N/A	
			22 August 2019	Dusk emergence	Confirmed – one unidentified bat emerged. The bat was identified as a pipistrelle in the field however no call was recorded so this cannot be confirmed.	Day roost	
Tree 91	Moderate	2	31 July 2019	Dawn re-entry	No	N/A	
			22 August 2019	Dusk emergence	No	N/A	
Tree 92	Moderate	2	31 July 2019	Dawn re-entry	No	N/A	
			29 August 2019	Dusk emergence	No	N/A	
Tree 93	Moderate	2	31 July 2019	Dawn re-entry	No	N/A	
			22 August 2019	Dusk emergence	No	N/A	
Tree 94	Moderate	1	13 August 2019	Dusk emergence	No	N/A	

Receptor	Bat Roost Potential	No. of surveys	Survey date	Survey type	Roost confirmed/potential/no	Roost classification	Notes
Tree 95	Moderate	1	13 August 2019	Dusk emergence	No	N/A	
Tree 98	Moderate	1	29 August 2019	Dusk emergence	No	N/A	
Tree 99	Moderate/ confirmed roost	1	9 September 2019	Dusk emergence	Confirmed – two P55s emerged	Day roost	
Tree 100	Moderate	2	13 August 2019	Dusk emergence	No	N/A	
			12 September 2019	Dawn re-entry	No	N/A	
Tree 101	High	2	13 August 2019	Dusk emergence	No	N/A	
			12 September 2019	Dawn re-entry	Potential – one unidentified bat potentially re-entered	Potential day roost	

4.3. Results summary

4.3.1. Taking together the Sweco and RSK survey results from 2019, six (6) buildings were confirmed to be in use by bats, which are:

- [REDACTED] (mixed species roost used by brown long-eared, soprano pipistrelle and unidentified bats for day roosting by single bats);
- [REDACTED] (mixed species roost used by common and soprano pipistrelles for day roosting by max. 2-3 bats);
- [REDACTED] (common pipistrelle day roost used by max. 5 bats);
- [REDACTED] (common pipistrelle day roost used by max. 1 bat);
- [REDACTED] (mixed species common and soprano pipistrelle day roost used by single bats); and
- [REDACTED] garage (brown long-eared bat potential maternity roost with max. 25 individuals found during internal inspection surveys and 20 during emergence surveys).

4.3.2. Taking together the previously identified roost of unknown species in tree 51 and Sweco and RSK survey results from 2019, twenty-one (21) trees were confirmed to be in use by bats, which are:

- Tree A/77 (common pipistrelle day roost used by single bats);
- Tree B (common pipistrelle day roost used by single bats);
- Tree C (common pipistrelle/pipistrelle sp. day roost used by max. 3 bats);
- Tree D/78 (common pipistrelle day roost used by single bats);
- Tree E (mixed species roost used by common and soprano pipistrelle and potentially Myotis species by up to 5 bats);
- Tree F (common pipistrelle/pipistrelle sp. day roost used by max. 5 bats);
- Tree G (common pipistrelle/pipistrelle sp. day roost used by single bats);
- Tree 1 (common pipistrelle day roost used by single bats);
- Tree 49 (common pipistrelle day roost used by single bats);
- Tree 50 (pipistrelle sp. day roost used by max. 2 bats);
- Tree 51 (previously identified roost of unknown species);
- Tree 74 (common pipistrelle/pipistrelle sp. day roost used by single bats);
- Tree 78 (common pipistrelle day roost used by single bats);
- Tree 80 (mixed species common pipistrelle and brown long-eared day roost used by single bats);
- Tree 81 (soprano pipistrelle day roost used by max. 4 bats);
- Tree 82 (soprano pipistrelle day roost used by single bats);

- Tree 83 (soprano pipistrelle day roost used by single bats);
- Tree 90 (unidentified species (thought to be pipistrelle) day roost used by single bats);
- Tree 99 (common pipistrelle day roost used by max. 2 bats);
- Tree 101 (soprano pipistrelle day roost used by single bats);
- Tree 118 (soprano pipistrelle day roost used by single bats);
- Tree 121 (soprano pipistrelle day roost used by single bats); and
- Tree 123 (soprano pipistrelle day roost used by single bats).

5. Evaluation

5.1. Bat roosts

- 5.1.1. The features with bat roost potential which were assessed as part of this 2019 study are shown in the maps in Annex B (buildings) and Annex C (trees) with a summary of the confirmed roosts shown in Annex C. The results and conclusions from the 2019 RSK surveys are included within Annex E.
- 5.1.2. Three species – common pipistrelle, soprano pipistrelle and brown long-eared – were recorded roosting within the study area (see section 4.3 for summary) (Results summary), all of which are regularly present within Norfolk . Three day roosts for unidentified bats were recorded where individuals were seen emerging or re-entering but where identification from flight behaviour or call file analysis was not possible. It cannot be ruled out that these registrations are of rarer species.
- 5.1.3. A single possible *Myotis* species was recorded using a tree on the basis of call file analysis and flight behaviour (tree E) and this represents the only such roost recorded.
- 5.1.4. Common pipistrelle: a total of 17 day roosts were recorded of which 4 are in buildings and 13 in trees. Common pipistrelle is the most frequently encountered species of bat within Norfolk and indeed across the UK and can be found across the British Isles (Norfolk LBAP, JNCC 2019). The England population is estimated to be around 18 million individuals with a stable or even increasing population (<https://jncc.gov.uk/jncc-assets/Art17/S1309-EN-Habitats-Directive-Art17-2019.pdf>). This species is highly adaptable, is a generalist feeder (foraging wherever there is sufficient vegetation to support an adequate insect population) and prefers hunting over water, tree and hedge lines and woodland edges. In terms of their roosting behaviour, nursery roosts are invariably within buildings and other man-made structures and can form colonies of up to 200 females. Colonies may use several roost sites, alternating between them in a single season such that large colonies of related individuals may fragment and occupy several roosts at a time (Altringham, 2003). Single bats using trees in late summer/autumn may be males occupying mating roosts and defending these against other males, although none of the typical mating activity was recorded during the present surveys which might indicate the presence of territorial roosts. The presence of around 17 small roosts within the study area is about as expected for an area of this size.
- 5.1.5. Soprano pipistrelle: a total of 8 day roosts (three in buildings and five in trees) were recorded. Soprano pipistrelle bats are common and widely distributed across Britain and Ireland and the England population is estimated to be around

3 million individuals (JNCC, 2019) with a stable and possibly increasing population in the region (<https://jncc.gov.uk/jncc-assets/Art17/S5009-EN-Habitats-Directive-Art17-2019.pdf>). Soprano pipistrelle has a species action plan within the Norfolk LBAP. Similar to the common pipistrelle (with which this species was thought to be the same until technological advances in acoustic detection enabled the two to be separated) the soprano pipistrelle has a preference for maternity roosting in buildings, is a generalist forager and is very adaptable to different foraging strategies, possibly a reason for its abundance and success. The presence of around 8 small roosts within the study area is considered an expected number for an area of this size.

- 5.1.6. Brown long-eared bat: a total of three roosts – two in buildings and one in a tree – were recorded which included a maternity roost. BLE is common throughout Britain and Ireland except for the Scottish Islands (Norfolk LBAP) and the England population is estimated to be between 34,000 and 1.43 million individuals (depending on the method used – JNCC, 2019) with a stable population showing no discernible trend upwards or downwards (<https://jncc.gov.uk/jncc-assets/Art17/S1326-EN-Habitats-Directive-Art17-2019.pdf>). Long-eared bats prefer open woodland and parkland and are also found in towns and cities with large gardens and trees (Altringham, 2003). Its wing shape and size have adapted the species to slow, manoeuvrable flight and it often snatches insects directly from surfaces, hovering and using passive listening to detect moving prey. BLE are very faithful to well-used hedge- and treelines when commuting between roosts and foraging habitat and tend to stay close to the roost, most frequently feeding between 0.5 – 1.5km from the roost but rarely further than 3km (Altringham, 2003). Nursery roosts – typically of 10-50 bats - are often found in the roof voids of large and often old buildings (as has been found here at the Church Hall garage) as these features have warm roof spaces and open flyways (BLE often flies within the roost before leaving to forage in the evening) and maternity roosts tend to have large woodlands within 500m. BLE will also use trees (their traditional roost sites) and bat boxes. The presence of a BLE maternity and two smaller roosts is not unexpected, given the suitability of the building and tree complexes for this commonly encountered species.
- 5.1.7. Six tree day roosts had pipistrelle species emerging or re-entering them; common and soprano pipistrelle are discussed above. No nathusius' pipistrelle (*P. nathusii*) calls were recorded during any surveys therefore this species – which is rarely encountered – is not considered to be present.
- 5.1.8. Notes taken by surveyors together with interpretation of the data conclude that a number of features within the study area are used transiently or for day roosting by bats, with frequent roost switching behaviour and several cases where bats may have gone into/emerged from either of a number of potential roosts within adjacent trees. Roost switching is a very common practise among bats since

there is an advantage to being able to use several small roosts – rather than a single roost – to ensure that if a roost becomes unsuitable or unavailable (e.g. due to damage or detection by predators) then the individual or group can still find shelter or protection. As such, it is possible that a small number of individual bats are using multiple roosts regularly, rather than each bat having its own roost tree or building which it uses all of the time.

6. Impact assessment

- 6.1.1. Bats are European Protected Species and they and their roosts are protected under UK and European legislation (see Annex F). The primary legislation – the Conservation of Habitats and Species Regulations 2017 (as amended) makes it an offence to:
- deliberately capture, injure or kill bats;
 - damage or destroy a breeding or resting place;
 - obstruct access to their resting or sheltering places;
 - possess, sell, control or transport live or dead bats, or parts of them; or
 - intentionally or recklessly disturb a bat while it's in a structure or place of shelter or protection.
- 6.1.2. Four species of bat have species action plans in the Norfolk Local Biodiversity Action Plan in recognition of the fact that they are conservation priorities: brown long-eared, barbastelle, soprano pipistrelle and noctule, however the grouped action plan addresses the needs of all 12 bat species resident in Norfolk. The species action plan lists the following threats to bats:
- Loss of significant roost sites (i.e. maternity and hibernation sites) in man-made structures;
 - Loss of and disturbance to other roost sites;
 - Loss and degradation of feeding habitats as a result of development and changes in landuse (in particular wetlands, woodlands and grasslands, the in-filling of ditches, dykes, ponds and pools, and the increased use of pesticides);
 - Disturbance to, or destruction of, commuting routes resulting from the removal of hedgerows and the artificial illumination of linear features such as rivers and hedgerows.
- 6.1.3. Confirmed roosts have been identified within the study area which includes 6 buildings and 21 trees. In addition a further three buildings and 35 trees with bat roost potential have been identified within the study area which have not been shown – through emergence or re-entry surveys or internal building inspection surveys – to be in use by (or have been used by) bats for roosting. It should be noted that bats will use a number of roosts during their life cycle and may only use some of these transiently or occasionally investigate new roost opportunities. It is difficult to conclude absence of roosting bats within a structure or tree therefore precautionary measures must be applied where roost potential exists if activities which may otherwise constitute an offence would be undertaken.

6.1.4. The Proposed Scheme would involve the following key activities which have the potential to affect bat roosts:

- Demolition of structures or felling and pruning of trees to make way for the new road and associated junctions, crossings and ancillary works;
- Clearance of vegetation and topsoils to allow for access and laydown areas during construction;
- Culverting and bridging across watercourses; and
- Lighting, vibration and noise.

6.1.5. Table 5-1 identifies those features which are within the Scheme footprint (including temporary works footprint or DCO boundary) and would therefore be lost; and those which are adjacent to it but which would be anticipated to remain intact (**TR010038/APP/6.1**).

6.1.6. The following would be lost:

- No building roosts
- 15 tree roosts;
 - Tree A/T77 (common pipistrelle day roost used by single bats)
 - Tree B (common pipistrelle day roost used by single bats)
 - Tree C (common pipistrelle/pipistrelle sp. day roost used by max. 3 bats)
 - Tree D/T78 (common pipistrelle day roost used by single bats)
 - Tree E (mixed species roost used by common and soprano pipistrelle and potentially Myotis species by up to 5 bats)
 - Tree F (common pipistrelle/pipistrelle sp. day roost used by max. 5 bats)
 - Tree G (common pipistrelle/pipistrelle sp. day roost used by single bats)
 - Tree 1 (common pipistrelle day roost used by single bats)
 - Tree 51 (previously identified roost of unknown species and characterisation)
 - Tree 81 (soprano pipistrelle day roost used by max. 4 bats)
 - Tree 82 (soprano pipistrelle day roost used by single bats)
 - Tree 83 (soprano pipistrelle day roost used by single bats)
 - Tree 99 (common pipistrelle day roost used by max. 2 bats)
 - Tree 101 (soprano pipistrelle day roost used by single bats)
 - Tree 118 (soprano pipistrelle day roost used by single bats)

In addition, the Proposed Scheme would be anticipated to result in indirect disturbance on the following:

- Six building roosts;
 - [REDACTED] (mixed species roost used by brown long-eared, soprano pipistrelle and unidentified bats for day roosting by single bats)
 - [REDACTED] (mixed species roost used by common and soprano pipistrelles for day roosting by max. 2-3 bats)
 - [REDACTED] (common pipistrelle day roost used by max. 5 bats)
 - [REDACTED] (common pipistrelle day roost used by max. 1 bat)
 - [REDACTED] [REDACTED] (mixed species common and soprano pipistrelle day roost used by single bats); and
 - [REDACTED] garage (brown long-eared bat potential maternity roost with max. 25 individuals found during internal inspection surveys and 20 during emergence surveys).

- seven tree roosts:
 - Tree 49 (common pipistrelle day roost used by single bats)
 - Tree 50 (pipistrelle sp. day roost used by max. 2 bats)
 - Tree 74 (common pipistrelle/pipistrelle sp. day roost used by single bats)
 - Tree 80 (mixed species common pipistrelle and brown long-eared day roost used by single bats)
 - Tree 90 (unidentified species (thought to be pipistrelle) day roost used by single bats)
 - Tree 121 (soprano pipistrelle day roost used by single bats)
 - Tree 123 (soprano pipistrelle day roost used by single bats)

Table 5-1: Impact assessment

Receptor	Bat Roost Potential	Number of surveys completed	Species	Maximum number of bats observed	Roost location/notes	Roost classification	Directly affected	Indirectly affected
[REDACTED]	Confirmed roost	2 (Sweco)	Brown long-eared Soprano pipistrelle unidentified bat	1 1 1	North aspect South east aspect	Day roost		Yes
[REDACTED]	Confirmed roost	3 (Sweco)	Common pipistrelle Soprano pipistrelle	2 3	Eaves on south aspect of the main body of the church North aspect	Day roost x2		Yes
[REDACTED] B1 guesthouse	High	1 (Sweco) 2 (RSK)				N/A		Yes
[REDACTED] B2 garage and workshop	Confirmed roost	2 (Sweco) 1 (RSK)	Common pipistrelle	5	re-entered a roost through a crack at the top of the west wall of the workshop at dawn	Day roost		Yes
[REDACTED] B3 main house	High	1 (Sweco) 2 (RSK)	None			N/A		Yes
[REDACTED] B4 stable block	High	3 (Sweco)	Common pipistrelle	1	emerged from the south-west corner roof	Day roost		Yes
[REDACTED] ouse	High	4 (Sweco)	Common pipistrelle Soprano pipistrelle	1 1	northern-most extension on the west aspect and between the extensions on the west aspect.	Day roosts x2		Yes
[REDACTED] garage/workshop	High	4 (Sweco)	Brown long-eared	20	emerged from an open door on the southern aspect/north	Potential maternity		Yes

Receptor	Bat Roost Potential	Number of surveys completed	Species	Maximum number of bats observed	Roost location/notes	Roost classification	Directly affected	Indirectly affected
					aspect under the eaves			
		Internal inspection	Brown long-eared	25	Observed visually during inspection	Potential maternity		
██████ holiday accommodation	Moderate	2 (Sweco)				N/A		Yes
Tree A/T77	Confirmed roost	1 (Sweco) 2 (RSK – see Annex E)	Common pipistrelle	1	From cavity in tree.	Day roost	Yes	
Tree B	Moderate/potential roost	2 (Sweco)	Common pipistrelle	1	flew behind the limb with the PRF and appeared to fly into the tree.	Potential day roost	Yes	
Tree C	Confirmed roost	3 (Sweco)	Pipistrelle species Potentially common pipistrelle Common pipistrelle	1 3 1	one from the top of the tree and one from an east-facing branch.	Confirmed day roost x1 Potential day roost x2	Yes	
Tree D/T78	Confirmed roost	1 (Sweco) 3 (RSK – see Annex E)	Common pipistrelle	1	split in a limb over the track	Day roost	Yes	
Tree E	Confirmed roost	3 (Sweco)	Unidentified bat Common pipistrelle Soprano pipistrelle Potential Myotis sp.	1-2 2-4 4-5 2	Cavity 2m high on the central trunk Cavity 2m high on the right-most trunk cavity 5m high on the central trunk SW aspect of trunk	Day roosts x3 – two confirmed, one potential	Yes	

Receptor	Bat Roost Potential	Number of surveys completed	Species	Maximum number of bats observed	Roost location/notes	Roost classification	Directly affected	Indirectly affected
Tree F	Confirmed roost	3 (Sweco)	Pipistrelle species Common pipistrelle	5 1	Unclear if Tree F or Tree G	Day roost	Yes	
Tree G	Confirmed roost	3 (Sweco)	Pipistrelle species Common pipistrelle	1 1	North aspect.	Day roost	Yes	
Tree 1	High	3 (RSK – see Annex E)	Common pipistrelle	1	Single record of emerging bat out of 3 surveys.	Day roost	Yes	
Tree 4	High	3 (RSK – see Annex E)				N/A		
Tree 5	High	3 (RSK – see Annex E)				N/A		
Tree 6	High	3 (RSK – see Annex E)				N/A		
Tree 9	Moderate	2 (RSK – see Annex E)				N/A		
Tree 43	High	3 (RSK – see Annex E)				N/A		
Tree 48	High	3 (RSK – see Annex E)				N/A		
Tree 49	Confirmed roost	2 (RSK – see Annex E)	Common pipistrelle	1	No further details given	Day roost		Yes
Tree 50	Confirmed roost	2 (RSK – see Annex E)	Pipistrelle species	2	No further details given	Day roost		Yes
Tree 51	High	3 (RSK – see Annex E)	Unknown	Unknown	Unknown	Previously confirmed	Yes	
Tree 61	High	2 (Sweco)				N/A		
Tree 62	Moderate	2 (Sweco) 2 (RSK – see Annex E)				N/A		

Receptor	Bat Roost Potential	Number of surveys completed	Species	Maximum number of bats observed	Roost location/notes	Roost classification	Directly affected	Indirectly affected
Tree 65	Moderate	1 (Sweco) 2 (RSK – see Annex E)				N/A		
Tree 73	Moderate	2 (RSK – see Annex E)				N/A		
Tree 74	Confirmed roost	3 (Sweco)	Common pipistrelle Unidentified bat	1 1	No further details given	Day roost		Yes
Tree 75	Moderate	2 (Sweco)				N/A		
Tree 76	Moderate	2 (Sweco)				N/A		
Tree 77 (see Tree A above)								
Tree 78 (see D above)	Confirmed roost	3 (RSK – see Annex E)	Common pipistrelle	1	Split in limb over track	Day roost		
Tree 79	Moderate	2 (RSK – see Annex E)				N/A		
Tree 80	Confirmed roost	3 (RSK – see Annex E)	Pipistrelle species Brown long-eared	1 1	SW side of trunk and end of east facing limb	Day roost x2		Yes
Tree 81	Confirmed roost	3 (RSK – see Annex E)	Soprano pipistrelle	4	SW side of trunk and end of east facing limb	Day roost	Yes	
Tree 82	High	2 (RSK – see Annex E)	Soprano pipistrelle	1	Main trunk	Day roost	Yes	
Tree 83	Confirmed roost	3 (RSK – see Annex E)	Soprano pipistrelle	1	Main trunk	Day roost	Yes	
Tree 84	Moderate	2 (RSK – see Annex E)				N/A		

Receptor	Bat Roost Potential	Number of surveys completed	Species	Maximum number of bats observed	Roost location/notes	Roost classification	Directly affected	Indirectly affected
Tree 85	Moderate	2 (Sweco)				N/A		
Tree 90	Confirmed roost	2 (Sweco)	Unidentified bat (likely pipistrelle)	1	No further details given	Day roost		Yes
Tree 91	Moderate	2 (Sweco)				N/A		
Tree 92	Moderate	2 (Sweco)				N/A		
Tree 93	Moderate	2 (Sweco)				N/A		
Tree 94	Moderate	1 (Sweco)				N/A		
Tree 95	Moderate	1 (Sweco)				N/A		
Tree 97	Moderate	2 (RSK – see Annex E)				N/A		
Tree 98	Moderate	1 (Sweco)				N/A		
Tree 99	Confirmed roost	1 (Sweco)	Common pipistrelle	2	No further details given	Day roost	Yes	
Tree 100	Moderate	2 (Sweco)				N/A		
Tree 101	High	2 (Sweco)	Potential unidentified bat	1	No further details given	Potential day roost	Yes	
Tree 102	Moderate	2 (RSK – see Annex E)				N/A		
Tree 103	Moderate	2 (RSK – see Annex E)				N/A		
Tree 117	Moderate	2 (RSK – see Annex E)				N/A		
Tree 118	Moderate	2 (RSK – see Annex E)	Soprano pipistrelle	1	No further details given	Day roost	Yes	

Receptor	Bat Roost Potential	Number of surveys completed	Species	Maximum number of bats observed	Roost location/notes	Roost classification	Directly affected	Indirectly affected
Tree 119	Moderate	2 (RSK – see Annex E)				N/A		
Tree 120	Moderate	2 (RSK – see Annex E)				N/A		
Tree 121	Moderate	2 (RSK – see Annex E*)	Soprano pipistrelle	1	No further details given	N/A		Yes
Tree 122	Moderate	2 (RSK – see Annex E)				N/A		
Tree 123	Moderate	2 (RSK – see Annex E)	Soprano pipistrelle	1	No further details given	Day roost		Yes

*the survey of tree 121 undertaken on 15 August 2019 identified the soprano pipistrelle roost detailed in Table 5-1 above. Whilst this survey has been reported on in RSKs report (see Annex E) the roost has been omitted by error.

7. Mitigation

7.1. Overview

- 7.1.1. In relation to the high level of protection enjoyed by bats in the UK (see section 6) (Impact assessment) it is a mandatory requirement to ensure that works which are undertaken as part of the Proposed Scheme do not result in an offence (**TR010038/APP/6.1**). Therefore any action which can reasonably be expected to result in bats being killed, injured or directly/indirectly disturbed, or their roosts damaged, destroyed or becoming otherwise unusable – must be planned for and managed. It is an offence to carry out such actions unless a valid licence from Natural England has been approved, and the conditions of such a licence must be followed and a report must be submitted following completion of the work (<https://www.gov.uk/government/publications/bats-apply-for-a-mitigation-licence>). The results published in this report provide a baseline against which a licence application may be made, however the status of bat roosts may change. A suitably qualified ecologist (SQE) must assess whether sufficient up-to-date information is known about roosts prior to a licence application being submitted, and data collection should be undertaken in accordance with the pertinent BCT guidelines (Collins, 2016). CIEEM advise that survey results more than 3 years old are unlikely to be valid (CIEEM, 2019).
- 7.1.2. The impacts which can be expected to occur as a result of a road development scheme are complex and may vary over time (since summer nursery roosts and winter hibernation roosts have higher conservation value than smaller or more transient roosts used intermittently through the year) and the following sections identify the measures to be considered as part of the bat species protection plan (SPP) in relation to works being undertaken at or adjacent to bat roosts, and the SPP will include an emergency plan in case of bats being found unexpectedly during works.
- 7.1.3. Although artificial bat roosting habitat cannot replace the range of natural cavities and features that trees provide, they can create additional roosting opportunities for a variety of species (particularly where no potential existed previously) and boxes can be fitted on trees. Replacement bat roosting habitat must be provided to offset the loss of bat roosts within buildings/trees.

Buildings

- 7.1.4. Where buildings containing bat roosts are to be demolished, altered or significantly disturbed the bat licence will identify the specific measures which will be taken to exclude bats from the roost and ensure bats have not re-entered prior to the work taking place.

- 7.1.5. Demolition and building alterations must take into account advice given within the Bat Mitigation Guidelines (Mitchell-Jones, 2004) in relation to safeguarding bats and their roosts during building work at known bat roosts. The use of screens to reduce impacts on known roost entrances should be considered where works in close proximity to known roost buildings.
- 7.1.6. Consideration must be given to the requirement for, intensity and positioning of temporary and permanent lighting. Bats are very susceptible to changes in ambient lighting (BCT & ILP, 2018) and inappropriate lighting can result in roosts being abandoned, increased predation and changes to behaviour (such as suitability of commuting routes/flight lines). Wherever possible night working should be avoided near bat roosts, commuting routes and foraging areas and lighting should be directed away from roosts and used only temporarily.

7.2. Tree work operations

- 7.2.1. Where trees containing bat roosts are to be felled or extensively pruned the bat licence will identify the specific measures which will be taken to exclude bats from the roost, ensure bats have not re-entered and for the felling of the tree.
- 7.2.2. Section felling, soft-felling and other means of lowering limbs and/or entire trees to the ground under the supervision of the SQE should be considered where it is not possible to fully assess a tree before it is felled and the emergency plan will include details of the nearest alternative feature to be used in case a bat is found during works.
- 7.2.3. Where trees with bat roost potential (at which roosts have NOT been confirmed) the SQE must undertake a pre-felling check on the tree, from the ground, using binoculars, torch, endoscope, Polekam or via tree climbing or platform in order to ensure that the cavities are fully inspected. Felling should take place immediately thereafter or certainly within 24 hours (48 hours in winter) to ensure that bats don't move in.

8. References

- Altringham, J. (2003). British Bats. New Naturalist. Harper Collins.
- BCT/ILP (2018). Guidance Note 08/18. Bats and Artificial Lighting in the UK. Bats and the Built Environment Series. Available at <https://www.bats.org.uk/our-work/buildings-planning-and-development/lighting>.
- CIEEM (2019). Advice Note on the Lifespan of Ecological Reports and Surveys. Available at <https://cieem.net/wp-content/uploads/2019/04/Advice-Note.pdf>.
- Collins, J. (ed)(2016). Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd Edition). The Bat Conservation Trust.
- Harris, S., Cresswell, P. and Jefferies, D. (1989). Surveying Badgers. The Mammal Society. London.
- JNCC (2019). Article 17 Habitats Directive Report 2019: Species Conservation Status Assessments 2019. Online: <https://jncc.gov.uk/our-work/article-17-habitats-directive-report-2019-species/>.
- Mitchell-Jones, A.J. (2004). Bat Mitigation Guidelines. English Nature. Available at <http://www.warksbats.co.uk/pdf/Batmitigationguide.pdf>.
- Norfolk Local Biodiversity Action Plan. <http://www.norfolkbiodiversity.org/assets/Uploads/>
- Russ, J. (2012). British Bat Calls A Guide to Species Identification. Pelagic Publishing, Exeter.
- Stileman (2011). Bats in the Context of Tree Work Operations, the Arboricultural Association.

Annex A – Full emergence/re-entry survey results

Emergence/re-entry surveys

25/6/19 Dusk emergence survey – [REDACTED] (Location A)

21:14: soprano pipistrelle commuting unseen.

21:15: common pipistrelle commuting unseen.

21:17: *Pipistrellus* sp. foraging around trees to the north of the [REDACTED]

21:19: common pipistrelle commuting east to west over the trees west of the [REDACTED].

21:26: soprano pipistrelle commuting unseen.

21:28: soprano pipistrelle commuting unseen.

21:30: soprano pipistrelle commuting unseen.

21:31: soprano pipistrelle foraging around trees to the north west of the [REDACTED] for five (5) minutes.

21:37: *Pipistrellus* sp. commuting east to west along tree line to the north of the church.

21:38: common pipistrelle commuting unseen.

21:38: soprano pipistrelle foraging around trees to the north west of the [REDACTED] for four (4) minutes.

21:43: common pipistrelle commuting unseen.

21:44: common pipistrelle commuting north to south.

21:44: soprano pipistrelle commuting unseen.

21:46: common pipistrelle commuting unseen.

21:49: common pipistrelle commuting foraging around trees to the north west of the [REDACTED].

21:49: soprano pipistrelle commuting unseen.

21:53: soprano pipistrelle commuting unseen.

21:57: soprano pipistrelle commuting unseen.

22:13: common pipistrelle commuting unseen.

22:26: common pipistrelle foraging around trees to the west of the [REDACTED] for five (5) minutes.

22:32: common pipistrelle commuting unseen.

22:36: brown-long eared bat emerged from the north aspect of the [REDACTED]

22:37: *Pipistrellus* sp. commuting unseen.

22:38: common pipistrelle foraging over churchyard north of the [REDACTED] for one (1) minute.

22:43: common pipistrelle commuting unseen.

22:45: common pipistrelle commuting unseen.

22:49: common pipistrelle commuting unseen.

22:51: common pipistrelle commuting unseen.

22:52: common pipistrelle commuting unseen.

25/6/19 Dusk emergence survey – [REDACTED] (Location B)

21:13: soprano pipistrelle commuting unseen.

21:15: *Pipistrellus* sp. commuting unseen.

21:17: soprano pipistrelle commuting west to east along tree line to the north of the [REDACTED]

21:23: soprano pipistrelle commuting unseen.

21:28: soprano pipistrelle foraging around trees to the east of the [REDACTED]

21:31: soprano pipistrelle foraging around trees to the east of the [REDACTED]

21:32: soprano pipistrelle commuting unseen.

21:33: soprano pipistrelle commuting east to west along tree line to the north of the [REDACTED]

21:35: soprano pipistrelle commuting unseen.

21:36: soprano pipistrelle commuting unseen.

21:37: common pipistrelle commuting east to west along tree line to the north of the [REDACTED]

21:40: soprano pipistrelle commuting unseen.

21:42: soprano pipistrelle commuting unseen.

21:43: soprano pipistrelle foraging around trees to the north of the [REDACTED]

21:44: soprano pipistrelle commuting east to west along tree line to the north of the [REDACTED]

21:46: soprano pipistrelle and common pipistrelle commuting unseen.

21:47: soprano pipistrelle commuting unseen.

21:49: common pipistrelle commuting unseen.

21:51: soprano pipistrelle commuting unseen.

21:53: soprano pipistrelle foraging around trees to the north of the [REDACTED]

21:57: soprano pipistrelle foraging around trees to the north of the [REDACTED]

22:13: common pipistrelle commuting unseen.

22:27: common pipistrelle commuting in a circle over the churchyard to the north of the [REDACTED] Two (2) bats in tandem flight.

22:30: common pipistrelle commuting unseen.

22:39: common pipistrelle commuting unseen.

22:43: common pipistrelle commuting unseen.

22:45: common pipistrelle commuting unseen.

22:47: common pipistrelle commuting unseen.

22:49: common pipistrelle commuting east to west along tree line to the north of the [REDACTED]

22:50: common pipistrelle commuting east to west along tree line to the north of the [REDACTED]

22:51: soprano pipistrelle commuting unseen.

22:54: common pipistrelle commuting unseen.

25/6/19 Dusk emergence survey – [REDACTED] (Location C)

21:29: noctule commuting unseen.

21:31: *Pipistrellus* sp. commuting unseen.

21:33: *Pipistrellus* sp. commuting unseen.

21:33: common pipistrelle commuting unseen.

21:35: soprano pipistrelle commuting unseen.

21:44: common pipistrelle commuting unseen.

21:46: soprano pipistrelle commuting south to north, passing to the west of the [REDACTED] at a height of approximately 2.5m.

21:51: soprano pipistrelle commuting unseen.

21:56: soprano pipistrelle commuting east to west, passing to the south of the [REDACTED] at a height of approximately 2.5m. Circled overhead briefly.

21:57: soprano pipistrelle commuting unseen.

22:10: *Pipistrellus* sp. commuting unseen.

22:19: common pipistrelle commuting unseen.

22:27: brown long-eared bat commuting east to west, passing to the south of the [REDACTED] at a height of approximately 3m.

22:27: *Pipistrellus* sp. commuting unseen.

22:35: noctule commuting unseen.

22:27: brown long-eared bat commuting south to north, passing to the west of the [REDACTED] at a height of approximately 2.5m.

22:36: common pipistrelle commuting unseen.

22:40: common pipistrelle commuting unseen.

22:41: soprano pipistrelle commuting unseen.

22:42: soprano pipistrelle commuting unseen.

22:44: soprano pipistrelle commuting unseen.

22:45: *Pipistrellus* sp. commuting unseen.

22:51: soprano pipistrelle commuting unseen.

25/6/19 Dusk emergence survey – [REDACTED] (Location D)

21:57: soprano pipistrelle commuting west to east at a height of approximately 2m.

22:10: common pipistrelle commuting unseen.

22:27: soprano pipistrelle commuting unseen.

22:28: brown long-eared bat commuting unseen.

22:29: common pipistrelle commuting unseen.

22:30: soprano pipistrelle commuting unseen.

22:36: common pipistrelle commuting unseen.

22:45: soprano pipistrelle commuting unseen.

22:47: soprano pipistrelle commuting unseen.

22:51: soprano pipistrelle commuting unseen.

22:52: soprano pipistrelle commuting unseen.

30/7/19 Dusk emergence survey – Tree 74 (surveyor 1)

20:57: common pipistrelle commuting west to east.

21:03: common pipistrelle commuting south to north along track. Two (2) bats seen.

21:05: common pipistrelle commuting and foraging at entrance to woods from track for four (4) minutes. Six (6) bats seen.

21:09: noctule commuting unseen.

21:10: soprano pipistrelle commuting unseen.

21:15: soprano pipistrelle commuting unseen.

21:19: common pipistrelle emerged from Tree 74, departing to the east.

21:19: soprano pipistrelle commuting and foraging. Two (2) bats seen.

21:19: common pipistrelle commuting unseen.

- 21:23: soprano pipistrelle commuting unseen.
- 21:24: common pipistrelle commuting and foraging unseen.
- 21:25: soprano pipistrelle and common pipistrelle commuting and foraging unseen.
- 21:26: common pipistrelle commuting unseen.
- 21:26: common pipistrelle foraging unseen.
- 21:27: brown long-eared bat commuting unseen.
- 21:27: common pipistrelle foraging unseen.
- 21:29: common pipistrelle foraging unseen.
- 21:32: soprano pipistrelle commuting unseen.
- 21:33: *Myotis* sp. commuting unseen.
- 21:35: common pipistrelle foraging unseen.
- 21:35: common pipistrelle commuting unseen.
- 21:37: *Myotis* sp. commuting unseen.
- 21:39: common pipistrelle commuting unseen.
- 21:39: soprano pipistrelle commuting unseen.
- 21:41: common pipistrelle commuting unseen.
- 21:45: common pipistrelle commuting unseen.
- 21:49: common pipistrelle commuting unseen.
- 21:55: noctule commuting unseen.

30/7/19 Dusk emergence survey – Tree 74 (surveyor 2)

- 21:23: common pipistrelle foraging to the west of Tree 74. Flew in from the north and circled overhead at a height of approximately 3m.
- 21:26: noctule commuting unseen.
- 21:30: soprano pipistrelle commuting west to east, entering the tree line north of Tree 74 at a height of between 3 and 4m.

21:41: common pipistrelle commuting from the east, over the treeline and heading north, following the treeline at a height of between 3 and 4m.

21:42: barbastelle commuting south to north, passing to the west of Tree 74 at a height of approximately 2m.

21:48: barbastelle commuting unseen.

21:50: barbastelle commuting unseen.

21:52: barbastelle commuting unseen.

22:01: barbastelle commuting unseen.

22:09: soprano pipistrelle commuting unseen.

30/7/19 Dusk emergence survey – Tree 75 and Tree 76

21:23: common pipistrelle commuting unseen.

21:25: soprano pipistrelle commuting unseen.

22:03: soprano pipistrelle commuting unseen.

30/7/19 Dusk emergence survey – Tree 74, Tree 75 and Tree 76

21:03: soprano pipistrelle commuting south to north along track.

21:03 to 21:05: common pipistrelle commuting south to north along track. Three (3) bats seen.

21:09: common pipistrelle commuting south to north along hedgerow.

21:10 to 21:12: common pipistrelle commuting south to north along track. Five (5) bats seen.

21:15: common pipistrelle commuting south to north along track.

21:17: common pipistrelle commuting south to north along track. Two (2) bats seen.

21:19: common pipistrelle commuting south to north along track.

21:20: common pipistrelle commuting south to north along track. Two (2) bats seen.

21:21: common pipistrelle commuting north to south along track.

21:23: common pipistrelle commuting south to north along track.

21:28: barbastelle commuting unseen.
21:29: common pipistrelle commuting unseen.
21:32: common pipistrelle commuting south to north along track.
21:33: *Myotis* sp. pipistrelle commuting unseen.
21:33: common pipistrelle commuting unseen.
21:33: common pipistrelle commuting south to north along track.
21:37: *Myotis* sp. commuting south to north along track.
21:39: common pipistrelle commuting unseen.
21:40: common pipistrelle commuting unseen.
21:42: common pipistrelle commuting south to north along track.
21:42: barbastelle commuting south to north along track.

[31/7/19 Dawn re-entry survey – Tree 90 and Tree 91 \(surveyor 1\)](#)

03:54: barbastelle commuting unseen.

[31/7/19 Dawn re-entry survey – Tree 90 and Tree 91 \(surveyor 2\)](#)

03:48: barbastelle commuting unseen.
03:51: barbastelle commuting unseen.
03:54: barbastelle commuting unseen.
04:00: common pipistrelle commuting unseen.
04:03: common pipistrelle commuting unseen.
04:07: common pipistrelle commuting unseen.
04:14: soprano pipistrelle commuting unseen.
04:17: soprano pipistrelle commuting unseen.
04:19: soprano pipistrelle commuting unseen.
04:21: soprano pipistrelle commuting unseen.

04:24: soprano pipistrelle commuting unseen.

04:31: soprano pipistrelle commuting unseen.

[31/7/19 Dawn re-entry survey – Tree 92 and Tree 93 \(surveyor 1\)](#)

No bats were detected during this survey.

[31/7/19 Dawn re-entry survey – Tree 92 and Tree 93 \(surveyor 2\)](#)

03:50: barbastelle commuting unseen.

03:51: barbastelle commuting unseen.

03:55: barbastelle commuting unseen.

03:57: barbastelle commuting unseen.

03:58: barbastelle commuting unseen.

03:59: common pipistrelle commuting unseen.

04:04: barbastelle commuting unseen.

04:08: soprano pipistrelle commuting unseen.

04:09: soprano pipistrelle foraging unseen for two (2) minutes.

04:22: soprano pipistrelle foraging in circles around Tree 92 for four (4) minutes.

[31/7/19 Dusk emergence survey – \[REDACTED\] \(Location A\)](#)

20:40: soprano pipistrelle foraging over [REDACTED].

20:49: soprano pipistrelle foraging over [REDACTED].

20:59: soprano pipistrelle commuting unseen.

21:02: soprano pipistrelle commuting east to west over the trees to the [REDACTED].

21:07: common pipistrelle commuting unseen.

21:08: soprano pipistrelle commuting unseen.

21:10: soprano pipistrelle foraging back and forth along the treeline to the west of the [REDACTED].

21:12: soprano pipistrelle foraging back and forth along the treeline to the west of the [REDACTED] for one (1) minute.

21:14: soprano pipistrelle foraging around the treeline to the [REDACTED]. Two (2) bats seen.

21:15: soprano pipistrelle commuting unseen.

21:15: noctule commuting unseen.

21:16: soprano pipistrelle foraging around the treeline to the [REDACTED] for four (4) minutes.

21:21: common pipistrelle commuting unseen.

21:22: soprano pipistrelle commuting unseen.

21:23: soprano pipistrelle and common pipistrelle commuting unseen.

21:24: soprano pipistrelle foraging unseen for four (4) minutes.

21:28: common pipistrelle over churchyard to the north of [REDACTED]

21:31: brown long-eared bat commuting unseen.

21:32: Leisler's bat commuting unseen.

21:37: common pipistrelle commuting unseen.

21:22: soprano pipistrelle commuting south to north towards the A47.

21:59: common pipistrelle commuting unseen.

22:12: brown long-eared bat commuting unseen. Surveyor noted calls which were suspected to be Leisler's but there are no recordings from this time to verify the identification.

31/7/19 Dusk emergence survey – [REDACTED] (Location B)

20:39: soprano pipistrelle and brown long-eared bat commuting east to west passing to the north of [REDACTED]

20:59: soprano pipistrelle commuting unseen.

21:02: soprano pipistrelle commuting unseen.

21:10: soprano pipistrelle commuting unseen.

21:13: soprano pipistrelle emerged from the north aspect of the church, flying towards the A47.

21:19: soprano pipistrelle commuting and foraging unseen.

21:23: soprano pipistrelle and common pipistrelle commuting and foraging over churchyard to the north of [REDACTED]

21:42: soprano pipistrelle commuting and foraging unseen.

21:52: soprano pipistrelle foraging unseen.

21:55: soprano pipistrelle foraging unseen.

21:59: noctule commuting unseen.

22:08: Leisler's bat commuting unseen.

22:09: noctule commuting unseen.

31/7/19 Dusk emergence survey – [REDACTED] (Location C)

20:39: soprano pipistrelle foraging around the south and west aspects of the church at a height of between 1 and four 4m. Flew in from the south and exited to the west.

20:55: soprano pipistrelle commuting unseen.

21:02: soprano pipistrelle commuting unseen.

21:06: soprano pipistrelle commuting unseen.

21:08: common pipistrelle commuting south to north along the treeline to the west of the [REDACTED] at a height of approximately 2m.

21:09: soprano pipistrelle commuting south to north along the treeline to the west of the [REDACTED] at a height of approximately 2m before reversing direction.

21:11: common pipistrelle foraging in circles for one (1) minute to the west of [REDACTED] at a height of between 1 and 3m before going out of sight around the north of [REDACTED]

21:13: soprano pipistrelle commuting north to south along the treeline to the west of [REDACTED] before turning west over the trees.

21:15: noctule commuting unseen.

21:15: soprano pipistrelle commuting unseen.

21:17: soprano pipistrelle commuting unseen.

21:18: soprano pipistrelle foraging from north of the church to the south at height of approximately 2m.

21:19: soprano pipistrelle foraging unseen.

21:20: soprano pipistrelle foraging north to south to the west of the [REDACTED] at height of approximately 2m.

21:22: common pipistrelle foraging unseen.

21:23: soprano pipistrelle foraging in circles to the southwest of the [REDACTED] before exiting to the north.

21:25: soprano pipistrelle commuting unseen.

21:29: soprano pipistrelle commuting unseen.

21:31: soprano pipistrelle foraging in circles to the southwest of [REDACTED] before exiting to the north.

21:35: soprano pipistrelle commuting unseen.

21:37: common pipistrelle commuting unseen.

21:40: soprano pipistrelle commuting unseen.

21:41: soprano pipistrelle commuting unseen.

21:48: common pipistrelle commuting unseen.

21:52: common pipistrelle commuting unseen.

21:53: soprano pipistrelle commuting unseen.

21:53: common pipistrelle commuting unseen.

21:55: soprano pipistrelle and common pipistrelle commuting unseen.

21:59: noctule commuting unseen.

22:09: common pipistrelle commuting unseen.

22:12: noctule commuting unseen.

22:20: noctule commuting unseen.

31/7/19 Dusk emergence survey – [REDACTED] (Location D)

20:47: common pipistrelle commuting eastwards over the trees to the west of [REDACTED] swooped over [REDACTED] and flew away to the west.

21:10: soprano pipistrelle commuting south to north passing to the east of the [REDACTED]

21:15: noctule commuting unseen.

21:15: soprano pipistrelle commuting unseen.

21:19: soprano pipistrelle commuting unseen.

21:23: *Pipistrellus* sp. commuting unseen.

21:25: common pipistrelle commuting unseen.

21:31: soprano pipistrelle commuting unseen.

21:44: soprano pipistrelle commuting unseen.

21:45: soprano pipistrelle commuting unseen.

21:51: common pipistrelle commuting unseen.

21:52: soprano pipistrelle commuting unseen.

21:54: soprano pipistrelle commuting unseen.

21:59: noctule commuting unseen.

22:09: *Pipistrellus* sp. commuting unseen.

22:11: *Pipistrellus* sp. commuting unseen.

22:12: noctule commuting unseen.

22:12: brown long-eared bat commuting unseen.

22:19: brown long-eared bat commuting unseen.

1/8/19 Dawn re-entry survey – Tree 85 (surveyor 1)

03:41: soprano pipistrelle commuting unseen.

03:46: soprano pipistrelle commuting unseen.

03:48: common pipistrelle commuting unseen.

- 03:52: soprano pipistrelle commuting unseen.
- 03:56: common pipistrelle commuting unseen.
- 03:57: soprano pipistrelle commuting unseen.
- 04:08: soprano pipistrelle commuting unseen.
- 04:13: soprano pipistrelle commuting unseen.
- 04:16: common pipistrelle commuting unseen.
- 04:18: common pipistrelle commuting unseen.
- 04:22: soprano pipistrelle commuting unseen.
- 04:30: soprano pipistrelle foraging in circles to the west of Tree 85.
- 04:34: soprano pipistrelle commuting unseen.
- 04:37: noctule commuting unseen.
- 04:38: soprano pipistrelle commuting unseen.
- 04:39: noctule commuting northwards along the drain to the west of Tree 85 before turning eastwards.
- 04:41: soprano pipistrelle commuting unseen.
- 04:42: soprano pipistrelle commuting unseen.
- 04:44: soprano pipistrelle commuting unseen.
- 04:51: noctule commuting unseen.
- 04:54: soprano pipistrelle commuting unseen.
- 04:59: common pipistrelle commuting north to south passing to the west of Tree 85.

[1/8/19 Dawn re-entry survey – Tree 85 \(surveyor 2\)](#)

- 03:52: common pipistrelle commuting unseen.
- 03:56: common pipistrelle commuting unseen.
- 04:16: common pipistrelle commuting unseen.
- 04:40: noctule commuting unseen.

1/8/19 Dawn re-entry survey – Tree 62 (surveyor 1)

05:03: noctule commuting unseen.

1/8/19 Dawn re-entry survey – Tree 62 (surveyor 2)

03:40: common pipistrelle commuting unseen.

03:41: common pipistrelle commuting unseen.

03:45: common pipistrelle commuting unseen.

03:50: common pipistrelle commuting unseen.

03:53: soprano pipistrelle and common pipistrelle commuting unseen.

1/8/19 Dusk emergence survey – [REDACTED] (Location A)

21:10: brown long-eared bat commuting west to east in front of the garage.

21:16: brown long-eared bat emerging from open garage door.

21:17: brown long-eared bat emerging from open garage door.

21:19: brown long-eared bat emerging from open garage door.

21:20: brown long-eared bat emerging from open garage door.

21:21: brown long-eared bat emerging from open garage door. Three (3) bats emerged in quick succession.

21:22: brown long-eared bat emerging from open garage door. Three (3) bats emerged in quick succession.

21:23: soprano pipistrelle commuting unseen.

21:27: brown long-eared bat emerging from open garage door. Two (2) bats emerged in quick succession.

21:28: brown long-eared bat emerging from open garage door.

21:31: brown long-eared bat emerging from open garage door. Immediately flew back into the garage.

21:32: brown long-eared bat emerging from open garage door.

21:33: brown long-eared bat emerging from open garage door.

21:34: brown long-eared bat emerging from open garage door. Two (2) bats emerged in quick succession.

21:35: brown long-eared bat emerging from open garage door.

21:35: common pipistrelle commuting over main house.

21:38: common pipistrelle commuting unseen.

21:40: brown long-eared bat emerging from open garage door.

21:40: common pipistrelle commuting unseen.

21:43: brown long-eared bat emerging from open garage door.

21:43: common pipistrelle commuting unseen.

21:45: common pipistrelle commuting unseen.

21:49: common pipistrelle commuting unseen.

21:52: noctule commuting unseen.

21:54: common pipistrelle foraging unseen for three (3) minutes.

21:58: brown long-eared bat commuting unseen.

22:11: soprano pipistrelle commuting unseen.

22:13: soprano pipistrelle commuting unseen.

22:14: soprano pipistrelle foraging unseen for three (3) minutes.

22:16: noctule commuting unseen.

22:13: common pipistrelle commuting unseen.

1/8/19 Dusk emergence survey – [REDACTED] (Location B)

21:04: soprano pipistrelle commuting unseen.

21:06: soprano pipistrelle commuting unseen.

21:13: common pipistrelle commuting unseen.

21:14: common pipistrelle emerged from the northern extension to the farmhouse on the west of the building.

-
- 21:15: soprano pipistrelle foraging over the garden to the west of the farmhouse.
- 21:17: soprano pipistrelle foraging over the garden to the south of the farmhouse.
- 21:20: soprano pipistrelle foraging unseen.
- 21:22: soprano pipistrelle foraging over the garden to the west of the farmhouse.
- 21:23: noctule commuting unseen.
- 21:25: common pipistrelle commuting unseen.
- 21:27: soprano pipistrelle emerged from between the two (2) extensions to the farmhouse on the west of the building.
- 21:32: soprano pipistrelle commuting unseen.
- 21:35: common pipistrelle foraging unseen.
- 21:37: common pipistrelle foraging unseen.
- 21:49: brown long-eared bat commuting unseen.
- 21:52: noctule commuting unseen.
- 21:54: brown long-eared bat commuting unseen.
- 21:56: common pipistrelle commuting unseen.
- 21:57: noctule commuting unseen.
- 21:57: common pipistrelle commuting unseen.
- 21:58: brown long-eared bat commuting unseen.
- 22:09: common pipistrelle commuting unseen.
- 22:11: noctule commuting unseen.
- 22:12: soprano pipistrelle commuting unseen.
- 22:13: noctule commuting unseen.
- 22:14: soprano pipistrelle commuting unseen.
- 22:16: noctule commuting unseen.
- 22:17: brown long-eared bat foraging unseen.

22:17: noctule commuting unseen.

22:17: soprano pipistrelle commuting unseen.

22:18: common pipistrelle commuting unseen.

1/8/19 Dusk emergence survey – [REDACTED] (Location C)

20:52: unidentified bat, not picked up by detector, commuting northwards away from the farmhouse.

20:53: common pipistrelle commuting east to west passing to the north of the farmhouse.

21:17: common pipistrelle commuting unseen.

21:18: soprano pipistrelle commuting east to west passing to the north of the farmhouse.

21:19: unidentified bat, not picked up by detector, commuting northwards away from the farmhouse.

21:20: common pipistrelle commuting unseen.

21:22: unidentified bat, not picked up by detector, commuting east to west passing to the north of the farmhouse.

21:23: unidentified bat, not picked up by detector, commuting east to west passing to the north of the farmhouse. Two (2) bats seen.

21:24: soprano pipistrelle commuting.

21:27: brown long-eared bat commuting west to east passing to the north of the farmhouse.

21:31: soprano pipistrelle commuting unseen.

21:32: soprano pipistrelle commuting west to east passing to the north of the farmhouse.

21:34: brown long-eared bat commuting east to west passing to the north of the farmhouse.

21:36: brown long-eared bat emerged from under the eaves of the single storey extension on the north aspect of the garage.

21:37: common pipistrelle commuting east to west passing to the north of the farmhouse.

21:47: soprano pipistrelle commuting unseen.

21:52: noctule commuting unseen.
21:55: common pipistrelle foraging unseen.
21:56: common pipistrelle commuting unseen.
21:57: noctule commuting unseen.
21:58: soprano pipistrelle commuting unseen.
22:07: brown long-eared bat foraging unseen.
22:11: soprano pipistrelle commuting unseen.
22:13: noctule commuting unseen.
22:15: soprano pipistrelle commuting unseen.
22:15: noctule commuting unseen.
22:17: soprano pipistrelle commuting unseen.

1/8/19 Dusk emergence survey – [REDACTED] (Location D)

20:57: common pipistrelle commuting south to north passing over the roof of the holiday accommodation.
21:05: common pipistrelle commuting from behind gable end of the holiday accommodation but not seen to emerge.
21:13: common pipistrelle commuting from behind gable end of the holiday accommodation but not seen to emerge.
21:17: common pipistrelle commuting northwards from between the garage and the holiday accommodation before reversing direction.
21:23: soprano pipistrelle and common pipistrelle foraging to the north of the holiday accommodation for nine (9) minutes.
21:34: brown long-eared bat commuting northwards from between the garage and the holiday accommodation.
21:36: common pipistrelle commuting unseen.
21:40: common pipistrelle foraging around the trees to the north of the holiday accommodation.

21:44: brown long-eared bat commuting unseen.

21:47: soprano pipistrelle commuting unseen.

21:49: brown long-eared bat commuting south to north passing over the roof of the holiday accommodation.

21:52: noctule commuting unseen.

21:55: common pipistrelle foraging unseen.

21:57: noctule commuting unseen.

21:58: brown long-eared bat and soprano pipistrelle commuting unseen.

21:59: soprano pipistrelle foraging unseen.

22:03: soprano pipistrelle foraging unseen.

22:10: noctule and common pipistrelle commuting unseen.

22:11: soprano pipistrelle foraging unseen.

22:13: noctule and soprano pipistrelle commuting unseen.

22:13: Leisler's bat commuting unseen.

13/8/19 Dusk emergence survey – Tree 100 and Tree 101 (surveyor 1)

20:50: soprano pipistrelle commuting unseen.

20:59: soprano pipistrelle commuting unseen.

21:07: common pipistrelle commuting unseen.

21:10: common pipistrelle commuting unseen.

21:11: soprano pipistrelle commuting unseen.

21:13: common pipistrelle commuting east to west before turning south, passing to the west of Tree 100.

21:13: common pipistrelle foraging to the west of Tree 100.

21:24: common pipistrelle foraging unseen.

21:26: common pipistrelle foraging unseen.

21:28: common pipistrelle commuting unseen.

21:28: barbastelle foraging unseen.

21:29: common pipistrelle commuting unseen.

21:31: noctule commuting unseen.

21:34: barbastelle commuting unseen.

21:35: common pipistrelle commuting unseen.

21:40: common pipistrelle commuting unseen.

21:42: soprano pipistrelle commuting unseen.

21:54: barbastelle foraging unseen.

13/8/19 Dusk emergence survey – Tree 100 and Tree 101 (surveyor 2)

20:52: soprano pipistrelle commuting unseen.

20:53: soprano pipistrelle commuting west to east passing to the south of the trees.

21:02: soprano pipistrelle commuting unseen.

21:04: *Pipistrellus* sp. commuting west to east passing to the north of the trees.

21:20: barbastelle commuting unseen.

21:22: common pipistrelle commuting unseen.

21:26: barbastelle commuting west to east passing to the south of the trees.

21:27: common pipistrelle commuting unseen.

21:30: common pipistrelle foraging unseen.

21:31: barbastelle commuting unseen.

21:32: barbastelle commuting unseen.

21:39: barbastelle commuting unseen.

21:51: unidentified bat, not picked up by detector, foraging between the trees.

13/8/19 Dusk emergence survey – Tree 94 and Tree 95 (surveyor 1)

20:50: unidentified bat, not picked up by detector, commuting west to east passing to the north of the trees.

21:04: soprano pipistrelle commuting unseen.

21:08: noctule commuting unseen.

21:26: soprano pipistrelle commuting unseen.

21:31: barbastelle commuting unseen.

21:31: common pipistrelle commuting unseen.

21:32: noctule commuting unseen.

21:32: common pipistrelle commuting unseen.

21:33: common pipistrelle foraging unseen.

21:34: barbastelle commuting unseen.

21:35: barbastelle and common pipistrelle commuting unseen.

21:38: soprano pipistrelle commuting unseen.

21:39: barbastelle commuting unseen.

21:41: barbastelle commuting unseen.

21:42: barbastelle commuting unseen.

21:49: barbastelle commuting unseen.

13/8/19 Dusk emergence survey – Tree 94 and Tree 95 (surveyor 1)

21:08: noctule commuting unseen.

21:26: soprano pipistrelle commuting unseen.

21:32: noctule commuting unseen.

21:36: Leisler's bat commuting unseen.

21:42: soprano pipistrelle commuting unseen.

21:44: soprano pipistrelle commuting unseen.

21:49: common pipistrelle commuting unseen.

14/8/19 Dawn re-entry survey – [REDACTED] (Location A)

04:26: soprano pipistrelle commuting unseen.

04:37: soprano pipistrelle commuting unseen.

04:38: soprano pipistrelle commuting unseen.

04:41: soprano pipistrelle commuting unseen.

04:43: soprano pipistrelle commuting unseen.

04:52: soprano pipistrelle commuting west to east over the trees to the west of [REDACTED]
before turning south and passing to the west of [REDACTED]

04:55: soprano pipistrelle commuting unseen.

05:01: soprano pipistrelle commuting unseen.

05:10: soprano pipistrelle commuting unseen.

05:15: soprano pipistrelle commuting unseen.

14/8/19 Dawn re-entry survey – [REDACTED] (Location B)

04:04: soprano pipistrelle commuting unseen.

04:20: soprano pipistrelle commuting unseen.

04:22: soprano pipistrelle commuting unseen.

04:23: common pipistrelle commuting unseen.

04:25: soprano pipistrelle commuting unseen.

04:35: soprano pipistrelle commuting unseen.

04:38: soprano pipistrelle commuting unseen.

04:40: soprano pipistrelle commuting unseen.

04:41: soprano pipistrelle commuting unseen.

04:43: soprano pipistrelle commuting unseen.

04:50: soprano pipistrelle commuting unseen.

04:52: soprano pipistrelle commuting unseen.

04:55: soprano pipistrelle commuting unseen.

04:57: soprano pipistrelle commuting unseen.

04:58: soprano pipistrelle commuting unseen.

05:01: soprano pipistrelle commuting unseen.

05:10: soprano pipistrelle commuting unseen.

05:12: soprano pipistrelle commuting unseen.

05:15: soprano pipistrelle commuting unseen.

14/8/19 Dawn re-entry survey – [REDACTED] (Location C)

04:26: soprano pipistrelle commuting unseen.

04:30: *Myotis* sp. commuting unseen.

04:31: common pipistrelle commuting unseen.

04:54: soprano pipistrelle foraging unseen.

04:57: soprano pipistrelle foraging unseen.

05:01: soprano pipistrelle foraging unseen.

14/8/19 Dawn re-entry survey – [REDACTED] (Location D)

04:19: soprano pipistrelle commuting unseen.

04:23: common pipistrelle commuting unseen.

04:25: soprano pipistrelle commuting unseen.

04:32: common pipistrelle commuting unseen.

04:35: soprano pipistrelle commuting unseen.

04:38: soprano pipistrelle commuting unseen.

04:39: soprano pipistrelle commuting unseen.

04:41: soprano pipistrelle commuting unseen.

04:42: soprano pipistrelle commuting unseen.

04:53: soprano pipistrelle commuting unseen.

05:01: soprano pipistrelle foraging unseen.

14/8/19 Dusk emergence survey – [REDACTED] (Location A)

20:19: common pipistrelle emerged from eaves on south west corner of the [REDACTED]
[REDACTED]

20:30: soprano pipistrelle foraging over [REDACTED]

20:35: common pipistrelle foraging north to south passing to the west of [REDACTED]

20:41: soprano pipistrelle foraging south to north along the treeline to the west of [REDACTED]
[REDACTED]

20:43: soprano pipistrelle emerged from eaves on south aspect of the main body of the [REDACTED]
[REDACTED] Three (3) bats seen to emerge.

20:46: soprano pipistrelle foraging over churchyard to the [REDACTED]

20:48: common pipistrelle foraging south to north along the treeline to the west of the [REDACTED]
[REDACTED]

20:53: soprano pipistrelle foraging north to south along the treeline to the west of the [REDACTED]
[REDACTED]

20:53: common pipistrelle foraging west to east passing to the south of the [REDACTED].

20:55: common pipistrelle possibly emerged from eaves on south west corner of the main
body of the [REDACTED]

21:01: *Pipistrellus* sp. commuting unseen.

21:03: noctule foraging unseen.

21:04: soprano pipistrelle foraging unseen.

21:08: barbastelle foraging unseen.

21:09: barbastelle and *Pipistrellus* sp. foraging unseen.

21:12: soprano pipistrelle and common pipistrelle commuting unseen. Social calls
continuously for twenty-eight (28) minutes.

21:22: noctule commuting unseen.

21:24: barbastelle commuting unseen.

21:30: soprano pipistrelle commuting unseen.

21:30: common pipistrelle commuting unseen.

14/8/19 Dusk emergence survey – [REDACTED] (Location B)

20:19: common pipistrelle commuting unseen.

20:24: common pipistrelle emerged from eaves on south aspect of the main body of the [REDACTED]

20:36: common pipistrelle commuting south eastwards at a height of approximately 2m.

20:41: soprano pipistrelle commuting unseen.

20:46: soprano pipistrelle commuting unseen.

20:48: soprano pipistrelle commuting unseen.

20:51: common pipistrelle commuting south to north passing to the east of the [REDACTED]

21:01: common pipistrelle commuting unseen.

21:02: *Myotis* sp. commuting unseen.

21:03: noctule commuting unseen.

21:11: soprano pipistrelle commuting unseen.

21:33: brown long-eared bat commuting unseen.

21:39: common pipistrelle commuting unseen.

21:44: soprano pipistrelle commuting unseen.

14/8/19 Dusk emergence survey – [REDACTED] (Location C)

20:29: soprano pipistrelle commuting unseen.

20:30: common pipistrelle commuting unseen.

20:31: common pipistrelle foraging over the [REDACTED] for twenty-two (22) minutes.

20:33: common pipistrelle commuting unseen.

20:44: soprano pipistrelle commuting unseen.

20:45: common pipistrelle commuting across the [REDACTED]
heading south east.

20:47: soprano pipistrelle foraging over the [REDACTED]

20:53: soprano pipistrelle commuting south to north passing to the east of [REDACTED]

20:59: common pipistrelle commuting unseen.

20:59: soprano pipistrelle commuting unseen.

21:02: soprano pipistrelle commuting unseen.

21:02: noctule commuting unseen.

21:10: common pipistrelle commuting unseen.

14/8/19 Dusk emergence survey – [REDACTED] (Location C)

20:25: soprano pipistrelle commuting north to south along the treeline to the west of the [REDACTED]

20:26: soprano pipistrelle commuting north to south along the treeline to the west of the [REDACTED]

20:28: soprano pipistrelle commuting unseen.

20:29: common pipistrelle foraging over the trees to the north west of [REDACTED]

20:30: common pipistrelle commuting south to north along the treeline to the west of the [REDACTED]

20:31: common pipistrelle commuting north to south along the treeline to the west of the [REDACTED]

20:32: common pipistrelle foraging over the churchyard around the north west corner of the [REDACTED] for one (1) minute.

20:34: soprano pipistrelle commuting north to south along the treeline to the west of the [REDACTED]

20:35: soprano pipistrelle commuting south to north along the treeline to the west of the [REDACTED]

20:36: soprano pipistrelle foraging unseen.

20:38: common pipistrelle foraging over the churchyard around the north west corner of [REDACTED] for eight (8) minutes.

20:41: common pipistrelle foraging over the churchyard around the north west corner of [REDACTED]

20:44: common pipistrelle commuting east to west passing to the [REDACTED]

20:46: soprano pipistrelle foraging over the churchyard to the [REDACTED] for twelve (12) minutes.

20:48: common pipistrelle foraging over the churchyard to the [REDACTED] for thirteen (13) minutes.

20:53: *Myotis* sp. commuting unseen.

21:02: soprano pipistrelle commuting unseen.

21:03: noctule commuting unseen.

21:08: barbastelle commuting unseen.

21:09: soprano pipistrelle commuting unseen.

21:10: common pipistrelle commuting unseen.

21:17: brown long-eared bat commuting north to south along the treeline to the west of the [REDACTED]

21:23: barbastelle commuting unseen.

21:26: barbastelle commuting unseen.

21:37: common pipistrelle commuting unseen.

21:39: common pipistrelle commuting unseen.

15/8/19 Dawn re-entry survey – [REDACTED] – Building 1 (surveyor 1)

04:25: common pipistrelle commuting unseen.

04:50: soprano pipistrelle commuting unseen.

05:21: common pipistrelle commuting around the south of the building.

15/8/19 Dawn re-entry survey – [REDACTED] – Building 1 (surveyor 2)

04:50: soprano pipistrelle commuting unseen.

05:21: common pipistrelle commuting around the south of the building.

15/8/19 Dawn re-entry survey – [REDACTED] – Building 1 (surveyor 3)

04:05: soprano pipistrelle commuting unseen.

04:09: common pipistrelle commuting unseen.

04:23: common pipistrelle commuting unseen.

04:27: common pipistrelle commuting unseen.

04:50: soprano pipistrelle commuting unseen.

05:21: common pipistrelle commuting around the south of the building.

15/8/19 Dawn re-entry survey – [REDACTED] – Building 2

04:13: common pipistrelle commuting unseen.

04:23: common pipistrelle commuting unseen.

04:50: soprano pipistrelle commuting unseen.

05:12: common pipistrelle foraging over paddock south of the workshop for four (4) minutes before entering roost. Two (2) bats seen.

05:25: common pipistrelle roosting in workshop.

05:25: common pipistrelle roosting in workshop. Two (2) bats seen.

15/8/19 Dusk emergence survey – [REDACTED] – Building 2

20:39: common pipistrelle commuting unseen.

21:06: common pipistrelle commuting west to east passing to the north of Building 2.

21:08: common pipistrelle commuting unseen.

21:10: common pipistrelle commuting unseen.

21:11: common pipistrelle commuting unseen.

21:12: common pipistrelle commuting unseen.

21:13: common pipistrelle commuting unseen.

21:13: common pipistrelle commuting east to west before turning south, passing to the west of Building 2.

21:16: common pipistrelle commuting unseen.

21:20: common pipistrelle commuting unseen.

21:21: common pipistrelle commuting unseen.

21:26: common pipistrelle commuting unseen.

21:28: common pipistrelle commuting unseen.

21:32: common pipistrelle commuting unseen.

21:34: common pipistrelle commuting unseen.

21:38: common pipistrelle commuting unseen.

21:40: *Myotis* sp. and common pipistrelle commuting unseen.

21:40: soprano pipistrelle commuting unseen.

21:41: common pipistrelle commuting unseen.

21:47: common pipistrelle commuting unseen.

16/8/19 Dawn re-entry survey – [REDACTED] (Location A)

04:09: brown long-eared bat commuting in a wide circle to the south of the garage.

04:10: brown long-eared bat commuting unseen.

04:14: soprano pipistrelle commuting unseen.

04:17: brown long-eared bat commuting unseen.

04:18: brown long-eared bat commuting in a wide circle to the south of the garage.

04:21: brown long-eared bat entering open garage door.

04:23: brown long-eared bat entering open garage door.

04:25: brown long-eared bat emerged from open garage door.

04:28: brown long-eared bat emerged from open garage door.

- 04:32: brown long-eared bat entering open garage door.
04:33: brown long-eared bat entering open garage door.
04:34: brown long-eared bat emerged from open garage door.
04:34: brown long-eared bat entering open garage door.
04:35: brown long-eared bat entering open garage door.
04:37: brown long-eared bat entering open garage door.
04:38: brown long-eared bat entering open garage door.
04:38: brown long-eared bat emerged from open garage door.
04:41: brown long-eared bat entering open garage door.
04:41: brown long-eared bat entering open garage door.
04:47: brown long-eared bat entering open garage door. Two (2) bats seen.

16/8/19 Dawn re-entry survey – [REDACTED] (Location B)

- 04:09: brown long-eared bat commuting unseen.
04:12: brown long-eared bat commuting unseen.
04:18: noctule commuting unseen.
04:24: brown long-eared bat commuting unseen.
04:51: noctule commuting unseen.
04:57: brown long-eared bat commuting unseen.
05:01: brown long-eared bat commuting unseen.
05:09: common pipistrelle foraging over the farmhouse and the garden to the west.
05:17: common pipistrelle foraging over the farmhouse and the garden to the west.
05:20: common pipistrelle foraging over the farmhouse.
05:21: common pipistrelle foraging over the farmhouse.

16/8/19 Dawn re-entry survey – [REDACTED] (Location C)

- 04:10: brown long-eared bat commuting unseen.
- 04:12: noctule commuting unseen.
- 04:14: soprano pipistrelle commuting unseen.
- 04:18: brown long-eared bat and noctule commuting unseen.
- 04:20: brown long-eared bat commuting unseen.
- 04:21: brown long-eared bat commuting unseen.
- 04:25: brown long-eared bat commuting unseen.
- 04:36: barbastelle commuting unseen.
- 04:37: brown long-eared bat commuting unseen.
- 04:40: brown long-eared bat commuting unseen.
- 04:46: barbastelle commuting unseen.
- 04:46: brown long-eared bat commuting unseen.
- 04:49: brown long-eared bat commuting unseen.
- 04:50: common pipistrelle commuting unseen.
- 04:51: brown long-eared bat commuting in a circle to the north of the garage.
- 04:56: brown long-eared bat commuting unseen.
- 04:57: brown long-eared bat potentially roosting under the eaves of the extension on the north aspect of the garage but surveyor not certain.
- 05:00: brown long-eared bat commuting east to west passing to the north of the garage.
- 05:01: soprano pipistrelle commuting unseen.
- 05:06: brown long-eared bat commuting north to south towards the farmhouse.
- 05:08: brown long-eared bat commuting unseen.
- 05:10: soprano pipistrelle commuting unseen.
- 05:13: *Pipistrellus* sp. commuting.

05:15: common pipistrelle commuting unseen.

05:19: brown long-eared bat commuting around the east end of the garage to the south side.

16/8/19 Dawn re-entry survey – [REDACTED] (Location D)

04:09: brown long-eared bat commuting unseen.

04:16: brown long-eared bat commuting unseen.

04:17: brown long-eared bat commuting unseen. Two (2) bats detected.

04:20: unidentified bat foraging unseen.

04:31: unidentified bat commuting unseen.

04:33: unidentified bat commuting unseen.

04:34: unidentified bat commuting unseen.

04:35: unidentified bat commuting unseen.

04:40: unidentified bat commuting unseen.

04:41: unidentified bat foraging around trees to the west.

04:47: unidentified bat commuting unseen.

04:50: *Pipistrellus* sp. commuting unseen.

04:56: unidentified bat commuting.

04:57: unidentified bat foraging.

05:05: unidentified bat commuting.

05:08: unidentified bat foraging west to east passing to the north of the holiday accommodation.

05:09: unidentified bat commuting.

05:10: *Pipistrellus* sp. commuting.

05:11: unidentified bat entered roost in the extension on the north aspect of the garage.

05:14: unidentified bat commuting.

05:10: *Pipistrellus* sp. circling over roof at east end of holiday accommodation.

05:10: *Pipistrellus* sp. foraging.

19/8/19 Dusk emergence survey – [REDACTED] (Location C)

20:14: soprano pipistrelle commuting unseen.

20:20: soprano pipistrelle foraging over churchyard to the [REDACTED]

20:36: noctule commuting unseen.

20:37: soprano pipistrelle foraging over churchyard to the [REDACTED].

20:44: noctule commuting east to west over [REDACTED]

20:45: soprano pipistrelle foraging over [REDACTED]

20:48: noctule commuting east to west over churchyard passing to the north of [REDACTED]

20:58: common pipistrelle foraging unseen.

21:04: soprano pipistrelle commuting unseen.

21:08: common pipistrelle commuting unseen.

21:15: brown long-eared bat foraging unseen.

21:19: common pipistrelle commuting unseen.

21:20: soprano pipistrelle foraging unseen.

21:22: common pipistrelle foraging unseen.

21:25: common pipistrelle commuting unseen.

21:27: soprano pipistrelle and common pipistrelle commuting unseen.

21:34: noctule foraging unseen.

21:38: common pipistrelle commuting unseen.

19/8/19 Dusk emergence survey – [REDACTED] Location C)

20:20: common pipistrelle emerged from the south east corner of [REDACTED]

20:27: common pipistrelle commuting west to east at a height of approximately 2m.

20:35: common pipistrelle commuting east to west at a height of approximately 2m.

20:36: noctule commuting north to south at a height of approximately 30m.

20:37: soprano pipistrelle commuting unseen.

20:36: noctule commuting unseen.

20:38: soprano pipistrelle commuting unseen.

20:39: soprano pipistrelle commuting unseen.

20:42: soprano pipistrelle commuting unseen.

20:44: noctule and soprano pipistrelle commuting unseen.

20:44: soprano pipistrelle foraging unseen for four (4) minutes.

20:49: noctule commuting unseen.

20:49: soprano pipistrelle commuting unseen.

20:50: soprano pipistrelle and common pipistrelle commuting unseen.

20:51: soprano pipistrelle and brown long-eared bat commuting unseen.

20:52: soprano pipistrelle commuting unseen.

20:55: soprano pipistrelle and common pipistrelle commuting unseen.

20:57: common pipistrelle commuting unseen.

20:59: common pipistrelle commuting unseen.

21:00: *Myotis* sp. commuting unseen.

21:08: noctule commuting unseen.

21:15: brown long-eared bat commuting unseen.

21:21: common pipistrelle commuting unseen.

21:22: common pipistrelle commuting unseen.

21:23: soprano pipistrelle commuting unseen.

21:24: common pipistrelle commuting unseen.

21:25: noctule commuting unseen.

21:26: common pipistrelle commuting unseen.
21:28: soprano pipistrelle commuting unseen.
21:28: common pipistrelle foraging unseen.
21:30: common pipistrelle foraging unseen.
21:31: soprano pipistrelle and common pipistrelle foraging unseen.
21:32: soprano pipistrelle commuting unseen.
21:33: common pipistrelle commuting unseen.
21:34: noctule commuting unseen.
21:38: common pipistrelle foraging unseen for five (5) minutes.

20/8/19 Dawn re-entry survey – [REDACTED] (Location A)

04:56: soprano pipistrelle commuting unseen.

20/8/19 Dawn re-entry survey – [REDACTED] (Location D)

04:33: brown long-eared bat commuting unseen.

04:56: soprano pipistrelle commuting unseen.

20/8/19 Dusk emergence survey – [REDACTED] – Building 4 (surveyor 1)

20:38: common pipistrelle commuting east to west over the stables.

20:45: *Pipistrellus* sp. commuting unseen.

20:54: common pipistrelle foraging south to north passing to the west of the stables before reversing direction.

21:01: common pipistrelle foraging in circles to the west of the stables.

21:03: soprano pipistrelle commuting unseen.

21:10: common pipistrelle commuting unseen.

21:30: common pipistrelle commuting unseen.

21:39: soprano pipistrelle commuting unseen.

20/8/19 Dusk emergence survey – [REDACTED] – Building 4 (surveyor 2)

- 20:17: common pipistrelle commuting north to south over stables.
- 20:28: common pipistrelle commuting north to south over stables.
- 20:34: common pipistrelle foraging to the south of the stables.
- 20:38: common pipistrelle foraging east to west passing to the south of the stables.
- 20:42: common pipistrelle commuting north to south over stables.
- 20:57: common pipistrelle foraging to the south of the stables.
- 21:04: common pipistrelle foraging unseen.
- 21:10: common pipistrelle commuting unseen.
- 21:29: common pipistrelle commuting unseen.
- 21:31: common pipistrelle commuting unseen.
- 21:35: *Pipistrellus* sp. commuting unseen.

21/8/19 Dawn re-entry survey – [REDACTED] – Building 4 (surveyor 1)

- 04:48: common pipistrelle commuting unseen.

21/8/19 Dawn re-entry survey – [REDACTED] – Building 4 (surveyor 2)

No bats were detected during this survey.

21/8/19 Dusk emergence survey – [REDACTED] (Location A)

- 20:25: common pipistrelle foraging over farmhouse and departing to the north.
- 20:27: noctule commuting unseen.
- 20:29: common pipistrelle foraging over farmhouse and for thirty-six (36) minutes.
- 20:30: noctule commuting unseen.
- 20:36: soprano pipistrelle commuting unseen.
- 21:12: noctule commuting unseen.
- 21:15: common pipistrelle foraging unseen.

21:16: brown long-eared bat commuting unseen.

21:22: noctule commuting unseen.

21:29: brown long-eared bat commuting unseen.

21:36: common pipistrelle commuting unseen.

21/8/19 Dusk emergence survey – [REDACTED] (Location A)

20:18: soprano pipistrelle commuting unseen.

20:19: soprano pipistrelle commuting unseen.

20:21: common pipistrelle commuting unseen.

20:26: common pipistrelle foraging to the south east of the farm buildings.

20:27: noctule and soprano pipistrelle commuting unseen.

20:30: noctule foraging above the farmhouse at a height of approximately 15m.

20:33: soprano pipistrelle foraging above the garage at a height of approximately 5m.

20:36: common pipistrelle commuting unseen.

20:36: soprano pipistrelle foraging above the garage at a height of approximately 4m.

20:38: noctule commuting unseen.

20:39: common pipistrelle foraging above the greenhouse at a height of approximately 10m.

20:40: common pipistrelle foraging above the greenhouse at a height of approximately 10m.

20:42: soprano pipistrelle foraging unseen.

20:42: brown long-eared bat commuting unseen.

20:44: common pipistrelle foraging above the garden.

20:45: brown long-eared bat, soprano pipistrelle and common pipistrelle foraging unseen.

20:47: soprano pipistrelle foraging unseen.

20:52: common pipistrelle foraging unseen.

20:52: noctule commuting unseen.

20:52: common pipistrelle foraging above the garden for sixteen (16) minutes.

21:13: noctule commuting unseen.

21:16: common pipistrelle commuting unseen.

21:17: common pipistrelle foraging unseen.

21:19: noctule commuting unseen.

21:20: brown long-eared bat and common pipistrelle foraging unseen.

21:21: noctule foraging unseen for one (1) minute.

21:23: common pipistrelle foraging unseen.

21:23: brown long-eared bat commuting unseen.

21:24: soprano pipistrelle and common pipistrelle commuting unseen.

21:26: common pipistrelle commuting unseen.

21:27: noctule commuting unseen.

21:29: common pipistrelle foraging unseen.

21:31: common pipistrelle commuting unseen.

21:32: soprano pipistrelle and common pipistrelle foraging unseen for several minutes.

21:35: soprano pipistrelle foraging unseen.

22/8/19 Dusk emergence survey – Tree 90 and Tree 91 (surveyor 1)

20:28: noctule commuting unseen.

20:33: noctule commuting north to south at a height of approximately 30m passing between the trees.

20:35: noctule foraging north to south at a height of approximately 30m passing between the trees then turning west.

20:46: noctule foraging unseen.

20:46: noctule commuting north to south at a height of approximately 30m passing between the trees then turning west.

20:46: common pipistrelle commuting unseen.

20:56: noctule foraging unseen.

21:07: noctule commuting unseen.

21:15: noctule foraging unseen.

22/8/19 Dusk emergence survey – Tree 90 and Tree 91 (surveyor 2)

20:28: noctule commuting east to west passing to the north of the trees.

20:33: noctule foraging north to south passing between the trees.

20:35: noctule foraging north to south passing between the trees.

20:38: *Pipistrellus* sp. emerged from Tree 90.

20:41: noctule foraging over the field to the north of the trees.

20:43: noctule foraging over the field to the north of the trees.

20:46: noctule foraging over the field to the north of the trees.

20:56: noctule foraging over the field to the north of the trees.

21:07: common pipistrelle commuting unseen.

21:14: common pipistrelle commuting unseen.

21:14: noctule foraging unseen.

21/8/19 Dawn re-entry survey [REDACTED] (Location B)

04:21: common pipistrelle commuting unseen.

04:21: noctule commuting unseen.

04:31: brown long-eared bat and noctule foraging unseen.

04:33: common pipistrelle commuting unseen.

04:33: brown long-eared bat foraging unseen.

04:38: soprano pipistrelle commuting unseen.

04:44: common pipistrelle commuting unseen.

04:45: noctule commuting unseen.
04:46: soprano pipistrelle commuting unseen.
04:50: brown long-eared bat commuting unseen.
04:54: brown long-eared bat foraging unseen.
05:01: common pipistrelle commuting unseen.
05:04: noctule foraging north to south over the farmhouse.
05:07: soprano pipistrelle foraging over the garden to the west of the farmhouse.
05:08: brown long-eared bat foraging unseen.
05:10: brown long-eared bat commuting unseen.
05:11: common pipistrelle commuting unseen.
05:25: *Pipistrellus* sp. commuting over the garden to the west of the farmhouse.
05:27: noctule commuting unseen.
05:29: common pipistrelle commuting unseen.
05:33: common pipistrelle foraging.
05:41: common pipistrelle entered roost in northern extension on west of farmhouse.
05:47: soprano pipistrelle foraging over the garden to the west of the farmhouse.

21/8/19 Dawn re-entry survey – [REDACTED] (Location D)

04:26: brown long-eared bat commuting unseen.
04:28: brown long-eared bat and common pipistrelle foraging unseen.
04:28: brown long-eared bat foraging unseen.
04:31: brown long-eared bat foraging unseen.
04:32: brown long-eared bat foraging unseen.
04:42: brown long-eared bat commuting unseen.
04:44: brown long-eared bat commuting unseen.

04:45: brown long-eared bat commuting unseen.
04:55: brown long-eared bat commuting unseen.
04:57: brown long-eared bat commuting unseen.
04:59: barbastelle commuting unseen.
05:04: brown long-eared bat commuting unseen.
05:08: brown long-eared bat foraging unseen for one (1) minute.
05:10: soprano pipistrelle commuting unseen.
05:10: brown long-eared bat foraging unseen.
05:12: brown long-eared bat and common pipistrelle commuting unseen.
05:14: brown long-eared bat foraging unseen.
05:24: brown long-eared bat commuting unseen.
05:24: common pipistrelle commuting unseen.
05:25: soprano pipistrelle commuting south to north over the garage.
05:28: noctule commuting unseen.
05:35: common pipistrelle foraging south to north over the garage.

28/8/19 Dusk emergence survey – [REDACTED] – Building 4 (surveyor 1)

20:04: *Pipistrellus* sp. commuting south to north over the stables.
20:07: common pipistrelle commuting south to north over the stables.
20:28: soprano pipistrelle foraging in circles to the south of the stables for one (1) minute.
20:37: common pipistrelle commuting south to north before reversing direction.
20:40: common pipistrelle commuting unseen.
20:42: common pipistrelle commuting unseen.
20:45: common pipistrelle foraging unseen for one (1) minute.
20:48: common pipistrelle foraging unseen for twenty-nine (29) minutes.

20:51: brown long-eared bat commuting unseen.

21:17: noctule commuting unseen.

21:18: *Myotis* sp. commuting unseen.

28/8/19 Dusk emergence survey – [REDACTED] Building 4 (surveyor 2)

20:14: common pipistrelle commuting north to south over the stables.

20:43: common pipistrelle commuting unseen.

20:43: brown long-eared bat commuting unseen.

20:45: common pipistrelle commuting unseen.

20:46: common pipistrelle commuting unseen.

20:48: common pipistrelle commuting unseen.

20:52: common pipistrelle commuting unseen.

20:55: soprano pipistrelle commuting unseen.

20:55: common pipistrelle commuting unseen.

20:59: common pipistrelle commuting unseen.

21:03: common pipistrelle commuting unseen.

21:04: common pipistrelle commuting unseen.

21:09: common pipistrelle commuting unseen.

21:13: brown long-eared bat commuting unseen.

21:13: common pipistrelle commuting unseen.

21:15: common pipistrelle commuting unseen.

21:17: common pipistrelle commuting unseen.

21:17: noctule commuting unseen.

21:18: common pipistrelle commuting unseen.

21:19: common pipistrelle commuting unseen.

21:22: common pipistrelle commuting unseen.

28/8/19 Dusk emergence survey – [REDACTED] – Building 4 (surveyor 3)

20:14: common pipistrelle commuting unseen.

20:29: common pipistrelle commuting unseen.

20:40: common pipistrelle commuting unseen.

20:42: common pipistrelle commuting unseen.

20:44: barbastelle commuting unseen.

20:47: common pipistrelle commuting unseen.

20:55: common pipistrelle commuting unseen.

20:59: common pipistrelle commuting unseen.

21:03: common pipistrelle foraging unseen.

21:06: soprano pipistrelle commuting unseen.

21:08: common pipistrelle foraging unseen.

21:10: common pipistrelle foraging unseen.

21:13: brown long-eared bat commuting unseen.

21:13: common pipistrelle foraging unseen.

21:17: common pipistrelle commuting unseen.

21:17: noctule commuting unseen.

28/8/19 Dusk emergence survey – [REDACTED] – Building 4 (surveyor 4)

20:09: common pipistrelle commuting unseen.

20:14: common pipistrelle commuting unseen.

20:29: common pipistrelle commuting unseen.

20:37: common pipistrelle commuting unseen.

20:38: common pipistrelle commuting unseen.

20:43: common pipistrelle commuting unseen.
20:43: brown long-eared bat commuting unseen.
20:44: common pipistrelle commuting unseen.
20:47: common pipistrelle foraging unseen.
20:48: common pipistrelle commuting unseen.
20:50: common pipistrelle commuting unseen.
20:51: common pipistrelle commuting unseen.
20:54: soprano pipistrelle foraging unseen.
20:56: common pipistrelle commuting unseen.
20:58: common pipistrelle foraging unseen for two (2) minutes.
21:03: *Myotis* sp. commuting unseen.
21:05: common pipistrelle commuting unseen.
21:09: common pipistrelle commuting unseen.
21:11: common pipistrelle commuting unseen.
21:13: brown long-eared bat commuting unseen.
21:16: common pipistrelle commuting unseen.
21:17: noctule commuting unseen.
21:18: common pipistrelle foraging unseen for four (4) minutes.
21:19: brown long-eared bat commuting unseen.

29/8/19 Dusk emergence survey – Tree 98 (surveyor 1)

20:10: noctule commuting unseen.
20:23: common pipistrelle commuting unseen.
20:31: soprano pipistrelle foraging to the east of Tree 98 for thirteen (13) minutes.
20:34: common pipistrelle foraging to the north of Tree 98.

20:44: common pipistrelle foraging unseen.

20:45: soprano pipistrelle foraging unseen.

20:51: *Pipistrellus* sp. commuting unseen.

20:53: *Myotis* sp. commuting unseen.

21:06: barbastelle commuting unseen.

29/8/19 Dusk emergence survey – Tree 98 (surveyor 2)

20:10: noctule commuting unseen.

20:23: soprano pipistrelle commuting unseen.

20:24: soprano pipistrelle commuting along the hedgerow west of Tree 98.

20:27: noctule commuting unseen.

20:39: common pipistrelle commuting unseen.

20:40: soprano pipistrelle commuting unseen.

20:41: soprano pipistrelle commuting unseen.

20:43: soprano pipistrelle commuting unseen.

20:44: common pipistrelle commuting unseen.

20:45: soprano pipistrelle commuting unseen.

20:52: common pipistrelle commuting unseen.

29/8/19 Dusk emergence survey – Tree 92 and Tree 93 (surveyor 1)

20:11: noctule commuting unseen.

20:15: unidentified bat, not picked up by the detector, commuting east to west along the hedgerow between the trees.

20:24: noctule commuting unseen.

20:27: noctule commuting unseen.

29/8/19 Dusk emergence survey – Tree 92 and Tree 93 (surveyor 2)

20:10: noctule commuting east to west passing to the north of the trees.

20:24: noctule commuting east to west passing to the north of the trees.

20:27: noctule commuting unseen.

21:00: noctule commuting unseen.

21:08: barbastelle commuting unseen.

21:12: barbastelle foraging unseen.

21:13: barbastelle commuting unseen.

21:14: barbastelle commuting unseen.

21:18: barbastelle commuting unseen.

21:21: barbastelle commuting unseen.

21:22: barbastelle commuting unseen.

30/8/19 Dawn re-entry survey – [REDACTED] (Location A)

04:35: soprano pipistrelle commuting unseen.

04:44: barbastelle commuting unseen.

04:45: common pipistrelle commuting unseen.

04:49: barbastelle commuting unseen.

04:49: brown long-eared bat commuting unseen.

04:50: common pipistrelle commuting unseen.

04:51: barbastelle commuting unseen.

04:52: brown long-eared bat commuting unseen.

04:53: common pipistrelle commuting unseen.

04:53: barbastelle commuting unseen.

04:55: common pipistrelle commuting unseen.

04:55: soprano pipistrelle commuting unseen.

05:00: common pipistrelle commuting unseen.

05:17: common pipistrelle commuting west to east passing to the south of [REDACTED]

05:19: common pipistrelle commuting north to south passing to the west of [REDACTED]

05:21: common pipistrelle commuting unseen.

05:23: common pipistrelle foraging over the [REDACTED] for two (2) minutes.

05:23: common pipistrelle foraging over the [REDACTED] for ten (10) minutes.

05:38: soprano pipistrelle commuting south to north passing to the west of [REDACTED]

30/8/19 Dawn re-entry survey – [REDACTED] (Location B)

04:35: soprano pipistrelle commuting unseen.

04:47: soprano pipistrelle commuting unseen.

04:51: common pipistrelle commuting unseen.

04:52: soprano pipistrelle commuting unseen.

04:54: common pipistrelle commuting unseen.

04:57: common pipistrelle commuting unseen.

04:58: soprano pipistrelle commuting unseen.

05:06: *Pipistrellus* sp. commuting.

05:14: brown long-eared bat commuting unseen.

05:17: soprano pipistrelle commuting east to west passing to the [REDACTED]

05:18: brown long-eared bat commuting.

05:18: common pipistrelle commuting.

05:22: common pipistrelle commuting unseen.

05:24: common pipistrelle foraging around [REDACTED]

05:27: common pipistrelle commuting unseen.

05:31: common pipistrelle commuting east to west passing to the [REDACTED]

05:35: common pipistrelle commuting east to west passing to the south of the church.

30/8/19 Dawn re-entry survey – [REDACTED] (Location C)

04:30: soprano pipistrelle commuting unseen.

04:35: soprano pipistrelle commuting unseen.

04:42: soprano pipistrelle commuting unseen.

04:44: barbastelle commuting unseen.

04:47: soprano pipistrelle commuting unseen.

04:48: barbastelle commuting unseen.

04:50: common pipistrelle foraging unseen.

04:50: common pipistrelle commuting unseen.

05:08: brown long-eared bat foraging unseen.

05:13: brown long-eared bat commuting unseen.

05:17: soprano pipistrelle foraging unseen.

05:17: common pipistrelle commuting unseen.

05:25: common pipistrelle commuting unseen.

05:30: common pipistrelle commuting unseen.

05:33: soprano pipistrelle commuting unseen.

05:43: *Pipistrellus* sp. seen flying around top [REDACTED]

05:48: soprano pipistrelle entered a roost on the north aspect of [REDACTED]

30/8/19 Dawn re-entry survey – [REDACTED] (Location D)

04:35: soprano pipistrelle foraging unseen.

04:41: brown long-eared bat commuting unseen.

04:44: barbastelle commuting unseen.

- 04:45: common pipistrelle commuting unseen.
- 04:46: soprano pipistrelle commuting unseen.
- 04:47: soprano pipistrelle commuting unseen.
- 04:48: barbastelle commuting unseen.
- 04:50: common pipistrelle foraging unseen.
- 04:53: soprano pipistrelle commuting unseen.
- 04:55: soprano pipistrelle commuting unseen.
- 04:59: common pipistrelle foraging unseen.
- 04:59: brown long-eared bat commuting unseen.
- 05:10: brown long-eared bat commuting south to north away from [REDACTED]
- 05:12: soprano pipistrelle commuting unseen.
- 05:13: brown long-eared bat commuting unseen.
- 05:15: brown long-eared bat commuting unseen.
- 05:16: brown long-eared bat commuting northwards over [REDACTED]
[REDACTED] Two (2) bats seen.
- 05:18: common pipistrelle foraging along treeline to the west of [REDACTED]
- 05:24: soprano pipistrelle commuting unseen.
- 05:31: soprano pipistrelle foraging around the north west corner of [REDACTED] for three (3) minutes.
- 05:32: common pipistrelle foraging churchyard to the north [REDACTED] for three (3) minutes.
- 05:38: soprano pipistrelle foraging northwards over churchyard to the north of [REDACTED].
- 05:40: soprano pipistrelle commuting unseen.

3/9/19 Dawn re-entry survey – Tree 74

- 04:28: *Pipistrellus* sp. commuting unseen.
- 05:40: soprano pipistrelle commuting unseen.

3/9/19 Dawn re-entry survey – Tree 74, Tree 75 and Tree 76 (surveyor 1)

- 04:38: *Pipistrellus* sp. commuting unseen.
- 04:41: common pipistrelle commuting unseen.
- 04:47: brown long-eared bat commuting unseen.
- 04:49: common pipistrelle commuting unseen.
- 04:51: soprano pipistrelle foraging unseen.
- 04:51: common pipistrelle commuting unseen.
- 04:54: common pipistrelle commuting unseen.
- 04:56: soprano pipistrelle commuting unseen.
- 04:57: common pipistrelle commuting unseen.
- 05:02: common pipistrelle commuting unseen.
- 05:07: common pipistrelle foraging unseen.
- 05:13: brown long-eared bat commuting unseen.
- 05:14: common pipistrelle commuting unseen.
- 05:16: common pipistrelle commuting unseen.
- 05:19: common pipistrelle commuting unseen.
- 05:20: soprano pipistrelle commuting unseen.
- 05:19: common pipistrelle commuting north to south past Tree 76.
- 05:19: brown long-eared bat commuting unseen.
- 05:24: soprano pipistrelle commuting unseen.
- 05:25: soprano pipistrelle commuting unseen.
- 05:28: soprano pipistrelle commuting south to north passing to the west of Trees 75 and 76.
- 05:29: soprano pipistrelle commuting unseen.
- 05:31: common pipistrelle commuting north to south along track. Three (3) bats seen.

05:31: soprano pipistrelle foraging unseen for one (1) minute.

05:33: soprano pipistrelle foraging unseen for one (1) minute.

05:36: soprano pipistrelle commuting unseen.

05:38: soprano pipistrelle commuting south to north passing to the west of Trees 75 and 76. Four (4) bats seen.

05:39: common pipistrelle commuting north to south passing to the west of Trees 75 and 76. Five (5) bats seen.

05:46: soprano pipistrelle commuting unseen.

05:48: soprano pipistrelle commuting unseen.

05:49: common pipistrelle commuting north to south following the hedgerow south of Trees 75 and 76.

05:54: soprano pipistrelle commuting unseen.

3/9/19 Dawn re-entry survey – Tree 74, Tree 75 and Tree 76 (surveyor 2)

04:39: common pipistrelle commuting unseen.

04:41: common pipistrelle commuting unseen.

04:50: soprano pipistrelle commuting unseen.

04:51: common pipistrelle commuting unseen.

04:54: common pipistrelle commuting unseen.

04:57: common pipistrelle commuting unseen.

05:02: soprano pipistrelle commuting unseen.

05:02: common pipistrelle foraging unseen for three (3) minutes.

05:14: common pipistrelle commuting unseen.

05:19: common pipistrelle commuting unseen.

05:21: brown long-eared bat commuting unseen.

05:21: common pipistrelle commuting unseen.

05:31: common pipistrelle commuting unseen.

05:32: common pipistrelle commuting unseen.
05:33: soprano pipistrelle commuting unseen.
05:34: soprano pipistrelle commuting unseen.
05:36: soprano pipistrelle commuting south to north along track.
05:46: soprano pipistrelle commuting unseen.
05:46: soprano pipistrelle commuting south to north along track.
05:49: common pipistrelle commuting north to south along track.
05:54: soprano pipistrelle commuting south to north along track.

3/9/19 Dawn re-entry survey –Tree 75 and Tree 76

04:39: common pipistrelle foraging unseen.
04:43: common pipistrelle foraging unseen.
04:51: barbastelle commuting unseen.
04:53: soprano pipistrelle commuting unseen.
04:54: soprano pipistrelle commuting unseen.
05:03: common pipistrelle commuting unseen.
05:08: common pipistrelle foraging unseen for one (1) minute.
05:19: soprano pipistrelle foraging to the east of Tree 75 for two (2) minutes.
05:22: common pipistrelle commuting east to west between the trees.
05:24: soprano pipistrelle foraging around the canopy of Tree 75.
05:26: common pipistrelle commuting north to south passing to the east of the trees.
05:27: soprano pipistrelle foraging around the canopy of Tree 75 for two (2) minutes.
05:38: soprano pipistrelle commuting unseen.
05:39: common pipistrelle commuting unseen.

20/8/19 Dusk emergence survey – [REDACTED] – Building 3 (Location A)

20:08: unidentified bat, not picked up by the detector, commuting west to east over the house.

20:11: common pipistrelle foraging over the garden to the west of the house for one (1) minute.

20:18: common pipistrelle foraging over the garden to the west of the house for two (2) minutes. Two (2) bats seen.

20:26: soprano pipistrelle and common pipistrelle foraging over the garden to the west of the house.

20:27: common pipistrelle foraging over the garden to the west of the house for two (2) minutes.

20:37: common pipistrelle commuting unseen.

20:51: common pipistrelle commuting unseen.

20:55: common pipistrelle commuting unseen.

20/8/19 Dusk emergence survey – [REDACTED] – Building 3 (Location B)

19:38: common pipistrelle commuting unseen.

20:26: common pipistrelle commuting unseen.

20:28: common pipistrelle commuting unseen.

20:43: common pipistrelle commuting unseen.

20:46: common pipistrelle commuting unseen.

20:55: common pipistrelle commuting unseen for two (2) minutes.

20/8/19 Dusk emergence survey – [REDACTED] – Building 3 (Location C)

19:50: unidentified bat, not picked up by the detector, commuting north to south over the house.

20:20: common pipistrelle commuting unseen.

20:23: common pipistrelle commuting north to south over garden to the west of the house.

20:24: common pipistrelle commuting unseen.

20:26: common pipistrelle commuting east to west over garage to the south of the house.
Two (2) bats seen.

20:31: soprano pipistrelle commuting unseen.

20:32: common pipistrelle commuting unseen.

20:37: common pipistrelle commuting unseen.

20:39: common pipistrelle commuting unseen.

20:40: common pipistrelle commuting unseen.

20:46: common pipistrelle commuting unseen.

20:47: common pipistrelle commuting unseen.

20:51: common pipistrelle commuting unseen.

20:55: common pipistrelle commuting unseen.

20:59: common pipistrelle commuting unseen.

20/8/19 Dusk emergence survey – [REDACTED] – Building 3 (Location C)

19:38: common pipistrelle commuting north to south over the guest house to the east.

19:50: common pipistrelle commuting north to south over the house

20:20: *Pipistrellus* sp. commuting unseen.

20:24: common pipistrelle commuting unseen.

20:26: common pipistrelle commuting unseen.

20:31: soprano pipistrelle commuting unseen.

20:32: common pipistrelle commuting unseen.

20:35: common pipistrelle commuting unseen.

20:37: common pipistrelle commuting unseen.

20:38: common pipistrelle commuting unseen.

20:39: common pipistrelle commuting unseen.

20:40: common pipistrelle commuting unseen.

20:41: common pipistrelle commuting unseen.
20:42: common pipistrelle foraging unseen for one (1) minute.
20:46: common pipistrelle foraging unseen for five (5) minutes.
20:47: soprano pipistrelle commuting unseen.
20:55: common pipistrelle commuting unseen.
20:56: common pipistrelle commuting unseen.
20:59: common pipistrelle commuting unseen.
21:08: common pipistrelle foraging unseen.

[4/9/19 Dusk emergence survey – Tree 62 \(surveyor 1\)](#)

No bats were detected during this survey.

[4/9/19 Dusk emergence survey – Tree 62 \(surveyor 2\)](#)

20:04: soprano pipistrelle commuting north to south along the hedgerow on the east of Wood Lane.
20:15 unidentified bat, not picked up by the detector, commuting north to south along the hedgerow on the west of Wood Lane.
20:30: common pipistrelle commuting unseen.
20:34: common pipistrelle commuting unseen.
20:43: soprano pipistrelle commuting unseen.
20:47: common pipistrelle commuting unseen.
21:01: soprano pipistrelle commuting unseen.

[4/9/19 Dusk emergence survey – Tree 61 \(surveyor 1\)](#)

20:25: brown long-eared bat commuting unseen.
20:40: common pipistrelle commuting unseen.

[4/9/19 Dusk emergence survey – Tree 61 \(surveyor 2\)](#)

No bats were detected during this survey.

9/9/19 Dusk emergence survey – Tree 99 (surveyor 1)

19:43: noctule commuting unseen.
19:49: noctule commuting unseen.
19:50: soprano pipistrelle commuting unseen.
19:52: noctule commuting unseen.
19:53: soprano pipistrelle commuting west to east passing to the north of Tree 99.
19:53: soprano pipistrelle emerged from Tree 99 and flew to the east.
19:54: noctule commuting unseen.
19:57: soprano pipistrelle emerged from Tree 99 and flew to the west.
20:01: soprano pipistrelle commuting unseen.
20:19: soprano pipistrelle commuting unseen.
20:22: common pipistrelle commuting unseen.
20:25: barbastelle commuting unseen.
20:30: barbastelle commuting unseen.
20:32: barbastelle commuting unseen.
20:35: brown long-eared bat commuting unseen.
20:36: barbastelle commuting unseen.

9/9/19 Dusk emergence survey – Tree 99 (surveyor 2)

19:44: noctule commuting unseen.
19:49: noctule commuting unseen.

10/9/19 Dawn re-entry survey – [REDACTED] – Building 2 (surveyor 1)

No bats were detected during this survey.

10/9/19 Dawn re-entry survey – [REDACTED] – Building 2 (surveyor 2)

No bats were detected during this survey.

10/9/19 Dusk emergence survey – Tree 74 (surveyor 1)

- 19:44: noctule commuting east to west passing to the south of Tree 74.
- 19:48: noctule commuting unseen.
- 19:49: unidentified bat, not picked up by the detector, emerged from Tree 74 and flew north.
- 19:55: soprano pipistrelle commuting unseen.
- 20:01: soprano pipistrelle commuting unseen.
- 20:08: soprano pipistrelle commuting unseen.
- 20:12: brown long-eared bat commuting unseen.
- 20:12: common pipistrelle commuting unseen.
- 20:14: brown long-eared bat foraging to the west of Tree 74.
- 20:17: common pipistrelle commuting unseen.
- 20:18: brown long-eared bat commuting unseen.
- 20:20: noctule foraging unseen.
- 20:20: common pipistrelle commuting unseen.
- 20:24: brown long-eared bat commuting unseen.
- 20:46: brown long-eared bat commuting unseen.
- 20:46: common pipistrelle commuting unseen.
- 20:51: noctule foraging unseen.

10/9/19 Dusk emergence survey – Tree 74 (surveyor 2)

- 19:33: unidentified bat, not picked up by the detector, commuting south to north to the north of Tree 74.
- 19:36: common pipistrelle potentially emerging from a small tree just north of Tree 74.
- 19:37: soprano pipistrelle commuting unseen.
- 19:38: *Pipistrellus* sp. commuting south to north to the north of Tree 74.

19:39: soprano pipistrelle commuting north to south along the track. Two (2) bats seen.

19:39: *Pipistrellus* sp. commuting south to north to the north of Tree 74.

19:40: unidentified bat, not picked up by the detector, commuting north to south along the track. Two (2) bats seen.

19:41: common pipistrelle foraging above the Tree 74 and surrounding trees.

19:42: serotine commuting unseen.

19:43: common pipistrelle commuting unseen.

19:44: noctule commuting unseen.

19:44: soprano pipistrelle commuting unseen.

19:44: common pipistrelle foraging unseen for four (4) minutes.

19:48: soprano pipistrelle commuting north to south along the track.

19:49: common pipistrelle commuting south to north to the north of Tree 74.

19:51: common pipistrelle foraging unseen for nine (9) minutes.

19:52: soprano pipistrelle foraging unseen for five (5) minutes.

19:55: barbastelle commuting unseen.

19:56: barbastelle commuting unseen.

20:00: barbastelle and common pipistrelle commuting unseen.

20:01: barbastelle commuting unseen.

20:04: common pipistrelle foraging unseen for three (3) minutes.

20:08: barbastelle commuting unseen.

20:09: barbastelle commuting unseen.

20:10: barbastelle commuting unseen.

20:20: common pipistrelle commuting unseen.

20:26: common pipistrelle commuting unseen.

20:28: common pipistrelle commuting unseen.

20:34: common pipistrelle commuting unseen.
20:38: common pipistrelle commuting unseen.
20:41: common pipistrelle foraging unseen.
20:43: common pipistrelle foraging unseen for one (1) minute.
20:46: barbastelle commuting unseen.
20:46: common pipistrelle commuting unseen.
20:48: common pipistrelle commuting unseen.
20:51: noctule commuting unseen.
20:52: common pipistrelle commuting unseen.

[11/9/19 Dawn re-entry survey – Tree 61 \(surveyor 1\)](#)

05:02: barbastelle commuting unseen.
06:01: noctule commuting unseen.

[11/9/19 Dawn re-entry survey – Tree 61 \(surveyor 2\)](#)

05:02: barbastelle commuting unseen.
06:01: noctule commuting unseen.

[11/9/19 Dusk emergence survey – Tree 85 \(surveyor 1\)](#)

19:53: soprano pipistrelle foraging to the west of the tree for fifteen (15) minutes.
20:06: common pipistrelle foraging unseen.
20:10: common pipistrelle commuting unseen.
20:16: soprano pipistrelle commuting unseen.
20:21: common pipistrelle commuting unseen.
20:28: unidentified bat commuting unseen.
20:31: common pipistrelle commuting unseen.
20:35: *Myotis* sp. commuting unseen.

20:37: soprano pipistrelle commuting unseen.

20:39: *Pipistrellus* sp. commuting unseen.

20:44: *Pipistrellus* sp. commuting unseen.

11/9/19 Dusk emergence survey – Tree 85 (surveyor 2)

19:32: common pipistrelle commuting to the north of the tree.

19:40: soprano pipistrelle commuting to the north of the tree.

19:41: unidentified bat commuting west to east passing to the north of the tree.

19:41: soprano pipistrelle commuting unseen.

19:42: soprano pipistrelle commuting unseen.

19:43: soprano pipistrelle foraging unseen for four (4) minutes.

19:48: common pipistrelle commuting east to west passing to the south of the tree.

19:49: soprano pipistrelle foraging unseen for three (3) minutes.

19:51: common pipistrelle commuting unseen.

19:51: soprano pipistrelle foraging unseen.

19:53: soprano pipistrelle foraging north to south passing to the east of the tree. Two (2) bats seen.

19:54: soprano pipistrelle foraging in a circle around the tree for three (3) minutes. Two (2) bats seen.

19:54: common pipistrelle commuting unseen.

19:57: common pipistrelle commuting unseen.

19:58: soprano pipistrelle and common pipistrelle commuting unseen.

19:59: soprano pipistrelle commuting south to north.

20:01: soprano pipistrelle commuting unseen.

20:03: soprano pipistrelle commuting north to south passing to the east of the tree.

20:04: *Pipistrellus* sp. commuting unseen.

20:07: common pipistrelle foraging unseen.

20:09: soprano pipistrelle commuting to the north of the tree.

20:10: soprano pipistrelle foraging unseen.

20:12: common pipistrelle foraging unseen for four (4) minutes.

20:16: *Myotis* sp. commuting unseen.

20:17: common pipistrelle foraging unseen for one (1) minute.

20:19: barbastelle commuting unseen.

20:21: soprano pipistrelle commuting unseen.

20:22: soprano pipistrelle foraging unseen for nine (9) minutes.

20:22: brown long-eared bat foraging unseen.

20:23: common pipistrelle foraging unseen for nine (9) minutes.

20:25: brown long-eared bat foraging unseen.

20:26: *Myotis* sp. commuting unseen.

20:28: noctule commuting unseen.

20:30: barbastelle commuting unseen.

20:38: soprano pipistrelle commuting unseen.

20:39: *Myotis* sp. commuting to the north of the tree.

20:40: brown long-eared bat and *Myotis* sp. Commuting unseen.

20:42: *Myotis* sp. commuting unseen.

20:43: barbastelle commuting unseen.

20:43: *Myotis* sp. foraging unseen for three (3) minutes.

20:46: soprano pipistrelle commuting unseen.

20:47: *Myotis* sp. foraging unseen for three (3) minutes.

20:48: soprano pipistrelle and common pipistrelle commuting unseen.

20:50: common pipistrelle commuting unseen.

12/9/19 Dawn re-entry survey – Tree 100 and Tree 101 (surveyor 1)

05:12: barbastelle commuting unseen.

05:35: unidentified bat, not picked up by detector, entered tree 101.

05:43: unidentified bat, not picked up by detector, commuting east to west passing to the south of the trees.

12/9/19 Dawn re-entry survey – Tree 100 and Tree 101 (surveyor 2)

05:03: barbastelle commuting unseen.

05:07: barbastelle commuting unseen.

05:11: barbastelle commuting unseen.

05:14: barbastelle commuting unseen.

05:17: soprano pipistrelle commuting unseen.

05:17: barbastelle commuting unseen.

05:20: barbastelle commuting unseen.

05:23: soprano pipistrelle commuting unseen.

05:28: soprano pipistrelle commuting unseen.

05:31: soprano pipistrelle commuting unseen.

05:36: barbastelle commuting unseen.




05:47: *Pipistrellus* sp. commuting unseen.

Annex B Roost receptors – buildings (map)

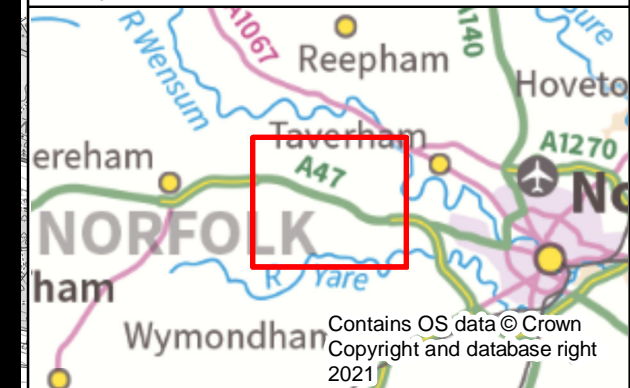
LEGEND

 Study area

Bat roost potential (BRP)

-  Confirmed roost
-  High
-  Moderate

REFERENCE MAP



P01	24/02/2021	First Edition	AC	BM	KR
REV	DATE	REVISION NOTE	ORG	CHK'D	APP'D

DESIGNER



CONTRACTOR



CLIENT



PROJECT TITLE

A47 NORTH TUDDENHAM TO EASTON

PROJECT STAGE

PCF STAGE 3

DRAWING TITLE

2020 BAT ROOST SURVEY RECEPTORS – BUILDINGS
TR010038/APP/6.2

SUITABILITY

FOR INFORMATION







SHEET SIZE	SCALE	STATUS
A3	1:30,000	S2

DRAWING NUMBER

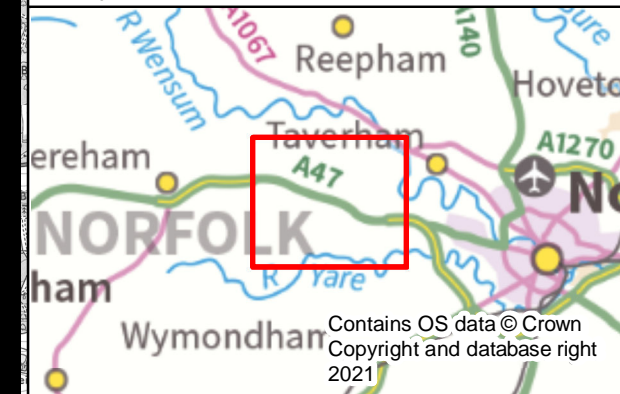
HE551489-GTY-EBD-000-DR-LB-30125

Annex C Roost receptors – trees (map)

LEGEND

-  Study area
- Bat roost potential (BRP)**
-  Confirmed Roost
-  Potential Roost
-  High BRP
-  Moderate BRP
-  Low

REFERENCE MAP



P01	24/02/2021	First Edition	AC	BM	KR
REV	DATE	REVISION NOTE	ORG	CHK'D	APP'D

DESIGNER


CONTRACTOR


CLIENT


PROJECT TITLE
 A47 NORTH TUDDENHAM TO EASTON

PROJECT STAGE
 PCF STAGE 3

DRAWING TITLE
 2020 BAT ROOST SURVEY RECEPTORS – TREES
 TR010038/APP/6.2






SUITABILITY
 FOR INFORMATION

SHEET SIZE	SCALE	STATUS
A3	1:30,000	S2

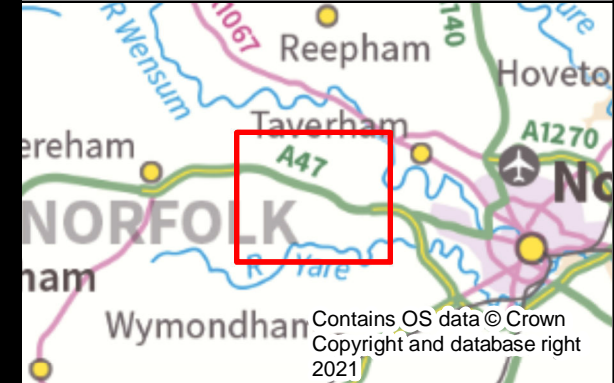
DRAWING NUMBER
 HE551489-GTY-EBD-000-DR-LB-30124

Annex D Roost survey results (map)

LEGEND

-  Study area
-  Confirmed tree roost - 2020
-  Potential tree roost - 2020
-  Confirmed building roost - 2020
-  Confirmed tree roost - 2017

REFERENCE MAP



P01	24/02/2021	First Edition	AC	BM	KR
REV	DATE	REVISION NOTE	ORG	CHK'D	APP'D

DESIGNER



CONTRACTOR



CLIENT



PROJECT TITLE

A47 NORTH TUDDENHAM TO EASTON

PROJECT STAGE

PCF STAGE 3

DRAWING TITLE

BAT ROOSTS SURVEY RESULTS 2020 AND 2017
TR010038/APP/6.2

UTILITY

FOR INFORMATION

HEET SIZE	SCALE	STATUS
A3	1:30,000	S3

DRAWING NUMBER

HE551489-GTY-EBD-000-DR-LB-30126

Annex E RSK bat survey report



A47 Improvements – Easton to North Tuddenham

SWECO Ltd

Bat Surveys Report

858484

FEBRUARY 2020

RSK



RSK GENERAL NOTES

Project No.: 857979

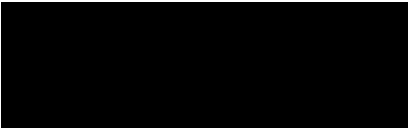
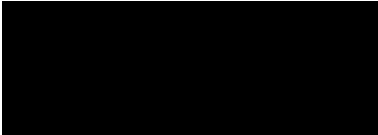
Title: A47 Improvements Easton to North Tuddenham – Bat Surveys Report

Client: SWECO

Date: February 2020

Office: Hemel Hempstead

Status: Final

Author	David Cove Principal Consultant	Technical reviewer	James Hildreth
Signature:		Signature:	
Date:	<u>20 / 03 / 20</u>	Date:	<u>30 / 03 / 20</u>

Project manager	David Cove Principal Consultant	Quality reviewer	James Hildreth
Signature:		Signature:	
Date:	<u>20 / 03 / 20</u>	Date:	<u>30 / 03 / 20</u>

RSK Environment Ltd (RSK) has prepared this report for the sole use of the client, showing reasonable skill and care, for the intended purposes as stated in the agreement under which this work was completed. The report may not be relied upon by any other party without the express agreement of the client and RSK. No other warranty, expressed or implied, is made as to the professional advice included in this report.

Where any data supplied by the client or from other sources have been used, it has been assumed that the information is correct. No responsibility can be accepted by RSK for inaccuracies in the data supplied by any other party. The conclusions and recommendations in this report are based on the assumption that all relevant information has been supplied by those bodies from whom it was requested.

No part of this report may be copied or duplicated without the express permission of RSK and the party for whom it was prepared.

Where field investigations have been carried out, these have been restricted to a level of detail required to achieve the stated objectives of the work.

This work has been undertaken in accordance with the quality management system of RSK Environment Ltd.

EXECUTIVE SUMMARY

1. This report presents the results of tree emergence and re-entry, transect and static bat detector surveys carried out along the proposed route of the A47 between Easton and North Tuddenham, Norfolk. The surveys were carried out to identify potential roosts in trees and to identify important foraging areas for bats that may be impacted by the proposals to dual this section of road. The surveys were carried out between the last week of June and October 2019.
2. Trees identified during surveys in 2017 as requiring emergence and dawn re-entry surveys were surveyed with trees identified as having high potential for roosting bats or already confirmed as a roost requiring a total of three surveys and those trees identified as having moderate potential for bat roost requiring two surveys. Where new roosts were identified in moderate potential trees a third survey was undertaken to comply with current guidance.
3. Transect surveys were undertaken twice a month along eight previously identified transect routes. Each transect was undertaken at dusk except during August when each of the transects was surveyed as back to back surveys at dusk and dawn. Transect 7 also had a survey in June 2019 but one survey was missed during July for both Transect 7 and Transect 8 due to access issues.
4. Static detector bat surveys were undertaken at 9 locations along the route of the existing A47. Each detector was placed adjacent to the road and all bat echolocation recorded for a period of five nights as a minimum.
5. All echolocation calls recorded during transect and static detector surveys were analysed and identified where possible to species level, where this was not possible particularly for *Myotis* calls these were identified to genus level.
6. As a result, areas where additional surveys may be required were identified including capture surveys to identify *Myotis* bats to species level to ensure that suitable mitigation could be designed where rare or uncommon species are identified. Also crossing point surveys at locations as having potential high risk for bats crossing the existing road and may be at risk once the new road was built.
7. A total of ten species of bat were confirmed as being present along the route including Common, Soprano and Nathusius's Pipistrelle, Barbastelle, Noctule, Leisler, Serotine, Brown Long-eared, Daubenton's, and Natterers bats. There were numerous classifications of *Myotis* species bats on all transect surveys and all static surveys. It is suspected that within this group Beckstein's, Whiskered and Brandt's bats are also present. Although suggested by the sound analysis software the recordings were of insufficient detail to confirm this.

8. Trees were the subject of dusk and dawn surveys and as a result a total of eleven trees were found to contain roosting bats. None of these roosts were large with the majority containing single bats, one containing two bats of two species and one tree with four bats of a single species. The species noted roosting in these trees were Soprano Pipistrelle (4), Common Pipistrelle (4), Brown Long-eared (1), and Pipistrelle species (2), only one tree was in use by bats on more than one occasion, suggesting that most tree roosts along the route are transient in nature. Only one tree that had been previously identified as a bat roost was confirmed as a roost during these surveys.

9. The survey results suggest that there is likely to be a need for capture and crossing point surveys to particularly identify the unknown *Myotis* species present on the site and to identify if specific mitigation may need to be applied to the route for those bats. Some high concentrations of bats along the route particularly where they were found close to the existing A47 and in particular close to the junction with Taverham Road where large numbers of Barbastelle and *Myotis* species bats were recorded during both transect and static bat surveys; and also near to [REDACTED] where roosts are known in the buildings and large numbers of Common and Soprano Pipistrelle were recorded using the hedgerows that border both sides of the A47 at this location. It is likely that bats are crossing the existing A47 at these locations and further survey would be required to see if crossing bats may be affected by the proposed new route.

CONTENTS

1	INTRODUCTION	1
1.1	Background	1
1.2	Site Location	1
1.3	Purpose of the Report	1
1.4	Existing Data	2
1.5	Structure of this Report	6
2	METHODS	7
2.1	Field Surveys	7
2.1.1	Bat Activity Transect Surveys	7
2.1.2	Static Bat Detector Surveys	13
2.1.3	Tree dusk emergence and dawn re-entry surveys	13
2.1.4	Sound Analysis	13
3	RESULTS	16
3.1	Transect Surveys	16
3.1.1	Transect 1	16
3.1.2	Transect 2	19
3.1.3	Transect 3	21
3.1.4	Transect 4	24
3.1.5	Transect 5	27
3.1.6	Transect 6	30
3.1.7	Transect 7	33
3.1.8	Transect 8	36
3.2	Static Bat Detector Results	39
3.2.1	Static 1 – [REDACTED] – on Transect four deployments	40
3.2.2	Static 2 – Woodland Strip adjacent to North Side of A47 at junction with Church Lane on Transect 8 – four deployments	42
3.2.3	Static 3 – Bridge over River Tud (Easton Estates) – two deployments	44
3.2.4	Static 4 – Grounds of [REDACTED] – two deployments	45
3.2.5	Static 5 – Wood Lane (east side) edge of woodland strip	46
3.2.6	Static 6 – Berry Lane j/w Dereham Road	48
3.2.7	Static 7 – South side of A47	50
	Table 33: Static Deployment – 21/08/2019 – 26/08/2019	50
	Table 34: Static Deployment – 05/09/2019 – 10/09/2019	51
	Table 35: Static Deployment – 15/10/2019	51
3.2.8	Static 8 – South side of A47 just west of [REDACTED]	51
3.2.9	Static 9 – In woodland strip north of A47 and south of Poppy's Wood – four deployments	53
3.3	Tree Survey results	56
4	EVALUATION	63
4.1	Transect Surveys	63
4.1.1	Transect 1	63
4.1.2	Transect 2	64
4.1.3	Transect 3	65
4.1.4	Transect 4	66
4.1.5	Transect 5	67

4.1.6	Transect 6.....	68
4.1.7	Transect 7.....	69
4.1.8	Transect 8.....	70
4.2	Static Detectors.....	71
4.2.1	Static 1.....	71
4.2.2	Static 2.....	71
4.2.3	Static 3.....	71
4.2.4	Static 4.....	72
4.2.5	Static 5.....	72
4.2.6	Static 6.....	73
4.2.7	Static 7.....	73
4.2.8	Static 8.....	74
4.2.9	Static 9.....	74
5	RECOMMENDATIONS.....	76
5.1	Transects.....	76
5.2	Statics 76	
5.3	Crossing Point Surveys.....	76
5.4	Trapping Surveys.....	77
5.5	Tracking Surveys.....	77
6	REFERENCES.....	79
7	FIGURES.....	80

1 INTRODUCTION

1.1 Background

RSK was commissioned by SWECO on behalf of Highways England to undertake bat surveys consisting of transect (activity) surveys, static bat detector surveys, and tree dawn re-entry and dusk emergence surveys along the proposed route of the A47, west of Norwich. The transect surveys were repeats of surveys undertaken during 2017, and the static surveys were at some locations that has also been sampled during 2017.

1.2 Site Location

The site is the route of a proposed new dual carriageway between Easton, Norfolk (Ordnance Survey grid reference TG 1317 1104) and North Tuddenham, Norfolk (Ordnance Survey grid reference TG 0506 1371) that will replace the existing two-lane carriageway. The new dual carriageway will follow or be close to the existing A47.

The survey area, hereinafter referred to as the 'site', is shown on *Figure 1* which shows the current road and in *Figure 2, Maps 2 – 7*, that show the new road transposed over the existing road. The site comprises a mix of habitats along its route mostly agriculture including fields with arable crops and grassland used for grazing livestock, hedgerows, woodlands, tree lines, rivers and villages.

1.3 Purpose of the Report

The aims of the survey work and the report presented here are to:

- identify habitats and features within the site that have the potential to be used by foraging and commuting bats by;
- carrying out walked transects twice a month along the previously identified eight transects and recording all bat activity along those transects to identify important habitats used by commuting and foraging bats;
- carrying out dawn re-entry surveys and dusk emergence surveys on trees previously identified as having suitable features for roosting bats and identifying those that support roosting bats;
- place one static bat detector on each transect once a month for at least five consecutive nights in each month to record passes by bats to identify the species present and their numbers;
- Report the findings of all the above surveys; and
- to identify from the survey findings where additional surveys may be required.

1.4 Existing Data

The following existing data was used to establish what surveys were required:

Trees

Existing data for the trees on site consisted of the tree species and the features observed during ground level tree assessments and carried out on behalf of Amey during 2017. These results were reported in a spreadsheet entitled Summer Bat Survey and were used as the basis for determining the tree surveys to be carried out during 2019. Some trees had no locations or other details shown in the spreadsheet, so reference was made to maps attached to the report. One tree number was not found. All trees subject to surveys is shown in *Figure 5*.

Table 1 – Trees identified for emergence and dawn re-entry surveys

Tree Number	Tree Species	Features observed	Grid Reference	Tree Grading	Surveys Required	Comments
1	Quercus rober	Holes and Cracks	TG 06380 13438	High	2 dusk and 1 dawn	
4	Quercus rober	Ivy cover	TG 06731 13289	Moderate	1 dusk and 1 dawn	
5	Quercus rober	Holes, Cracks and Hollows	TG 06813 13298	Moderate	1 dusk and 1 dawn	
6	Quercus rober	Holes, Cracks and Lifted Bark	TG 06887 13277	Moderate	1 dusk and 1 dawn	
9	Quercus rober	Holes, Cracks and Lifted Bark	TG 07117 13122	Moderate	1 dusk and 1 dawn	
43	No details known	No details known	TG 07868 12629	High	1 dusk and 1 dawn	

48	Quercus rober	Holes, Splits and cracks	TG 08099 12524	High	2 dusk and 1 dawn	
50	Quercus rober – standing dead wood	Holes, Lifted Bark, Cracks and hollows	TG 08141 12504	Moderate	1 dusk and 1 dawn	
51	Quercus rober	Hollows	TG 08443 12528	Confirmed roost	2 dusk and 1 dawn	Species not identified from original survey
63	Quercus rober	Ivy cover	TG 09842 12601	Moderate	1 dusk and 1 dawn	
64	Quercus rober	Hollows and Cracks	TG 09717 12305	Moderate	1 dusk and 1 dawn	
65	Quercus rober	Hollows, Cracks and Lifted Bark	TG 09724 12256	Moderate	1 dusk and 1 dawn	Changed from its original classification of High.
73	Quercus rober	Lifted Bark	TG 10225 12086	Moderate	1 dusk and 1 dawn	
77	Quercus rober	Lifted bark, Hollows, Holes and Cracks	TG 10575 12290	Moderate	1 dusk and 1 dawn	Changed from its original classification of High.
78	Quercus rober	No features described		High		
79	Quercus rober	No features described		High		
80	Species not identified	Lifted bark, Hollows, Holes and Cracks	TG 10908 11395	High	2 dusk and 1 dawn	Standing dead wood

81	Quercus rober	Lifted bark, Hollows, Holes and Cracks	TG 11007 11293	High	2 dusk and 1 dawn	
82	Quercus rober	Cracks and lifted bark	TG 11045 11272	Moderate	1 dusk and 1 dawn	
83	Quercus rober	Cracks, Hollows, Ivy and lifted bark	TG 11087 11259	High	2 dusk and 1 dawn	
84	Quercus rober	Ivy and hollows	TG 11098 11259	Moderate	1 dusk and 1 dawn	
97	Quercus rober	Cracks and Ivy	TG 11677 10934	Moderate	1 dusk and 1 dawn	
102	Quercus rober	Ivy	TG 11542 11132	Moderate	1 dusk and 1 dawn	
103	Quercus rober	Ivy	TG 11672 11134	Moderate	1 dusk and 1 dawn	
117	Quercus rober	Ivy	TG 12137 11096	Moderate	1 dusk and 1 dawn	
118	Quercus rober	Ivy	TG 12134 11077	Moderate	1 dusk and 1 dawn	
119	Quercus rober	Ivy	TG 12216 11052	Moderate	1 dusk and 1 dawn	
120	Quercus rober	Holes and hollows	TG 12474 10977	Moderate	1 dusk and 1 dawn	
121	Quercus rober	Holes and hollows	TG 12800 11100	Moderate	1 dusk and 1 dawn	Grid reference is wrong

122	Quercus rober	Cracks, ivy and hollows		Moderate	1 dusk and 1 dawn	Grid reference is wrong. Changed from its original classification of High.
123	Quercus rober	No features described	TG1308510974	High	2 dusk and 1 dawn	Veteran Tree

1.5 Structure of this Report

The remainder of this report is structured as follows:

- *Section 2* describes the survey and assessment methods;
- *Section 3* presents the survey results;
- *Section 4* evaluates the results;
- *Section 5* lists the references;
- *Section 6* provides the figures; and

2 METHODS

2.1 Field Surveys

2.1.1 Bat Activity Transect Surveys

Bat activity transect surveys were carried out over eight pre-determined transect routes (*Figure 3*) that had previously been surveyed during 2017 (WYG report 2017). The length of the A47 proposed for upgrading to a dual carriageway had been assessed as having 'high' suitability for foraging and commuting bats requiring two walked transect surveys to be carried out each month during the bat active season.

The transect routes sampled all habitats present along the existing A47 and included areas within both the existing route of the road and the proposed route of the new dual carriageway.

All transects were carried out twice a month¹ with reference to best practice guidelines (Collins, 2016), except for June when a single transect for transect 7 was carried out due to late instruction. A proposed transect for transect 8 in June was cancelled due to aggressive cattle being present on the transect (near miss report submitted). Additionally, one date in July for Transects 7 and 8 was missed due to access issues. Each transect was conducted at dusk, with one of the two surveys in August being a back to back survey (dusk and pre-dawn)

Each transect was commenced at or just before dusk with surveyors initially remaining static at the start point for up to 15 minutes after sunset. Surveyors then started walking the transect to capture foraging and commuting bats along the route using bat detectors to record time expanded sound files for later analysis. Where possible for consistency BatLogger M bat detectors were used on all transects. The exception to this was the use of Titley Scientific Anabat Walkabout for Transects 7 and 8 during August, September and October 2019.

The transects were walked at a steady pace taking approximately 2 hours to walk. Along the route surveyors stopped for five-minute periods at locations that had high potential for bats such as the junctions between hedges. Each month for each of the two surveys for each transect, the route was reversed allowing an assessment of the transect route and when bats appeared along the route at different times.

Table 2: Transect Descriptions and lengths

Transect Number	Transect Length	Primary Transect Features
1	4.7 km	Woodland (Poppy's Wood), Woodland edge, Hedgerows, Open fields, Road Verge

¹ Collins, J. (ed.) (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn). Section 8.2.

2	3.7 km	Large open arable fields bounded by hedgerows with standard trees, woodland edge, and road verges
3	5.9 km	Large open arable fields bounded by hedgerows with standard trees, and road verges
4	4.26 km	Hedgerows, woodland, open fields, River Tud, Scrub and road verge.
5	4.5 km	Hedgerows, woodland
6	5.7 km	Hedgerows, Woodland edge, road verge, open fields
7	3.5 km	Hedgerows, woodlands both deciduous and plantation, and the River Tud. All bordered by fields containing arable crops
8	5.7 km	River Tud, water meadow, woodland, hedgerows and road verge along A47

Table 3: Summary of bat transect survey times and weather conditions

Transect No	Date of Survey	Time			Temperature (°C)		Precipitation	Wind Speed (Beaufort)	Cloud (Octas)
		Sunrise /Sunset	Start	Finish	Start	End			
1	04/07/2019	21:21	21:05	23:30	19	17	Nil	0	8
	25/07/2019	21:00	20:50	21:23	28.5	28	Abandoned due to thunderstorm and torrential rain	3	8
	31/07/2019	20:50	20:50	23:33	19	18	Nil	3 – 4	8
	12/08/2019	20:30	20:30	22:50	17	14	Nil	0	4
	13/08/2019	05:15	03:15	05:05	12	10	Nil	0	0
	20/08/2019	20:12	20:12	22:25	17	13	Nil	0	2
	03/09/2019	19:40	19:40	22:00	22	18	Nil	1	7
	16/09/2019	19:08	19:00	21:30	14	12	Nil	2	4
	08/10/2019	18:30	18:30	20:30	12	12	Nil	2	2
15/10/2019	18:02	18:02	20:10	13	12	Nil	0	4	
2	03/07/2019	21:22	21:22	23:27	15	10	Nil	0 – 1	0
	31/07/2019	20:50	20:50	22:41	21	19	Nil	1	7
	12/08/2019	20:28	20:28	22:41	13	11	Nil	2	4
	13/08/2019	05:34	03:40	05:30	9	10	Nil	2	4
	20/08/2019	20:12	20:12	22:23	15	13	Nil	1	3
	03/09/2019	19:40	19:40	22:00	22	18	Nil	1	7

	16/09/2019	19:12	19:01	21:00	14.5	12	Nil	0	2
	09/10/2019	18:14	18:14	20:30	11	10	Nil	2	11`
	17/10/2019	17:59	17:59	20:30	12	12	Nil	1	3
3	17/07/2019	21:09	21:09	23:49	20	18	Light drizzle for last 10 minutes of survey	3	3
	29/07/2019	20:54	20:54	22:56	22	21	Nil	0	1
	05/08/2019	20:41	20:41	23:30	14	16	Nil	1	5
	06/08/2019	05:20	02:57	05:20	18	15	Nil	1	6
	21/08/2019	20:11	20:11	22:30	18	16	Nil	0	3
	05/09/2019	19:35	19:35	22:04	16	15	Nil	2	3
	17/09/2019	19:06	19:00	21:24	11	9	Nil	1	0
	02/10/2019	18:30	18:20		14	12.8	Nil	1	3
	09/10/2019	18:14	18:05	20:45	18	16	Nil	2	2
4	17/07/2019	21:09	21:09	23:49	20	18	Light drizzle for last 10 minutes of survey	3	3
	29/07/2019	20:54	20:54	22:56	22	21	Nil	0	1
	05/08/2019	20:41	20:41	22:51	22	20	Nil	0	3
	06/08/2019	05:20	03:10	05:20	17	16	Nil	2	6
	21/08/2019	20:09	20:09	22:22	20	19	Nil	2	2
	10/09/2019	19:24	19:24	21:50	19	12	Nil	1	4
	17/09/2019	19:06	19:00	21:30	11	9	Nil	1	0

	02/10/2019	18:30	18:21	20:34	14	13	Nil	1	3
	10/10/2019	18:15	19:15	20:30	14	11	Nil	3	7
5	17/07/2019	21:09	20:55	23:40	20	18	Nil	1 – 2	8
	30/07/2019	20:51	20:51	22:57	21	18	Nil	0	7
	06/08/2019	20:39	20:35	23:10	24	18	Nil	2	2
	19/08/2019	20:14	20:14	22:19	16	14	Nil	1	4
	20/08/2019	05:45	03:30	05:40	12	11	Nil	1	0
	10/09/2019	19:22	19:22	21:34	21	13	Nil	2	2
	18/09/2019	19:03	19:03	21:36	21	11	Nil	3	1
	03/10/2019	18:28	18:28	21:26	16	13	Nil	2	2
	16/10/2019	17:58	17:58	20:00	14	12	Nil	2	8
6	18/07/2019	21:08	21:00	23:22	20	15	Nil	3	7
	30/07/2019	20:51	20:51	23:15	18	17	Nil	3	8
	08/08/2019	20:36	20:36	22:44	20	20	Nil	0	2
	19/08/2019	20:11	20:11	22:30	17	13	Nil	0	4
	20/08/2019	05:45	03:15	05:25	12	12	Nil	1	3
	11/09/2019	19:21	19:21	21:50	18	14	Nil	1	2
	18/09/2019	19:05	19:00	21:00	14.2	7.7	Nil	1	2
	03/10/2019	18:28	18:28	20:41	16	13	Nil	2	2
16/10/2019	17:58	17:58	20:20	12	11	Nil	0	3	
7	26/06/2019	21:23	21:08	23:30	14	14	Nil	3	8

	18/07/2019	21:09	21:05	23:17	17	17	Nil	1	5
	07/08/2019	20:37	20:37	22:52	24	21	Nil	2	4
	08/08/2019	05:21	03:20	05:21	15	15	Nil	1	0
	27/08/2019	19:55	19:44	22:19	26	23	Nil	1	3
	02/09/2019	19:40	19:27	22:02	17	15	Nil	1	8
	16/09/2019	19:12	19:01	21:00	14.5		Nil	0	2
	09/10/2019								
	21/10/2019	17:48	17:33	19:15	13	12	Nil	1	8
8	18/07/2019	21:09	21:00	23:41	19	18	Nil	0 – 1	0
	07/08/2019	20:38	20:30	22:45	20	18	Nil	2	3
	08/08/2019	05:25	03:25	05:09	15	13	Nil	1	1
	22/08/2019	19:56	19:40	21:40	26	24	Nil	0	8
	02/09/2019	19:40	19:27	22:02	17	15	Nil	1	8
	16/09/2019	19:12	19:08	21:16	14.5	12	Nil	0	2
	08/10/2019	18:16							
	21/10/2019	17:48	17:40	19:45	12	11	Light drizzle at start, but stopped after 10 minutes	0	8

2.1.2 Static Bat Detector Surveys

Wildlife Acoustics SM4 bat detectors were deployed at a total of nine locations along the route (Figure 4). They were deployed for a minimum of five days for each deployment. The detectors were deployed once a month during the survey period for each transect route. The specific locations used were each used on at least 2 occasions during the survey period. The deployments of the detectors were for one detector per transect route as described above. The detectors were programmed to operate remotely with each detector programmed to start 30 minutes before sunset and to record all sound until 30 minutes after sunrise. These times were set automatically by each detector by programming the location of the site using latitude and longitude co-ordinates so that commencement and finish times were accurate and consistent.

Siting of the detectors was carried out so that microphones were as far away as possible from any reflective surfaces so that sound files would not be compromised by reflections and noise.

2.1.3 Tree dusk emergence and dawn re-entry surveys

Trees were surveyed using two surveyors for each tree so that all elevations of the tree could be observed. Observations were maintained from 15 minutes before sunset until at least 90 minutes after sunset. All observations noted any bats emerging from any features on the trees and any echolocation used by the bats was recorded using handheld bat detectors for later analysis to confirm species.

Trees surveys were carried out for the following number of times:

- All trees that had been graded as having moderate potential for roosting bats were surveyed twice once as a dusk emergence survey and once as a dawn re-entry survey and if during any of these surveys bats were noted emerging a third survey (usually an additional dusk survey) was carried out to comply with the current guidelines;
- All trees that had been graded as having high potential for roosting bats or as having been previously confirmed as a bat roost were surveyed on three occasions comprising two dusk emergence surveys and one dawn re-entry survey.

2.1.4 Sound Analysis

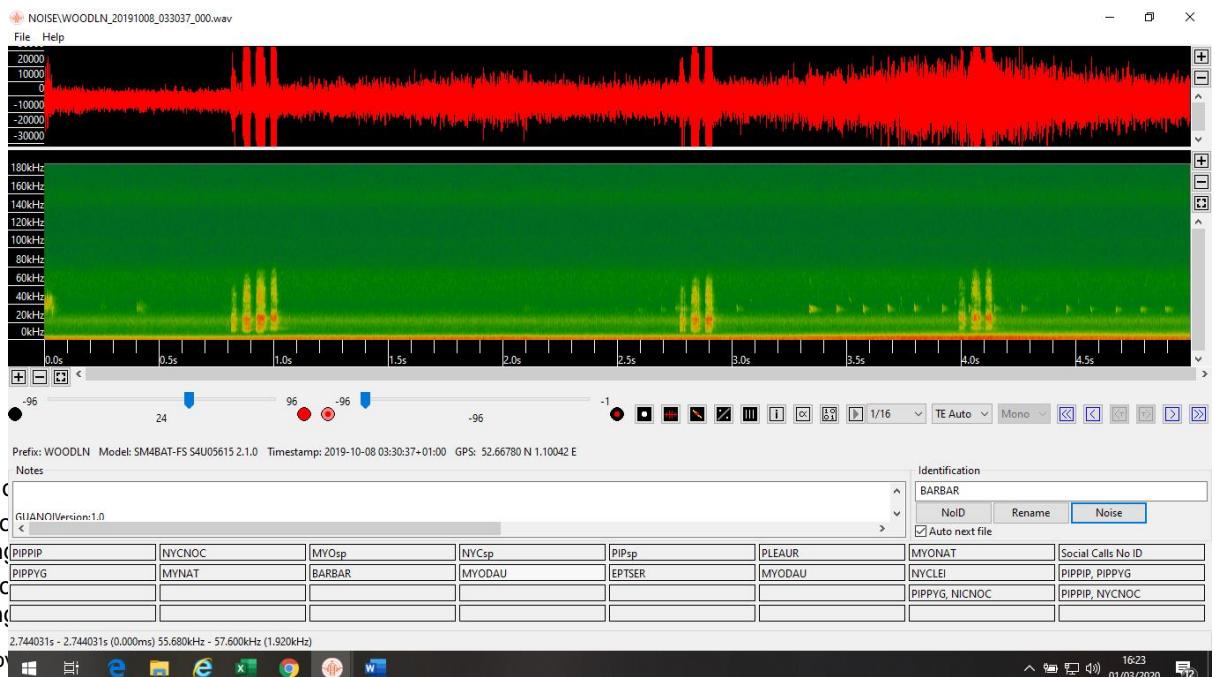
All bat calls recorded during the Transect, Static Detector deployments and tree surveys were subject to analysis using proprietary software designed for that purpose. All calls recorded on BatLogger bat detectors were analysed using BatExplorer© software designed to be used in conjunction with those detectors. All calls recorded using Wildlife Acoustics SM4 bat detectors were analysed using Wildlife Acoustics Kaleidoscope Pro© software.

Both types of software are capable of the auto identification of calls to species level although all such auto identifications were treated with caution. Both software packages when making an identification of a bat call also shows the degree of confidence in that identification. All calls with a less than 80% degree of confidence were also subject to manual confirmation. To assist in manual identification reference was made to the publication *British Bat Calls*² (Russ, 2012), particularly where calls from *Myotis* bats were recorded. These calls are often difficult to separate to species level and in many instances are only identifiable to genus level even with the aid of reference materials. As a result of this difficulty many calls from *Myotis* bats are referenced as *Myotis species* within the text.

On many occasions the recorders (both hand-held and static) recorded what were clearly social calls. The attribution of a species to individual or a series of social calls can be very difficult depending on the type of social call and the number of pulses recorded. This particularly applied to pipistrelle bats where the social calls of both Common and Soprano Pipistrelles overlap. Therefore, most recordings where just social calls were recorded these were treated as a pass by a bat but were recorded as Pipistrelle Species during the final analysis. To aid in identifying the social calls of bats reference was made to the publication *Social Calls of the Bats of Britain and Ireland*³ (Middleton, 2014).

Many calls were also recorded as noise which may have been generated from several sources including mechanical sources, raindrops, the rustling of leaves, insects, etc. These recorded noise files were also capable of hiding bat calls and were therefore manually searched for all hidden bat calls so that an accurate record of the passes of bats was made. Some noise pulses can appear to be echolocation pulses and to confirm some recordings as noise reference was made to the publication *Is That a Bat* (Middleton, 2020)⁴

As an example, below is the recording of a Barbastelle bat within a noise file. The noise file was generated by a mechanical source. Whilst the recording was being made by the detector a Barbastelle flew through and was recorded at the same time. It is likely that this bat would not have been recorded by the unit if there were no other extraneous noise sources.



² Russ, J

³ Middleto

Publishing

⁴ Middleto

Publishing

Classifications were made to species level where enough detail and enough pulses was contained within the calls recorded. This was not always possible and such calls were noted to genus level only.

3 RESULTS

3.1 Transect Surveys

All transect results are mapped at Figures 7 – 14 in Section 6.

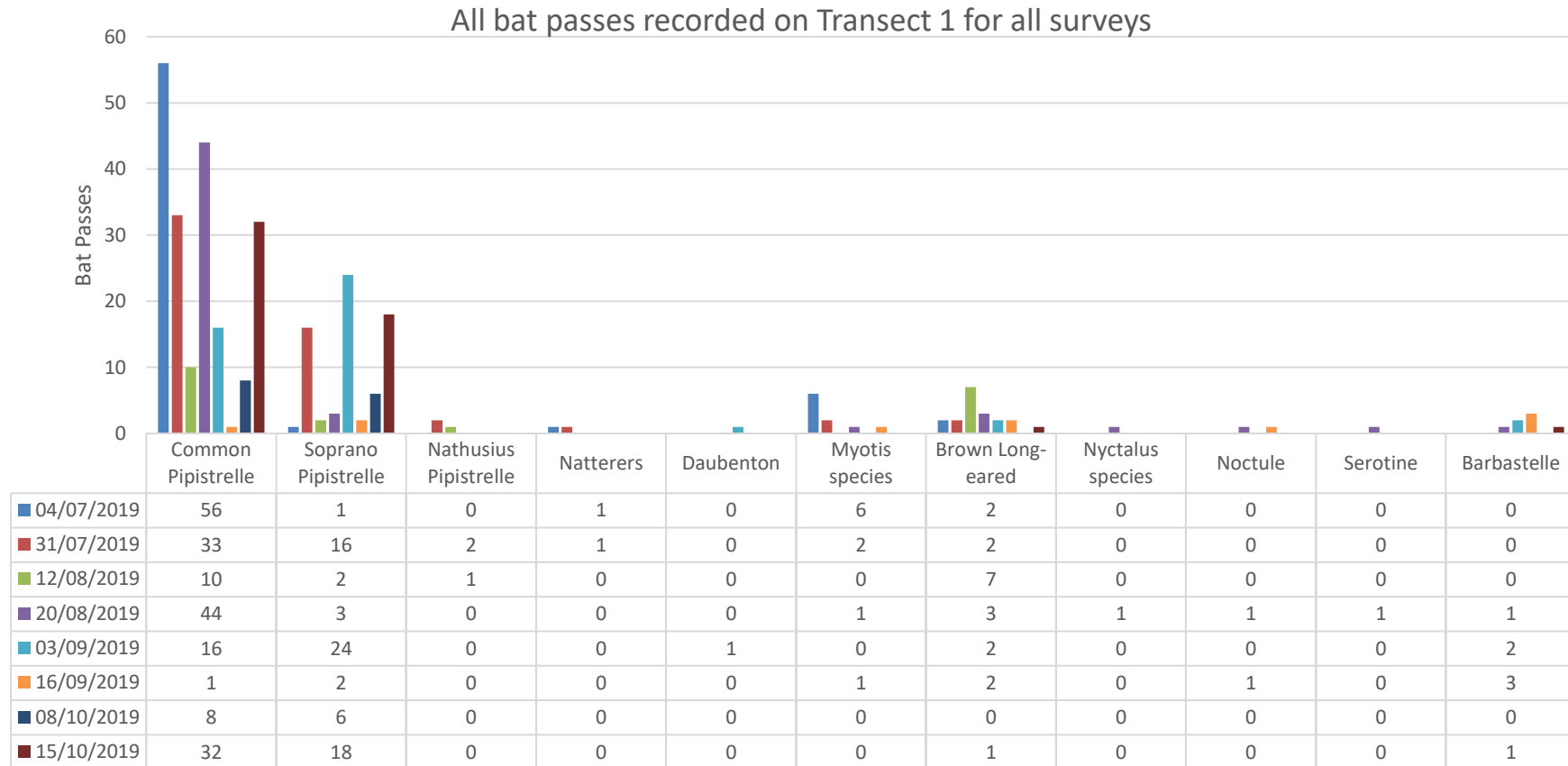
3.1.1 Transect 1

Table 3 – Transect Results for Transect 1

Date	Species Recorded	Total of Bat Passes for each Species
04/07/2019	<i>Myotis nattereri</i>	1
	<i>Myotis spec.</i>	6
	<i>Pipistrellus pipistrellus</i>	56
	<i>Pipistrellus pygmaeus</i>	1
	<i>Plecotus auritus</i>	2
31/07/2019	<i>Myotis nattereri</i>	1
	<i>Myotis spec.</i>	2
	<i>Pipistrellus nathusii</i>	2
	<i>Pipistrellus pipistrellus</i>	33
	<i>Pipistrellus pygmaeus</i>	16
	<i>Plecotus auritus</i>	2
12/08/2019	<i>Pipistrellus nathusii</i>	1
	<i>Pipistrellus pipistrellus</i>	10
	<i>Pipistrellus pygmaeus</i>	2
	<i>Plecotus auritus</i>	7
20/08/2019	<i>Barbastella barbastellus</i>	1
	<i>Eptesicus serotinus</i>	1
	<i>Myotis spec.</i>	1
	<i>Nyctalus noctula</i>	1
	<i>Nyctalus spec.</i>	1
	<i>Pipistrellus pipistrellus</i>	44
	<i>Pipistrellus pygmaeus</i>	3
	<i>Plecotus auritus</i>	3
03/09/2019	<i>Barbastella barbastellus</i>	2
	<i>Myotis daubentonii</i>	1
	<i>Pipistrellus pipistrellus</i>	16
	<i>Pipistrellus pygmaeus</i>	24
	<i>Plecotus auritus</i>	2
16/09/2019	<i>Barbastella barbastellus</i>	3
	<i>Myotis spec.</i>	1
	<i>Nyctalus noctula</i>	1
	<i>Pipistrellus pipistrellus</i>	1
	<i>Pipistrellus pygmaeus</i>	2

	<i>Plecotus auritus</i>	2
08/10/2019	<i>Pipistrellus pipistrellus</i>	8
	<i>Pipistrellus pygmaeus</i>	6
15/10/2019	<i>Barbastella barbastellus</i>	1
	<i>Pipistrellus pipistrellus</i>	32
	<i>Pipistrellus pygmaeus</i>	18
	<i>Plecotus auritus</i>	1

Chart 1 – Transect 1 Bat Passes by month per species

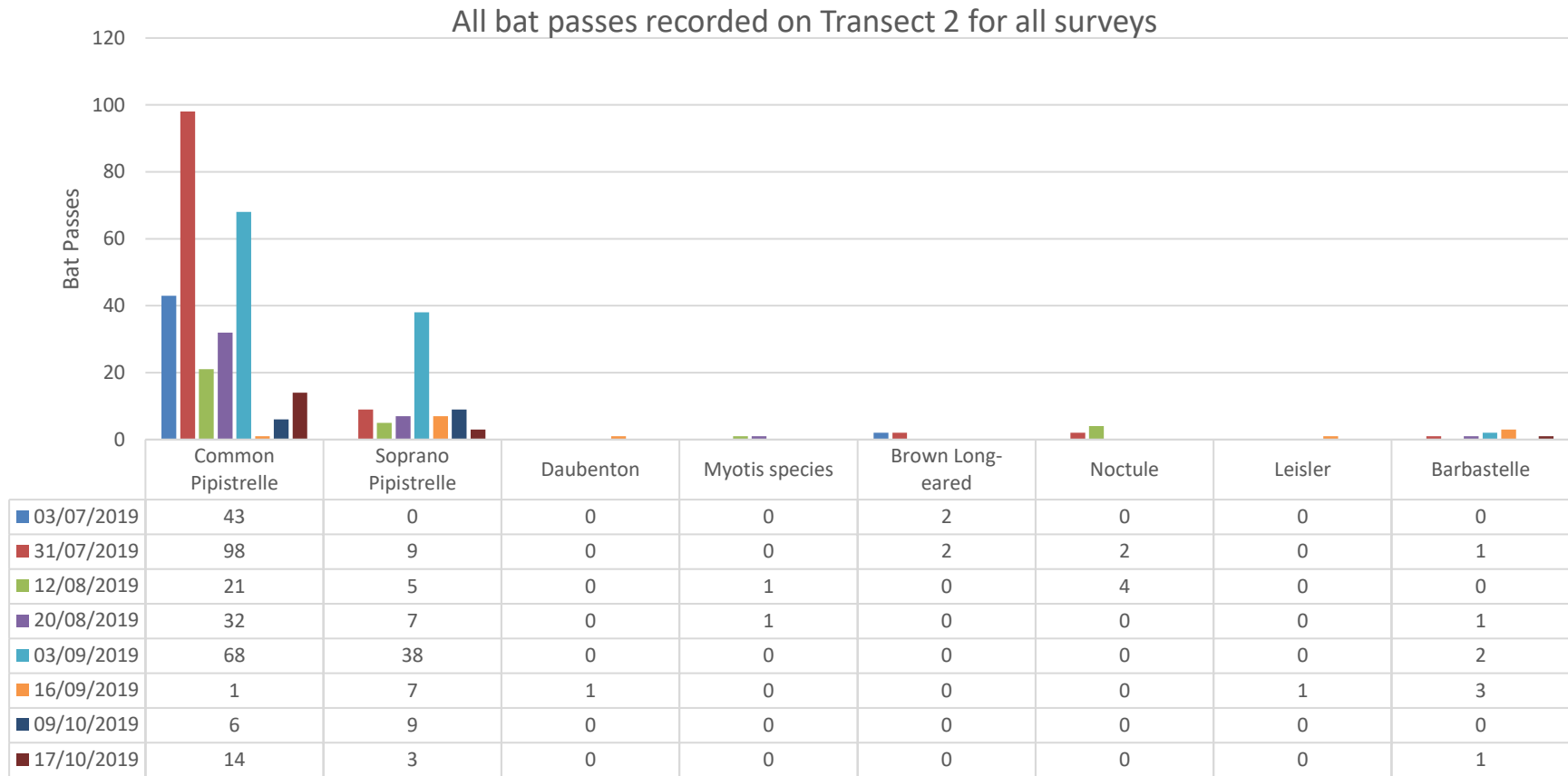


3.1.2 Transect 2

Table 4 – Results for Transect 2

Date	Species Recorded	Total of Bat Passes for each Species
03/07/2019	<i>Pipistrellus pipistrellus</i>	43
	<i>Plecotus auritus</i>	2
31/07/2019	<i>Barbastella barbastellus</i>	1
	<i>Nyctalus noctula</i>	2
	<i>Pipistrellus pipistrellus</i>	98
	<i>Pipistrellus pygmaeus</i>	9
	<i>Pipistrellus spec.</i>	1
	<i>Plecotus auritus</i>	2
12/08/2019 – 13/08/2019 Combined Dusk and Dawn	<i>Myotis spec.</i>	1
	<i>Nyctalus noctula</i>	4
	<i>Pipistrellus pipistrellus</i>	21
	<i>Pipistrellus pygmaeus</i>	5
20/08/2019	<i>Barbastella barbastellus</i>	1
	<i>Myotis spec.</i>	1
	<i>Pipistrellus pipistrellus</i>	32
	<i>Pipistrellus pygmaeus</i>	7
03/09/2019	<i>Nyctalus leisleri</i>	1
	<i>Pipistrellus pipistrellus</i>	68
	<i>Pipistrellus pygmaeus</i>	38
	<i>Pipistrellus spec.</i>	2
16/09/2019	<i>Myotis daubentonii</i>	1
	<i>Pipistrellus pipistrellus</i>	1
	<i>Pipistrellus pygmaeus</i>	7
09/10/2019	<i>Pipistrellus pipistrellus</i>	6
	<i>Pipistrellus pygmaeus</i>	9
17/10/2019	<i>Pipistrellus pipistrellus</i>	14
	<i>Pipistrellus pygmaeus</i>	3

Chart 2 - Transect 2 Bat Passes by month per species



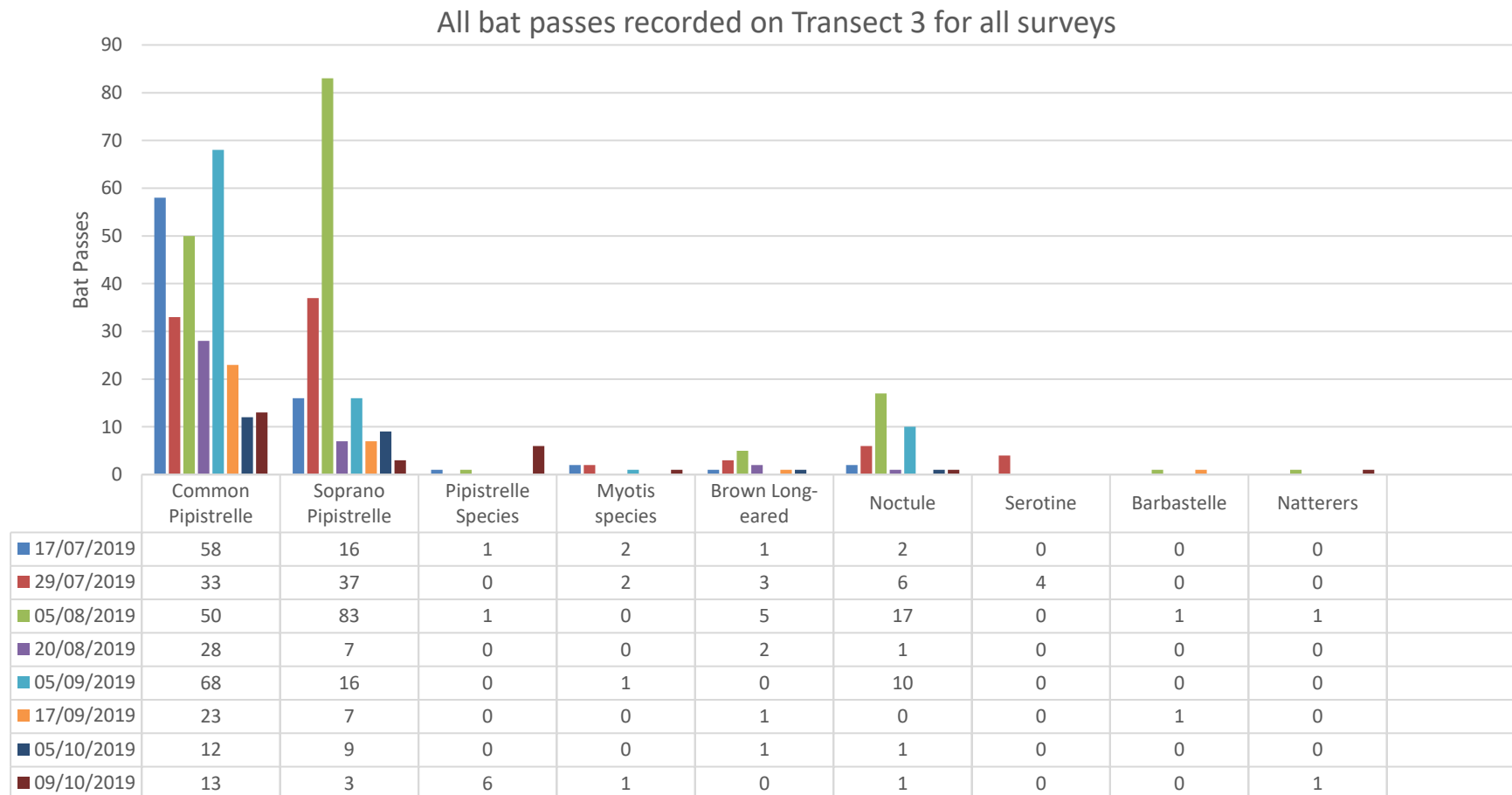
3.1.3 Transect 3

Table 5 – Results for Transect 3

Date	Species Recorded	Total Bat Passes for each Species
17/07/2019	<i>Myotis spec.</i>	2
	<i>Nyctalus noctula</i>	2
	<i>Pipistrellus pipistrellus</i>	58
	<i>Pipistrellus pygmaeus</i>	16
	<i>Pipistrellus spec.</i>	1
	<i>Plecotus auritus</i>	1
29/07/2019	<i>Eptesicus serotinus</i>	4
	<i>Myotis spec.</i>	2
	<i>Nyctalus noctula</i>	6
	<i>Pipistrellus pipistrellus</i>	33
	<i>Pipistrellus pygmaeus</i>	37
	<i>Plecotus auritus</i>	3
05/08/2019 – 06/08/2019 Combined Dusk and Dawn	<i>Barbastella barbastellus</i>	1
	<i>Myotis nattereri</i>	1
	<i>Nyctalus noctula</i>	17
	<i>Pipistrellus pipistrellus</i>	50
	<i>Pipistrellus pygmaeus</i>	83
	<i>Pipistrellus spec.</i>	1
	<i>Plecotus auritus</i>	5
20/08/2019	<i>Nyctalus noctula</i>	1
	<i>Pipistrellus pipistrellus</i>	28
	<i>Pipistrellus pygmaeus</i>	7
	<i>Plecotus auritus</i>	2
05/09/2019	<i>Myotis spec.</i>	1
	<i>Nyctalus noctula</i>	10
	<i>Pipistrellus pipistrellus</i>	68
	<i>Pipistrellus pygmaeus</i>	16
17/09/2019	<i>Barbastella barbastellus</i>	1
	<i>Pipistrellus pipistrellus</i>	23
	<i>Pipistrellus pygmaeus</i>	5
	<i>Plecotus auritus</i>	1
05/10/2019	<i>Nyctalus noctula</i>	1
	<i>Pipistrellus pipistrellus</i>	12
	<i>Pipistrellus pygmaeus</i>	26
	<i>Plecotus auritus</i>	1
09/10/2019	<i>Myotis nattereri</i>	1
	<i>Myotis spec.</i>	1
	<i>Nyctalus noctula</i>	1
	<i>Pipistrellus pipistrellus</i>	13
	<i>Pipistrellus pygmaeus</i>	37

Date	Species Recorded	Total Bat Passes for each Species
	<i>Pipistrellus spec.</i>	6

Chart 3 - Transect 3 Bat Passes by month per species



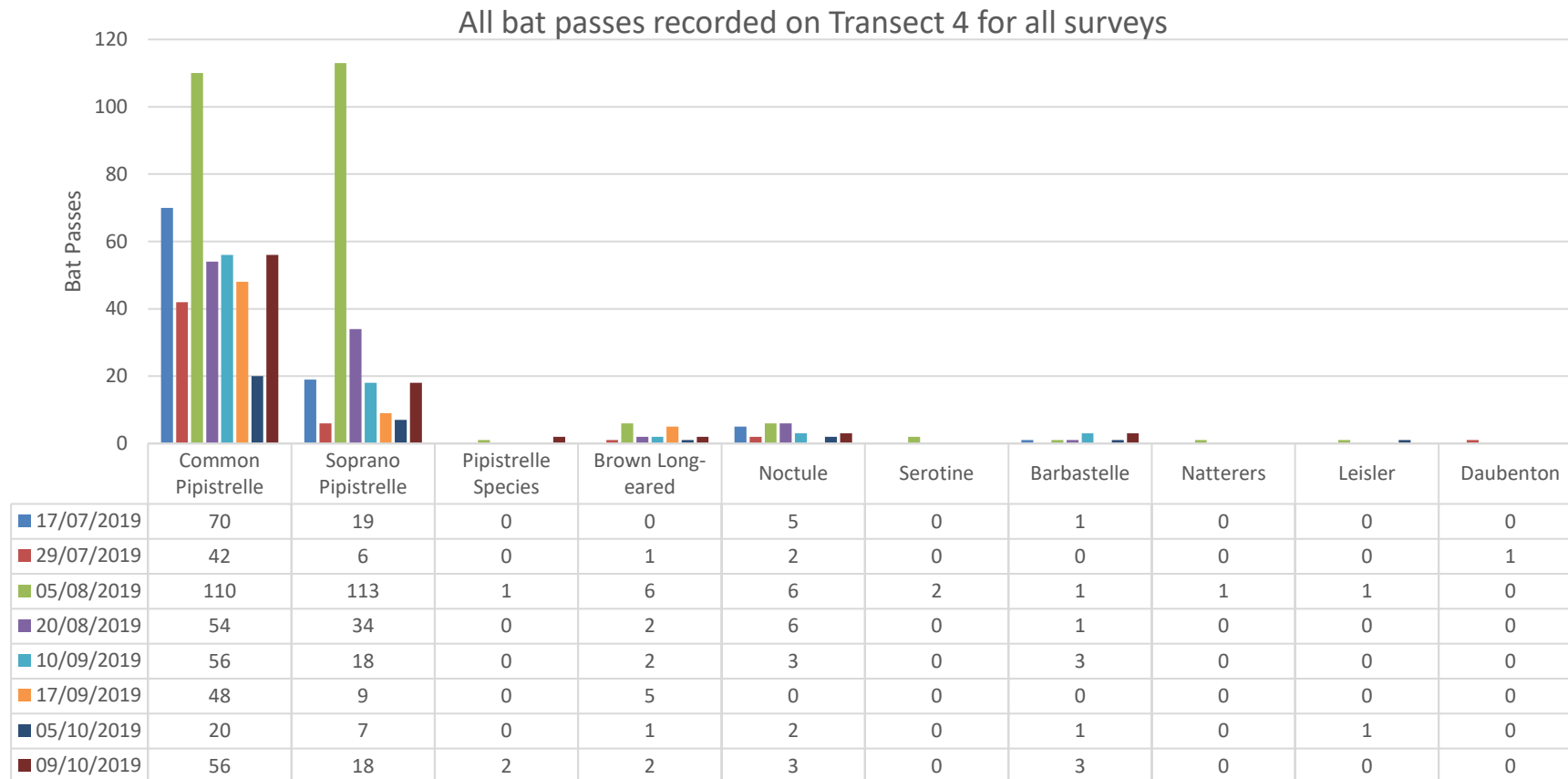
3.1.4 Transect 4

Table 6 - Results for Transect 4

Survey Date	Species Recorded	Total Bat Passes for each Species
17/07/2019	<i>Barbastella barbastellus</i>	1
	<i>Nyctalus noctula</i>	5
	<i>Pipistrellus pipistrellus</i>	70
	<i>Pipistrellus pygmaeus</i>	19
	<i>Barbastella barbastellus</i>	1
	<i>Nyctalus noctula</i>	5
29/07/2019	<i>Myotis daubentonii</i>	1
	<i>Nyctalus noctula</i>	2
	<i>Pipistrellus pipistrellus</i>	41
	<i>Pipistrellus pygmaeus</i>	6
	<i>Plecotus auritus</i>	1
05/08/2019 – 06/08/2019 Dusk and Dawn combined	<i>Barbastella barbastellus</i>	1
	<i>Eptesicus serotinus</i>	2
	<i>Myotis nattereri</i>	1
	<i>Nyctalus leisleri</i>	1
	<i>Nyctalus noctula</i>	6
	<i>Pipistrellus pipistrellus</i>	110
	<i>Pipistrellus pygmaeus</i>	113
	<i>Pipistrellus spec.</i>	1
	<i>Plecotus auritus</i>	6
20/08/2019	<i>Barbastella barbastellus</i>	1
	<i>Nyctalus noctula</i>	6
	<i>Pipistrellus pipistrellus</i>	54
	<i>Pipistrellus pygmaeus</i>	34
	<i>Plecotus auritus</i>	2
10/09/2019	<i>Barbastella barbastellus</i>	3
	<i>Nyctalus noctula</i>	3
	<i>Pipistrellus pipistrellus</i>	56
	<i>Pipistrellus pygmaeus</i>	18
	<i>Pipistrellus spec.</i>	2
	<i>Plecotus auritus</i>	2
17/09/2019	<i>Myotis nattereri</i>	2
	<i>Pipistrellus pipistrellus</i>	48
	<i>Pipistrellus pygmaeus</i>	9
	<i>Plecotus auritus</i>	5
05/10/2019	<i>Barbastella barbastellus</i>	1
	<i>Nyctalus leisleri</i>	1
	<i>Nyctalus noctula</i>	2
	<i>Pipistrellus pipistrellus</i>	20

Survey Date	Species Recorded	Total Bat Passes for each Species
	<i>Pipistrellus pygmaeus</i>	7
	<i>Plecotus auritus</i>	1
10/10/2019	<i>Barbastella barbastellus</i>	3
	<i>Nyctalus noctula</i>	3
	<i>Pipistrellus pipistrellus</i>	56
	<i>Pipistrellus pygmaeus</i>	18
	<i>Pipistrellus spec.</i>	2
	<i>Plecotus auritus</i>	2

Chart 7 - Transect 4 Bat Passes by month per species



3.1.5 Transect 5

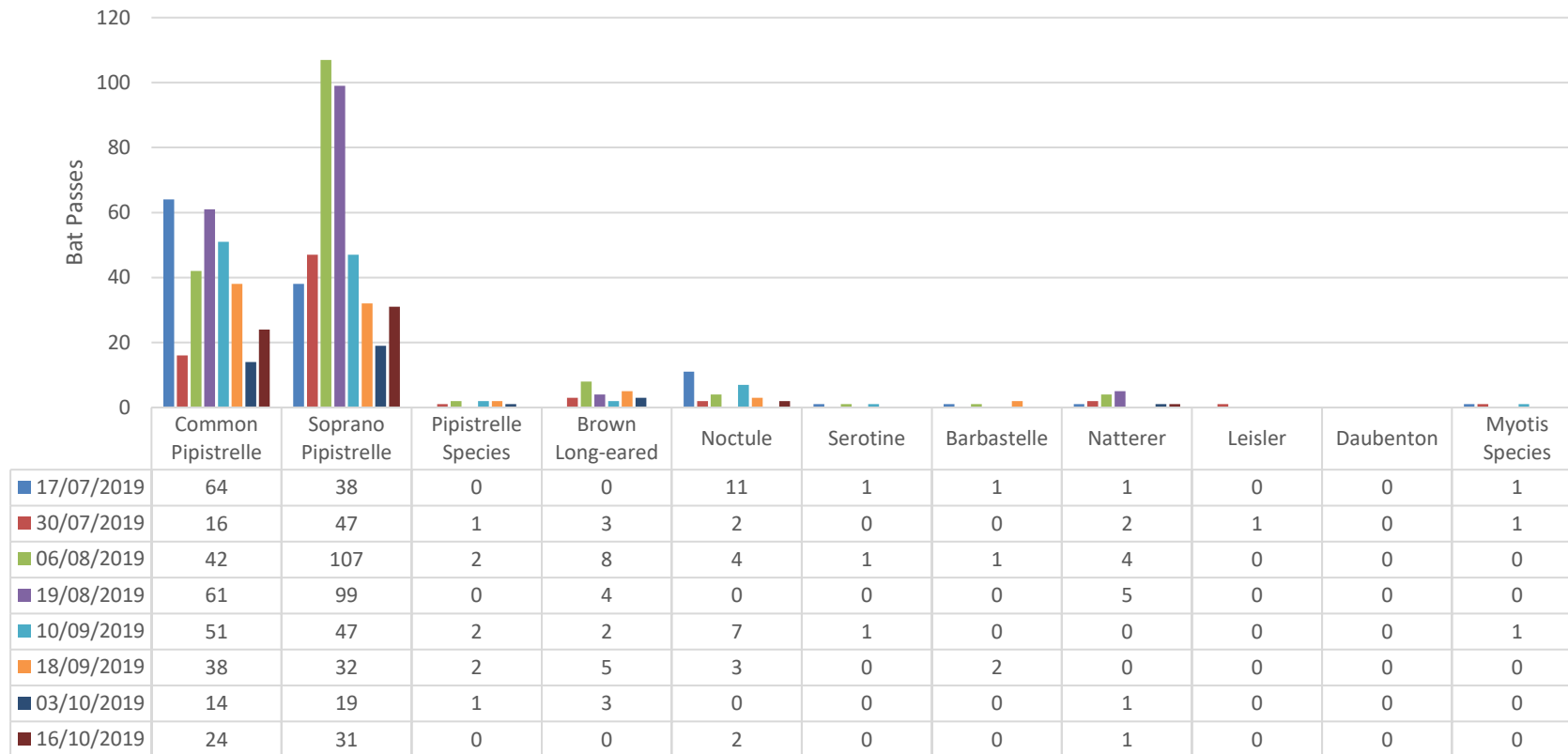
Table 8 - Results for Transect 5

Survey Date	Species Recorded	Total Bat Passes for each Species
17/07/2019	<i>Barbastella barbastellus</i>	1
	<i>Eptesicus serotinus</i>	1
	<i>Myotis nattereri</i>	1
	<i>Myotis spec.</i>	1
	<i>Nyctalus noctula</i>	11
	<i>Pipistrellus pipistrellus</i>	64
	<i>Pipistrellus pygmaeus</i>	38
30/07/2019	<i>Myotis nattereri</i>	2
	<i>Myotis spec.</i>	1
	<i>Nyctalus leisleri</i>	1
	<i>Nyctalus noctula</i>	2
	<i>Pipistrellus pipistrellus</i>	16
	<i>Pipistrellus pygmaeus</i>	47
	<i>Pipistrellus spec.</i>	1
	<i>Plecotus auritus</i>	3
06/08/2019	<i>Barbastella barbastellus</i>	1
	<i>Eptesicus serotinus</i>	1
	<i>Myotis nattereri</i>	4
	<i>Nyctalus noctula</i>	4
	<i>Pipistrellus nathusii</i>	1
	<i>Pipistrellus pipistrellus</i>	42
	<i>Pipistrellus pygmaeus</i>	107
	<i>Pipistrellus spec.</i>	2
	<i>Plecotus auritus</i>	8
19/08/2019 – 20/08/2019 Dusk and Dawn Combined	<i>Myotis nattereri</i>	5
	<i>Pipistrellus pipistrellus</i>	61
	<i>Pipistrellus pygmaeus</i>	99
	<i>Plecotus auritus</i>	4
10/09/2019	<i>Eptesicus serotinus</i>	1
	<i>Myotis spec.</i>	1
	<i>Nyctalus noctula</i>	7
	<i>Pipistrellus pipistrellus</i>	51
	<i>Pipistrellus pygmaeus</i>	47
	<i>Pipistrellus spec.</i>	2
	<i>Plecotus auritus</i>	2
18/09/2019	<i>Barbastella barbastellus</i>	2
	<i>Nyctalus noctula</i>	3
	<i>Pipistrellus pipistrellus</i>	38
	<i>Pipistrellus pygmaeus</i>	32
	<i>Pipistrellus spec.</i>	2

Survey Date	Species Recorded	Total Bat Passes for each Species
	<i>Plecotus auritus</i>	5
03/10/2019	<i>Myotis nattereri</i>	1
	<i>Pipistrellus pipistrellus</i>	14
	<i>Pipistrellus pygmaeus</i>	19
	<i>Pipistrellus spec.</i>	1
	<i>Plecotus auritus</i>	3
16/10/2019	<i>Myotis nattereri</i>	1
	<i>Nyctalus noctula</i>	2
	<i>Pipistrellus pipistrellus</i>	24
	<i>Pipistrellus pygmaeus</i>	31

Chart 5 - Transect 5 Bat Passes by month per species

All Bat passes recorded on Transect 5 for all surveys



3.1.6 Transect 6

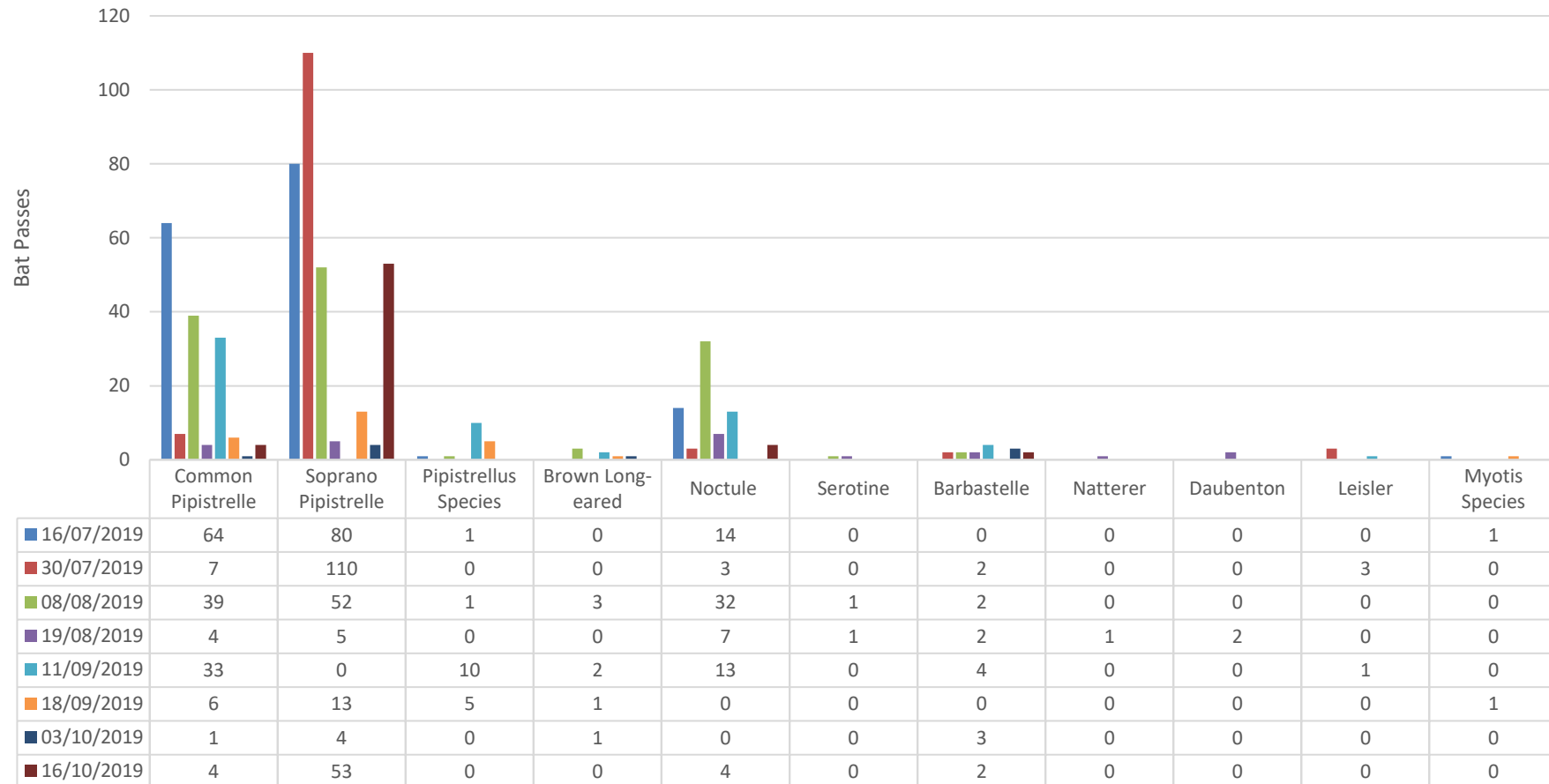
Table 9 - Results for Transect 6

Survey Date	Species Recorded	Total Bat Passes for each Species
16/07/2019	<i>Eptesicus serotinus</i>	4
	<i>Myotis spec.</i>	1
	<i>Nyctalus noctula</i>	14
	<i>Pipistrellus pipistrellus</i>	64
	<i>Pipistrellus pygmaeus</i>	80
	<i>Pipistrellus spec.</i>	1
30/07/2019	<i>Barbastella barbastellus</i>	2
	<i>Nyctalus leisleri</i>	3
	<i>Nyctalus noctula</i>	3
	<i>Pipistrellus pipistrellus</i>	7
	<i>Pipistrellus pygmaeus</i>	110
08/08/2019	<i>Barbastella barbastellus</i>	2
	<i>Eptesicus serotinus</i>	1
	<i>Nyctalus noctula</i>	32
	<i>Pipistrellus pipistrellus</i>	39
	<i>Pipistrellus pygmaeus</i>	52
	<i>Pipistrellus spec.</i>	1
	<i>Plecotus auritus</i>	3
19/08/2019	<i>Barbastella barbastellus</i>	2
	<i>Eptesicus serotinus</i>	1
	<i>Myotis daubentonii</i>	2
	<i>Myotis nattereri</i>	1
	<i>Nyctalus noctula</i>	7
	<i>Pipistrellus pipistrellus</i>	4
	<i>Pipistrellus pygmaeus</i>	5
11/09/2019	<i>Barbastella barbastellus</i>	4
	<i>Nyctalus leisleri</i>	1
	<i>Nyctalus noctula</i>	13
	<i>Pipistrellus pipistrellus</i>	33

Survey Date	Species Recorded	Total Bat Passes for each Species																																				
	<i>Pipistrellus spec.</i>	10																																				
	<i>Plecotus auritus</i>	2																																				
18/09/2019	<i>Plecotus auritus</i>	1																																				
	<i>Myotis spec.</i>	1																																				
	<i>Pipistrellus spec.</i>	5																																				
	<i>Pipistrellus pipistrellus</i>	6																																				
	<i>Pipistrellus pygmaeus</i>	13																																				
03/10/2019	<i>Barbastella barbastellus</i>	3																																				
	<i>Myotis spec</i>	1																																				
	<i>Pipistrellus pipistrellus</i>	4																																				
<p style="text-align: center;">Chart Title</p> <table border="1"> <caption>Chart Data</caption> <thead> <tr> <th>Species</th> <th>16/07/2019</th> <th>Series 2</th> <th>Series 3</th> </tr> </thead> <tbody> <tr> <td>Common Pipistrelle</td> <td>65</td> <td>2</td> <td>2</td> </tr> <tr> <td>Soprano Pipistrelle</td> <td>80</td> <td>5</td> <td>2</td> </tr> <tr> <td>Pipistrelle Species</td> <td>1</td> <td>1</td> <td>3</td> </tr> <tr> <td>Natusius Pipistrelle</td> <td>1</td> <td>3</td> <td>5</td> </tr> <tr> <td>Brown Long-eared</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>Noctule</td> <td>15</td> <td>0</td> <td>0</td> </tr> <tr> <td>Serotine</td> <td>5</td> <td>0</td> <td>0</td> </tr> <tr> <td>Barbastella</td> <td>0</td> <td>0</td> <td>0</td> </tr> </tbody> </table>			Species	16/07/2019	Series 2	Series 3	Common Pipistrelle	65	2	2	Soprano Pipistrelle	80	5	2	Pipistrelle Species	1	1	3	Natusius Pipistrelle	1	3	5	Brown Long-eared	0	0	0	Noctule	15	0	0	Serotine	5	0	0	Barbastella	0	0	0
Species	16/07/2019	Series 2	Series 3																																			
Common Pipistrelle	65	2	2																																			
Soprano Pipistrelle	80	5	2																																			
Pipistrelle Species	1	1	3																																			
Natusius Pipistrelle	1	3	5																																			
Brown Long-eared	0	0	0																																			
Noctule	15	0	0																																			
Serotine	5	0	0																																			
Barbastella	0	0	0																																			
16/10/2019	<i>Pipistrellus pygmaeus</i>	1																																				
	<i>Barbastella barbastellus</i>	2																																				
	<i>Nyctalus noctula</i>	4																																				
	<i>Pipistrellus pipistrellus</i>	4																																				
	<i>Pipistrellus pygmaeus</i>	53																																				

Chart 6 - Transect 6 Bat Passes by month per species

All bat passes recorded for Transect 6 for all surveys



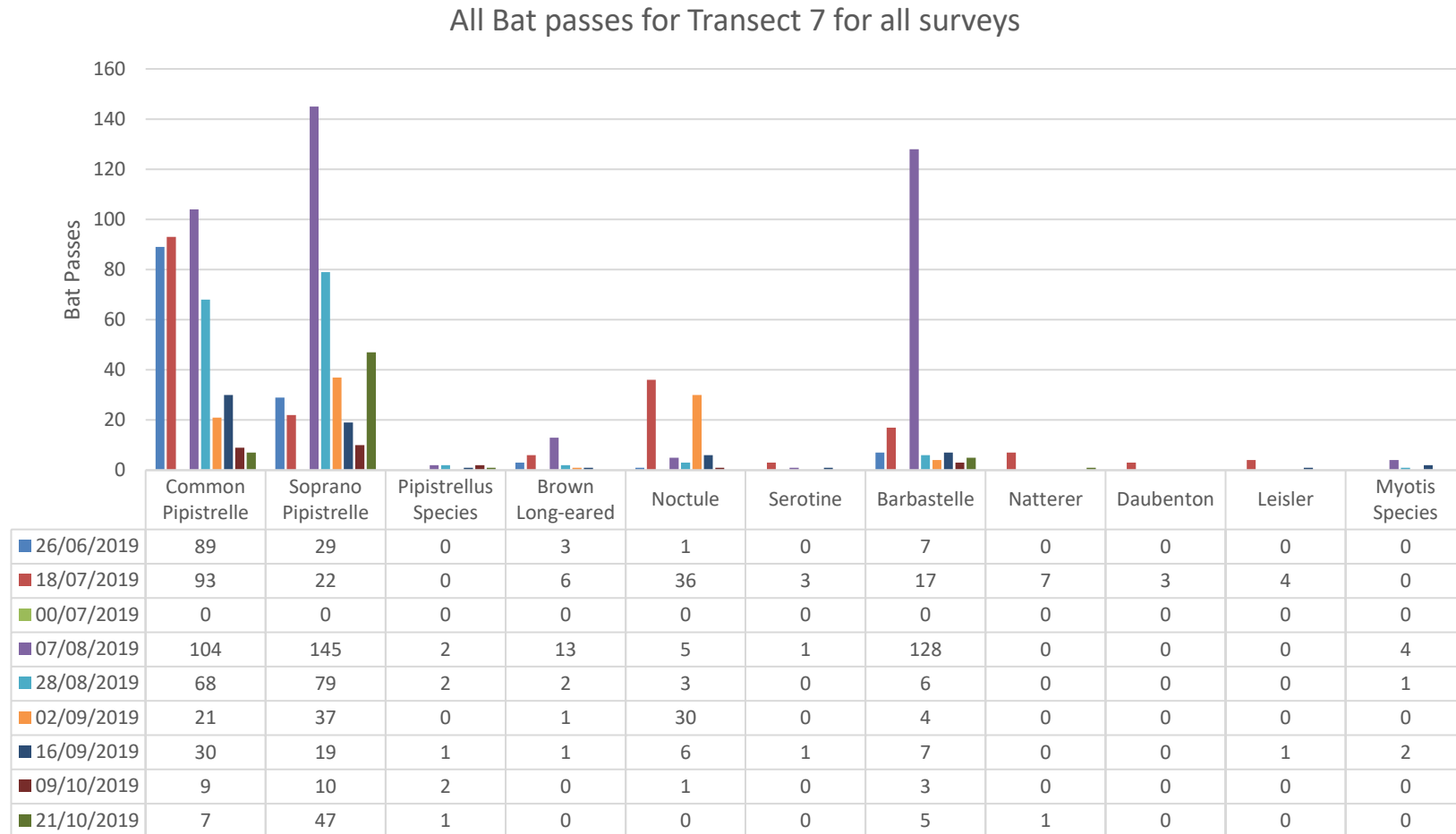
3.1.7 Transect 7

Table 10 - Results for Transect 7

Survey Date	Species Recorded	Total Bat Passes for each Species
26/06/2019	<i>Barbastella barbastellus</i>	7
	<i>Nyctalus noctula</i>	1
	<i>Pipistrellus pipistrellus</i>	89
	<i>Pipistrellus pygmaeus</i>	29
	<i>Plecotus auritus</i>	3
18/07/2019	<i>Barbastella barbastellus</i>	17
	<i>Eptesicus serotinus</i>	3
	<i>Myotis daubentonii</i>	3
	<i>Myotis nattereri</i>	7
	<i>Nyctalus leisleri</i>	4
	<i>Nyctalus noctula</i>	36
	<i>Pipistrellus pipistrellus</i>	93
	<i>Pipistrellus pygmaeus</i>	22
	<i>Plecotus auritus</i>	6
07/08/2019 – 08/08/2019 Dusk and Dawn Combined	<i>Barbastella barbastellus</i>	128
	<i>Eptesicus serotinus</i>	1
	<i>Myotis spec.</i>	4
	<i>Nyctalus noctula</i>	5
	<i>Pipistrellus pipistrellus</i>	104
	<i>Pipistrellus pygmaeus</i>	145
	<i>Pipistrellus spec.</i>	2
	<i>Plecotus auritus</i>	13
28/08/2019	<i>Barbastella barbastellus</i>	6
	<i>Myotis spec.</i>	1
	<i>Nyctalus noctula</i>	3
	<i>Pipistrellus pipistrellus</i>	68
	<i>Pipistrellus pygmaeus</i>	79
	<i>Pipistrellus spec.</i>	2
	<i>Plecotus auritus</i>	2
02/09/2019	<i>Barbastella barbastellus</i>	4
	<i>Nyctalus noctula</i>	30
	<i>Pipistrellus pipistrellus</i>	21
	<i>Pipistrellus pygmaeus</i>	37
	<i>Plecotus auritus</i>	1
16/09/2019	<i>Barbastella barbastellus</i>	7
	<i>Eptesicus serotinus</i>	1
	<i>Myotis spec.</i>	2
	<i>Nyctalus leisleri</i>	1
	<i>Nyctalus noctula</i>	6
	<i>Pipistrellus pipistrellus</i>	30

Survey Date	Species Recorded	Total Bat Passes for each Species
	<i>Pipistrellus pygmaeus</i>	19
	<i>Pipistrellus spec.</i>	1
	<i>Plecotus auritus</i>	1
09/10/2019	<i>Barbastella barbastellus</i>	3
	<i>Nyctalus noctula</i>	1
	<i>Pipistrellus pipistrellus</i>	9
	<i>Pipistrellus pygmaeus</i>	10
	<i>Pipistrellus spec.</i>	1
21/10/2019	<i>Barbastella barbastellus</i>	5
	<i>Myotis nattereri</i>	1
	<i>Pipistrellus pipistrellus</i>	7
	<i>Pipistrellus pygmaeus</i>	47
	<i>Pipistrellus spec.</i>	2

Chart 7 - Transect 7 Bat Passes by month per species



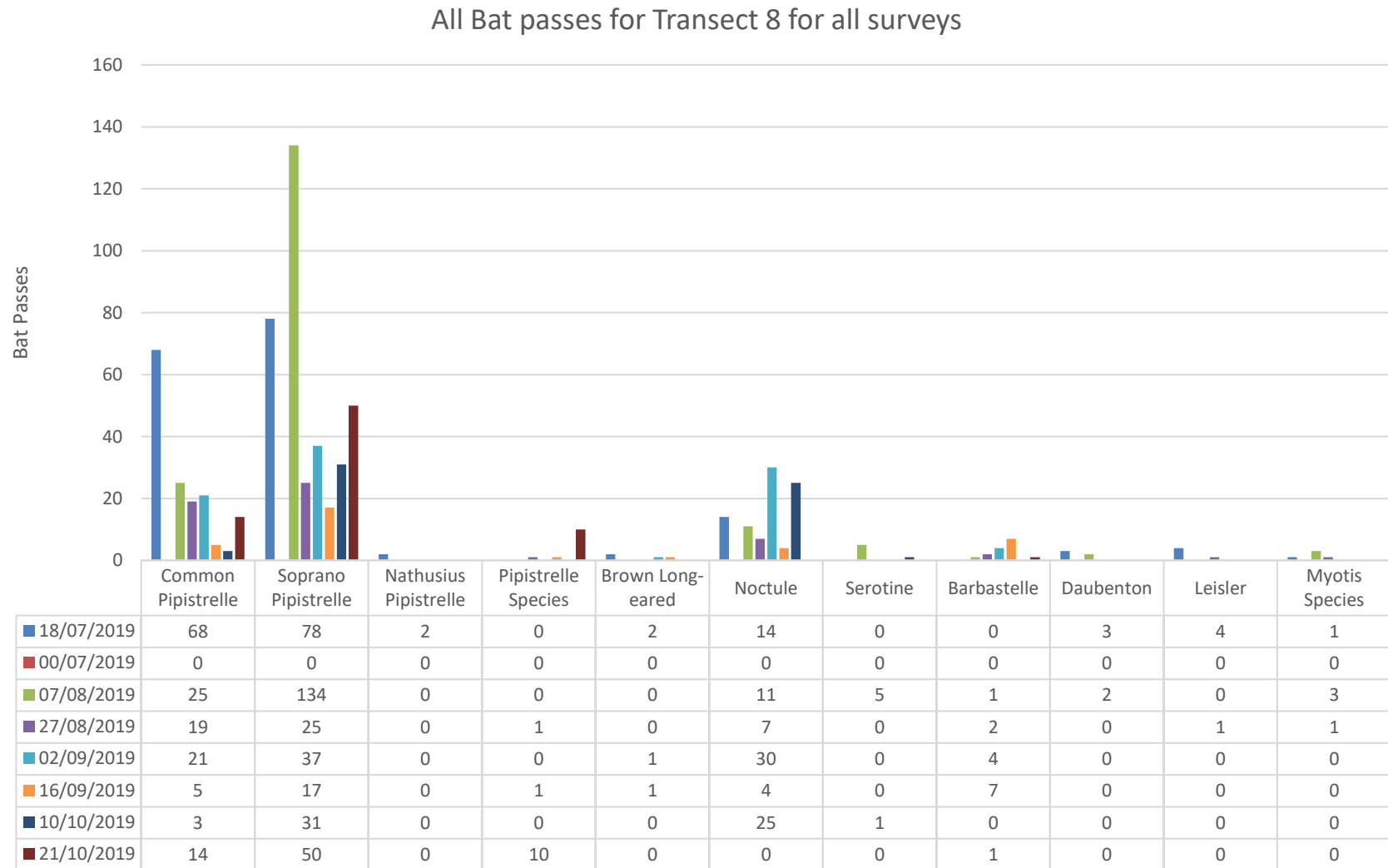
3.1.8 Transect 8

Table 11 - Results for Transect 8

Survey Date	Species Recorded	Total Bat Passes for each Species
18/07/2019	<i>Myotis daubentonii</i>	3
	<i>Myotis spec.</i>	1
	<i>Nyctalus leisleri</i>	4
	<i>Nyctalus noctula</i>	14
	<i>Pipistrellus nathusii</i>	2
	<i>Pipistrellus pipistrellus</i>	68
	<i>Pipistrellus pygmaeus</i>	78
	<i>Plecotus auritus</i>	2
07/08/2019 – 08/08/2019 Dusk and Dawn Combined	<i>Barbastella barbastellus</i>	1
	<i>Eptesicus serotinus</i>	5
	<i>Myotis daubentonii</i>	2
	<i>Myotis spec.</i>	3
	<i>Nyctalus noctula</i>	11
	<i>Pipistrellus pipistrellus</i>	25
	<i>Pipistrellus pygmaeus</i>	134
27/08/2019	<i>Barbastella barbastellus</i>	2
	<i>Myotis spec.</i>	1
	<i>Nyctalus leisleri</i>	1
	<i>Nyctalus noctula</i>	7
	<i>Pipistrellus pipistrellus</i>	19
	<i>Pipistrellus pygmaeus</i>	25
	<i>Pipistrellus spec.</i>	1
02/09/2019	<i>Barbastella barbastellus</i>	4
	<i>Nyctalus noctula</i>	30
	<i>Pipistrellus pipistrellus</i>	21
	<i>Pipistrellus pygmaeus</i>	37
	<i>Plecotus auritus</i>	1
16/09/2019	<i>Barbastella barbastellus</i>	7
	<i>Nyctalus noctula</i>	4
	<i>Pipistrellus pipistrellus</i>	5
	<i>Pipistrellus pygmaeus</i>	17
	<i>Pipistrellus spec.</i>	1
	<i>Plecotus auritus</i>	1
10/10/2019	<i>Eptesicus serotinus</i>	1
	<i>Nyctalus noctula</i>	25
	<i>Pipistrellus pipistrellus</i>	3
	<i>Pipistrellus pygmaeus</i>	31
21/10/2019	<i>Barbastella barbastellus</i>	1
	<i>Pipistrellus pipistrellus</i>	14
	<i>Pipistrellus pygmaeus</i>	50

Survey Date	Species Recorded	Total Bat Passes for each Species
	<i>Pipistrellus spec.</i>	10

Chart 8 - Transect 8 Bat Passes by month per species



3.2 Static Bat Detector Results

Static bat detector results are subject to the quality of recordings made during the deployment of the detectors (see Section 2.1.2.). Deployments at all static locations were subject to both rain and wind that can mask calls of any bats and these may be recorded as noise files. The detectors deployed at Wood Lane (Static 5) and Berrys Lane, with both detectors being positioned approximately 200 m apart on opposite sides of the A47 which were particularly affected by an unknown noise source that created thousands of false positive detections particularly of Pipistrelle bats but it would appear these noise pulses may also have impacted on the recording of other species.

3.2.1 Static 1 – [REDACTED] – on Transect four deployments

Table 12: Static 1 deployment – 26/07/2019 to 30/07/2019

Species	26/07/2019	27/07/2019	28/07/2019	29/07/2019	30/07/2019	Grand Total
Barbastelle	1		1			2
Brown Long-eared	2	2				4
Common Pipistrelle	53	19	45	45	29	191
Leisler	4	2		1	1	8
<i>Myotis</i> Species	1			2		3
Noctule	9	7	5	36	2	59
Pipistrelle Species	6	6	3	4	2	21
Serotine	1	2	5	2		10
Soprano Pipistrelle	323	212	264	362	174	1335
Daily Totals	400	250	323	452	208	1633

Table 13: Static 1 deployment - 21/08/2019 to 26/08/2019

Species	21/08/2019	22/08/2019	23/08/2019	24/08/2019	25/08/2019	26/08/2019	Grand Total
Barbastelle	1			5	3	4	13
Brown Long-eared	3	2	4	3	7	3	22
Common Pipistrelle	14	44	40	64	44	28	234
Daubenton's					1	2	3
Leislars			2			1	3
<i>Myotis</i> Species	2	1	3		3	1	10
Natterers			1		2	1	4
Noctule	4	15	40	63	60	71	253
Pipistrelle Species	2	3	8	5	4	2	24
Serotine			2	4	1	1	8
Soprano Pipistrelle	64	134	162	63	89	29	541

Grand Total	90	199	262	207	214	143	1115
--------------------	-----------	------------	------------	------------	------------	------------	-------------

Table 14: Static 1 deployment – 18/09/2019 – 23/09/2010

Species	18/09/20	19/09/20	20/09/20	21/09/20	22/09/20	23/09/20	Grand Total
Brown Long-eared	2		1	4	1		8
Common Pipistrelle	5	23	18	14	42		102
Daubenton's	2	1					3
<i>Myotis</i> Species	1						1
Nathusius's		1			1		2
Natterer				1			1
Noctule	2	5	1	4	7	11	30
Pipistrellus Species		1		1			2
Soprano Pipistrelle	17	19	17	20	27		100
Grand Total	29	50	37	44	78	11	249

Table 15: Static 1 deployment – 10/10/2019 to 15/10/2019

Species	10/10/2019	11/10/2019	12/10/2019	13/10/2019	14/10/2019	15/10/2019	Grand Total
Barbastelle		1	1		1		3
Brown Long-eared	2	3	5		4		14
Common Pipistrelle	9	6	2	3	4	5	29
<i>Myotis</i> Species			1		1		2
Noctule		6	5			4	15
Serotine					1		1
Soprano Pipistrelle	46	33	11	59	20	2	171
Grand Total	57	49	25	62	31	11	235

3.2.2 Static 2 – Woodland Strip adjacent to North Side of A47 at junction with Church Lane on Transect 8 – four deployments

Table 16: Static 2 deployment – 23/07/2019 – 29/07/2019

Species	23/07/2019	24/07/2019	25/07/2019	26/07/2019	27/07/2019	28/07/2019	29/07/2019	Grand Total
Barbastelle			3			1	2	6
Brown Long-eared							1	1
Common Pipistrelle	8	10	93	36	8	19	209	383
Daubenton's							1	1
Leisler			8	1	3	1	6	19
<i>Myotis</i> Species			1	3	1		3	8
Nathusius Pipistrelle			1					1
Noctule		1	18	15	10	15	39	98
Pipistrelle Species							15	15
Serotine			9		5	2	2	18
Soprano Pipistrelle	23	70	393	87	44	89	600	1306
Grand Total	31	81	526	142	71	127	878	1856

Table 17: Static 2 deployment – 21/08/2019 – 28/08/2019

Species	21/08/2019	22/08/2019	23/08/2019	24/08/2019	27/08/2019	28/08/2019	Grand Total
Barbastelle	8	10	22	10	2	2	54
Brown Long-eared	1	7	11	5		1	25
Common Pipistrelle	85	83	152	59	2	42	423
Daubenton's	1	4		3		1	9
Leisler		1		3		1	5
<i>Myotis</i> Species	1	5	4	4	1	1	16
Natterer	1	2	3	2			8
Noctule	28	71	115	116	11	49	390
Nyctalus Species			1				1

Pipistrelle Species	1	6	4	2	1	3	17
Serotine	2	1	4	3		2	12
Soprano Pipistrelle	113	118	94	92	6	33	456
Grand Total	241	308	410	299	23	135	1416

Table 18: Static 2 deployment – 18/09/2019 – 23/09/2019

Species	18/09/2019	19/09/2019	20/09/2019	21/09/2019	22/09/2019	23/09/2019	Grand Total
Barbastelle	2	2	2	1	1	3	11
Brown Long-eared	7	8	6	11		3	35
Common Pipistrelle	1	10	28	47	4	12	102
Daubenton's	1			1			2
Leisler		2					2
<i>Myotis</i> Species	2	3	5	4		2	16
Natterer		3	1	4		2	10
Noctule	1	9	9	12	4	4	39
Pipistrelle Species		2		2			4
Serotine		1			1		2
Soprano Pipistrelle	4	16	15	48	6	11	100
Grand Total	18	56	66	130	16	37	323

Table 19: Static 2 deployment – 10/10/2019 – 14/10/2019

Species	10/10/2019	11/10/2019	12/10/2019	13/10/2019	14/10/2019	Grand Total
Barbastelle		1			1	2
Brown Long-eared	1				1	2
Common Pipistrelle	15	6	11	4	21	57
Leisler	1					1
Noctule	2	4	3	3	2	14
Serotine	1					1

Soprano Pipistrelle	7	4	13	3	15	42
Grand Total	27	15	27	10	40	119

3.2.3 Static 3 – Bridge over River Tud (Easton Estates) – two deployments

Table 20: Static 3 deployment – 18 July 2019 – 23 July 2019

Species	18-Jul	19-Jul	20-Jul	21-Jul	22-Jul	23-Jul	Grand Total
Barbastelle	38	26	56	75	58	30	283
Serotine	1	2	1	2		2	8
Natterer	3						3
<i>Myotis</i> Species	14	5	5	5	6	9	44
Leisleri	3		3	3	3		12
Noctule	16	10	8	8	19	3	64
Common Pipistrelle	43	105	395	463	264	47	1317
Soprano Pipistrelle	5	51	87	106	66	11	326
Pipistrelle Species	1	3	5	2	1		12
Brown Long-eared	1	2	1	3	6	1	14
Grand Total	125	204	561	667	423	103	2083

Table 21: Static 3 deployment – 01/08/2019 – 06/08/2019

Species	01/08/2019	02/08/2019	03/08/2019	04/08/2019	05/08/2019	06/08/2019	Grand Total
Barbastelle	25	31	35	44	18	10	163
Brown Long-eared	4	2		3	3	3	15
Common Pipistrelle	95	77	202	191	202	103	870
Daubenton	1		1		3		5
Leisler	1				1	1	3
<i>Myotis</i> Species	6	6	8	6	3	2	31
Natterer				1			1

Noctule	126	5	12	15	5	4	167
Nyctalus Species				1			1
Pipistrelle Species	102		6	17	2	2	129
Serotine	2	1	2		1		6
Soprano Pipistrelle	259	109	352	295	577	557	2149
Grand Total	621	231	618	573	815	682	3540

3.2.4 Static 4 – [REDACTED] – two deployments

Table 22: Static 4 deployment – 18/09/2019 – 23/09/2019

Species	18/09/2019	19/09/2019	20/09/2019	21/09/2019	22/09/2019	23/09/2019	Grand Total
Brown Long-eared	2		1	4	1		8
Common Pipistrelle	5	23	18	14	42		102
Daubenton	2	1					3
<i>Myotis</i> Species	1						1
Nathusius	1			1			2
Natterer				1			1
Noctule	2	5	1	4	7	11	30
Pipistrellus Species	1		1				2
Soprano Pipistrelle	17	19	17	20	27		100
Grand Total	29	50	37	44	78	11	249

Table 23: Static 4 deployment – 10/10/2019 – 15/10/2019

Species	10/10/2019	11/10/2019	12/10/2019	13/10/2019	14/10/2019	15/10/2019	Grand Total
Barbastelle		1	1		1		3
Brown Long-eared	2	3	5		4		14
Common Pipistrelle	9	6	2	3	4	5	29
<i>Myotis</i> Species			1		1		2

Noctule		6	5			4	15
Serotine					1		1
Soprano Pipistrelle	46	33	11	59	20	2	171
Grand Total	57	49	25	62	31	11	235

3.2.5 Static 5 – Wood Lane (east side) edge of woodland strip

Table 24: Static 5 deployment - 18/07/2019 – 22/07/2019

Species	18/07/2019	19/07/2019	20/07/2019	21/07/2019	22/07/2019	Grand Total
Common Pipistrelle	123	1	1	67	93	285
Daubenton					4	4
<i>Myotis</i> Species				1	1	2
Natterer	1					1
Noctule	4	2		5	4	15
Serotine					1	1
Soprano Pipistrelle	24			14	16	54
Grand Total	152	3	1	87	119	362

Table 25: Static 5 deployment – 15/08/2019 – 19/08/2019

Species	15/08/2019	16/08/2019	17/08/2019	18/08/2019	19/08/2019	Grand Total
Barbastelle	3		8	5		16
Brown Long-eared	3		1	1	3	8
Common Pipistrelle	37	1	172	21	14	245
Daubenton	9		3	1	1	14
<i>Myotis</i> Species	13		7	9	1	30
Natterer	1					1
Noctule	6		9	3		18
Pipistrelle Species				1	1	2

Serotine			3			3
Soprano Pipistrelle	93		51	15	12	171
Grand Total	165	1	254	56	32	508

Table 26: Static 5 deployment – 04/09/2019 – 08/09/2019

Species	04/09/2019	05/09/2019	06/09/2019	07/09/2019	08/09/2019	Grand Total
Barbastelle	4	3	5	4	5	21
Brown Long-eared	1	4	2	5	3	15
Common Pipistrelle	5	91	25	19	9	149
Daubenton	2	2	2		1	7
<i>Myotis</i> Species	7	23	30	8	48	116
Natterer	3	10		5	11	29
Noctule	3	5	2	15	9	34
Pipistrelle Species		1	1	1		3
Soprano Pipistrelle	22	15	15	8	21	81
Grand Total	47	154	82	65	107	455

Table 27: Static 5 deployment – 03/10/2019 – 08/10/2019

Species	03/10/2019	04/10/2019	05/10/2019	07/10/2019	08/10/2019	Grand Total
Barbastelle	3	9	15	21	14	62
Brown Long-eared	6	4	10	5	6	31
Common Pipistrelle	8	28	13	16	6	71
Daubenton	1	8	8	1	5	23
Natterer	1		4	6	5	16
<i>Myotis</i> Species	15	18	38	16	34	121

Natterer	3	3	1	1	2	10
Noctule		4	4	3	1	12
Pipistrelle Species		1				1
Soprano Pipistrelle	8	35	23	27	5	98
Grand Total	45	110	116	96	78	445

3.2.6 Static 6 – Berry Lane j/w Dereham Road

Table 28: Static 6 deployment – 18/07/2019 – 22/07/2019

Species	18/07/2019	19/07/2019	20/07/2019	21/07/2019	22/07/2019	Grand Total
Barbastelle	3		1	2	6	12
Brown Long-eared	2		2	2	3	9
Common Pipistrelle	239	35	237	105	147	763
Daubenton			2	1	1	4
Leisler		2		1	2	5
<i>Myotis</i> Species	5		1	3	2	11
Natterer	4					4
Noctule	10	4	5	11	7	37
Pipistrelle Species	1				3	4
Serotine		2			2	4
Soprano Pipistrelle	309	102	123	91	453	1078
Grand Total	576	145	371	216	626	1933

Table 29: Static 6 Deployment – 15/08/2019 – 20/08/2019

Species	15/08/2019	16/08/2019	17/08/2019	18/08/2019	19/08/2019	20/08/2019	Grand Total
Barbastelle	2		5	1	1	2	11
Common Pipistrelle	25	11	80	38	32	27	213
Daubenton			1				1

Leisler				1			1
<i>Myotis</i> Species			2	1	2		5
Noctule	1		1	4	2		8
Serotine		1					1
Soprano Pipistrelle	7	3	27	8	10	10	65
Grand Total	35	15	116	53	47	39	305

Table 30: Static 6 deployment – 04/09/2019 – 11/09/2019

Species	04/09/2019	05/09/2019	06/09/2019	07/09/2019	08/09/2019	09/09/2019	10/09/2019	Grand Total
Barbastelle	7	2	2	1	1	2	5	20
Brown Long-eared					1		1	2
Common Pipistrelle	22	19	11	9	6	15	36	118
Leisler	2				1	2		5
<i>Myotis</i> Species		12		3	2		3	20
Natterer		1						1
Noctule	2	1	1		4	1	3	12
Soprano Pipistrelle	10	14	5	8	6	11	12	66
Grand Total	43	49	19	21	21	31	60	244

Table 31: Static 6 deployment – 03/10/2019 – 08/10/2019

Species	03/10/2019	04/10/2019	05/10/2019	06/10/2019	07/10/2019	08/10/2019	Grand Total
Barbastelle		2			6	6	14
Brown Long-eared	1		2	3	2	3	11
Common Pipistrelle	14	19	21	6	35	57	152
Daubenton	1	1					2
Leisler		1					1
<i>Myotis</i> Species		2	1		21	8	32
Natterer				1		10	11

Noctule	1	1		1	4	2	9
Nathusius Pipistrelle				1			1
Serotine		1			1		2
Soprano Pipistrelle	17	30	17	14	32	15	125
Grand Total	34	57	41	26	101	101	360

3.2.7 Static 7 – South side of A47

Table 32: Static Deployment - 24/07/2019 to 30/07/2019

Species	23/07/2019	24/07/2019	25/07/2019	26/07/2019	27/07/2019	28/07/2019	29/07/2019	Grand Total
Barbastelle			3			1	2	6
Brown Long-eared			3			1	3	7
Common Pipistrelle		3	125	75	2	58	58	321
Daubenton							2	2
Leisler				2			3	5
<i>Myotis</i> Species							1	1
Nathusius Pipistrelle			3	1			1	5
Noctule			1	4		1	3	9
Pipistrelle Species		2		1			1	4
Serotine						1	3	4
Soprano Pipistrelle	2	20	16	7		7	27	79
Grand Total	2	25	151	90	2	69	104	443

Table 33: Static Deployment – 21/08/2019 – 26/08/2019

Species	21/08/2019	22/08/2019	23/08/2019	24/08/2019	25/08/2019	26/08/2019	Grand Total
Brown Long-eared			1	1			2
Common Pipistrelle	8	19	20	22	9	7	85
<i>Myotis</i> Species	1	1	2		1		5
Noctule			6	8			14

Soprano Pipistrelle	7	3	14	8		1	33
Pipistrelle Species			1				1
Grand Total	16	23	44	39	10	8	140

Table 34: Static Deployment – 05/09/2019 – 10/09/2019

Species	04/09/2019	05/09/2019	06/09/2019	07/09/2019	08/09/2019	09/09/2019	10/09/2019	Grand Total
Barbastelle	3	2	1			4	5	15
Brown Long-eared		6	3	6	1	4	4	24
Common Pipistrelle	28	77	47	56	8	96	123	436
Leisler			2	1		3	2	8
<i>Myotis</i> Species		1	2				3	6
Noctule	2	3	5	2	1	3	7	23
Pipistrelle Species	16	13	3			3	31	66
Soprano Pipistrelle		1		1		9	7	18
Grand Total	49	103	63	66	10	122	182	596

Table 35: Static Deployment – 15/10/2019

Species	15/10/2019	16/10/2019	17/10/2019	19/10/2019	20/10/2019	Grand Total
Barbastelle	1	1				2
Brown Long-eared			1			1
Common Pipistrelle	33	63	4	3	4	107
<i>Myotis</i> Species	1		1			2
Noctule		1				1
Soprano Pipistrelle	2	2	3			7
Grand Total	37	67	9	3	4	120

3.2.8 Static 8 – South side of A47 just west of [REDACTED]

Table 36: Static 8 deployment 25/07/2019 – 30/07/2019

Species	25/07/2019	26/07/2019	27/07/2019	28/07/2019	29/07/2019	30/07/2019	Grand Total
Barbastelle					1		1
Brown Long-eared			2	1	1		4
Common Pipistrelle	6	52	21	39	45	26	189
<i>Myotis</i> Species	1	1					2
Noctule	2	14	8	5	28	4	61
Pipistrelle Species			1		1		2
Serotine	1	1	3	5	1		11
Soprano Pipistrelle	67	315	212	206	362	176	1398
Daubenton					1		1
Leisler	1	1		1			3
Grand Total	78	384	248	316	441	206	1673

Table 37: Static 8 deployment 01/08/2019 – 05/08/2019

Species	01/08/2019	02/08/2019	03/08/2019	04/08/2019	05/08/2019	Grand Total
Barbastelle	2	1	3	3	2	11
Brown Long-eared	1			5		6
Common Pipistrelle	288	260	234	264	246	1292
<i>Myotis</i> Species			1	2		3
Natterer				1		1
Nathusius Pipistrelle	2		3	1	2	8
Noctule	2	2		3	4	11
Pipistrelle Species	2			2	2	6
Serotine	3			1		4
Soprano Pipistrelle	6	6	20	36	15	83
Grand Total	306	269	261	318	271	1425

Table 38: Static 8 – 23/09/2019 – 28/09/2019

Species	23/09/2019	24/09/2019	25/09/2019	26/09/2019	27/09/2019	28/09/2019	Grand Total
Barbastelle		6	5	4	4	3	22
Brown Long-eared	1		4	1	1		7
Common Pipistrelle	7	19	61	42	8	3	140
Myotis spp,		4	8	1			13
Natterer			1				1
Noctule	1					1	2
Soprano Pipistrelle	1	2	4	8	8	10	33
Grand Total	10	31	83	56	21	17	218

Table 39: Static 8 – 10/10/2019 – 15/10/2019

Species	10/10/2019	12/10/2019	13/10/2019	14/10/2019	Grand Total
Barbastelle	1	1	1	2	5
Common Pipistrelle	30	14	40	7	91
Myotis spp.	3	1	2		6
Noctule		1	2		3
Pipistrelle spp.	1			1	2
Soprano Pipistrelle	21	2	7	2	32
Grand Total	56	19	52	12	139

3.2.9 Static 9 – In woodland strip north of A47 and south of Poppy’s Wood – four deployments

Table 40: Static 9 – 10/07/2019 to 15/07/2019

Species	10/07/2019	11/07/2019	12/07/2019	13/07/2019	14/07/2019	15/07/2019	Grand Total
Barbastelle		3		2	3	2	10
Brown Long-eared	6	4	3	5	8	5	31
Common Pipistrelle	44	39	6	122	89	82	382

Daubenton		1	1	1			3
Leisler			1				1
<i>Myotis</i> Species	1		1	1			3
Nathusius Pipistrelle				1			1
Noctule	6		1	2	5	2	16
Serotine						1	1
Soprano Pipistrelle	7	3	2	6	6	7	31
Grand Total	64	50	15	140	111	99	479

Table 41: Static 9 – 15/08/2019 – 20/08/2019

Species	15/08/2019	16/08/2019	17/08/2019	18/08/2019	19/08/2019	20/08/2019	Grand Total
Barbastelle	4		3		2	1	10
Brown Long-eared	3		3	7	2	5	20
Common Pipistrelle	11	3	61	36	10	20	141
Leisler	3		1			1	5
<i>Myotis</i> Species			2	2	1		5
Noctule	1		6	2	2	5	16
Soprano Pipistrelle	4	2	22	17	11	4	60
Grand Total	26	5	98	64	28	36	257

Table 42: Static 9 – 04/09/2019 – 10/09/2019

Species	04/09/2019	05/09/2019	06/09/2019	07/09/2019	08/09/2019	09/09/2019	10/09/2019	Grand Total
Barbastelle	1		4				3	8
Brown Long-eared	1		1	1			3	6
Common Pipistrelle	4	5	3	1	8	12	8	41
Leislars							2	2
<i>Myotis</i> species			1		1			2
Nathusius Pipistrelle			1					1

Noctule	1		4	3	1		1	10
Nyctalus species						1	1	2
Serotine		1					2	3
Soprano Pipistrelle	4	10	2	2		8	7	33
Grand Total	11	16	16	7	10	21	27	108

Table 43: Static 9 – 03/10/2019 – 08/10/2019

Species	03/10/2019	04/10/2019	05/10/2019	06/10/2019	07/10/2019	08/10/2019	Grand Total
Barbastelle	3	1	1	1	1	1	8
Brown Long-eared	1	3	1	1	6	1	13
Common Pipistrelle		6	6	1		2	15
Leisler			1			1	2
<i>Myotis</i> Species					1		1
Noctule		1					1
Pipistrellus Species						1	1
Soprano Pipistrelle	5	4	6		1	2	18
Grand Total	9	15	15	3	9	8	59

3.3 Tree Survey results

The following abbreviations are used in the below table to identify species that were identified, P45 – Common Pipistrelle, P55 – Soprano Pipistrelle, Pn – Nathusius Pipistrelle, Nc – Noctule, Nlei – Leisler, Pa – Brown Long-eared, Eptser – Serotine,

Tree Number	No of Surveys	Survey Date	Sunset/Sunrise Time	Survey Start	Survey End	Temp Start °C	Temp End °C	Cloud Cover (Octas)	Wind (Beaufort)	Precipitation	Emergence/Re-entry Yes/No	Comments Including bat species heard
1	3	01/08/2019	20:49	20:34	22:30	21	19	4	2	Nil	Yes P45 Single bat emerged confirmed from sound file	P45, P55
		14/08/2019	05:35	04:00	05:50	13	12	2	1	Nil	No	No bats heard or seen
		04/09/2019	19:37	19:30	21:15			8	1	Nil	No	P45, P55, Nc
4	2	30/07/2019	20:52	20:42	22:52	18	17	8		Nil	No	P45, P55
		14/08/2019	05:34	04:00	05:49	9	10	8	0	Nil	No	
5	3	22/07/2019	21:04	20:48	22:34	24	22	1	1	Nil	No	P45, P55, Nc
		01/08/2019	20:48	20:33	22:33	19	17	8	1	Nil	No	P45, P55 Nlei, Pa
		14/08/2019	05:36	04:00	05:36	11	12	2	1	Nil	No	Nc
6	3	22/07/2019	21:04	20:48	22:34	24	22	1		Nil	No	P45, P55, Nc
		01/08/2019	20:48	20:33	22:33	19	17	8	2	Nil	No	P45, P55 Nc, Pa
		14/08/2019	05:36	04:00	05:36	11	12	2	1	Nil	No	Nc

9	2	29/07/2019	20:54	20:45	22:41	22	18	2	1	Nil	No	P45, P55 Nc, Eptser
		14/08/2019	05:36	03:58	05:36	14	14	7	0	Nil	No	P45, P55, Nc
43	3	06/08/2019	20:40	20:25	22:10	17	15	2	2	Nil	No	P45, P55, Eptser
		17/09/2019	06:32	05:00	06:33	10	8	1	5	Nil	No	No bats heard
		08/10/2019	07:07	05:30	07:10	12	10	1	1	Nil	No	P55
48	3	22/07/2019	21:04	20:45	22:45	22	21	0	2	Nil	No	P45, Nc
		07/08/2019	20:37	20:30	22:07	20	16	1	1	Nil	No	P45, P55 Eptser
		10/09/2019	06:21	04:30	06:21	14	12	7	1	Nil	No	No bats heard
49		22/07/2019	21:04	20:45	22:45	22	21	0	2	Nil	Yes P45 Single bat emerged confirmed from sound file No	Pa, P45
		10/09/2019	06:21	04:30	06:21	14	12	7	1	Nil	No	No bats heard
50	2	22/07/2019	21:04	20:50	22:50	22	22	1		Nil	Yes x 2 Not recorded flight suggests Pipistrelle species	P45, P55
		10/09/2019	06:21	04:30	06:21	14	12	7	1	Nil	No	No bats heard
51	3	22/07/2019	21:04	20:45	22:50	24	22	2		Nil	No	P45, P55

Previously confirmed roost species unknown												Mouse using cavity
		07/08/2019	20:38	20:32	22:08	18	17	2		Nil	No	P45, Eptser
		10/09/2019	06:21	04:30	06:21	14	12	7	1	Nil	No	No bats heard
62	2	23/07/2019	21:03	20:48	22:48	24	22	2		Nil	No	P45
		13/08/2019	20:25	20:13	22:10	18	14	1	0	Nil	No	P55, Nc
63	2	23/07/2019	21:03	20:48	20:33	24	22	0	1	Nil	No	P45, Nc
		28/08/2019	05:58	04:41	05:58	18	19	8	0	Nil	No	P55
64	2	24/07/2019	21:02	20:50	22:33	24	21	2	1	Nil	No	P45, P55
		28/08/2019	05:58	04:41	06:00	18	19	8	0	Nil	No	P45, P55, Nc
65	2	24/07/2019	21:02	20:55	22:32	23	18.9	1	2	Nil	No	P45, P55 Nc, Pa
		28/08/2019	05:58	04:39	05:58	18	19	8	0	Nil	No	P45, P55
73	2	23/07/2019	21:03	20:48	22:50	25	23	1 – 2	1	Nil	No	P45, P55, Nc, Ser, Pa
		29/08/2019	06:00	04:34	06:00	13.5	13.5	8	1	Light drizzle at start then clear	No	P45, P55
77	2	23/07/2019	21:03	20:56	22:34	23.3	21.3	0	1	Nil	No	P45, P55, Nc, Bar
		29/08/2019	06:00	04:28	06:00	13.5	13.5	8	1	Light drizzle at start then clear	No	P45, P55, Pa

78	3	23/07/2019	21:03	20:56	22:34	23	21	0		Nil	Yes – P45 emerged from split in limb over track, confirmed from sound analysis	P45, P55, Nc, Bar
		29/08/2019	06:00	04:30	06:00	13	12	8	0	Light drizzle at start then clear	No	P45, P55,
		01/10/2019	07:04	05:25	07:05	14	12	8	1	Nil	No	P55
79	2	26/06/2019	21:22	21:08	23:00	16	14	4	1	Nil	No	Bar, P45, P55
		29/08/2019	06:00	04:30	06:00	13	12	8	0	Light drizzle at start then clear	No	P45, P55,
80	3	24/07/2019	21:00	20:45	22:45	24	19	1	1	Nil	No	P45, P55 Nc, Myo sp:
		07/08/2019	20:38	20:25	22:08	18	16	4	1	Nil	Yes 1 x Pip sp 1 x BLE	No other bats recorded. Pip sp. Emerged on SW side of trunk not echolocating. Paur emerged from end of east facing limb bat not echolocating.

81	3	24/07/2019	21:00	20:45	22:45	24	19	1	2	Nil	Yes P55 x 4 Confirmed from Sound Files	P45, P55, Eptser, Nn, Nlei
		08/08/2019	21:36	20:24	22:09	22	18.2	3	1	Nil	Yes P55 x 1 Confirmed from sound files	P45, P55 Nc, Eptser
		13/08/2019	20:27	20:12	22:00	16	14	2	1	Nil	No	P55, Nc, Myosp
82	2	24/07/2019	21:00	20:45	22:45	24	19	1	2	Nil	Yes P55 x 1 emerged from main trunk	P45, P55 Nn, <i>Myotis</i> sp.
		12/09/2019	06:23	04:40	06:25	15	13	2	1	Nil	No	P45, P55, Nc
83	3	24/07/2019	21:00	20:45	22:45	24	19	3		Nil	No	P45, P55, Nc
		08/08/2010	20:36	20:22	22:22	21	19	0	2	Nil	P55 x 1 emerged from main trunk	P45, P55
		16/09/2019	06:29	05:00	06:35	12	11	0	1	Nil	No	P45, P55, Nc
84	2	24/07/2019	21:00	20:45	22:45	24	19	1	1	Nil	No	P45, P55 Nc, Nlei, Eptser
		08/10/2019	07:07	05:30	07:18	10	10	6	3	Nil	No	P45, P55, Nc
97	2	02/09/2019	19:41	19:30	21:20	22	20	3	1	Nil	No	P55, Nc

		15/10/2019	07:19	05:45	07:25	17	16	7	1	Nil	No	P55
102	2	21/08/2019	20:10	19:55	21:40	19	18	2	1	Nil	No	P45, P55, Nc, Eptser
103	2	21/08/2019	05:45	03:45	05:45	12	13	8	2	Nil	No	P45, P55, Eptser
		17/09/2019	20:37	19:00	20:34	10.8	5.8	0	1	Nil	No	Db, Nc, Pa
117	2	05/08/2019	20:42	20:35	22:12	16.3	12.9	2		Nil	No	P45, P55 Nn
		15/10/2019	07:19	05:15	07:21	12	13	8	1	Nil	No	P55
118	2	05/08/2019	20:42	20:35	22:12	16.3	12.9	2	2	Nil	1 x P55 Confirmed from sound file	P45, P55, Nn
		15/10/2019	07:19	05:15	07:21	12	13	8	1	Nil	No	P55
119	2	01/08/2019	20:49	20:37	22:19	17	16	8		Nil	No	P55
		17/09/2019	20:37	19:00	20:34	10.8	5.8	0	1	Nil	No	No bats heard
120	2	11/09/2019	19:20	19:10	21:00	25	21	0	1	Nil	No	P55, Nc, Pa, P45
		19/09/2019	06:35	05:00	06:36	7.8	6.8	4	1	Nil	No	No bats heard
121	2	15/08/2019	20:21	20:01	21:51	18.5	14	3	1	Nil	No	P45, P55
		02/10/2019	06:57	05:27	06:57	9	8	8	1	Light Drizzle at start and then cleared	No	P55
122	2	15/08/2019	20:21	20:01	21:51	18.5	14	3	1	Nil	No	P45, P55

		04/09/2019	19:37	19:25	21:15	18	16	5	1	Nil	No	P55
123	2	20/08/2019	05:45	03:50	05:50	12	9	2	2	Nil	No	P55
		04/09/2019	19:37	19:25	21:15	18	16	5	1	Nil	1 x P55 emerged confirmed from sound file	P55

4 EVALUATION

4.1 Transect Surveys

Overall across all eight transect routes a total of ten confirmed species of bat were recorded as identified from sound recordings along with two sets of recordings identified to genus level only.

The species identified during the transects were:

- Barbastelle;
- Brown Long-eared;
- Common Pipistrelle;
- Soprano Pipistrelle;
- Nathusius Pipistrelle;
- Daubenton;
- Natterer;
- Noctule;
- Serotine; and
- Leisler.

4.1.1 Transect 1

This is a circular transect and includes Poppy's Wood, a small area of young woodland consisting of both deciduous and conifer trees between the A47 and the B1110, fields with hedgerows, a small area with farm buildings set on the boundary of two arable fields, part of the village of Hockering to its east side, and the northern boundary of the A47 consisting of a mature hedgerow. Most of the transect falls outside of the red line boundary but is all within approximately 100 m of it.

All transect surveys were conducted during periods of weather that were suitable for bats to be active with lowest temperature recorded during any of the transects being 10°C and the highest being 28.5°C (Table 3, Section 2.1.1.). There was a total of eight transects completed in July, August, September and October.

During the surveys there were a total of 318 sound files recorded attributed to bats. A total of eight species of bat were confirmed along this transect using sound analysis to identify bats to species level. The species identified to species level were:

- Common Pipistrelle bat (61.32%);
- Soprano Pipistrelle bat (22.64%);
- Brown Long-eared bat (5.97%);
- Barbastelle bat (2.2%);
- Noctule bat (0.62%);

- Natterers bat (0.62%);
- Nathusius Pipistrelle (0.31%); and
- Daubenton's bat (0.31%);

The two most frequently encountered bats around this transect were Common and Soprano Pipistrelle bats.

Common Pipistrelle bats had a peak count of 56 bats on 04/07.2019 with other counts varying between 44 and 2 bat(s) over the course of the transect surveys. A large proportion of the passes recorded during the surveys were concentrated within the northern red line boundary of the proposed new road. With numbers of these bats encountered within the small area of woodland between the A47 and the B1110, just west of the B1110 and Poppy's Wood (Figure 7, pages 1 – 8) and almost opposite [REDACTED] on the south side of the A47 where there was a large amount of foraging and commuting activity along the hedgerow running parallel to the A47. This suggests that pipistrelle bats from roosts that are known at [REDACTED] may be currently crossing the A47 at or close to this point.

There was one additional area of intense activity that was evident on this transect and this was at a fairly central point on the northern section of the transect along two farm tracks that intersected beside a small group of farm buildings. This location is outside of the red line boundary of the proposed works.

All transect results showing the areas where bats were encountered showing the areas of most activity are shown in *Figure 7, Maps 1 -8*.

4.1.2 Transect 2

This is a linear transect to the south of the existing A47 and between Fox Lane to the east and Mattishall Lane to the east and the south extending to 3.7 km (Figure 3). The transect passes alongside open arable fields, with hedgerows along some of the field margins; standard trees along field margins, past small copses, and to the north of a larger area of woodland to south of Mattishall Lane.

All transect surveys were conducted during periods of weather that were suitable for bats to be active with lowest temperature recorded during any of the transects being 9°C and the highest being 22°C (Table 3, Section 2.1.1.). There was a total of eight transects completed two in July, August, September and October. The dawn transect carried out on 13/08/2019 had a start temperature of 9°C and a finish temperature of 10°C and the published guidelines suggest that this should count as a sub-optimal survey, however bats were still encountered although in much reduced numbers than might have been expected.

During the surveys there were a total of 380 sound files recorded attributed to bats during the transects. A total of seven species of bat were confirmed along this transect using sound analysis to identify bats to species level. There were also a few echolocation calls that were only identifiable to genus level. The species identified to species level were:

- Common Pipistrelle bat (74.4%);
- Soprano Pipistrelle bat (20.5%);
- Noctule bat (7.3%);

- Brown Long-eared bat (1.05%);
- Barbastelle bat (0.52%);
- Leislars (0.26%)
- Daubenton's bat (0.26%);

The bats identified to genus level were:

- Pipistrellus spp. (0.78%); and
- *Myotis* spp. (0.26%).

By far the most common bat encountered during the transect over eight surveys was Common Pipistrelle accounting for 283 passes out of a total of 283. The most consistent area of activity was along the hedgerow associated with Low Road. This links to [REDACTED] where there are known roosts. The activity mostly falls outside of the red line boundary for the proposals.

All transect results showing the areas where bats were encountered showing the areas of most activity are shown in *Figure 8, Maps 1 -8*.

4.1.3 Transect 3

This is a circular transect to the south of the existing A47 and between Mattishall Lane to the east and almost reaching Church Lane to the west. The northern edge of the transect follows the boundary of the existing A47 and to the south the boundary follows a series of hedgerows with the transect route falling almost totally within the red line boundary of the site. The transect extends to 5.9 km (Figure 3). The transect around the field boundaries of large open arable fields, around areas of scattered trees and around a large reclamation yard.

All transect surveys were conducted during periods of weather that were suitable for bats to be active with lowest temperature recorded during any of the transects being 9°C and the highest being 22°C (Table 4, Section 2.1.1.). There was a total of eight surveys completed two in July, August, September and October. The dusk transect carried out on 17/10/2019 had a finish temperature of 9°C and the published guidelines suggest that this should count as a sub-optimal survey, however bats were still encountered although in reduced numbers than might have been expected although they were not the lowest passes recorded.

During the surveys there were a total of 565 sound files recorded attributed to bats during the transects. A total of seven species of bat were confirmed along this transect using sound analysis to identify bats to species level. There were also a few echolocation calls that were only identifiable to genus level. The species identified to species level were:

- Common Pipistrelle bat (52.92%);
- Soprano Pipistrelle bat (41.94%);
- Noctule bat (6.72%);
- Brown Long-eared bat (2.3%);
- Serotine (0.7%)
- Barbastelle (0.35%)

- Natterer's bat (0.35%);

The bats identified to genus level were:

- Pipistrellus spp. (1.23%); and
- *Myotis* spp. (1.06%).

By far the most common bat encountered during the transect over eight surveys was Common Pipistrelle accounting for 299 passes out of a total of 565. Activity across the transect was well spread with activity concentrated generally around the hedgerows on the site. All of the recorded activity fell within the red line boundary of the site.

All transect results showing the areas where bats were encountered showing the areas of most activity are shown in *Figure 9, Maps 1 -8*.

4.1.4 Transect 4

This is a circular transect to the south of the existing A47 and between Church Lane to the east and Dereham Raod to the west. The northern edge of the transect follows mostly the boundary of the existing A47, until it crosses Berrys Lane when it follows the boundary of Dereham Road. To the south the boundary follows the River Tud for the most part but also hedgerows along field boundaries. Only the northern extent of the transect falls within the red line boundary of the site. The transect extends to 4.26 km (Figure 3).

All transect surveys were conducted during periods of weather that were suitable for bats to be active with lowest temperature recorded during any of the transects being 9°C and the highest being 20°C (Table 4, Section 2.1.1.). There was a total of eight surveys completed two in July, August, September and October. The dusk transect carried out on 17/10/2019 had a finish temperature of 9°C and the published guidelines suggest that this should count as a sub-optimal survey, however bats were still encountered although in reduced numbers than might have been expected, although they were not the lowest passes recorded.

During the surveys there were a total of 355 sound files recorded attributed to bats during the transects. A total of eight species of bat were confirmed along this transect using sound analysis to identify bats to species level. There were also a few echolocation calls that were only identifiable to genus level. The species identified to species level were:

- Common Pipistrelle bat (55.64%);
- Soprano Pipistrelle bat (34.79%);
- Noctule bat (4.23%);
- Brown Long-eared bat (2.97%);
- Barbastelle (1.72%)
- Leisler (0.31%)
- Natterer's bat (0.15%); and
- Daubenton bat (0.15%).

The bats identified to genus level were:

- Pipistrellus spp. (0.78%); and

By far the most common bat encountered during the transect over eight surveys was Common Pipistrelle accounting for 355 passes out of a total of 665. Activity across the transect was well spread throughout the transect with larger concentrations of bat activity generally being in a different location around the transect on different surveys. There were concentrations associated with the River Tud to the south side of the transect and with concentrations of note on one occasion at Berrys Lane and another mid way along the A47 also on another night. with activity concentrated generally around the hedgerows on the site. Most of the recorded activity fell outside of the red line boundary of the site.

All transect results showing the areas where bats were encountered showing the areas of most activity are shown in *Figure 10, Maps 1 -8*.

4.1.5 Transect 5

This is a linear transect to the south of the existing A47 and between Berrys Lane to the east, Mattishall Lane to the west and south and the existing A47 to the North. Only the northern extent of the transect falls within the red line boundary of the site. The transect extends to 4.5 km (Figure 3). Some parts of the transect were moved slightly further south due to access issues relating to locked gates and impassable hedgerows.

All transect surveys were conducted during periods of weather that were suitable for bats to be active with lowest temperature recorded during any of the transects being 11°C and the highest being 24°C (Table 4, Section 2.1.1.). There was a total of eight surveys completed two in July, August, September and October.

During the surveys there were a total of 818 sound files recorded attributed to bats during the transects. A total of eight species of bat were confirmed along this transect using sound analysis to identify bats to species level. There were also a few echolocation calls that were only identifiable to genus level. The species identified to species level were:

- Soprano Pipistrelle bat (50.12%);
- Common Pipistrelle bat (37.89%);
- Noctule bat (3.54%);
- Brown Long-eared bat (2.44%);
- Natterers bat (1.71%);
- Barbastelle bat (0.48%)
- Serotine bat (0.36%); and
- Leislars bat (0.12%);

The bats identified to genus level were:

- Pipistrellus spp. (2.07%); and
- *Myotis* spp. (0.24%)

By far the most common bat encountered during the transect over eight surveys was Soprano Pipistrelle accounting for 420 passes out of a total of 818. Activity was primarily concentrated to the south side of the transect and associated with the River

Tud and small areas of woodland. Some activity was recorded along the hedgerow along the boundary with the A47. Most of the recorded activity was outside of the red line boundary of the proposals.

All transect results showing the areas where bats were encountered showing the areas of most activity are shown in *Figure 11, Maps 1 -8*.

4.1.6 Transect 6

This is a circular transect to the south of the existing A47 and between Mattishall Lane to the east, with [REDACTED] at the western extremity, the existing A47 to the North and the southern boundary following hedgerow boundaries through fields. The whole of the transect falls within the red line boundary. The transect extends to 5.7 km (Figure 3).

All transect surveys were conducted during periods of weather that were suitable for bats to be active with lowest temperature recorded during any of the transects being 7.7°C and the highest being 20°C (Table 4, Section 2.1.1.). There was a total of eight surveys completed two in July, August, September and October. The transect on 17/09/2019 started with an optimal temperature but during the survey fell to 7.7°C potentially making the survey sub-optimal however activity was higher than one other survey that was carried out in optimal conditions.

During the surveys there were a total of 611 sound files recorded attributed to bats during the transects. A total of nine species of bat were confirmed along this transect using sound analysis to identify bats to species level. There were also a few echolocation calls that were only identifiable to genus level. The species identified to species level were:

- Soprano Pipistrelle bat (54.5%);
- Common Pipistrelle bat (24.71%);
- Noctule bat (11.94%);
- Barbastelle bat (2.45%);
- Serotine bat (1.30%);
- Brown Long-eared bat (0.81%);
- Leislars bat (0.65%);
- Daubenton's bat (0.32%); and
- Natterers bat (0.16%).

The bats identified to genus level were:

- Pipistrellus spp. (2.78%); and
- *Myotis* spp. (0.16%)

By far the most common bat encountered during the transect over eight surveys was Soprano Pipistrelle accounting for 333 passes out of a total of 611. There were numerous clusters of activity along all areas of the transect. Most of these were associated with tree and hedgelines. There were two concentrations particularly of Common and Soprano Pipistrelle bats to the west and east side. It is possible that these concentrations could be associated with known roosts in trees to the north-east of

the transect and also within St Peters Church to the west. The hedgelines are being utilised extensively for foraging and commuting by all of the species recorded.

All transect results showing the areas where bats were encountered showing the areas of most activity are shown in *Figure 11, Maps 1 -8*.

4.1.7 Transect 7

This is a linear transect extending for approximately 3.5 km (Figure 3) extending from the B1535, Wood Lane to the East and the A47 in the south, near the junction with Taverham Road to the west. The transect traversed the Easton Estate throughout and utilised existing tracks. The transect passes alongside open arable fields, with hedgerows and standard trees, along the field margins; past small copses, and through a large area of woodland known as Church Plantation on the west side. At its south-western extremity the transect crossed the River Tud.

All transect surveys were conducted during periods of weather that were suitable for bats to be active with lowest temperature recorded during any of the transects being 14°C and the highest being 26°C (see Table 3, Section 2.1.1.). There was a total of eight transects completed with one transect completed in June and two in July, one in August, and two in each of September and October.

During the transects there were a total of 1130 sound files recorded attributed to bats during the transects. A total of nine species of bat were confirmed along this transect using sound analysis to identify bats to species level. There were also a few echolocation calls that were only identifiable to genus level. The species identified to species level were:

- Common Pipistrelle bat (37.5%);
- Soprano Pipistrelle bat (34,5);
- Barbastelle bat (15.76%);
- Noctule bat (7.3%);
- Brown Long-eared bat (2.32%);
- Natterers bat (0.71%);
- Leislars bat (0.45%);
- Serotine bat (0.45%); and
- Daubenton's bat (0.26%);

The bats identified to genus level were:

- *Myotis* spp. (0.7%); and
- Pipistrelle spp. (0.7%).

This transect was by far the most active of the eight transects and the habitat that the transect passed through is very important particularly for Barbastelle bats which are woodland specialists. Barbastelle activity was low in June and July and then peaked in the early part of August during the combined dusk and dawn surveys with 128 passes recorded. The majority of passes were recorded along the part of the transect that passed alongside Church Plantation, there were also occasional passes by these bats elsewhere on the transect where it was heavily treed.

Barbastelle activity was mirrored during the static detector deployments which was located on two occasions at the southern end of the transect where it crossed the River Tud (Static 3, 4.2.3.Section).

Activity by other species particularly Common and Soprano Pipistrelles was also high along this section of the transect.

All transect results showing the areas where bats were encountered showing the areas of most activity are shown in *Figure 11, Maps 1 -8*.

4.1.8 Transect 8

This is a circular transect to the north of the existing A47 and between [REDACTED] on the A47 and forms the eastern extent of the transect, to the north the transect follows a line through a water meadow to the west of Taverham Road, generally following the River Tud. The eastern extent is close to Church Lane, Easton and then returns along the north side of the A47. The habitats present that the transect traversed included water meadow, woodland hedgerows, small copses and scattered trees Only the southern half of the transect falls within the red line boundary. The transect extends to 5.7 km (Figure 3).

All transect surveys were conducted during periods of weather that were suitable for bats to be active with lowest temperature recorded during any of the transects being 11°C and the highest being 26°C (Table 4, Section 2.1.1.). There was a total of eight surveys completed two in each of July, August, September and October.

During the surveys there were a total of 656 sound files recorded attributed to bats during the transects. A total of eight species of bat were confirmed along this transect using sound analysis to identify bats to species level. There were also a few echolocation calls that were only identifiable to genus level. The species identified to species level were:

- Soprano Pipistrelle bat (56.88%);
- Common Pipistrelle bat (23.70%);
- Noctule bat (13.60%);
- Serotine bat (0.76%);
- Leislars bat (0.76%);
- Daubenton's bat (0.76%);
- Brown Long-eared bat (0.61%); and
- Nathusius Pipistrelle (0.30%).

The bats identified to genus level were:

- Pipistrellus spp. (1.83%); and
- *Myotis* spp. (0.76%)

By far the most common bat encountered during the transect over eight surveys was Soprano Pipistrelle accounting for 372 passes out of a total of 654. There were numerous clusters of activity along all areas of the transect. Most of these were associated with tree and hedge-lines. There were also concentrations associated with the River Tud and also some activity along the southern boundary with the A47.

All transect results showing the areas where bats were encountered showing the areas of most activity are shown in *Figure 12, Maps 1 -8*.

4.2 Static Detectors

4.2.1 Static 1

The detector was positioned within the grounds of [REDACTED] at the south-west end of the scheme and within the southern boundary of the proposed red line boundary of the scheme. The detector was positioned to the west side of the church within a tree line overlooking a small meadow.

Nine species of bats were recorded to species level and two were recorded to genus level. The most recorded bats were Soprano Pipistrelle with peaks in July and August during the maternity season. Soprano pipistrelle bats triggered the detector on 1335 times in July and 541 times in August. Numbers then declined extensively in September and October. The second most frequent species was Common Pipistrelle with 191 and 234 in July and August with a corresponding decline to Soprano Pipistrelles in September and October. It would appear that there are roosts nearby during the maternity period that then disperse during September and October with less reliance on this area for foraging and commuting during this time (Section 3.2.2., Tables 12 - 15).

All other species of bat were recorded in low numbers throughout all four deployments of this detector.

4.2.2 Static 2

The detector was positioned at the northern edge of a woodland strip that borders the A47 at the junction with Church Lane, Easton (Figure 4). The location had a closed tree canopy behind the detector and an open view over a field to the north. The detector was deployed on four occasions in July, August, September and October.

Ten Species of bats were recorded to species level and two were recorded to genus level. The two most recorded bats were Soprano and Common Pipistrelle bats. Peak triggers for these two species were during July and August during the maternity season and reflected the level of activity recorded by Static 1 which was located on the opposite side of the A47 approximately 250 m away. Soprano Pipistrelle bats triggered the detector on 1306 occasions during July with 456 triggers in August with significant declines in September and October mirroring the activity on the opposite side of the A47 (Section 3.2.2., Tables 16 – 19).

All other species of bat were recorded in low numbers throughout all four deployments of the detector.

4.2.3 Static 3

The detector was positioned along a track on the Easton Estate within 50 m of the A47 beside the River Tud (Figure 4). The location had a closed tree canopy over the top of the detector. The detector was deployed on two occasions in July and August.

Nine species of bat were recorded to species level and two were recorded to genus level. The two most recorded bats were Common and Soprano Pipistrelle bats. Peak triggers for these two species were 1306 and 456 for Common Pipistrelle and 383 and 423 for Soprano Pipistrelle.

Significantly Barbastelle bats were recorded passing the detector on 283 times in July and 163 times in August. For this species this is a significant number of passes and reflects the level of Barbastelle activity recorded during the transect surveys along Transect 7 in the same months.

It is clear that this track through these woods is an important commuting route for these bats and it also suggests that bats may be using this route just prior to crossing the A47 at the end of the track and also may pass through the woodland and cross over Taverham Road towards Transect 8 (Section 3.2.2., Tables 16 – 19).

All other bat species recorded at this location were in lower numbers but were generally higher than in other locations sampled using static detectors.

These results were likely to be because of the quality of the habitat being extremely high with a good mixture of habitat types including woodland and water.

4.2.4 Static 4

The detector was positioned at the rear of [REDACTED] overlooking an open field approximately 250 m east of Static 3 (Figure 4). The detector was deployed during September and October.

Eight species of bat were recorded to species level and two were recorded to genus level. The two most recorded bats were Common and Soprano Pipistrelle bats. Peak triggers for these two species were 102 and 29 for Common Pipistrelle and 100 and 171 for Soprano Pipistrelle.

Barbastelle bats were only recorded on 3 occasions during the two deployments even though the detector was close to where Static 3 had been deployed although the transect surveys during September and October on Transect 7 did also record a decline in Barbastelle passes.

All other bat species at this location were in lower numbers.

4.2.5 Static 5

The detector was positioned to the east side of Wood Lane in a narrow woodland strip that bordered both Wood Lane and the A47 at this location (Figure 4). The detector was deployed during July, August, September and October. The calls recorded on this detector along with Static 6 were found to have been affected by a mechanical noise that had recorded many thousands of false positive calls.

Species of bat were recorded to species level. Common and Soprano Pipistrelle bats were the most recorded bats during all of the deployments at this location with peaks for Common Pipistrelle being 285 (July), 245 (August) and 149 (September) and Soprano Pipistrelle being peaking at 171 (August) and 98 (October). These bats were present throughout with numbers starting to decline in October generally.

A significant presence were *Myotis* spp. bats and included bats that had been identified to species level (Tables 22 - 25, Section 3.2.5). These were present in significant numbers during the August and October deployments with bats from this genus numbering 146 in August and 160 in October.

Also detected at this location were Barbastelle bats with none recorded in July, and then numbers progressively increased with 16 in August, 21 in September and a significant increase in October with 62 bats recorded.

The location of Wood Lane and the A47 is something of a confluence of hedgerows radiating in all directions from where the detector was sited linking to numerous areas of woodland to the North, west and to the south on the other side of the A47. These potential commuting routes along the various hedgerows may be being used to gain access to the various woodlands and also for these bats to cross the A47 at this location.

4.2.6 Static 6

The detector was positioned in a small area of trees at the junction of Berry Lane and Dereham Road. This detector was approximately 250 m south of Static 5 in Wood Lane (Figure 4). The detector was deployed during July, August, September and October. The calls recorded on this detector along with Static 5 were found to have been affected by a mechanical noise that had recorded many thousands of false positive calls.

Species of bat were recorded to species level. Common and Soprano Pipistrelle bats were the most recorded bats during all deployments at this location with peaks for Common Pipistrelle being 763 (July), 323 (August) and 152 (October) with numbers at their lowest at 118 bats (September), and Soprano Pipistrelle peaking 1078 (July) and 125 (October) the lowest numbers were 65 and 66 bats (August and September).

Myotis species including Those identified to species level (Daubenton and Natterer) were only at very low numbers compared to those detected at Static 5 suggesting that there is either low or no numbers of *Myotis* species of bat crossing the A47 at this location.

Barbastelle bats were detected in all months during the deployment but in relatively low numbers 12 (July), 11 (August), 20 (September) and 14 (October). Although this is not comparable with the numbers recorded at Static 5 it does suggest that there may be some bats crossing the A47 at this location.

4.2.7 Static 7

The detector was positioned to the south side of the A47 opposite Yew Tree Court, Hockering. The detector was positioned within a small copse immediately bordering the A47 with microphone positioned overlooking the road (Figure 4). The detector was deployed during July, August, September and October.

Species of bat were recorded to species level. Common and Soprano Pipistrelle bats were the most recorded bats during all deployments at this location with peaks for Common Pipistrelle being 321 (July), and 436 (September) and Soprano Pipistrelle peaking at 79 (July). All other species were recorded in low numbers in all months.

Barbastelle bats were detected in all months except for August during the deployment but in low numbers 15 (July), 15 (September) and 2 (October). This suggests that occasional bats of this species pass along the edge of the road on occasions but not regularly.

4.2.8 Static 8

The detector was positioned to the south side of the A47 within a small copse approximately 50 m west of Oak Farm (Figure 4). The detector was deployed during July, August, September and October.

A total of nine species were confirmed as passing the detector during all of the deployments.

Species of bat were recorded to species level where this was possible. Common and Soprano Pipistrelle bats were the most recorded bats during all deployments at this location with peaks for Common Pipistrelle passes being 189 (July), and 1292 (August) with numbers at their lowest at 140 passes (September) and 91 passes (October). Soprano Pipistrelle peaked at 1398 passes (July) and then showed a general decline in all other months with 83 passes (August), 33 passes (September) and 31 passes (October). The figures generally suggest that roosts of these bats may have been local to the detector's placement with known roosts at Oak Farm within 200 m of the detector.

Myotis species including those identified to species level (Daubenton and Natterer) were only at very low numbers. This suggests that there are unlikely to be any roosts nearby and that only occasional *Myotis* species of bat are using this tree line for commuting or foraging.

Barbastelle bats were detected in all months during the deployment but in relatively low numbers 1 (July), 11 (August), 22 (September) and 5 (October). The numbers of this species passing this detector in each period was low with generally only occasionally passing bats on a daily basis.

4.2.9 Static 9

The detector was positioned to the south of the B on the northern side of a small copse about 100 m from the A47 (Figure 4). Immediately to the east of the detectors location is Poppy's Wood an area of woodland designated as a Country Park, and to the north a large open arable field. The detector was deployed during July, August, September and October.

Eight species of bat were recorded to species level and two were recorded to genus level. The two most recorded bats were Common and Soprano Pipistrelle bats. Peak triggers for these two species were 369 and 141 for Common Pipistrelle during July and August respectively and 60 and 33 for Soprano Pipistrelle during August and September. Numbers were significantly below this during all other deployments at this location.

Barbastelle bats were fairly constant over all four months with between 8 and 10 bats being recorded during each deployment. This number is not significant in itself but does indicate that this species is present over the whole length of the existing A47 proposed for dualling and would appear that they are using existing hedgerows along the A47 and around fields adjacent to the road probably used for commuting between smaller areas of woodland.

All the other 6 species recorded were in very low numbers during all 4 months.

5 RECOMMENDATIONS

5.1 Transects

Transects during 2019 were primarily carried out during the months of July, August, September and October. These surveys do not cover the period immediately after bats emerged after hibernation or as colonies build prior to the maternity season. This therefore gives an incomplete dataset from which to fully evaluate habitat important for all bat species that may be impacted by the proposals to widen the road and could potentially remove habitat that is critical for bats to move around the landscape. Full datasets are required so that adequate mitigation can be incorporated into the scheme to offset any negative impacts on habitat critical to bats use of the landscape that may be removed.

5.2 Statics

Further static surveys should be completed during April, May and June for all static locations so that a full picture can be established. This will aid confirmation of potential crossing points used by bats that may be disrupted during construction works at the site.

5.3 Crossing Point Surveys

Crossing point surveys should be carried out at several locations where high numbers of bats have been detected nearby during both transect and static detector surveys.

These should include

- Church Lane at its junction with the A47. This location has been established as important for bats with high numbers of Common and Soprano Pipistrelle bats being present on both sides of the A47 at this point. It is likely that these bats cross the A47 at this junction and crossing point surveys using appropriate equipment including Infra-red video recorders and/or thermal imaging cameras.
- A47 near to the junction with Taverham Road at the end of the trackway on the Easton Estate. This location has been shown to be important for both Common and Soprano Pipistrelle bats and Barbastelle bats. The habitat on the south side of the A47 is limited to hedgerows that link into small woodlands to the south of the A47 which are often critically important particularly for Barbastelle bats.
- A47 at its junction with Wood Lane and Berrys Lane. This location has been shown to be important for Common and Soprano Pipistrelle bats, *Myotis* spp. which were particularly prevalent on the north side of the A47 close to its junction with Wood Lane, and for Barbastelle bats with similar numbers although small on both sides. These numbers suggest that this location is potentially important as a crossing point for these bats, especially with good foraging and commuting features present on both sides of the A47. These features would be particularly important for both *Myotis* spp. bats and Barbastelle bats.

Crossing point surveys should utilise either video cameras using infra-red illumination or dedicated thermal image cameras, so that the A47 at these locations can be monitored for bats flying across the carriageway at the above locations.

Where crossing points are identified further evaluation can be made as to maintaining such crossing points so that bats can maintain their range lessening the likelihood of isolating colonies and impairing their ability to maintain a viable colony size and potentially the loss of these bats from the area.

It is likely to be important to identify commuting routes and foraging areas in relation to capture sights. Radio tags can last up to 10 days subject to them not being groomed off by the bats or the batteries failing. For tracking three tracking teams should be utilised using a receiver and Yaggi aerial. Each team should identify the signals from the tags and triangulate the signals from different locations. This should be carried out frequently during the course of each nights tracking so that all areas the bats are using are identified.

Daytime tracking should be utilised to identified trees to which bats have fled to after tagging and thereafter each day that the tag remains operational as bats move from roost to roost.

6 REFERENCES

Collins, J. (Ed.) (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn.) The Bat Conservation Trust, London.

Russ, Jon (2012) British Bat Calls, A guide to species identification. Exeter: Pelagic Publishing.

Middleton, N.; Froud, A. and French, K. (2014) Social Calls of the Bats of Britain and Ireland. Exeter: Pelagic Publishing

Middleton, N. (2020) Is That a Bat, A guide to Non-Bat sounds encountered during Bat Surveys. Exeter: Pelagic Publishing.

7 FIGURES

Figure 1 – Site Location

Figure 2 – Proposed scheme Maps 1 – 8

Figure 3 – Bat Transect Locations

Figure 4 – Static Bat Detector Locations

Figure 5 – Trees with Moderate and High Bat Roosting Potential

Figure 6 – Trees with confirmed bat roosts

Figure 7 – Transect 1 results Maps 1 – 8

Figure 8 – Transect 2 results Maps 1 – 8

Figure 9 – Transect 3 results Maps 1 – 8

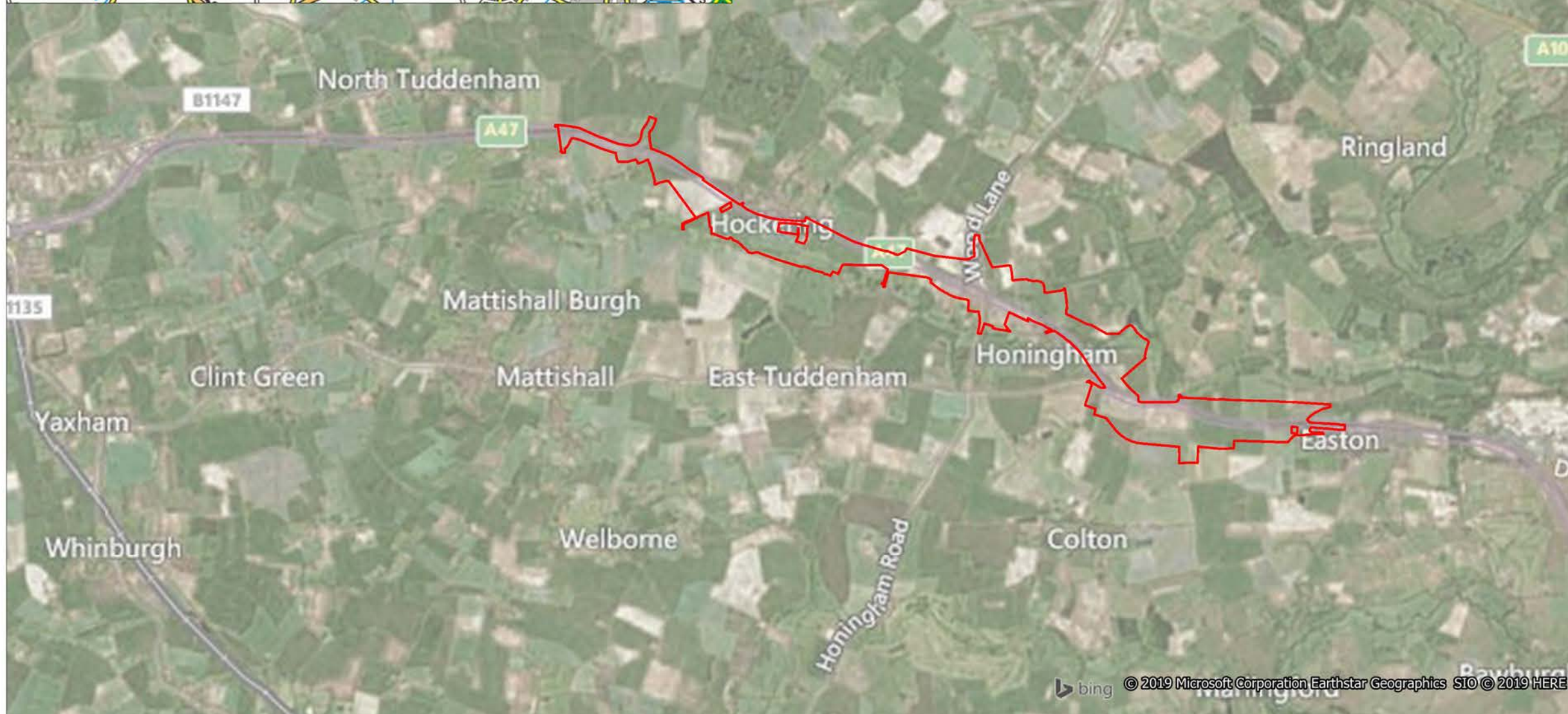
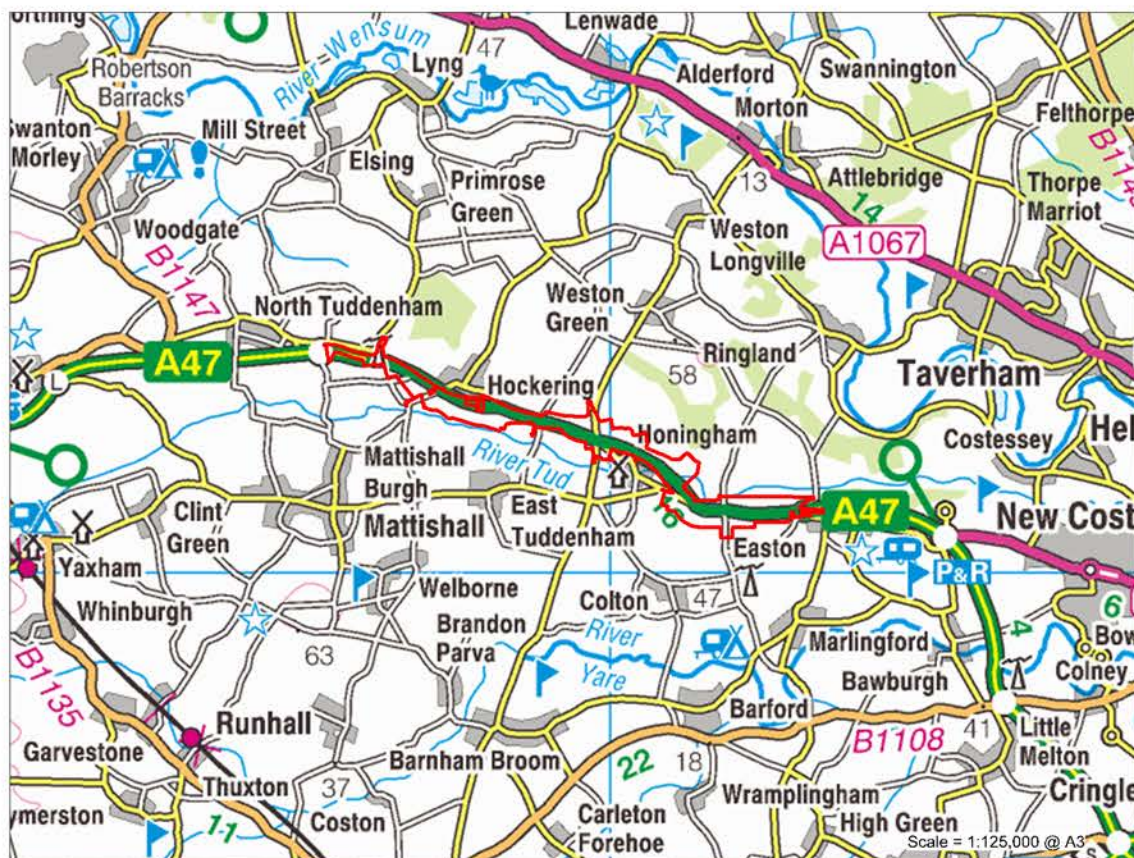
Figure 10 – Transect 4 results Maps 1 – 8

Figure 11 – Transect 5 results Maps 1 – 8

Figure 12 – Transect 6 results Maps 1 – 8

Figure 13 – Transect 7 results Maps 1 – 8

Figure 14 – Transect 8 results Maps 1 - 8



Site Boundary

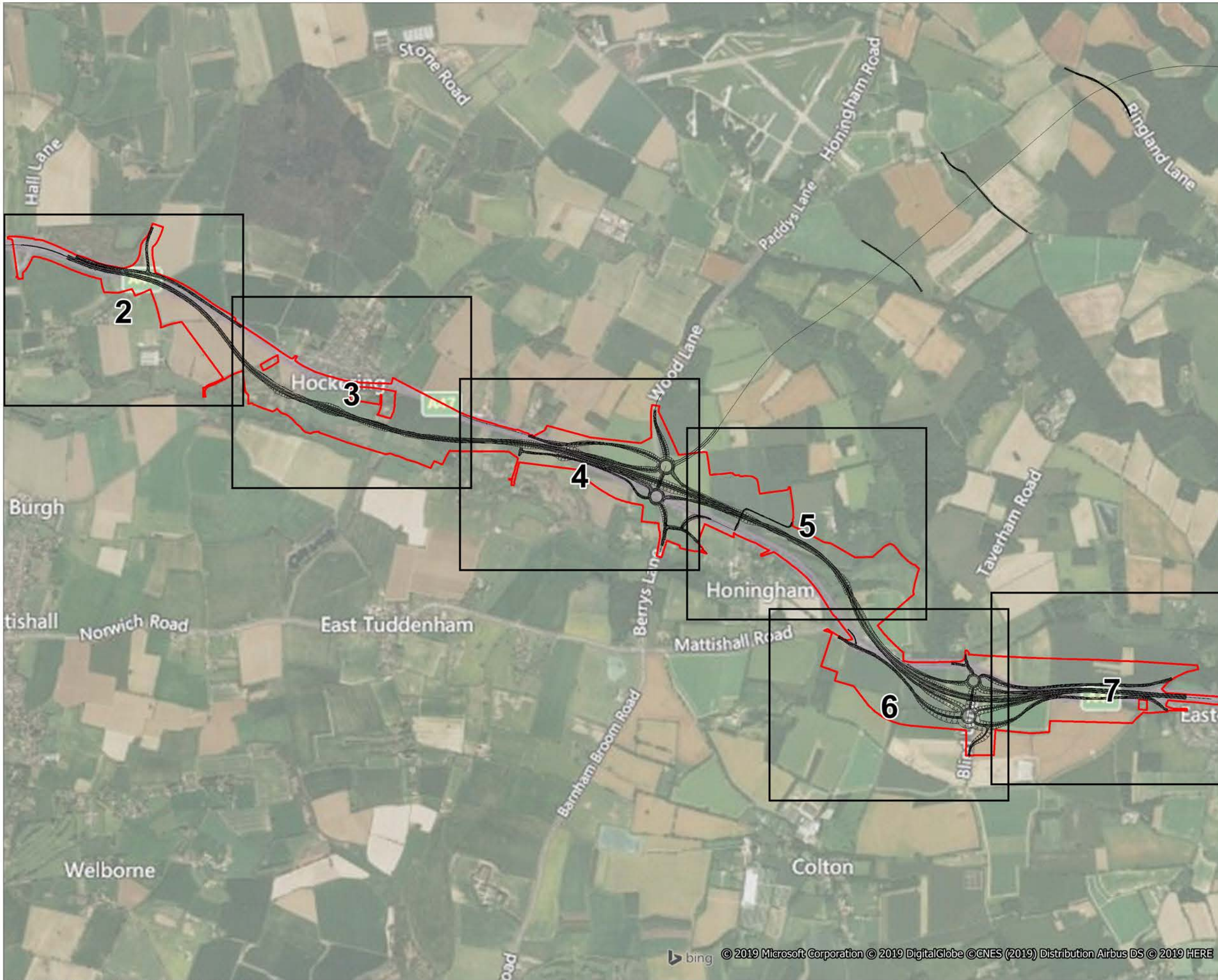
Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

A47 Improvements

Figure 1
Site Location Plan

0 1.5
km
Scale = 1:50,000 @ A3

REV 00



Site boundary

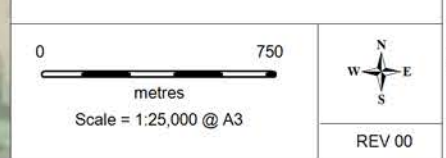


Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

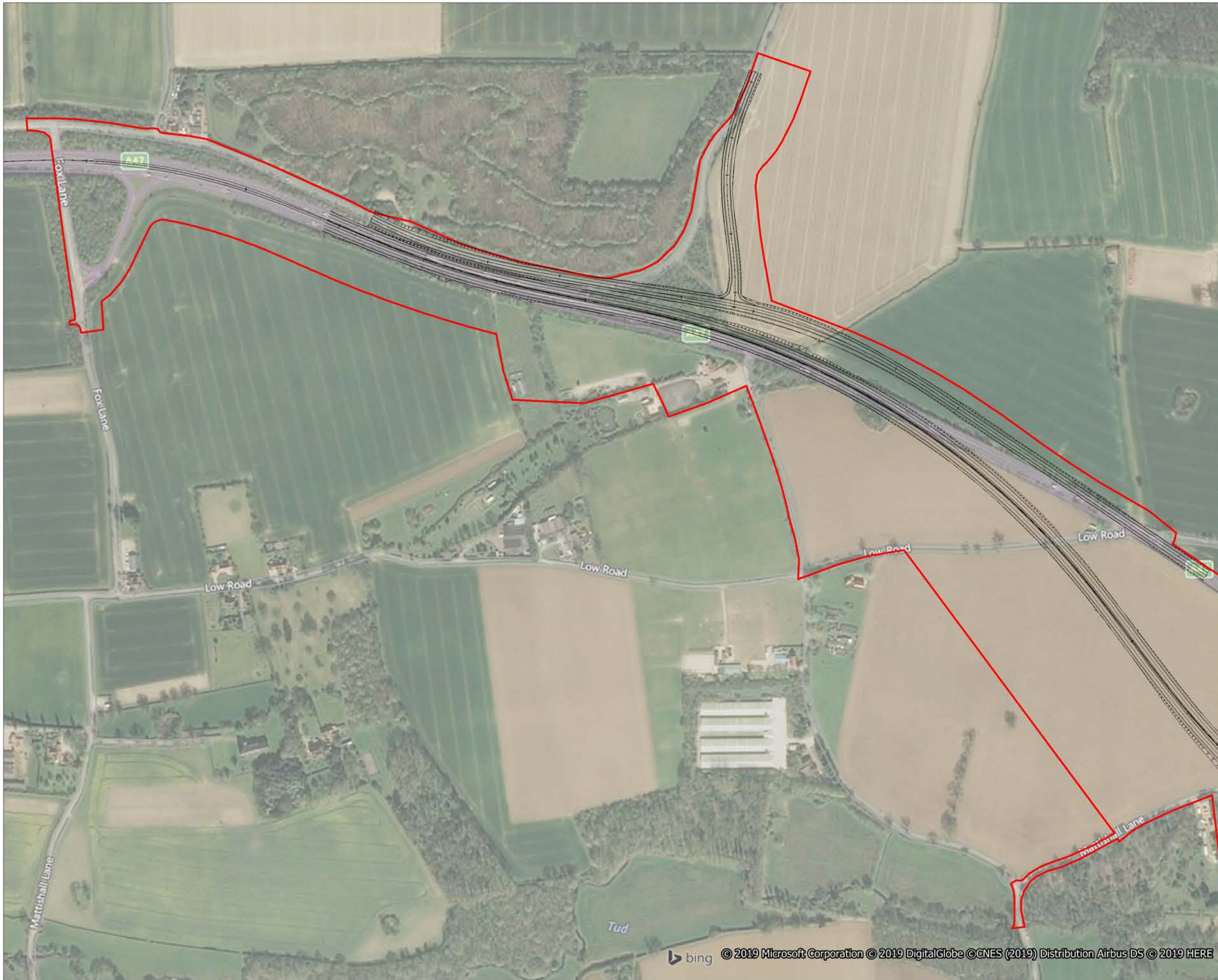
A47 Improvements



Figure 2
Proposed Scheme
Map 1 of 7



Contains Ordnance Survey data © Crown copyright and database right 2019
Proposed scheme layout provided by client Dec 2019



Site boundary

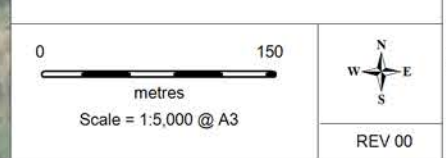


Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

A47 Improvements




Figure 2
Proposed Scheme
Map 2 of 7



Contains Ordnance Survey data © Crown copyright and database right 2019
Proposed scheme layout provided by client Dec 2019



 Site boundary

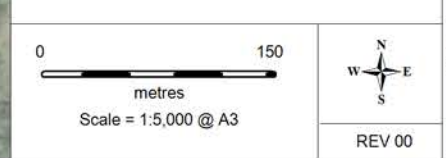


Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

A47 Improvements




Figure 2
Proposed Scheme
Map 3 of 7



Contains Ordnance Survey data © Crown copyright and database right 2019
Proposed scheme layout provided by client Dec 2019



 Site boundary

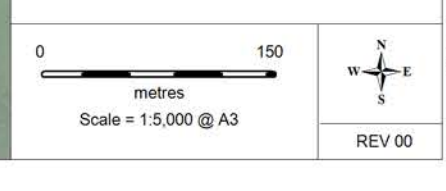


Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

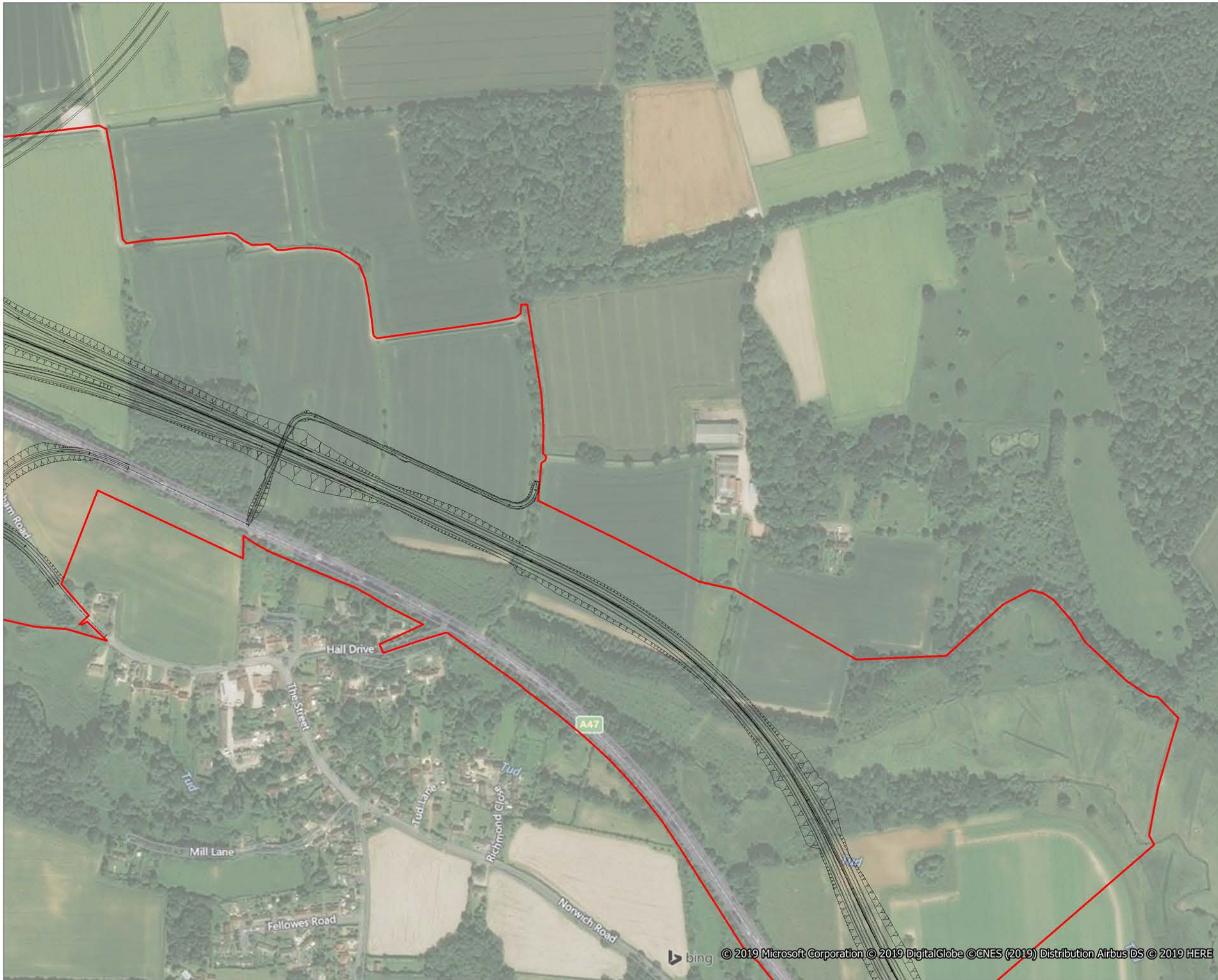
A47 Improvements




Figure 2
Proposed Scheme
Map 4 of 7



Contains Ordnance Survey data © Crown copyright and database right 2019
Proposed scheme layout provided by client Dec 2019



 Site boundary

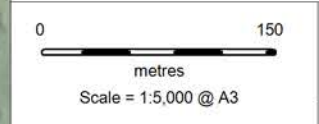


Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

A47 Improvements




Figure 2
Proposed Scheme
Map 5 of 7



REV 00

Contains Ordnance Survey data © Crown copyright and database right 2019
Proposed scheme layout provided by client Dec 2019



 Site boundary

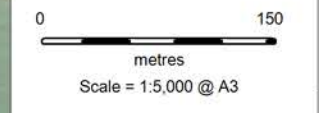


Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

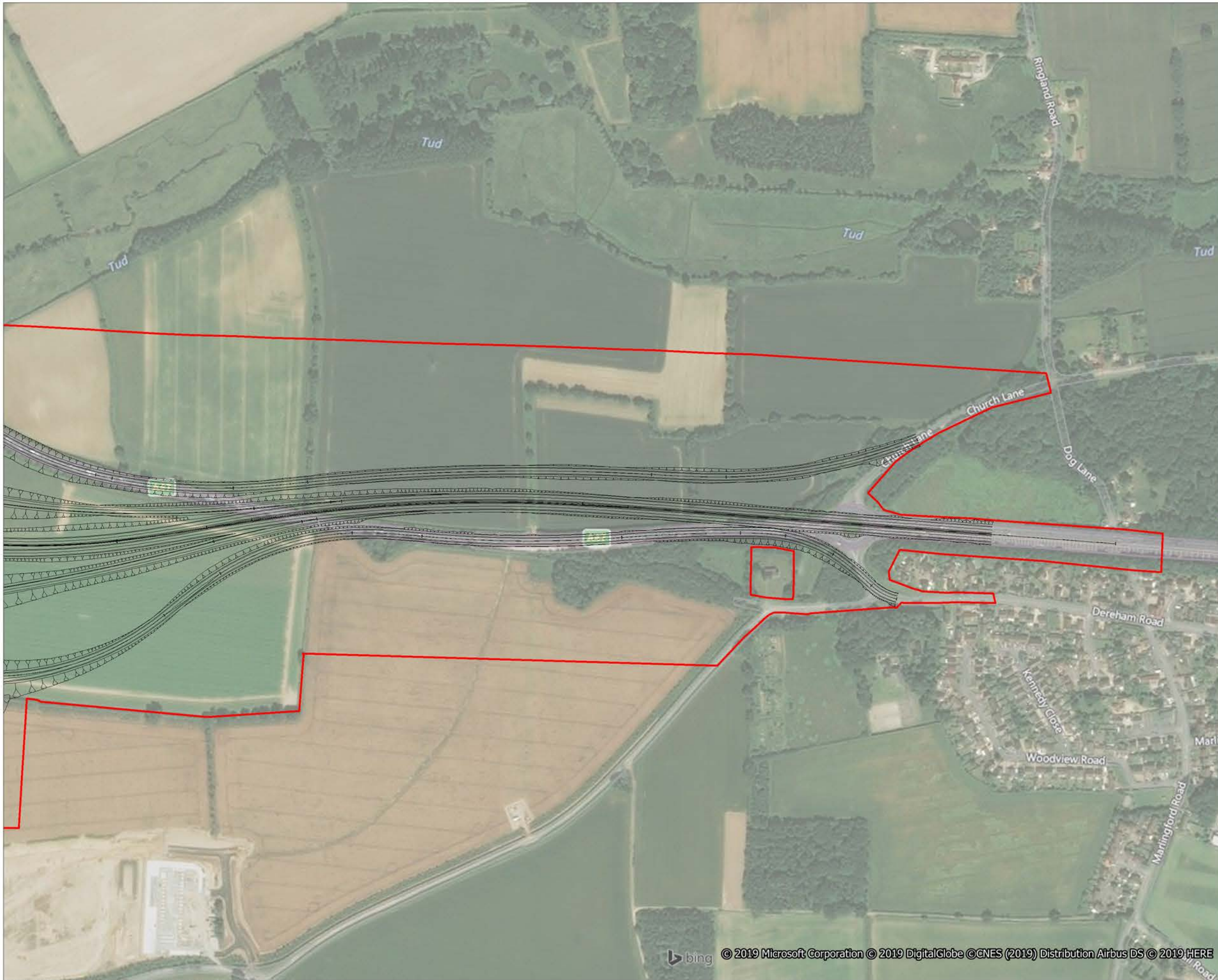
A47 Improvements




Figure 2
Proposed Scheme
Map 6 of 7



REV 00



 Site boundary

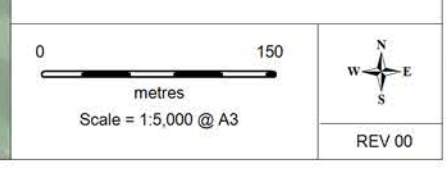


Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

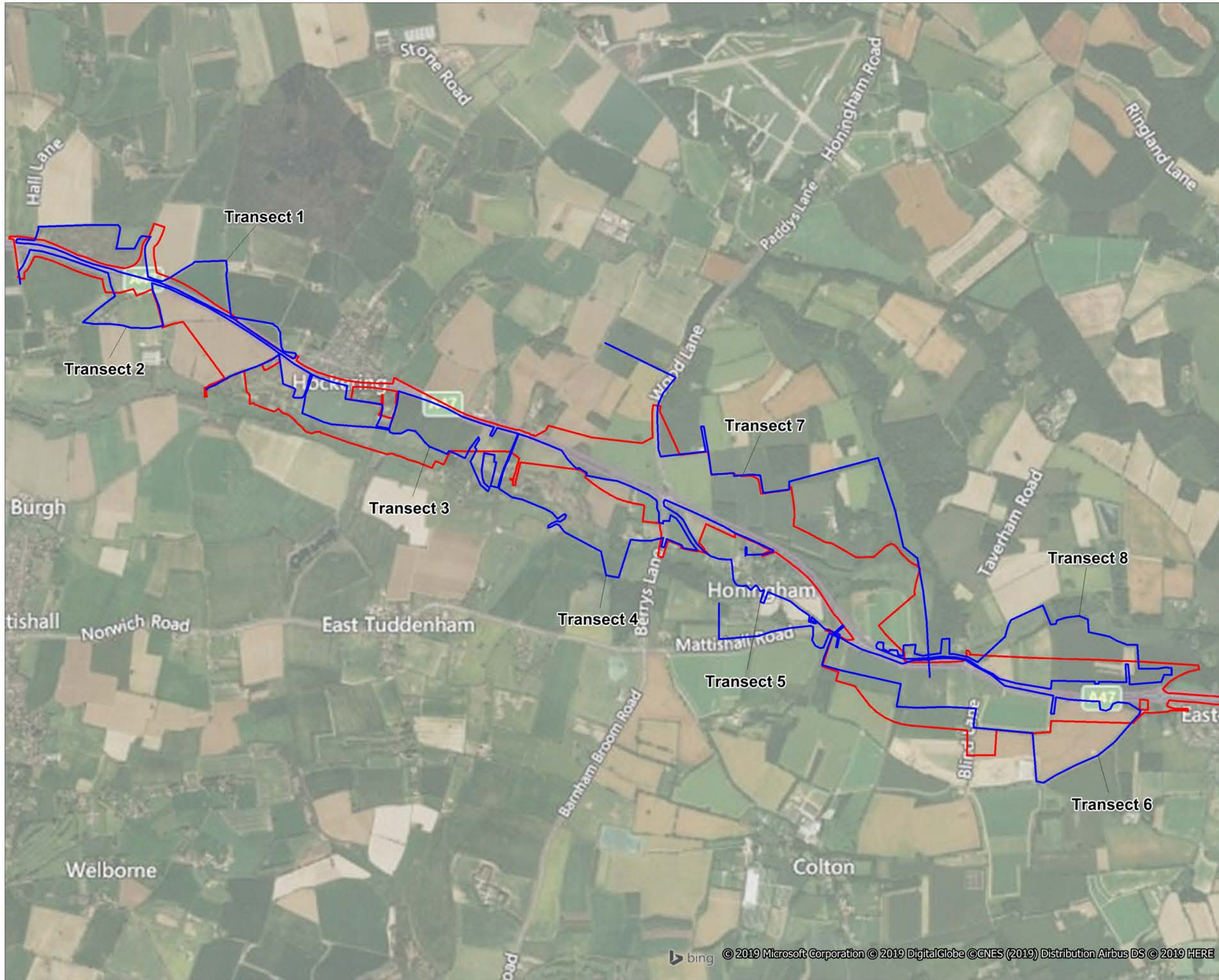
A47 Improvements



Figure 2
Proposed Scheme
Map 7 of 7



Contains Ordnance Survey data © Crown copyright and database right 2019
Proposed scheme layout provided by client Dec 2019



- Site boundary
- Bat transect

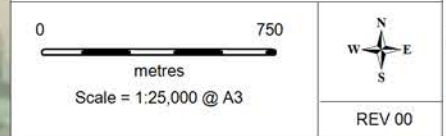


Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

A47 Improvements



Figure 3
Bat Transect Locations



Contains Ordnance Survey data © Crown copyright and database right 2019



- Site boundary
- Static bat detector locations

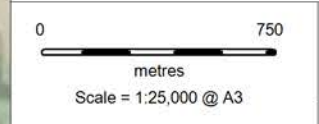


Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

A47 Improvements

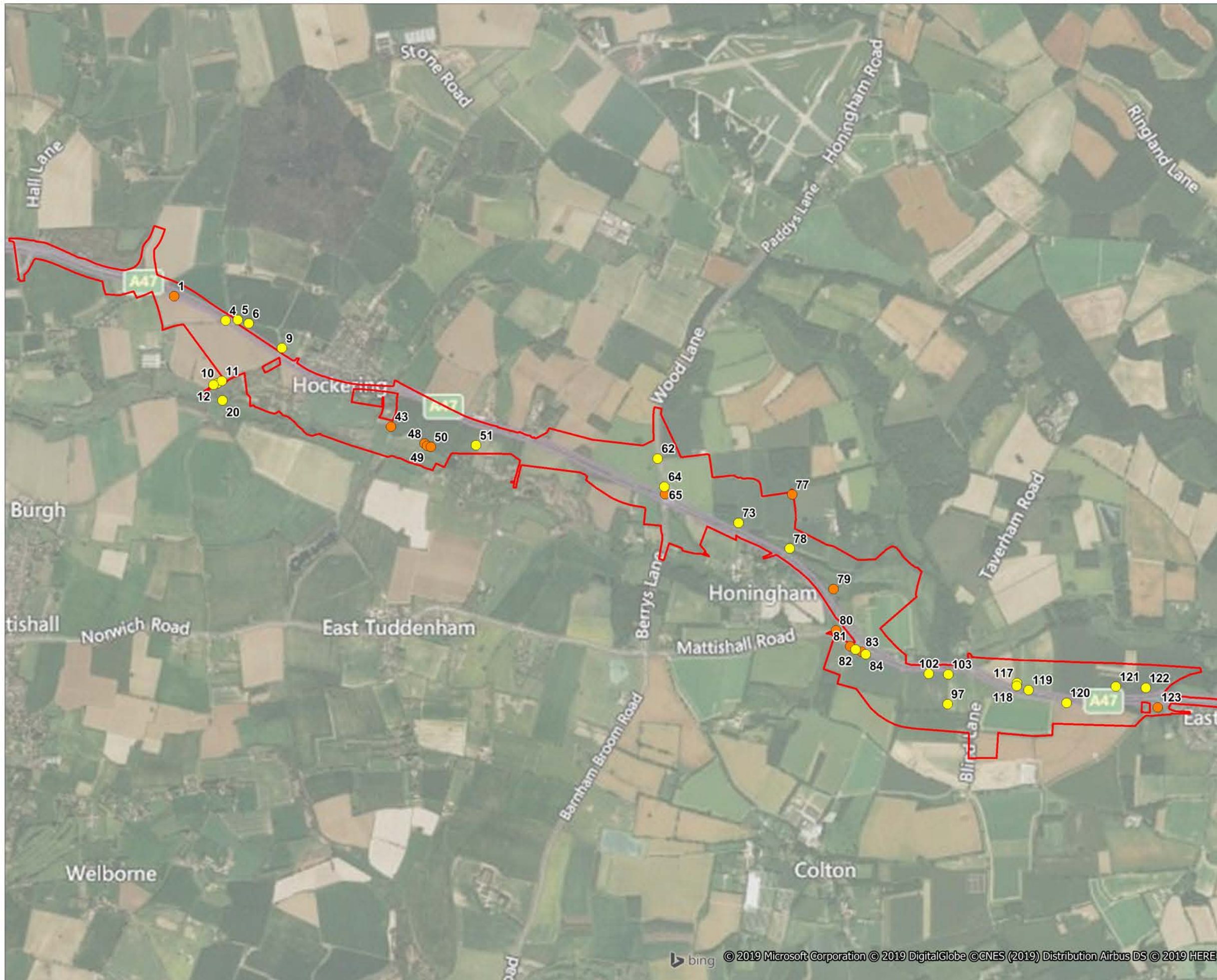


Figure 4
Static Bat Detector Locations



REV 00

Contains Ordnance Survey data © Crown copyright and database right 2019



- Site boundary
- Tree with high bat roost potential
- Tree with moderate bat roost potential

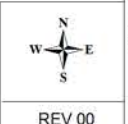
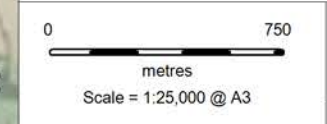


Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

A47 Improvements



Figure 5
Trees with Moderate and High Bat Roosting Potential



- Site boundary
- Tree with confirmed bat roost

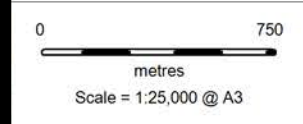


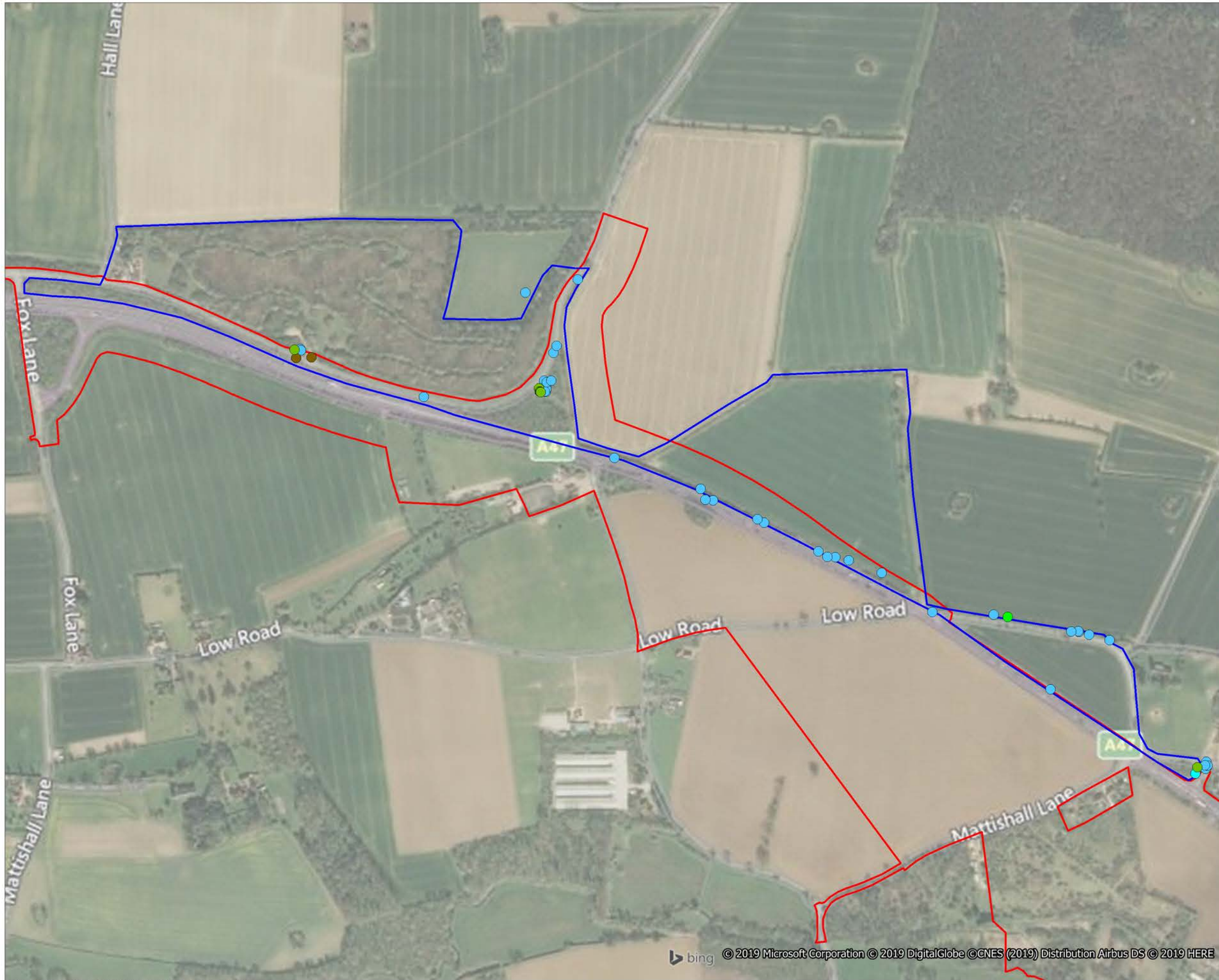
Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

A47 Improvements



Figure 6
Trees with Confirmed Bat Roosts





- Site boundary
 - Bat transect route
- Bat Species**
- Barbastelle bat
 - Serotine bat
 - Daubenton's bat
 - Natterer's bat
 - Myotis bat species
 - Leisler's bat
 - Noctule bat
 - Nyctalus bat species
 - Nathusius's Pipistrelle bat
 - Common Pipistrelle bat
 - Soprano Pipistrelle bat
 - Pipistrelle bat species
 - Brown Long-eared bat

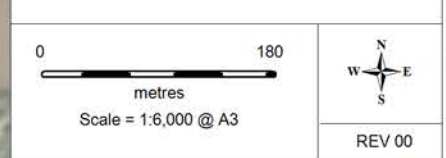


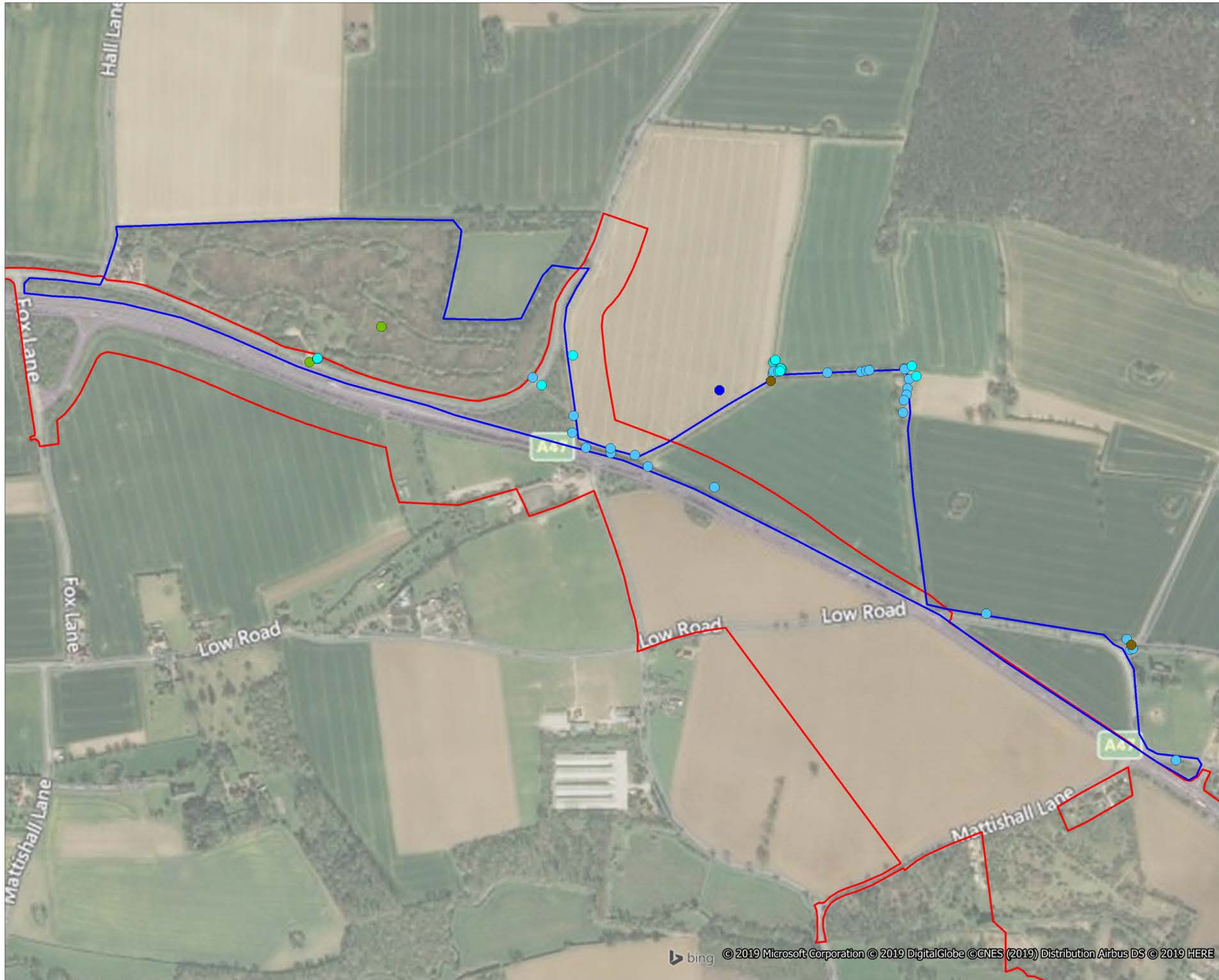
Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

A47 Improvements



Figure 7
Transect 1 - 4th July 2019
Map 1 of 8





- Site boundary
 - Bat transect route
- Bat Species**
- Barbastelle bat
 - Serotine bat
 - Daubenton's bat
 - Natterer's bat
 - Myotic bat species
 - Leisler's bat
 - Noctule bat
 - Nyctalus bat species
 - Nathusius's Pipistrelle bat
 - Common Pipistrelle bat
 - Soprano Pipistrelle bat
 - Pipistrelle bat species
 - Brown Long-eared bat

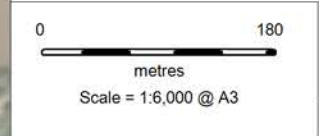


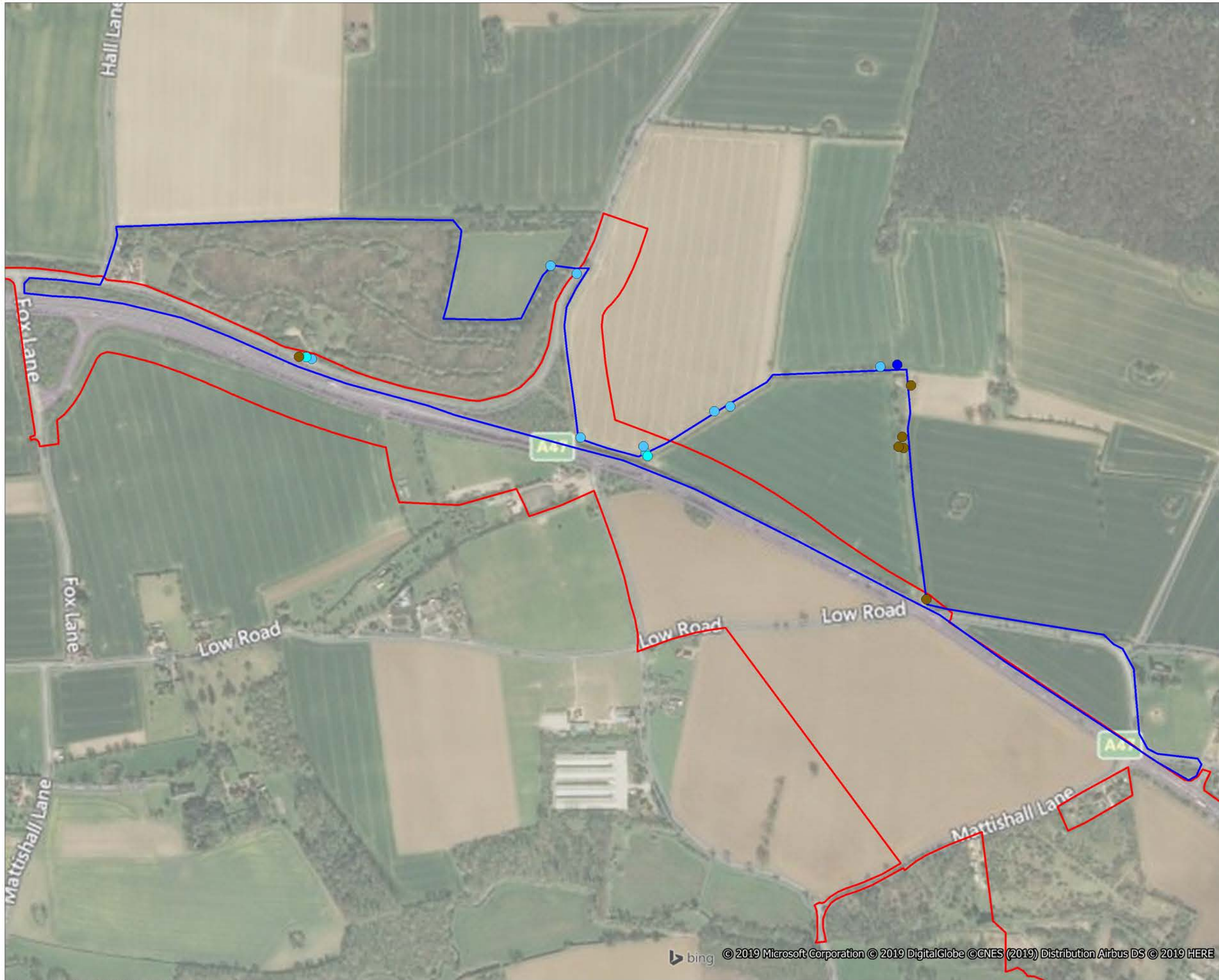
Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

A47 Improvements



Figure 7
Transect 1 - 31st July 2019
Map 2 of 8





- Site boundary
 - Bat transect route
- Bat Species**
- Barbastelle bat
 - Serotine bat
 - Daubenton's bat
 - Natterer's bat
 - Myotis bat species
 - Leisler's bat
 - Noctule bat
 - Nyctalus bat species
 - Nathusius's Pipistrelle bat
 - Common Pipistrelle bat
 - Soprano Pipistrelle bat
 - Pipistrelle bat species
 - Brown Long-eared bat

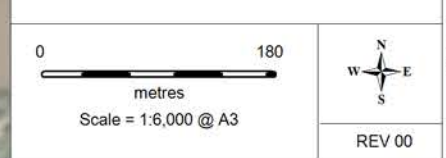


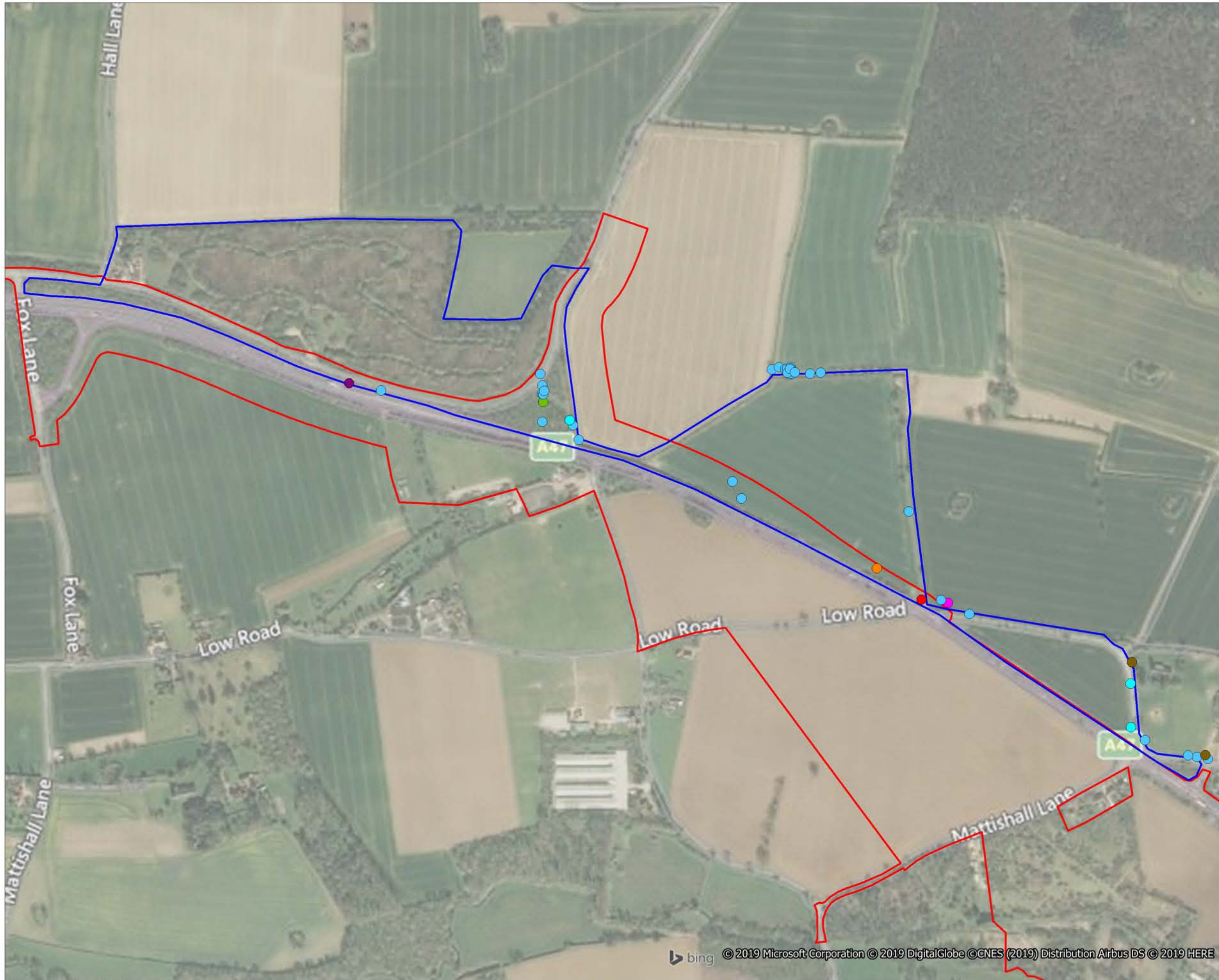
Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

A47 Improvements



Figure 7
Transect 1 - 12th August 2019
Map 3 of 8





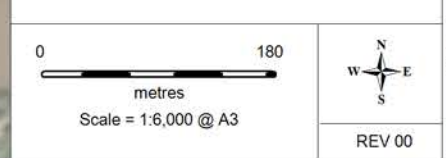
- Site boundary
 - Bat transect route
- Bat Species**
- Barbastelle bat
 - Serotine bat
 - Daubenton's bat
 - Natterer's bat
 - Myotic bat species
 - Leisler's bat
 - Noctule bat
 - Nyctalus bat species
 - Nathusius's Pipistrelle bat
 - Common Pipistrelle bat
 - Soprano Pipistrelle bat
 - Pipistrelle bat species
 - Brown Long-eared bat

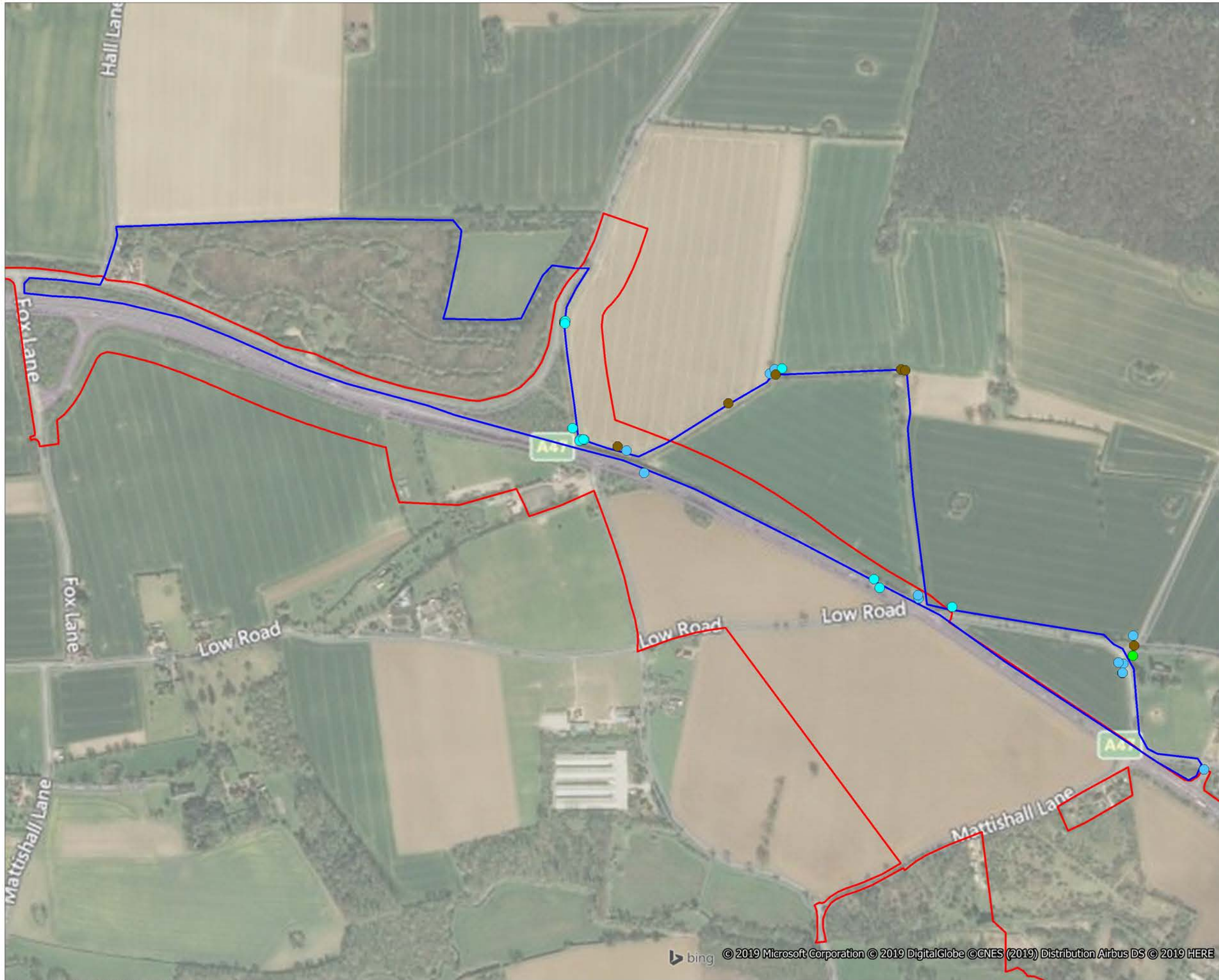


Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

A47 Improvements

Figure 7
 Transect 1 - 20th August 2019
 Map 4 of 8





- Site boundary
 - Bat transect route
- Bat Species**
- Barbastelle bat
 - Serotine bat
 - Daubenton's bat
 - Natterer's bat
 - Myotis bat species
 - Leisler's bat
 - Noctule bat
 - Nyctalus bat species
 - Nathusius's Pipistrelle bat
 - Common Pipistrelle bat
 - Soprano Pipistrelle bat
 - Pipistrelle bat species
 - Brown Long-eared bat



Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

A47 Improvements

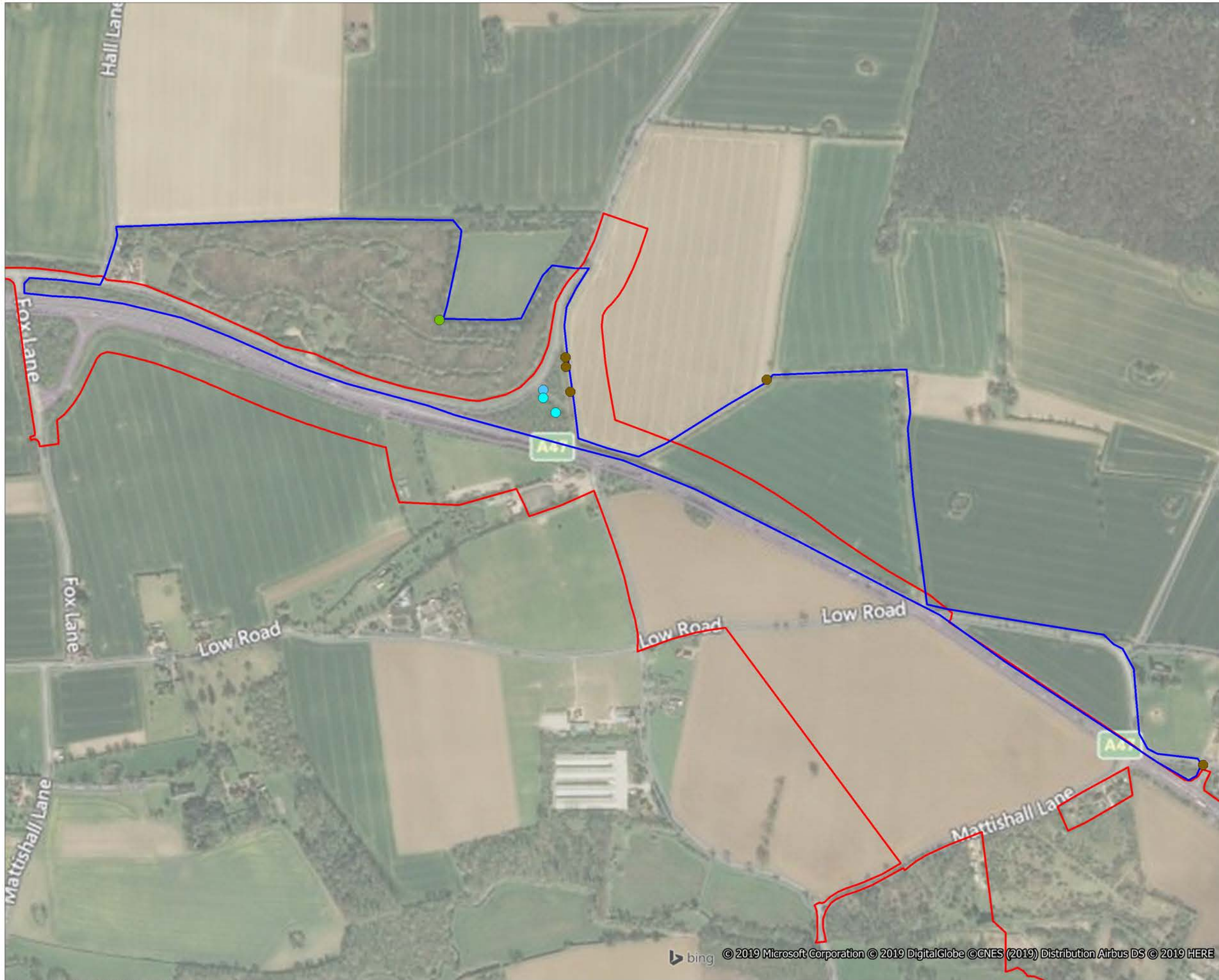
Figure 7
 Transect 1 - 3rd September 2019
 Map 5 of 8

0 180

metres

Scale = 1:6,000 @ A3

REV 00



- Site boundary
 - Bat transect route
- Bat Species**
- Barbastelle bat
 - Serotine bat
 - Daubenton's bat
 - Natterer's bat
 - Myotic bat species
 - Leisler's bat
 - Noctule bat
 - Nyctalus bat species
 - Nathusius's Pipistrelle bat
 - Common Pipistrelle bat
 - Soprano Pipistrelle bat
 - Pipistrelle bat species
 - Brown Long-eared bat

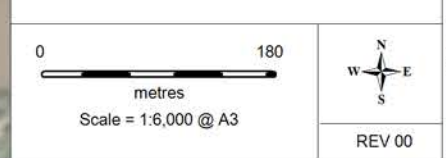


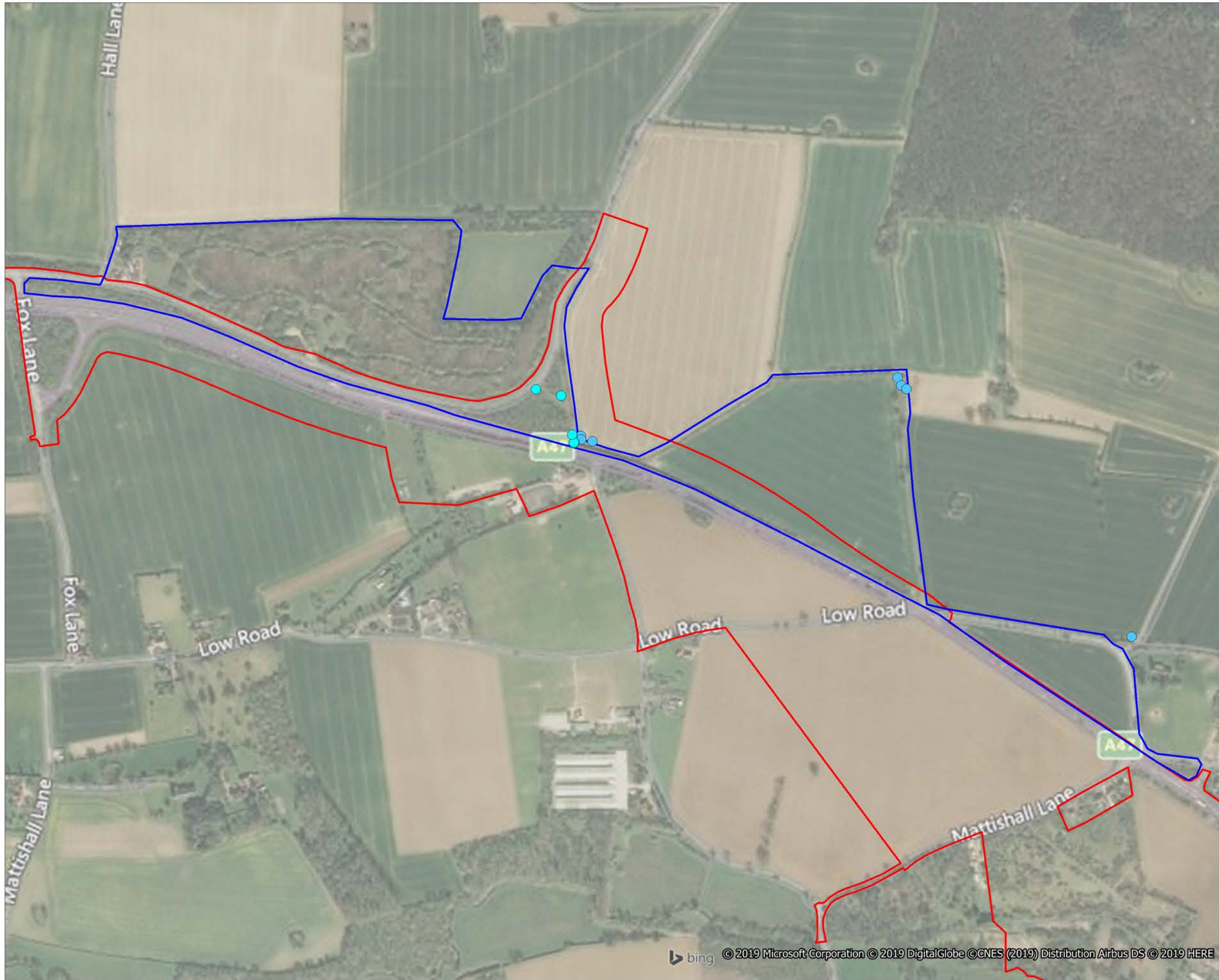
Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

A47 Improvements



Figure 7
Transect 1 - 16th September 2019
Map 6 of 8





- Site boundary
 - Bat transect route
- Bat Species**
- Barbastelle bat
 - Serotine bat
 - Daubenton's bat
 - Natterer's bat
 - Myotis bat species
 - Leisler's bat
 - Noctule bat
 - Nyctalus bat species
 - Nathusius's Pipistrelle bat
 - Common Pipistrelle bat
 - Soprano Pipistrelle bat
 - Pipistrelle bat species
 - Brown Long-eared bat

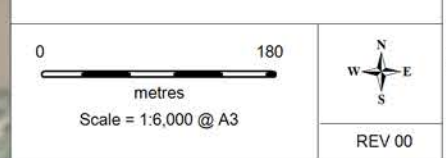


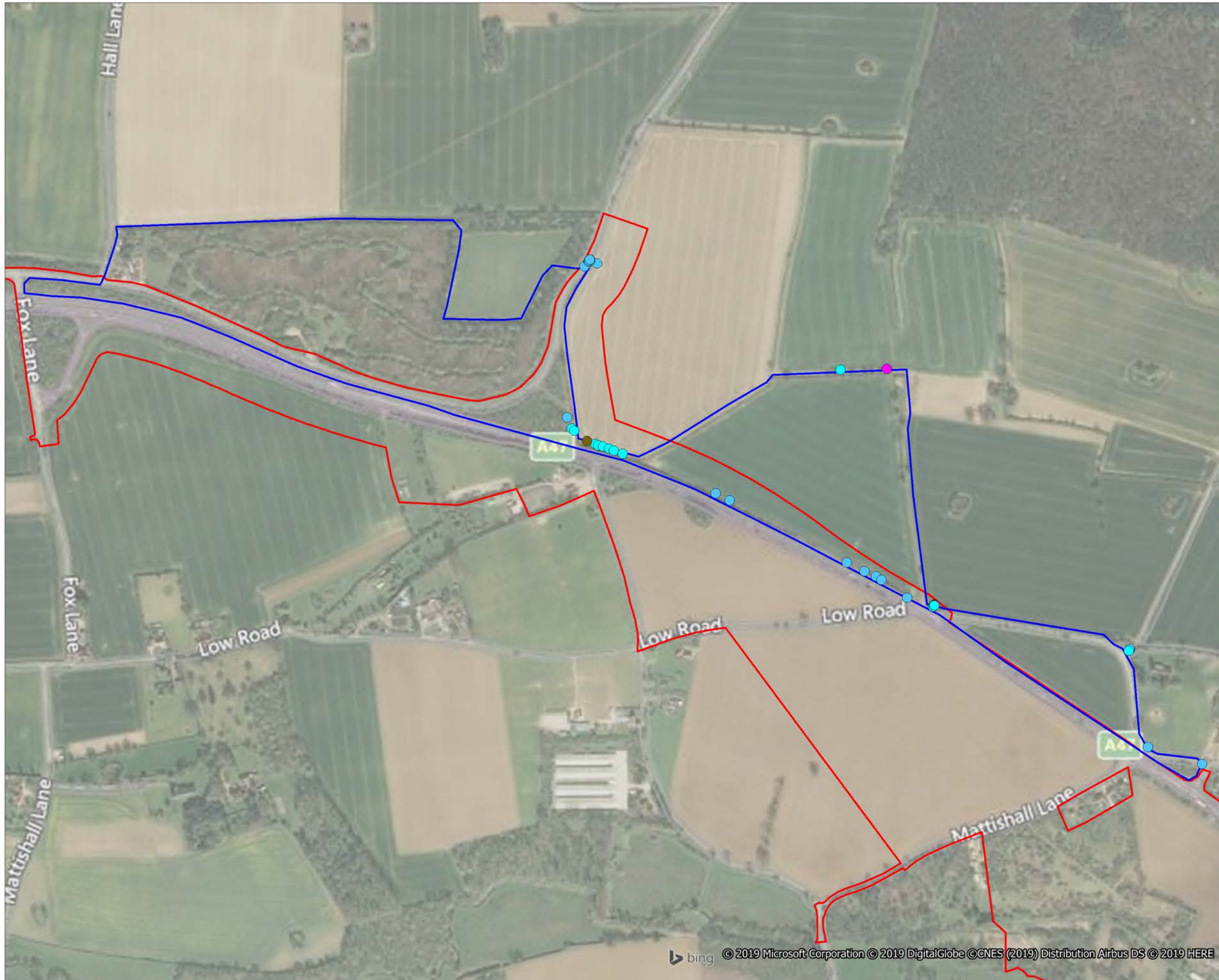
Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

A47 Improvements



Figure 7
Transect 1 - 8th October 2019
Map 7 of 8





- Site boundary
 - Bat transect route
- Bat Species**
- Barbastelle bat
 - Serotine bat
 - Daubenton's bat
 - Natterer's bat
 - Myotis bat species
 - Leisler's bat
 - Noctule bat
 - Nyctalus bat species
 - Nathusius's Pipistrelle bat
 - Common Pipistrelle bat
 - Soprano Pipistrelle bat
 - Pipistrelle bat species
 - Brown Long-eared bat

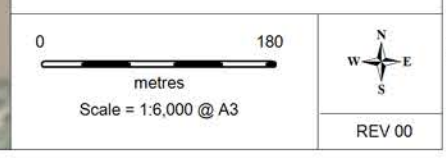


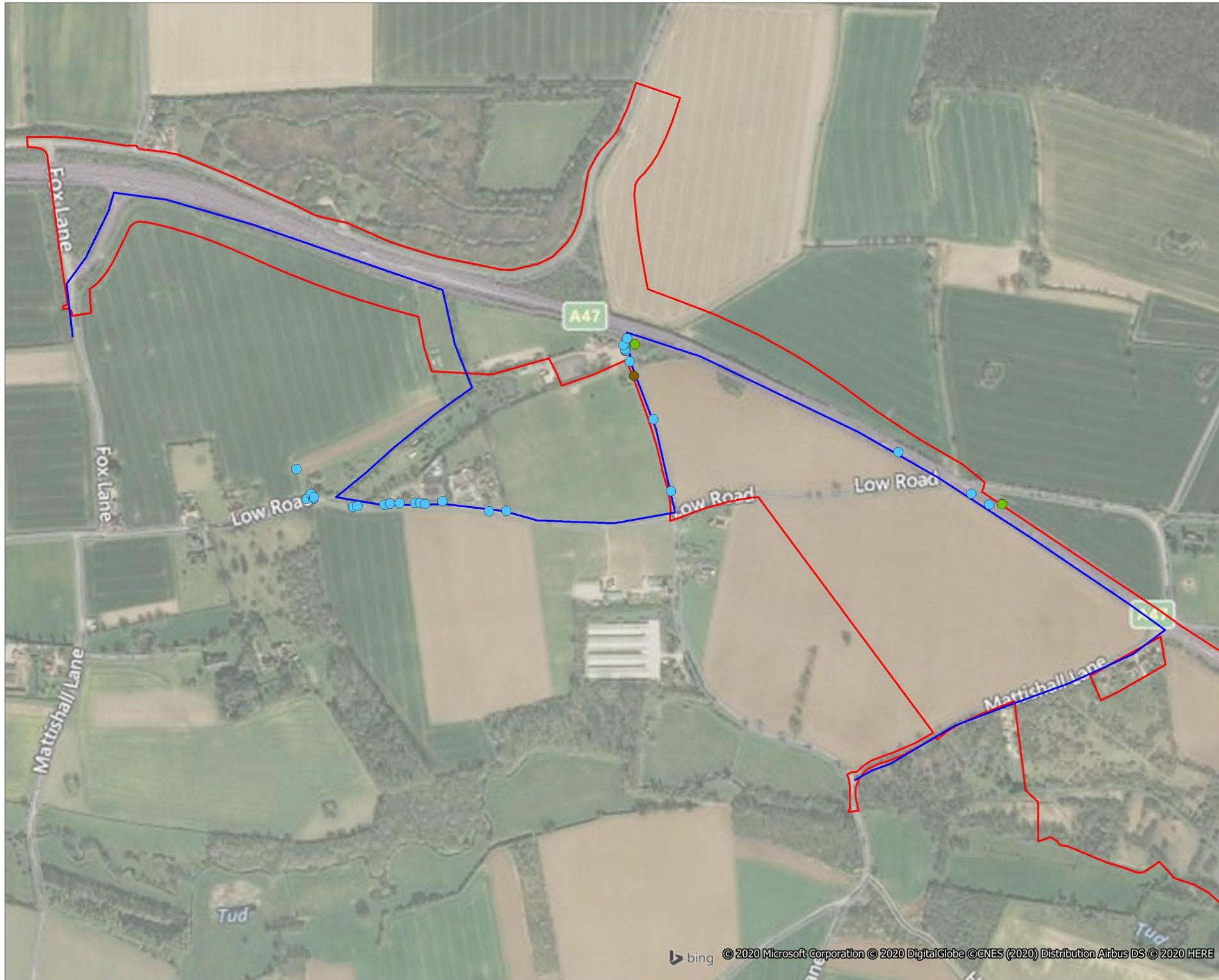
Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

A47 Improvements



Figure 7
Transect 1 - 15th October 2019
Map 8 of 8





- Site boundary
 - Bat transect route
- Bat Species**
- Barbastelle bat
 - Serotine bat
 - Daubenton's bat
 - Natterer's bat
 - Myotis bat species
 - Leisler's bat
 - Noctule bat
 - Nyctalus bat species
 - Nathusius's Pipistrelle bat
 - Common Pipistrelle bat
 - Soprano Pipistrelle bat
 - Pipistrelle bat species
 - Brown Long-eared bat

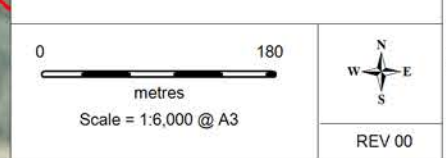


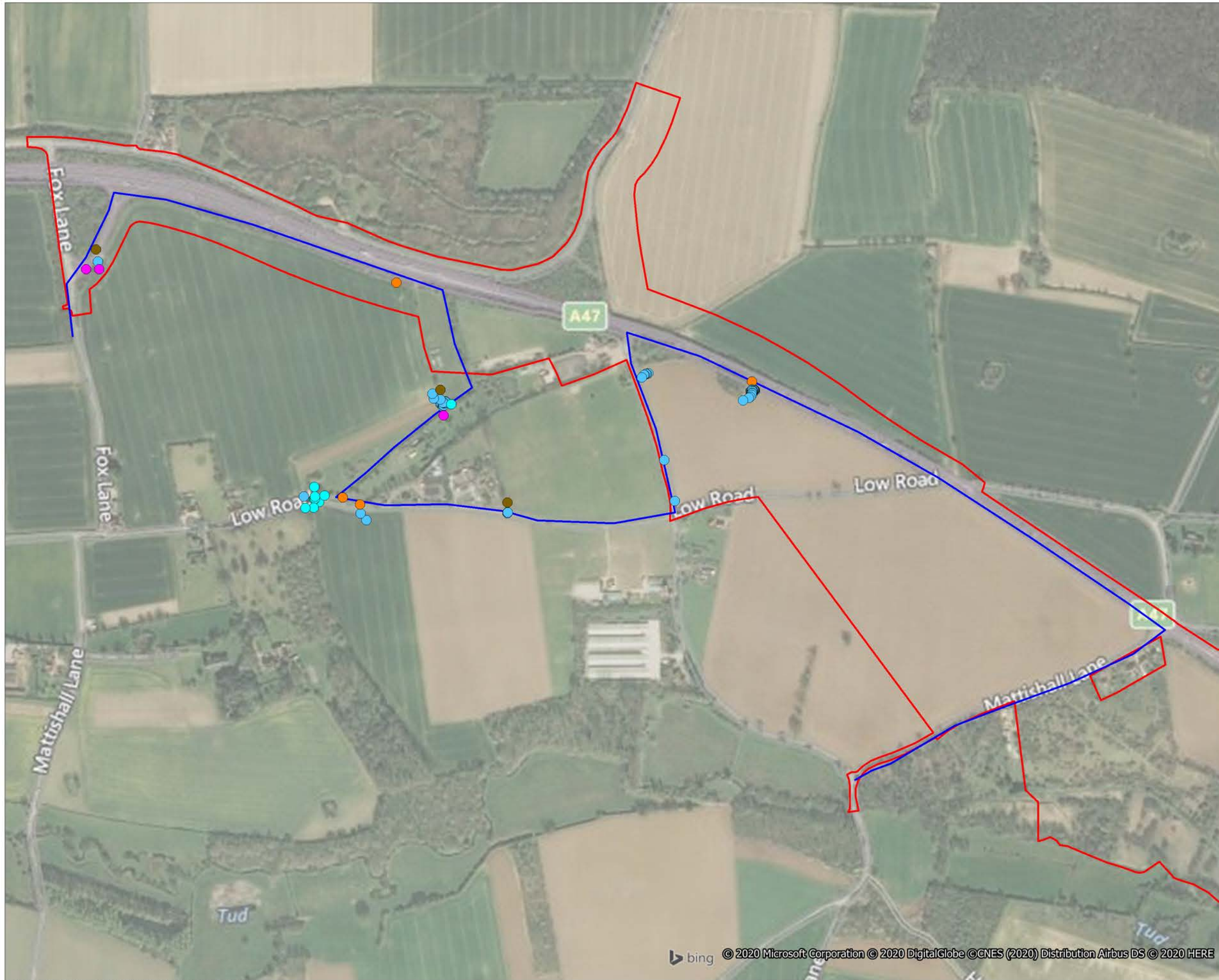
Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

A47 Improvements



Figure 8
Transect 2 - 3rd July 2019
Map 1 of 8





- Site boundary
 - Bat transect route
- Bat Species**
- Barbastelle bat
 - Serotine bat
 - Daubenton's bat
 - Natterer's bat
 - Myotis bat species
 - Leisler's bat
 - Noctule bat
 - Nyctalus bat species
 - Nathusius's Pipistrelle bat
 - Common Pipistrelle bat
 - Soprano Pipistrelle bat
 - Pipistrelle bat species
 - Brown Long-eared bat

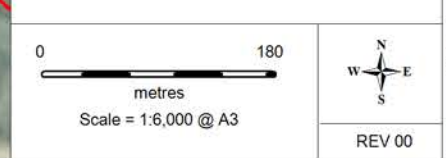


Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

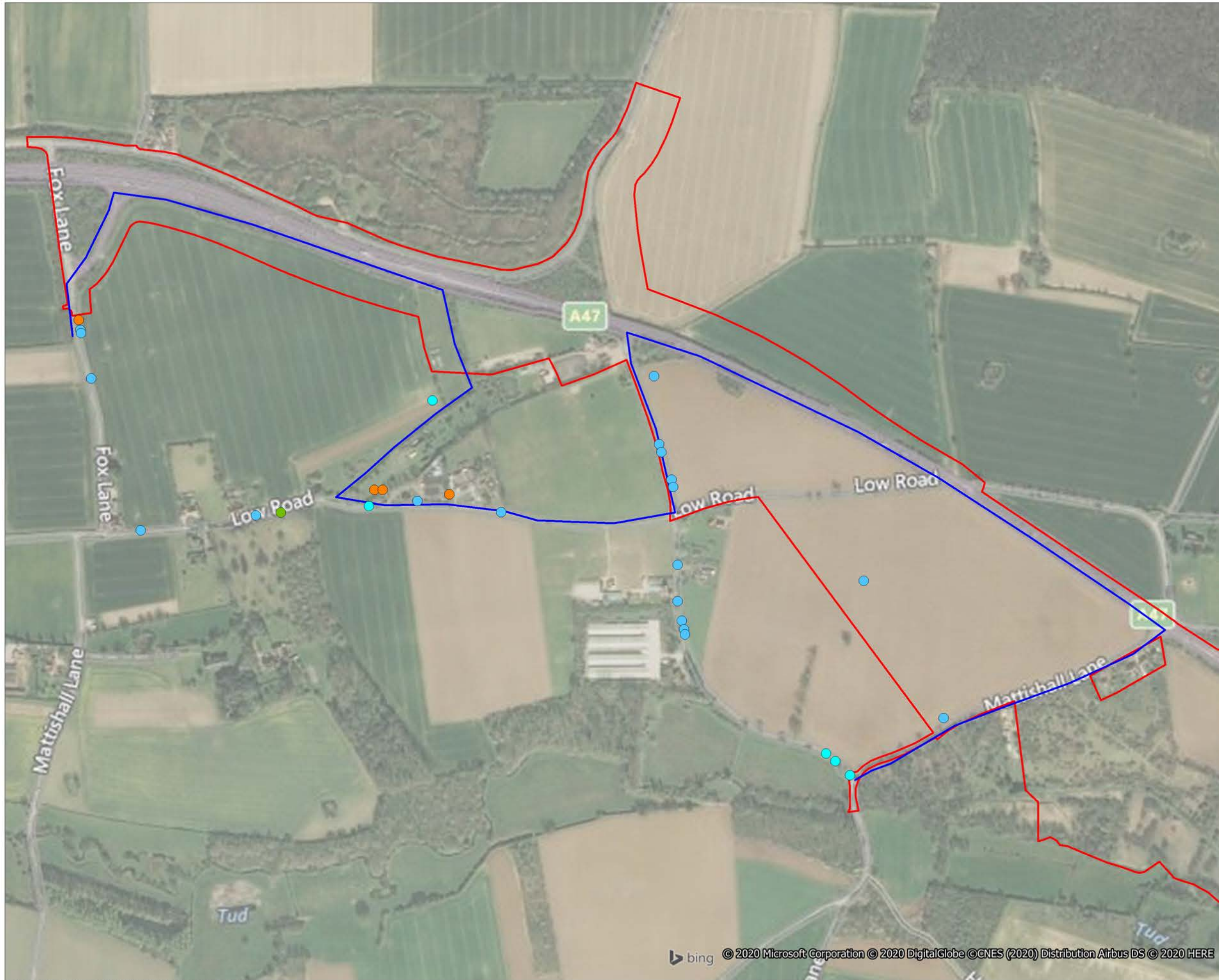
A47 Improvements



Figure 8
Transect 2 - 31st July 2019
Map 2 of 8



Contains Ordnance Survey data © Crown copyright and database right 2019



- Site boundary
 - Bat transect route
- Bat Species**
- Barbastelle bat
 - Serotine bat
 - Daubenton's bat
 - Natterer's bat
 - Myotic bat species
 - Leisler's bat
 - Noctule bat
 - Nyctalus bat species
 - Nathusius's Pipistrelle bat
 - Common Pipistrelle bat
 - Soprano Pipistrelle bat
 - Pipistrelle bat species
 - Brown Long-eared bat

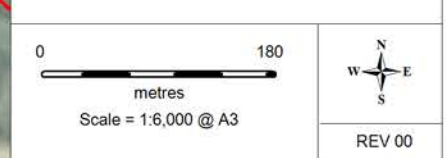


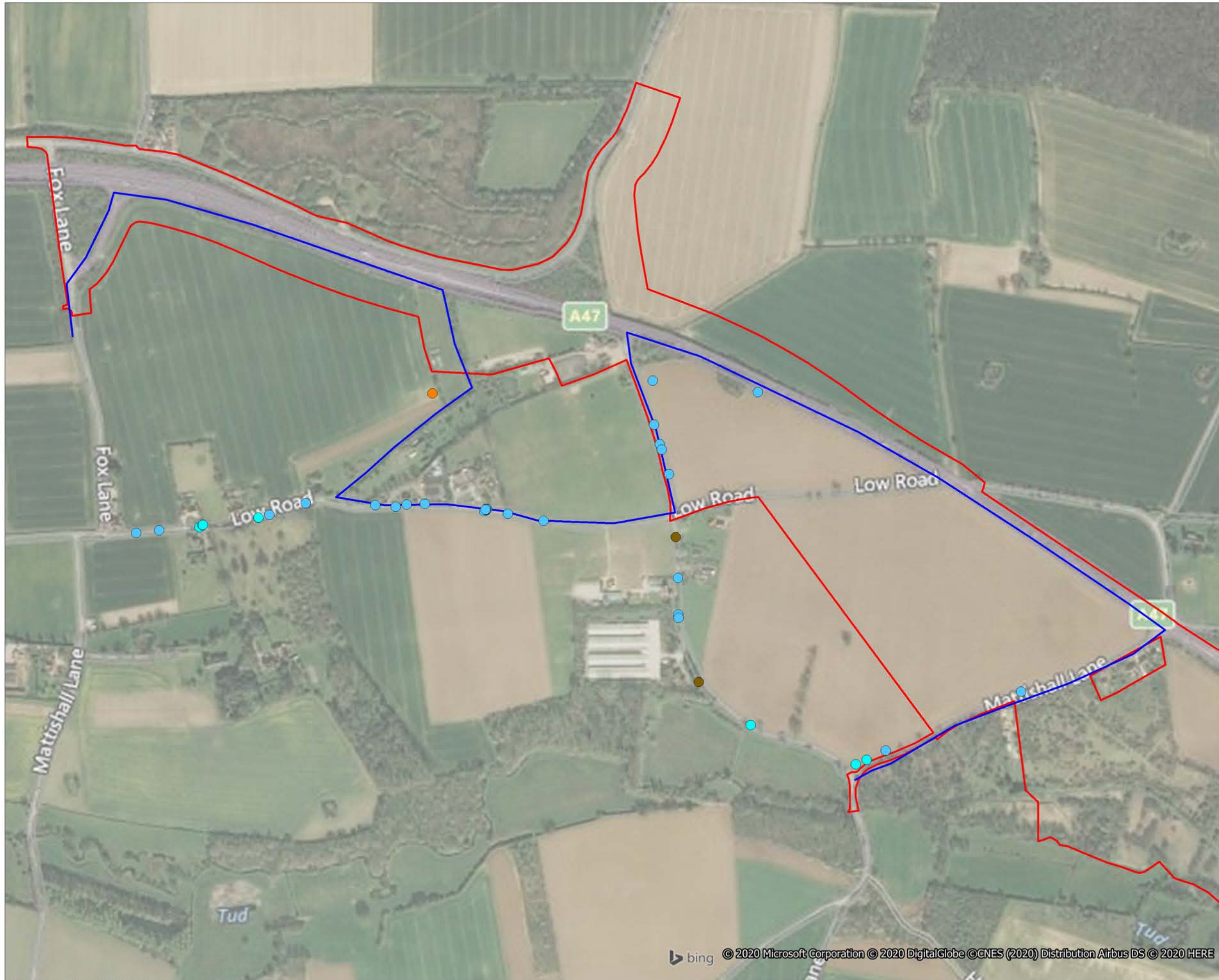
Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

A47 Improvements



Figure 8
Transect 2 - 12th August 2019
Map 3 of 8





- Site boundary
 - Bat transect route
- Bat Species**
- Barbastelle bat
 - Serotine bat
 - Daubenton's bat
 - Natterer's bat
 - Myotic bat species
 - Leisler's bat
 - Noctule bat
 - Nyctalus bat species
 - Nathusius's Pipistrelle bat
 - Common Pipistrelle bat
 - Soprano Pipistrelle bat
 - Pipistrelle bat species
 - Brown Long-eared bat

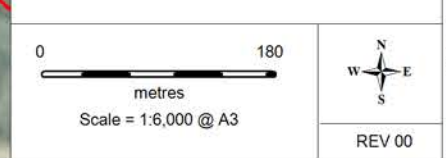


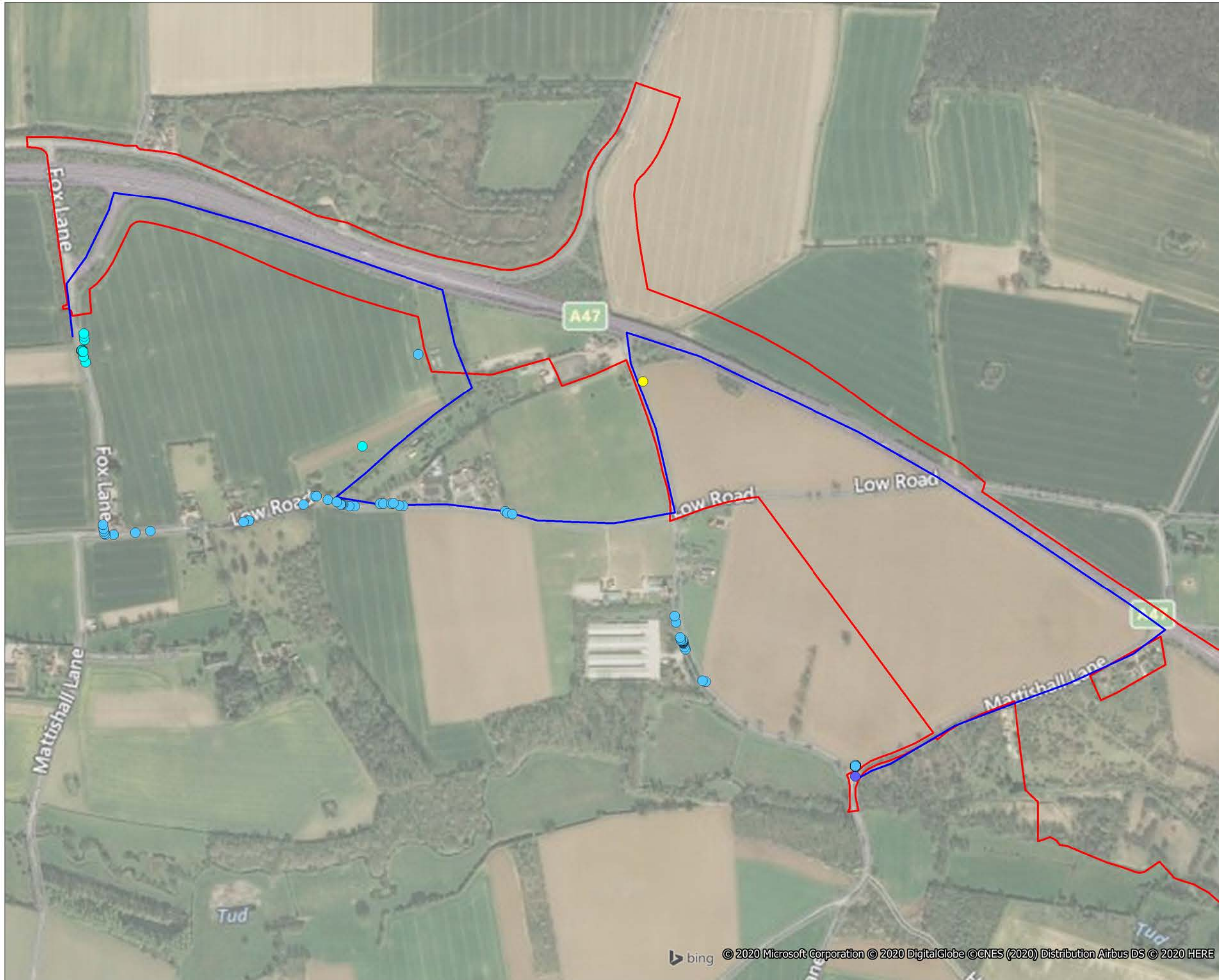
Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

A47 Improvements



Figure 8
Transect 2 - 20th August 2019
Map 4 of 8





- Site boundary
 - Bat transect route
- Bat Species**
- Barbastelle bat
 - Serotine bat
 - Daubenton's bat
 - Natterer's bat
 - Myotis bat species
 - Leisler's bat
 - Noctule bat
 - Nyctalus bat species
 - Nathusius's Pipistrelle bat
 - Common Pipistrelle bat
 - Soprano Pipistrelle bat
 - Pipistrelle bat species
 - Brown Long-eared bat

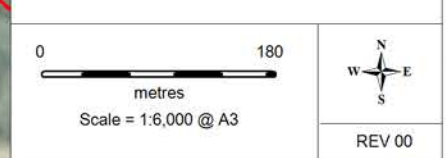


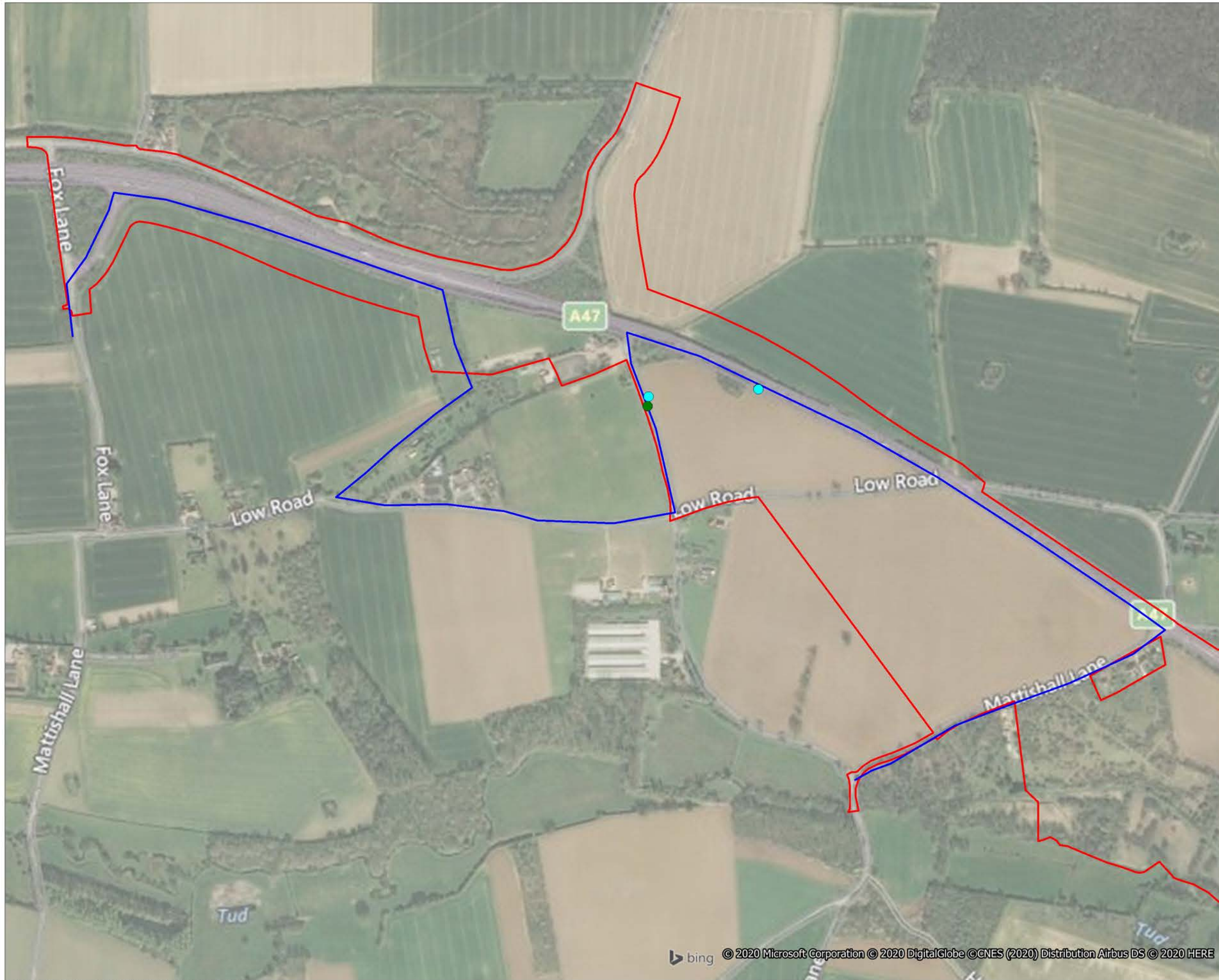
Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

A47 Improvements



Figure 8
Transect 2 - 3rd September 2019
Map 5 of 8





- Site boundary
 - Bat transect route
- Bat Species**
- Barbastelle bat
 - Serotine bat
 - Daubenton's bat
 - Natterer's bat
 - Myotis bat species
 - Leisler's bat
 - Noctule bat
 - Nyctalus bat species
 - Nathusius's Pipistrelle bat
 - Common Pipistrelle bat
 - Soprano Pipistrelle bat
 - Pipistrelle bat species
 - Brown Long-eared bat

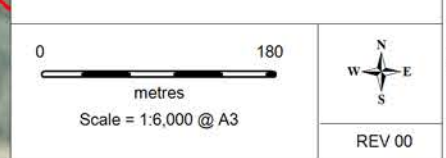


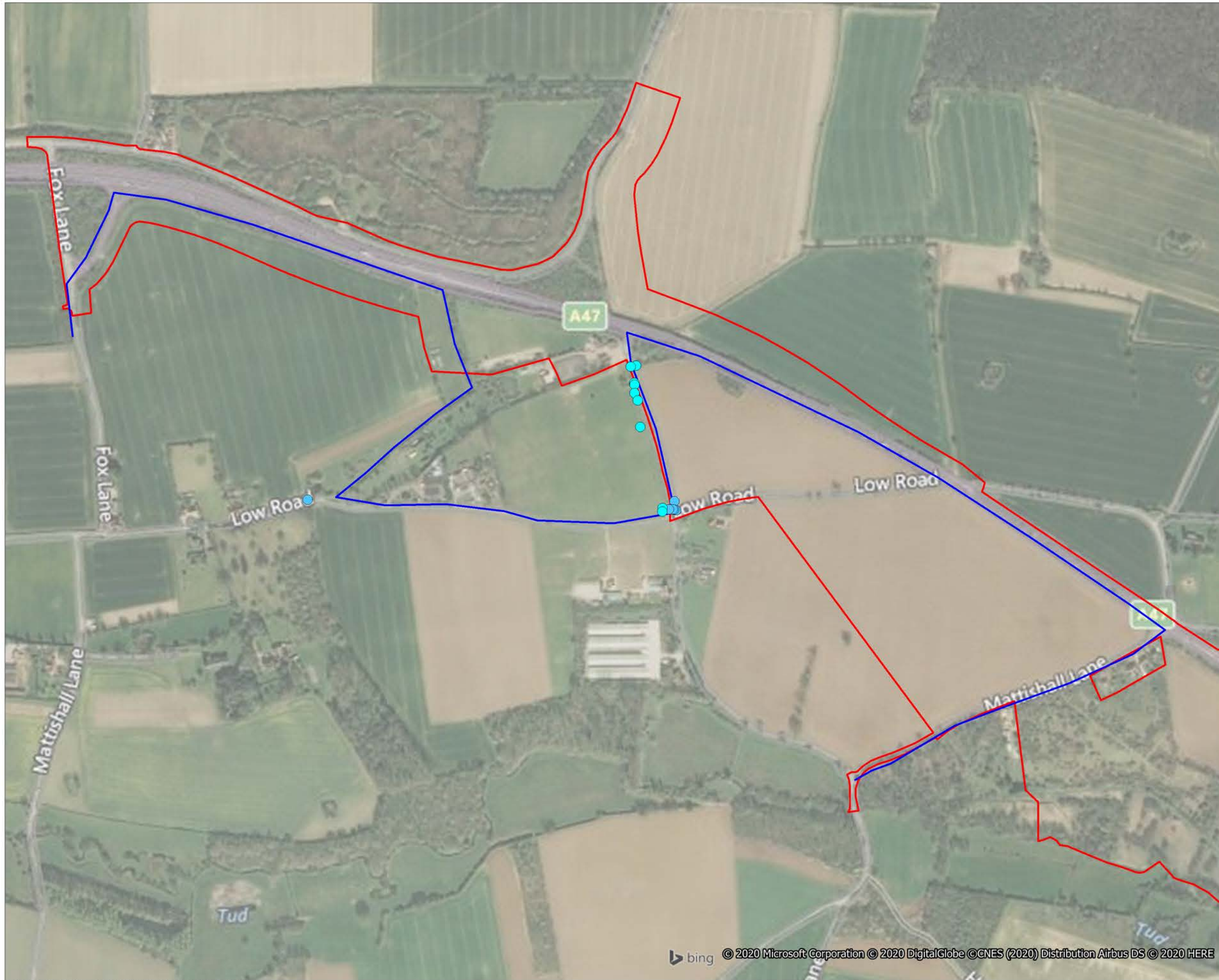
Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

A47 Improvements



Figure 8
Transect 2 - 16th September 2019
Map 6 of 8





- Site boundary
 - Bat transect route
- Bat Species**
- Barbastelle bat
 - Serotine bat
 - Daubenton's bat
 - Natterer's bat
 - Myotis bat species
 - Leisler's bat
 - Noctule bat
 - Nyctalus bat species
 - Nathusius's Pipistrelle bat
 - Common Pipistrelle bat
 - Soprano Pipistrelle bat
 - Pipistrelle bat species
 - Brown Long-eared bat

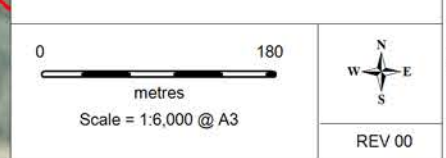


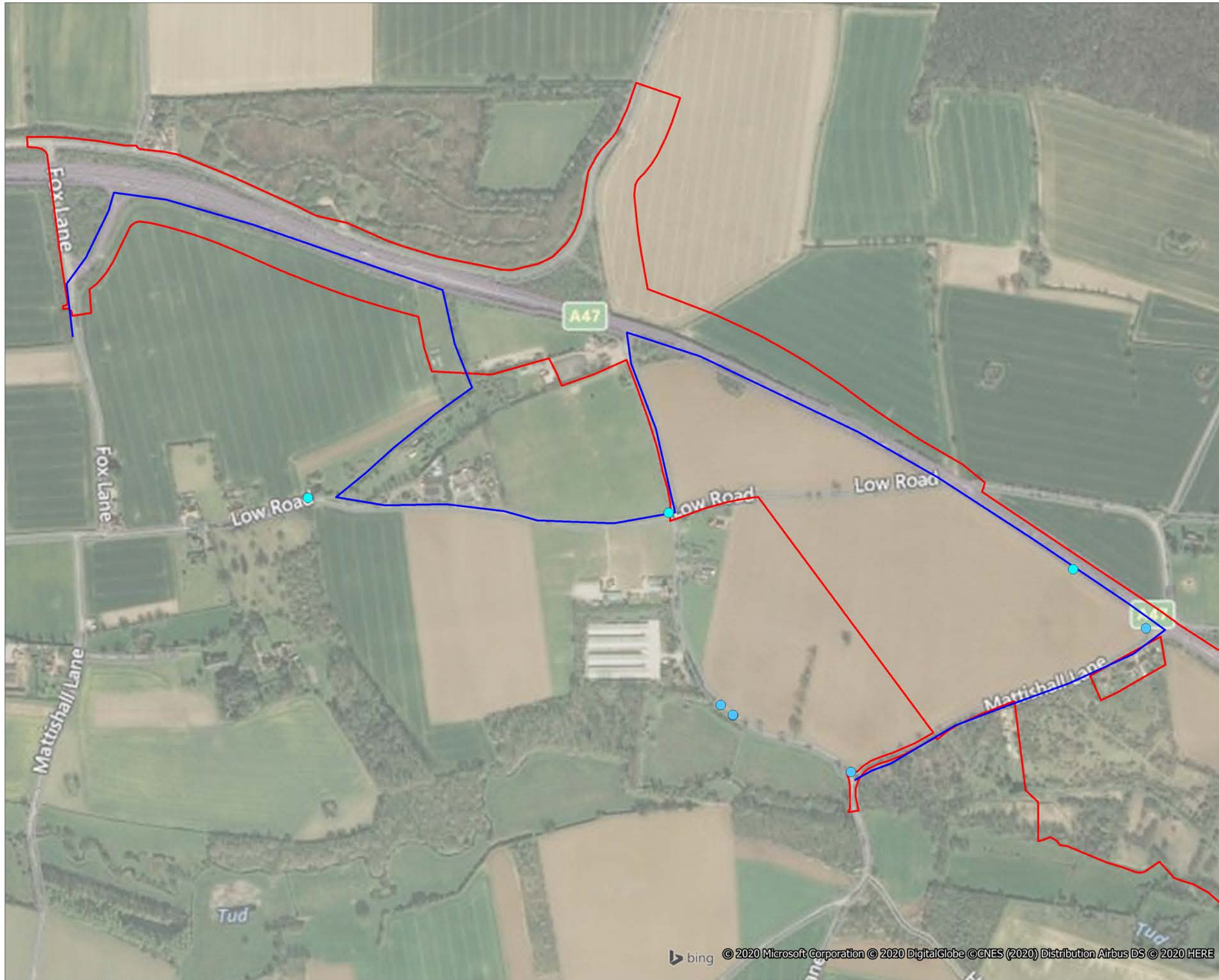
Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

A47 Improvements



Figure 8
Transect 2 - 9th October 2019
Map 7 of 8





- Site boundary
 - Bat transect route
- Bat Species**
- Barbastelle bat
 - Serotine bat
 - Daubenton's bat
 - Natterer's bat
 - Myotic bat species
 - Leisler's bat
 - Noctule bat
 - Nyctalus bat species
 - Nathusius's Pipistrelle bat
 - Common Pipistrelle bat
 - Soprano Pipistrelle bat
 - Pipistrelle bat species
 - Brown Long-eared bat

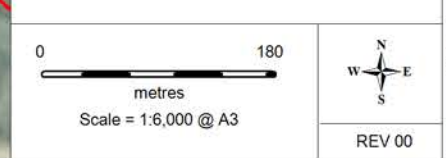


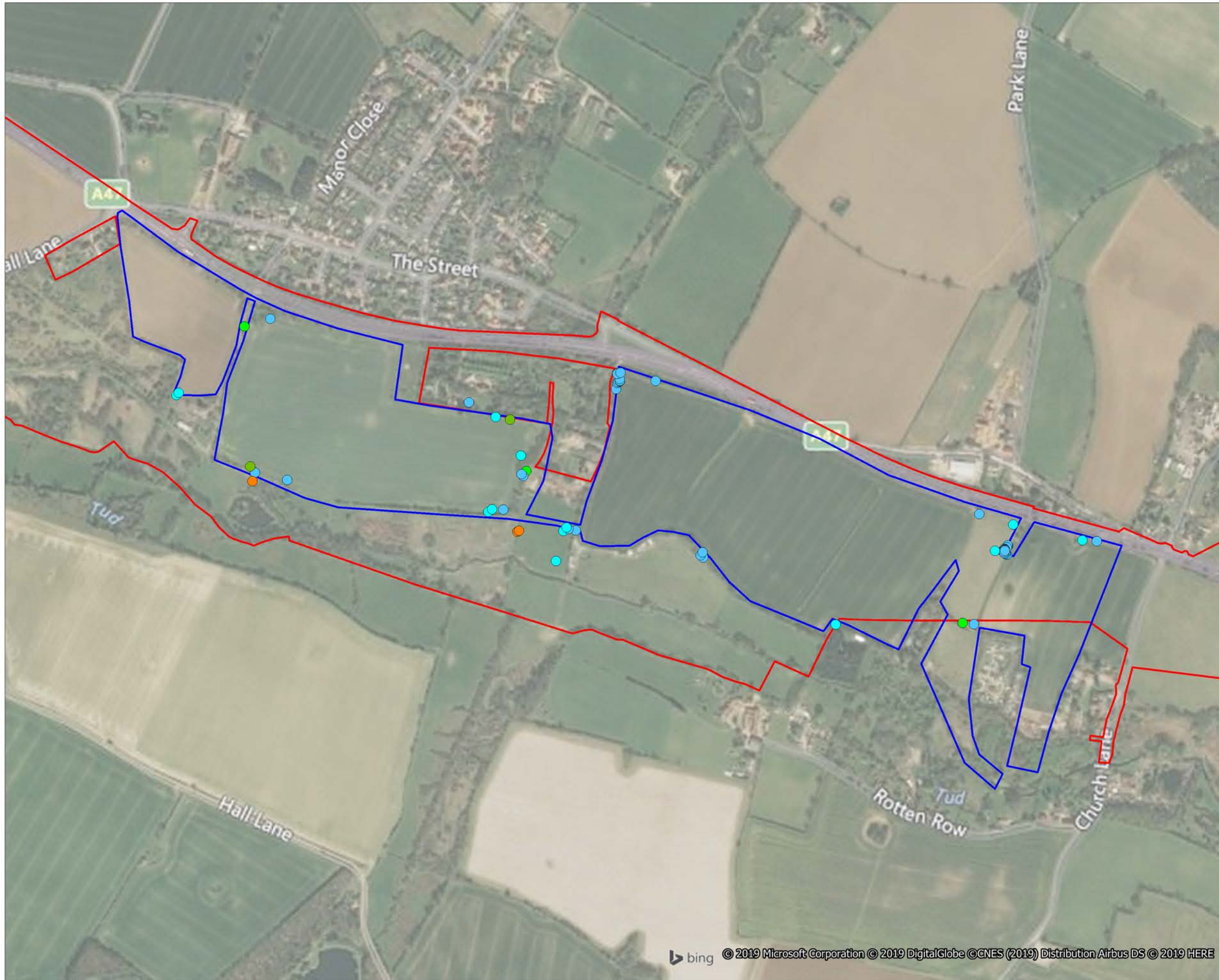
Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

A47 Improvements



Figure 8
Transect 2 - 17th October 2019
Map 8 of 8





- Site boundary
 - Bat transect route
- Bat Species**
- Barbastelle bat
 - Serotine bat
 - Daubenton's bat
 - Natterer's bat
 - Myotic bat species
 - Leisler's bat
 - Noctule bat
 - Nyctalus bat species
 - Nathusius's Pipistrelle bat
 - Common Pipistrelle bat
 - Soprano Pipistrelle bat
 - Pipistrelle bat species
 - Brown Long-eared bat

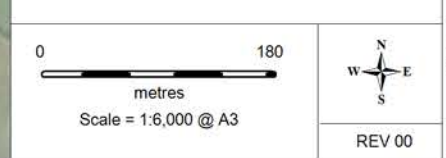


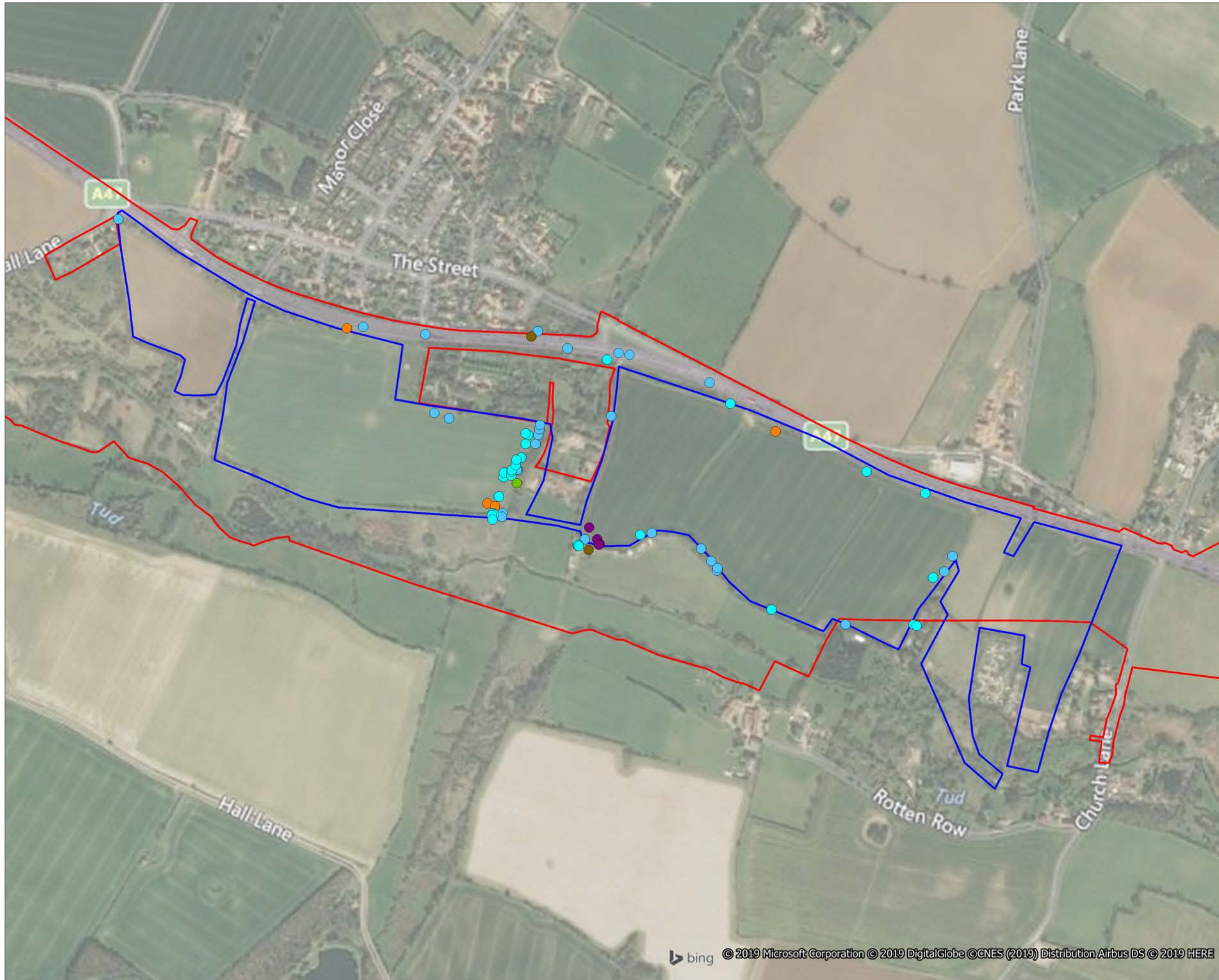
Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

A47 Improvements



Figure 9
Transect 3 - 17th July 2019
Map 1 of 8





- Site boundary
 - Bat transect route
- Bat Species**
- Barbastelle bat
 - Serotine bat
 - Daubenton's bat
 - Natterer's bat
 - Myotic bat species
 - Leisler's bat
 - Noctule bat
 - Nyctalus bat species
 - Nathusius's Pipistrelle bat
 - Common Pipistrelle bat
 - Soprano Pipistrelle bat
 - Pipistrelle bat species
 - Brown Long-eared bat

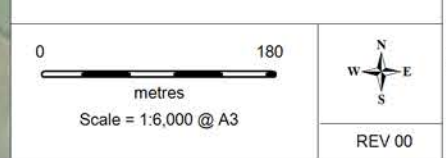


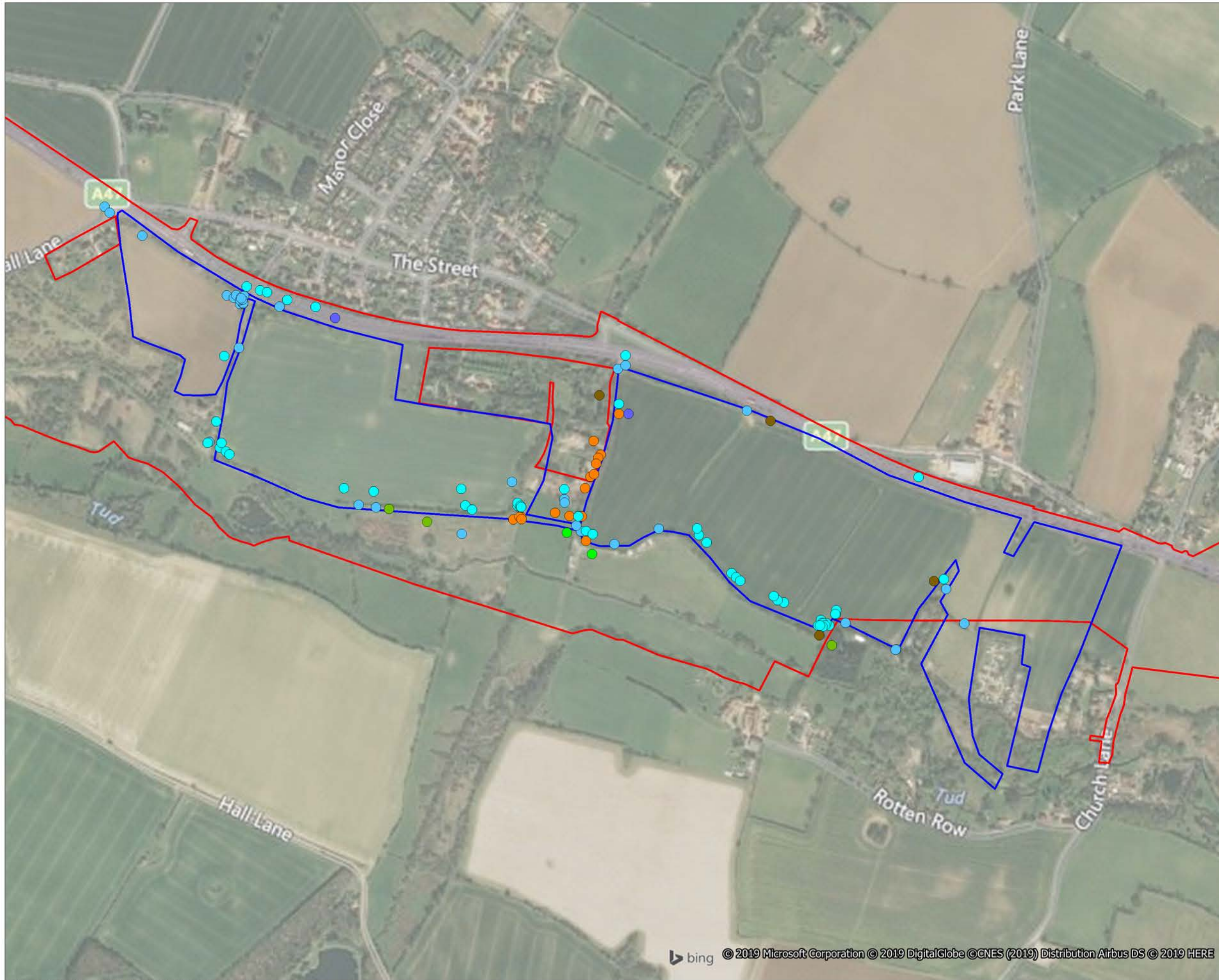
Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

A47 Improvements



Figure 9
Transect 3 - 29th July 2019
Map 2 of 8





- Site boundary
 - Bat transect route
- Bat Species**
- Barbastelle bat
 - Serotine bat
 - Daubenton's bat
 - Natterer's bat
 - Myotis bat species
 - Leisler's bat
 - Noctule bat
 - Nyctalus bat species
 - Nathusius's Pipistrelle bat
 - Common Pipistrelle bat
 - Soprano Pipistrelle bat
 - Pipistrelle bat species
 - Brown Long-eared bat

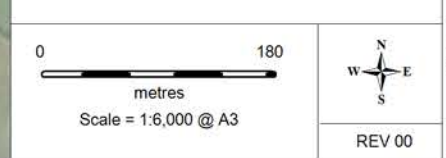


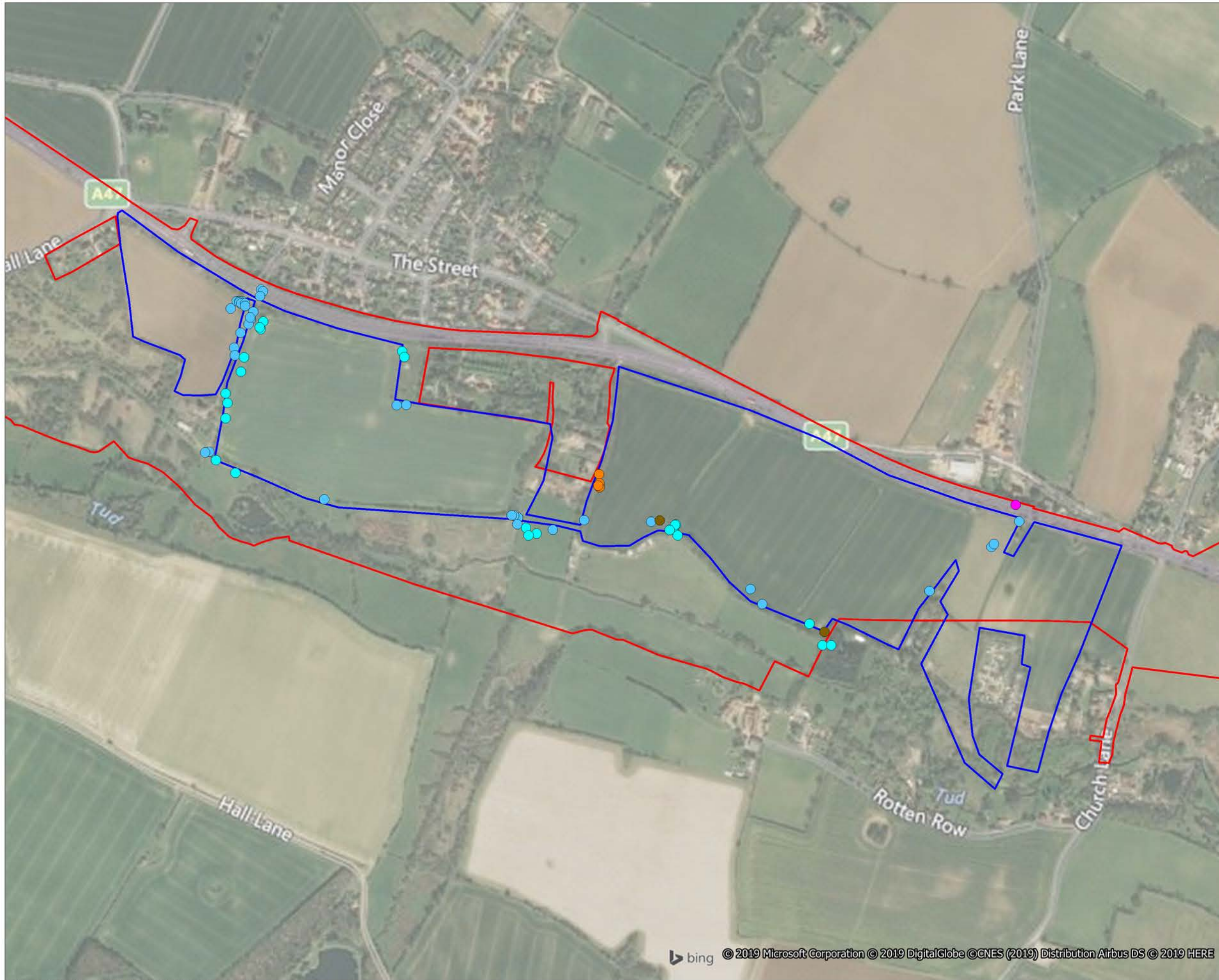
Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

A47 Improvements



Figure 9
Transect 3 - 5th August 2019
Map 3 of 8





- Site boundary
 - Bat transect route
- Bat Species**
- Barbastelle bat
 - Serotine bat
 - Daubenton's bat
 - Natterer's bat
 - Myotis bat species
 - Leisler's bat
 - Noctule bat
 - Nyctalus bat species
 - Nathusius's Pipistrelle bat
 - Common Pipistrelle bat
 - Soprano Pipistrelle bat
 - Pipistrelle bat species
 - Brown Long-eared bat

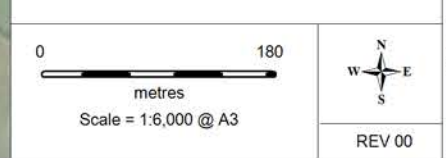


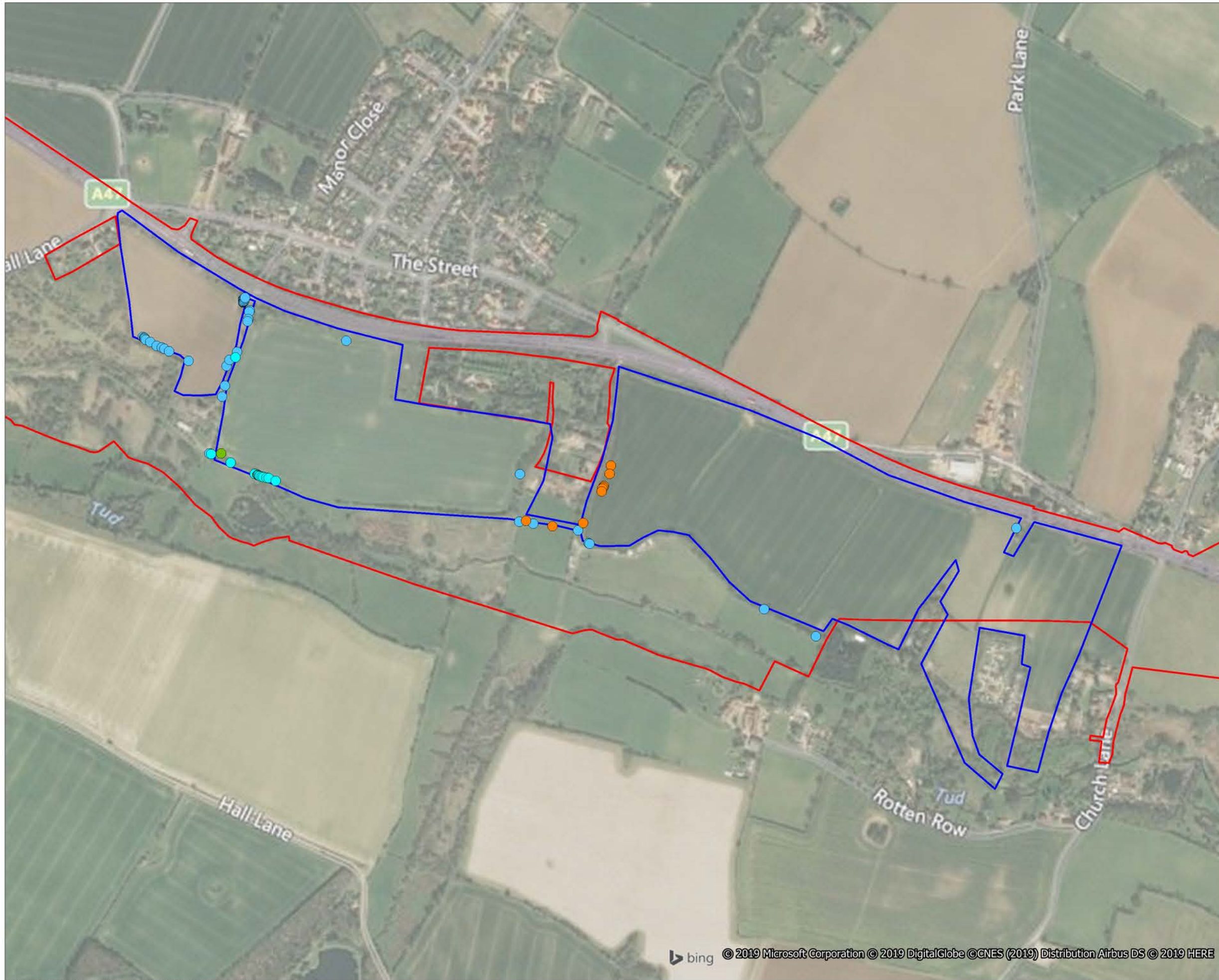
Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

A47 Improvements



Figure 9
Transect 3 - 21st August 2019
Map 4 of 8





- Site boundary
 - Bat transect route
- Bat Species**
- Barbastelle bat
 - Serotine bat
 - Daubenton's bat
 - Natterer's bat
 - Myotis bat species
 - Leisler's bat
 - Noctule bat
 - Nyctalus bat species
 - Nathusius's Pipistrelle bat
 - Common Pipistrelle bat
 - Soprano Pipistrelle bat
 - Pipistrelle bat species
 - Brown Long-eared bat

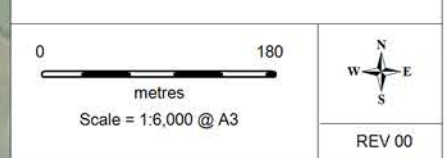


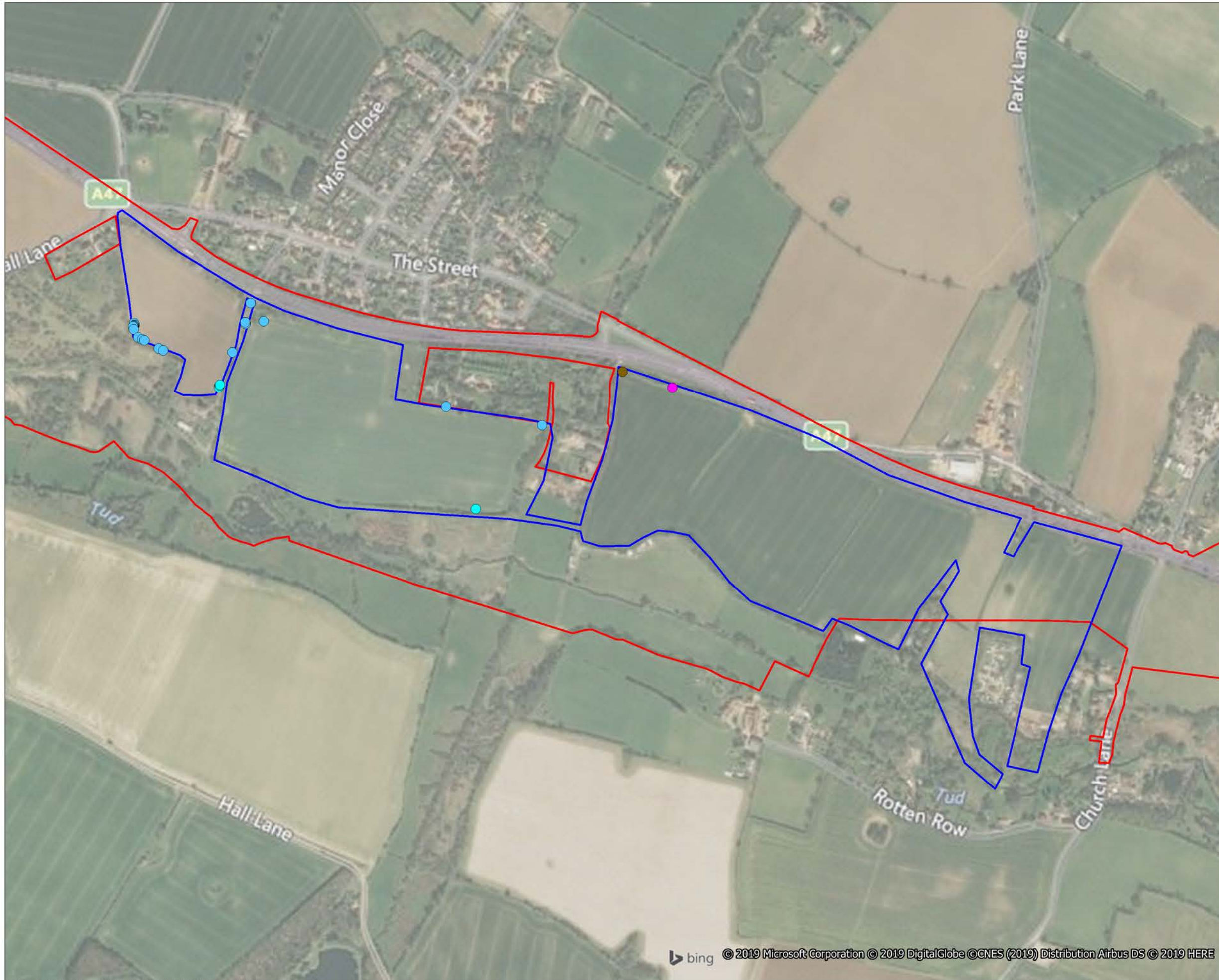
Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

A47 Improvements



Figure 9
Transect 3 - 5th September 2019
Map 5 of 8





- Site boundary
 - Bat transect route
- Bat Species**
- Barbastelle bat
 - Serotine bat
 - Daubenton's bat
 - Natterer's bat
 - Myotis bat species
 - Leisler's bat
 - Noctule bat
 - Nyctalus bat species
 - Nathusius's Pipistrelle bat
 - Common Pipistrelle bat
 - Soprano Pipistrelle bat
 - Pipistrelle bat species
 - Brown Long-eared bat

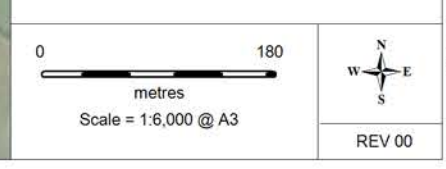


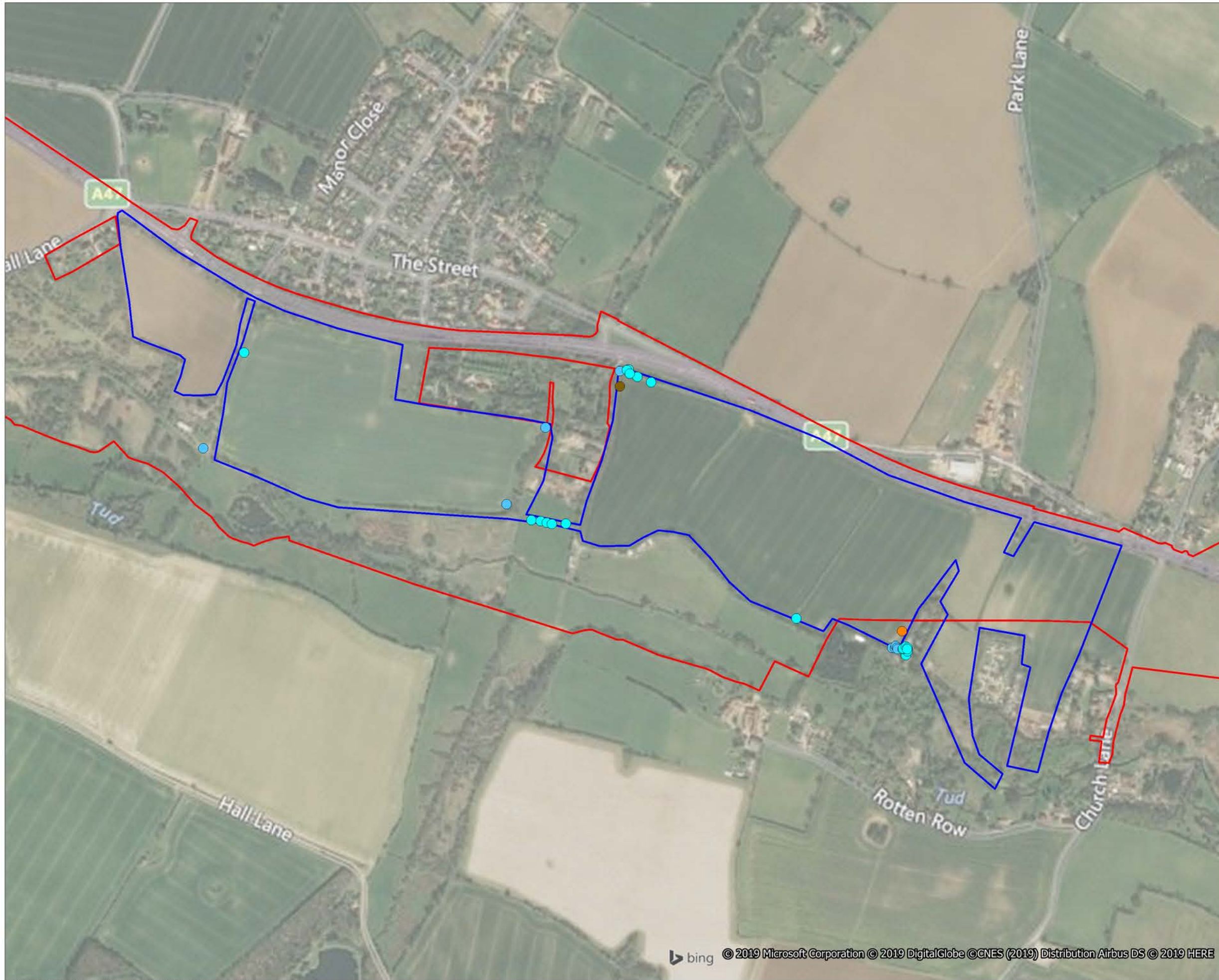
Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

A47 Improvements



Figure 9
Transect 3 - 17th September 2019
Map 6 of 8





- Site boundary
 - Bat transect route
- Bat Species**
- Barbastelle bat
 - Serotine bat
 - Daubenton's bat
 - Natterer's bat
 - Myotis bat species
 - Leisler's bat
 - Noctule bat
 - Nyctalus bat species
 - Nathusius's Pipistrelle bat
 - Common Pipistrelle bat
 - Soprano Pipistrelle bat
 - Pipistrelle bat species
 - Brown Long-eared bat

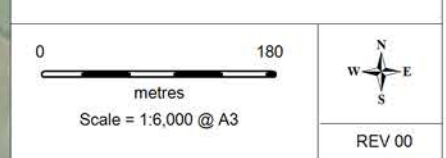


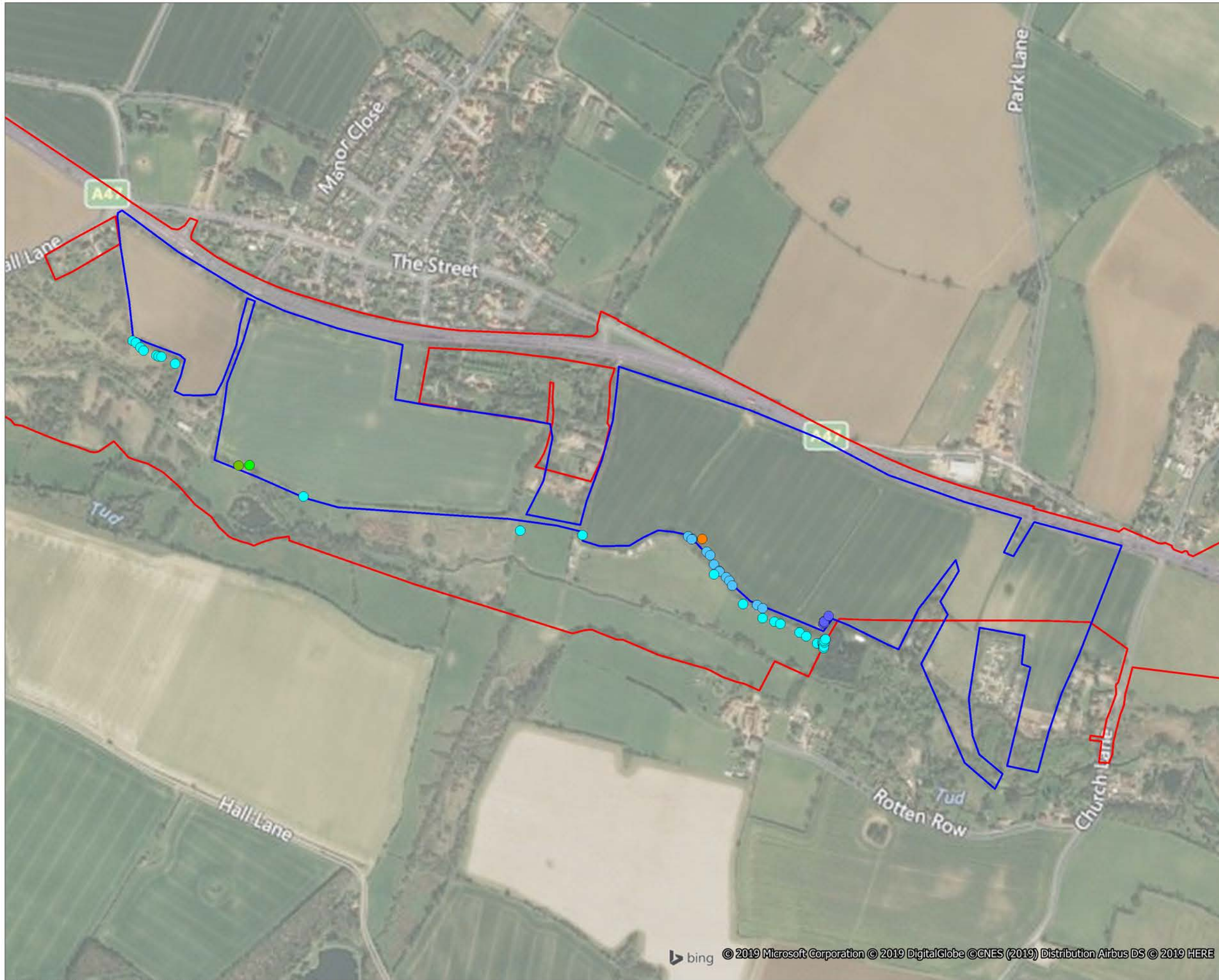
Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

A47 Improvements



Figure 9
Transect 3 - 2nd October 2019
Map 7 of 8





- Site boundary
 - Bat transect route
- Bat Species**
- Barbastelle bat
 - Serotine bat
 - Daubenton's bat
 - Natterer's bat
 - Myotis bat species
 - Leisler's bat
 - Noctule bat
 - Nyctalus bat species
 - Nathusius's Pipistrelle bat
 - Common Pipistrelle bat
 - Soprano Pipistrelle bat
 - Pipistrelle bat species
 - Brown Long-eared bat

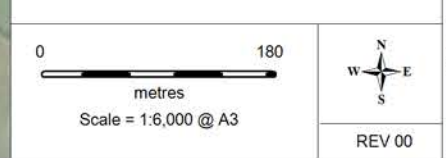


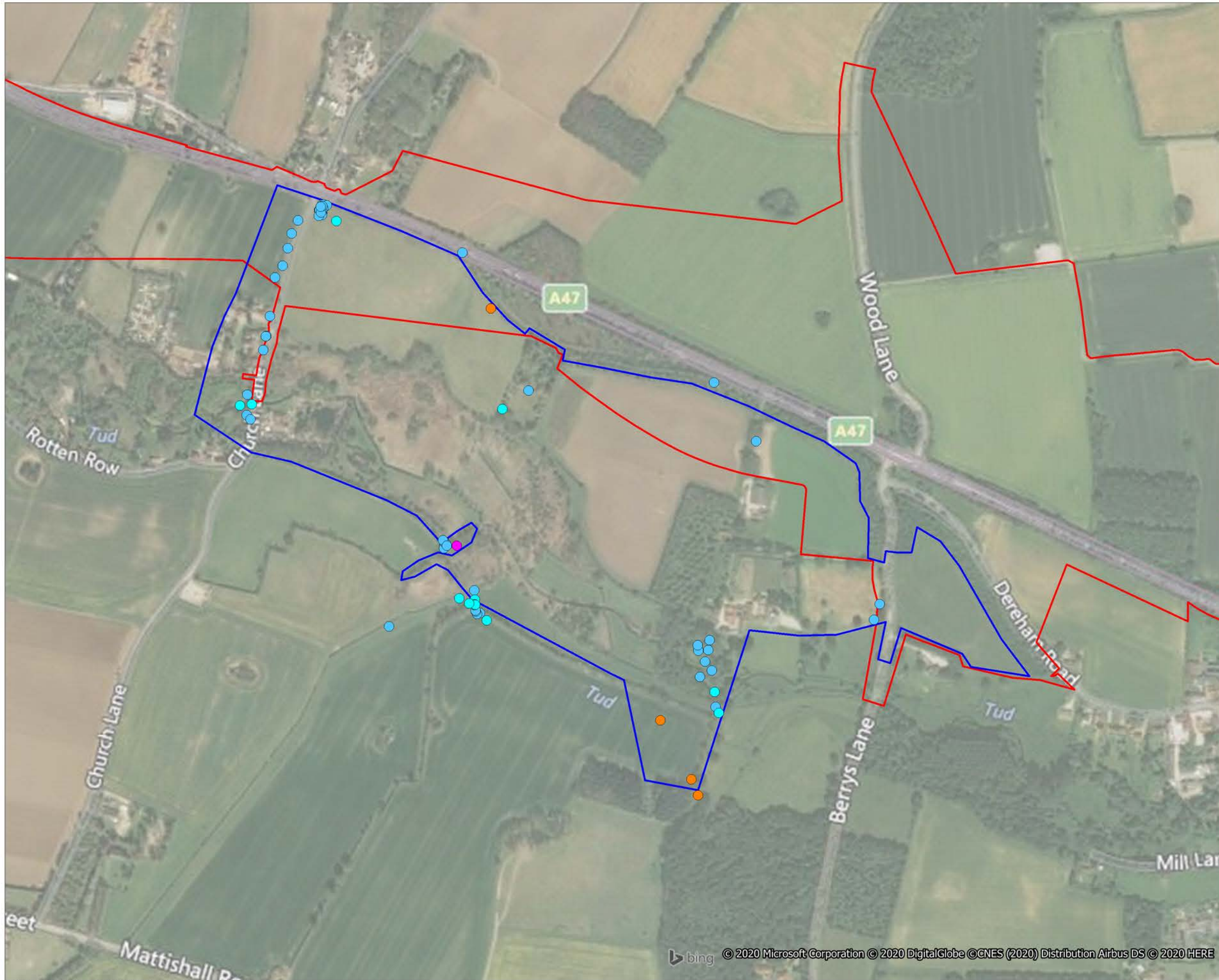
Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

A47 Improvements



Figure 9
Transect 3 - 9th October 2019
Map 8 of 8





- Site boundary
 - Bat transect route
- Bat Species**
- Barbastelle bat
 - Serotine bat
 - Daubenton's bat
 - Natterer's bat
 - Myotis bat species
 - Leisler's bat
 - Noctule bat
 - Nyctalus bat species
 - Nathusius's Pipistrelle bat
 - Common Pipistrelle bat
 - Soprano Pipistrelle bat
 - Pipistrelle bat species
 - Brown Long-eared bat

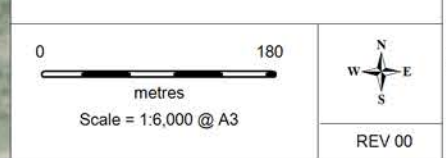


Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

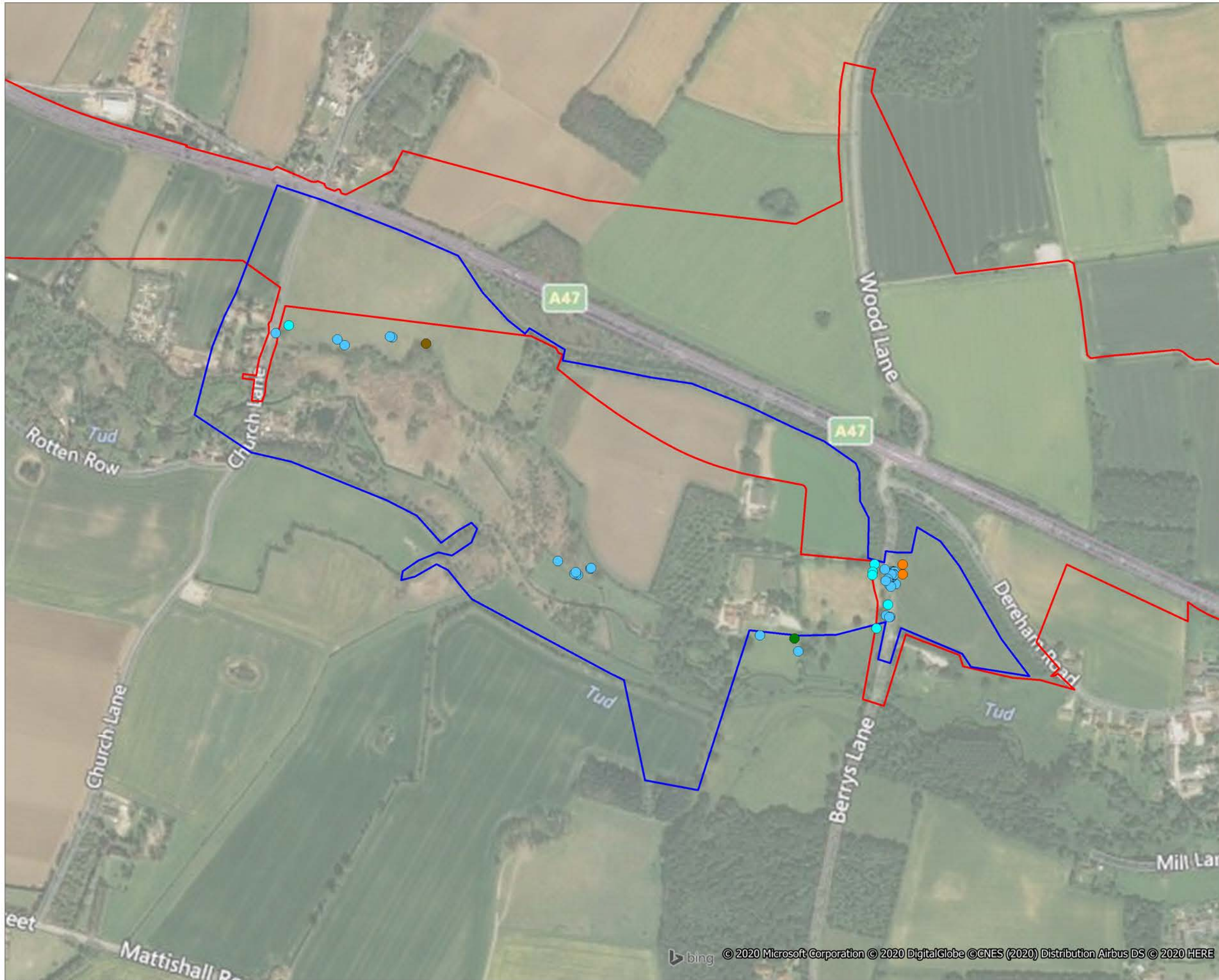
A47 Improvements



Figure 10
Transect 4 - 17th July 2019
Map 1 of 8



Contains Ordnance Survey data © Crown copyright and database right 2019



- Site boundary
 - Bat transect route
- Bat Species**
- Barbastelle bat
 - Serotine bat
 - Daubenton's bat
 - Natterer's bat
 - Myotis bat species
 - Leisler's bat
 - Noctule bat
 - Nyctalus bat species
 - Nathusius's Pipistrelle bat
 - Common Pipistrelle bat
 - Soprano Pipistrelle bat
 - Pipistrelle bat species
 - Brown Long-eared bat

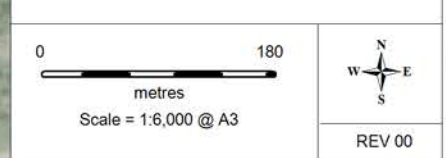


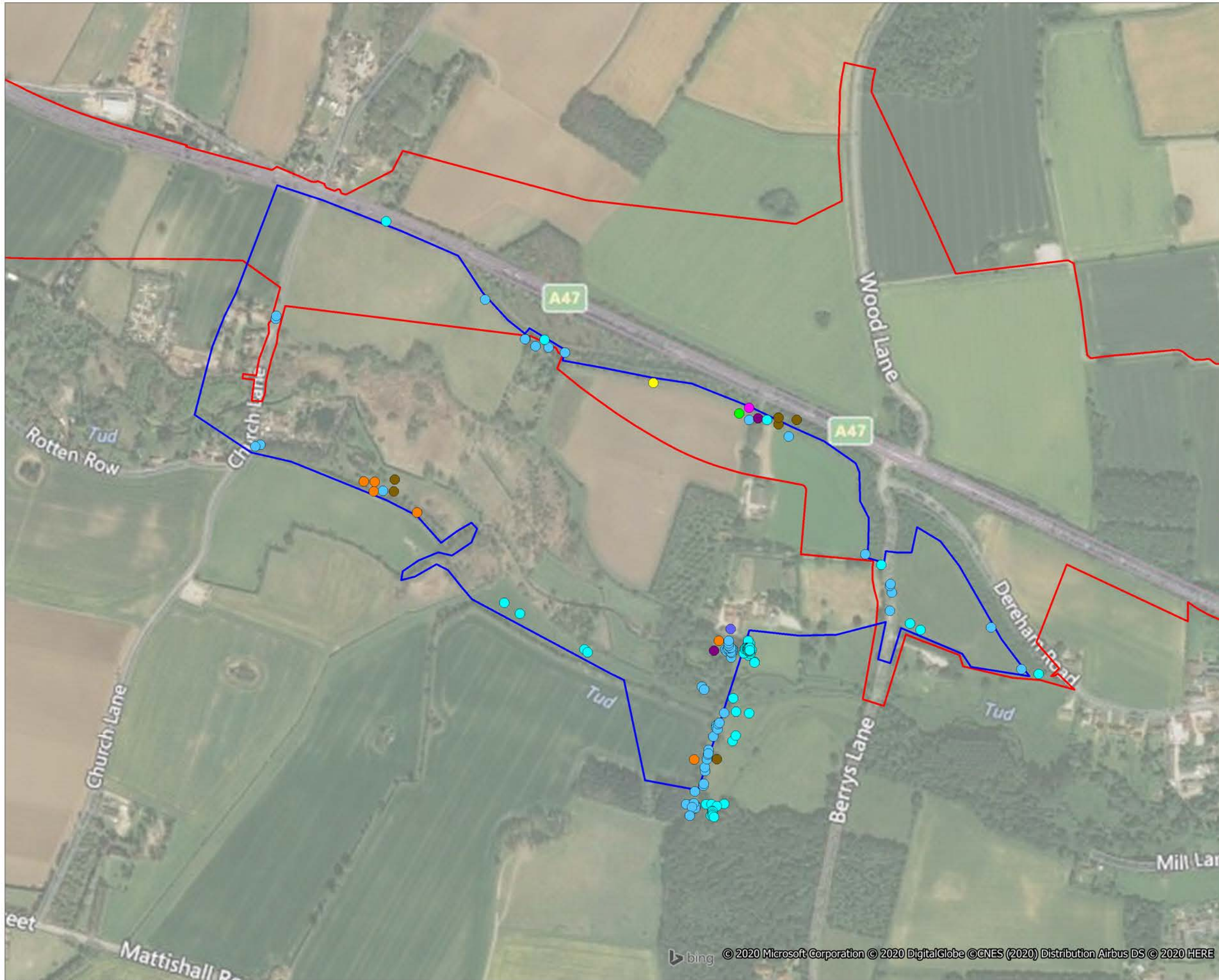
Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

A47 Improvements



Figure 10
Transect 4 - 29th July 2019
Map 2 of 8





- Site boundary
 - Bat transect route
- Bat Species**
- Barbastelle bat
 - Serotine bat
 - Daubenton's bat
 - Natterer's bat
 - Myotis bat species
 - Leisler's bat
 - Noctule bat
 - Nyctalus bat species
 - Nathusius's Pipistrelle bat
 - Common Pipistrelle bat
 - Soprano Pipistrelle bat
 - Pipistrelle bat species
 - Brown Long-eared bat

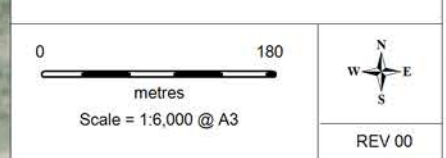


Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

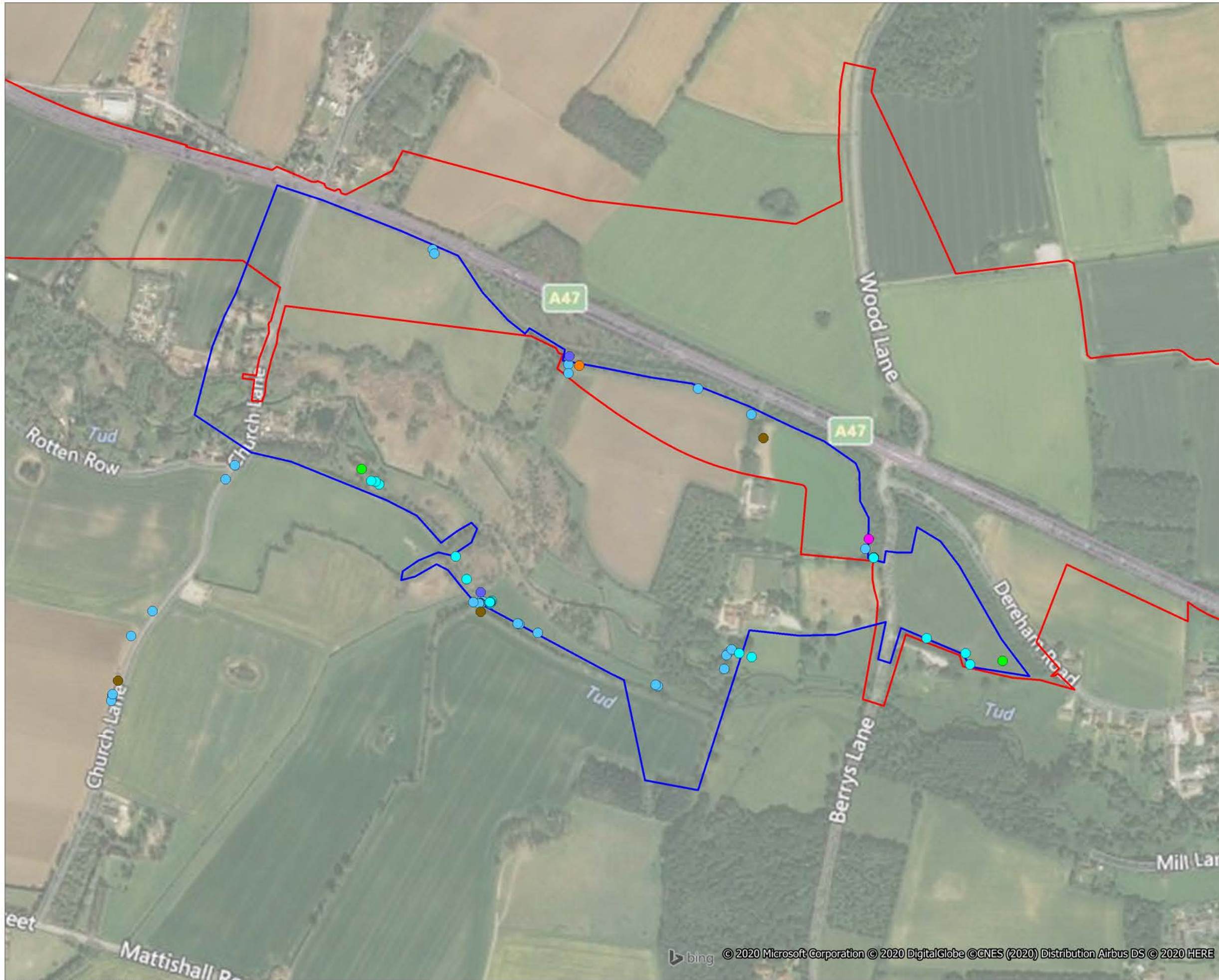
A47 Improvements



Figure 10
Transect 4 - 5th August 2019
Map 3 of 8



Contains Ordnance Survey data © Crown copyright and database right 2019



- Site boundary
 - Bat transect route
- Bat Species**
- Barbastelle bat
 - Serotine bat
 - Daubenton's bat
 - Natterer's bat
 - Myotis bat species
 - Leisler's bat
 - Noctule bat
 - Nyctalus bat species
 - Nathusius's Pipistrelle bat
 - Common Pipistrelle bat
 - Soprano Pipistrelle bat
 - Pipistrelle bat species
 - Brown Long-eared bat

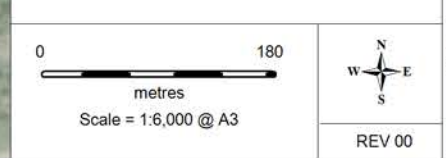


Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

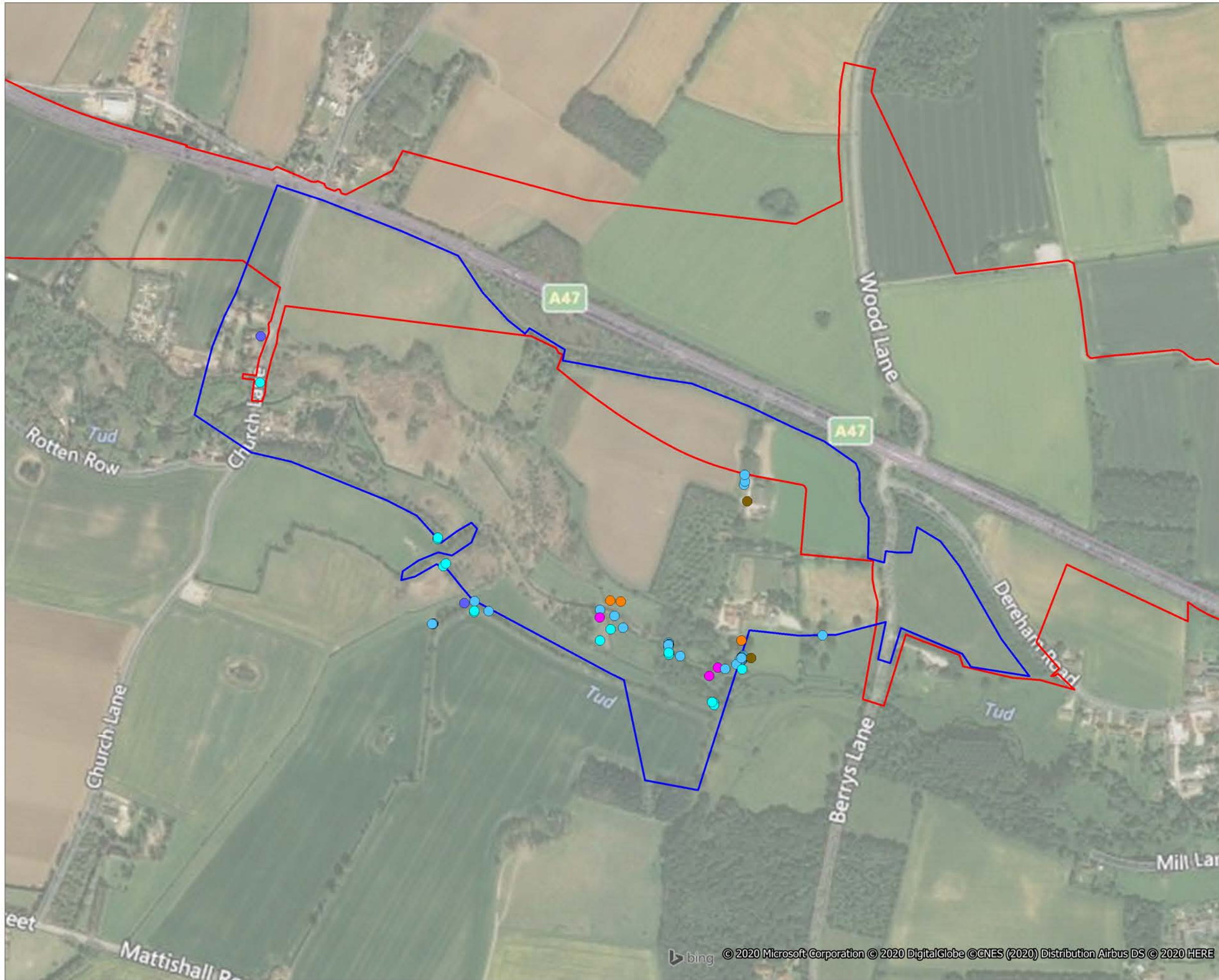
A47 Improvements



Figure 10
Transect 4 - 21st August 2019
Map 4 of 8



Contains Ordnance Survey data © Crown copyright and database right 2019



- Site boundary
 - Bat transect route
- Bat Species**
- Barbastelle bat
 - Serotine bat
 - Daubenton's bat
 - Natterer's bat
 - Myotis bat species
 - Leisler's bat
 - Noctule bat
 - Nyctalus bat species
 - Nathusius's Pipistrelle bat
 - Common Pipistrelle bat
 - Soprano Pipistrelle bat
 - Pipistrelle bat species
 - Brown Long-eared bat

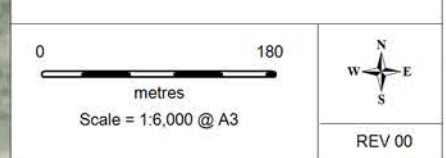


Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

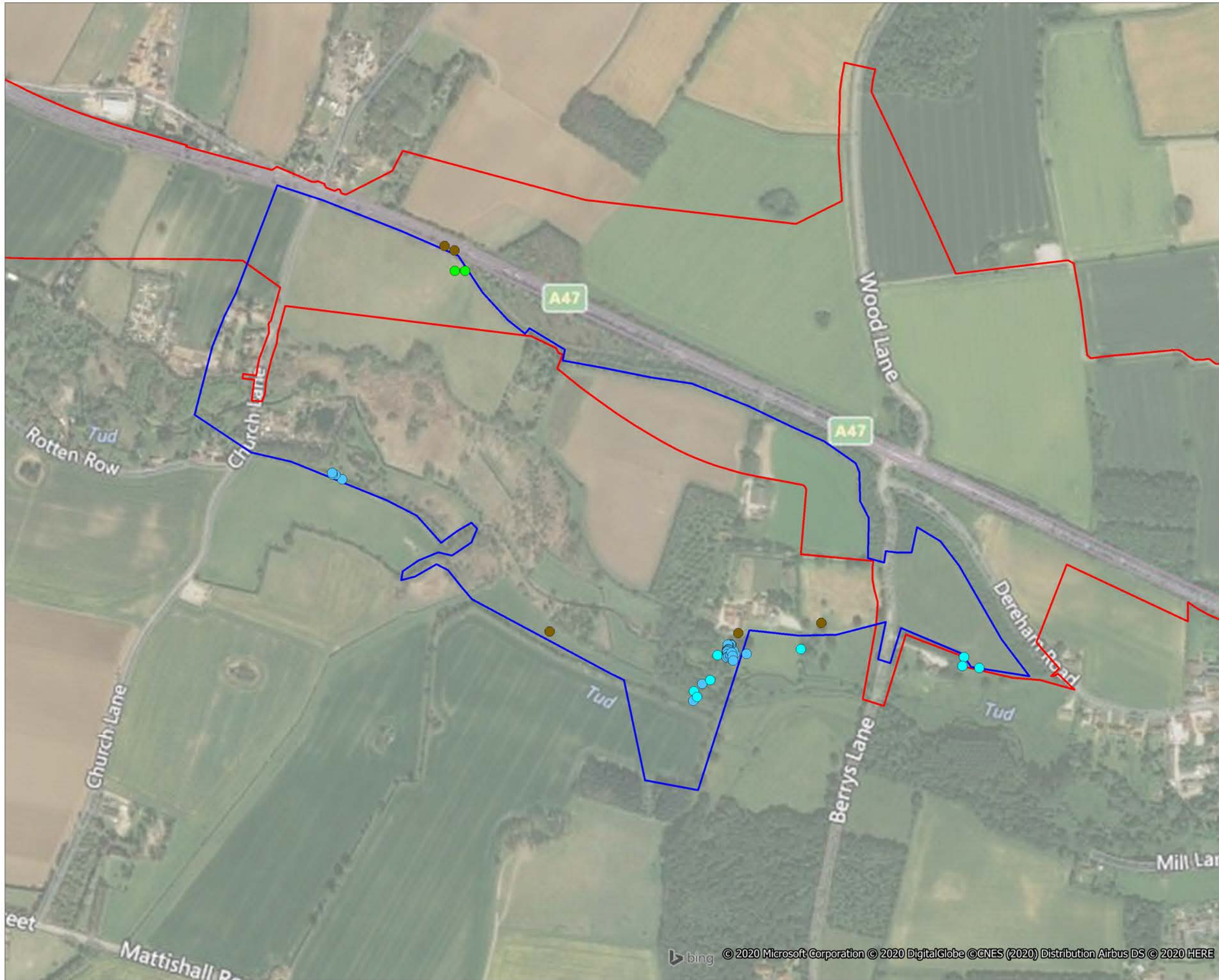
A47 Improvements



Figure 10
Transect 4 - 10th September 2019
Map 5 of 8



Contains Ordnance Survey data © Crown copyright and database right 2019



- Site boundary
 - Bat transect route
- Bat Species**
- Barbastelle bat
 - Serotine bat
 - Daubenton's bat
 - Natterer's bat
 - Myotis bat species
 - Leisler's bat
 - Noctule bat
 - Nyctalus bat species
 - Nathusius's Pipistrelle bat
 - Common Pipistrelle bat
 - Soprano Pipistrelle bat
 - Pipistrelle bat species
 - Brown Long-eared bat

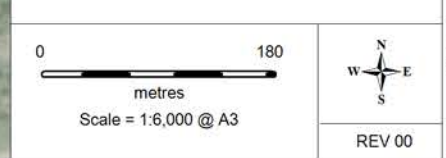


Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

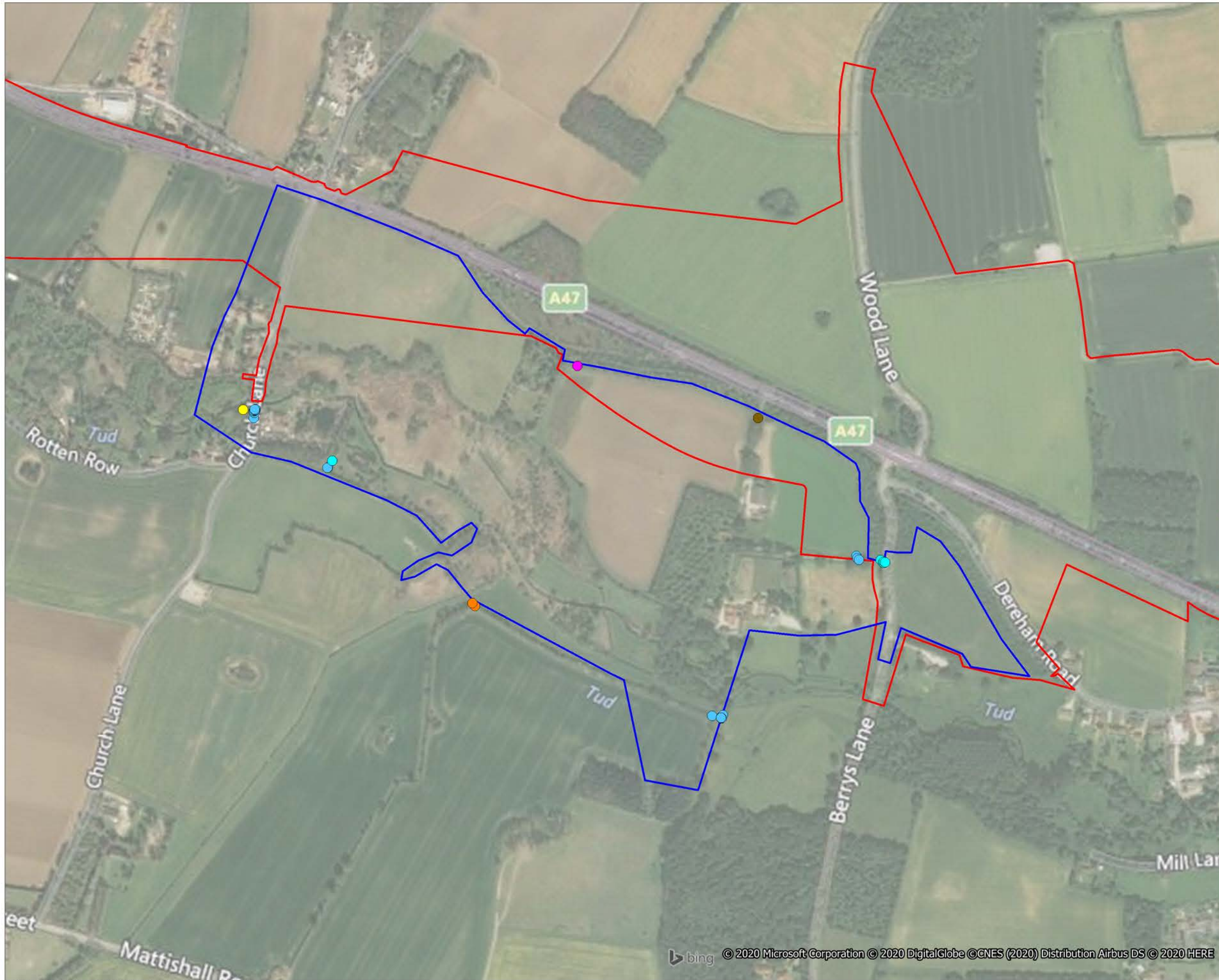
A47 Improvements



Figure 10
Transect 4 - 17th September 2019
Map 6 of 8



Contains Ordnance Survey data © Crown copyright and database right 2019



- Site boundary
 - Bat transect route
- Bat Species**
- Barbastelle bat
 - Serotine bat
 - Daubenton's bat
 - Natterer's bat
 - Myotis bat species
 - Leisler's bat
 - Noctule bat
 - Nyctalus bat species
 - Nathusius's Pipistrelle bat
 - Common Pipistrelle bat
 - Soprano Pipistrelle bat
 - Pipistrelle bat species
 - Brown Long-eared bat

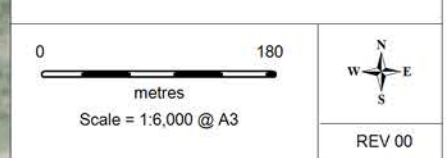


Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

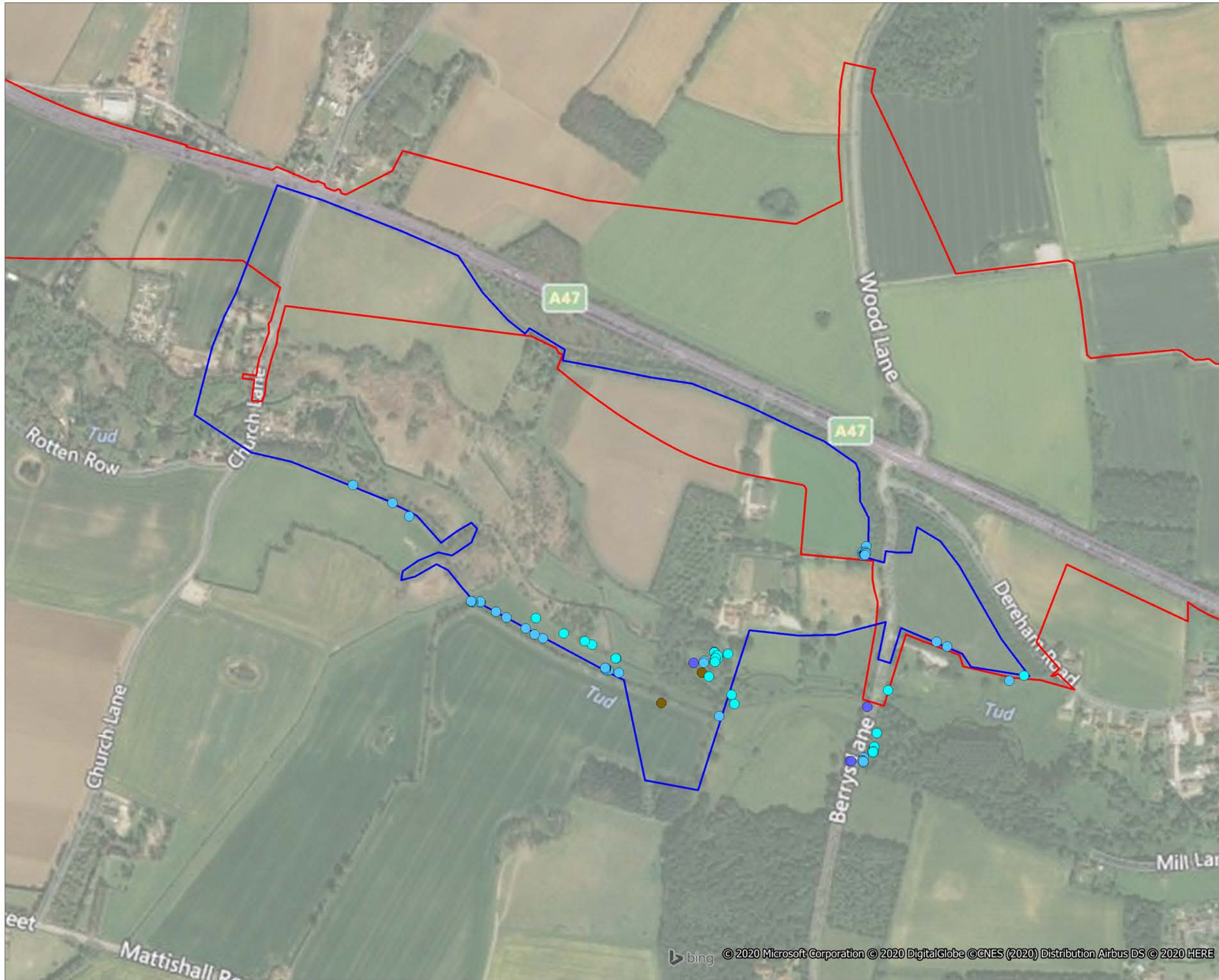
A47 Improvements



Figure 10
Transect 4 - 2nd October 2019
Map 7 of 8



Contains Ordnance Survey data © Crown copyright and database right 2019



- Site boundary
 - Bat transect route
- Bat Species**
- Barbastelle bat
 - Serotine bat
 - Daubenton's bat
 - Natterer's bat
 - Myotis bat species
 - Leisler's bat
 - Noctule bat
 - Nyctalus bat species
 - Nathusius's Pipistrelle bat
 - Common Pipistrelle bat
 - Soprano Pipistrelle bat
 - Pipistrelle bat species
 - Brown Long-eared bat

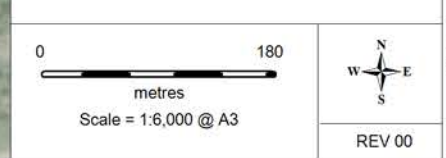


Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

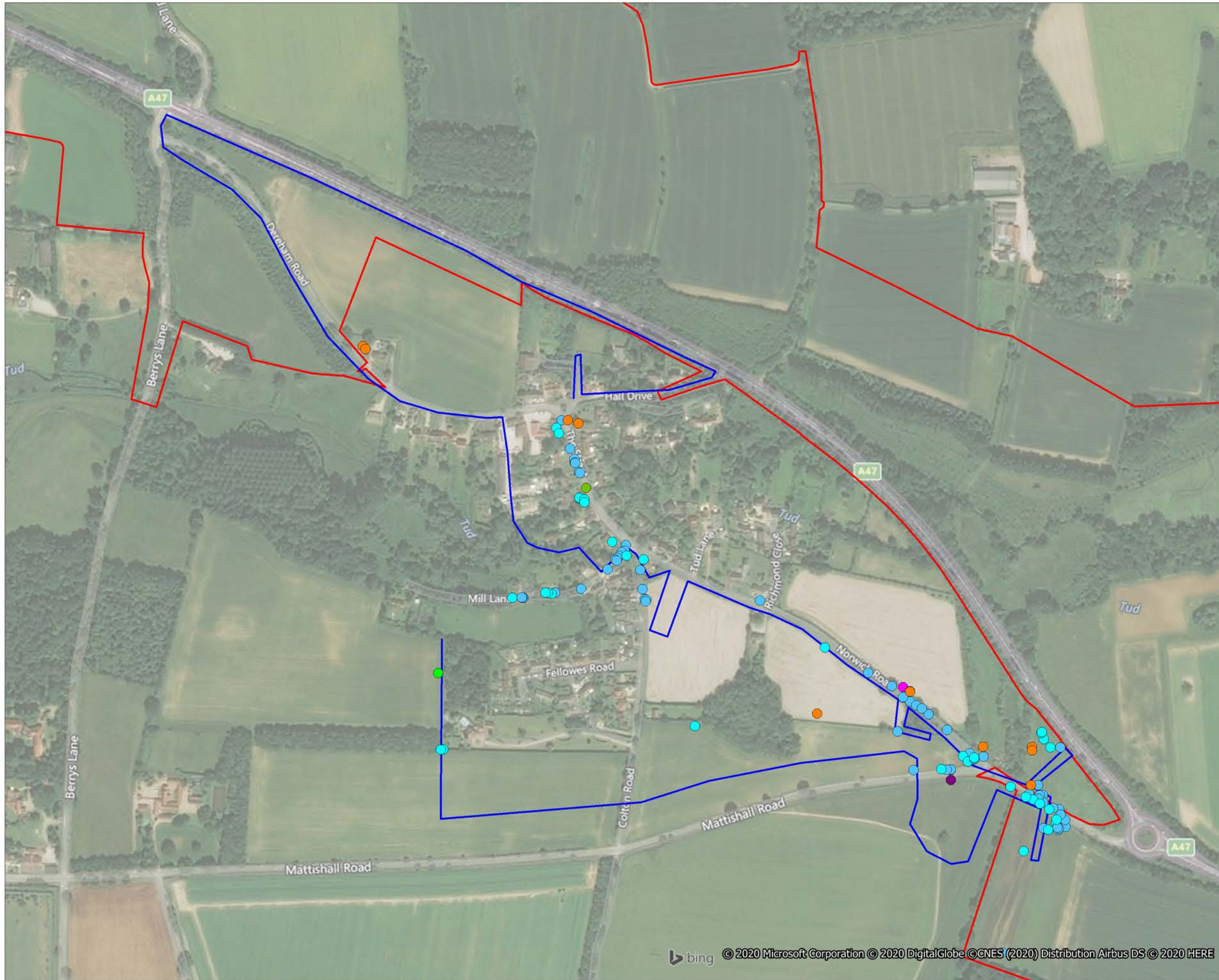
A47 Improvements



Figure 10
Transect 4 - 10th October 2019
Map 8 of 8



Contains Ordnance Survey data © Crown copyright and database right 2019



- Site boundary
 - Bat transect route
- Bat Species**
- Barbastelle bat
 - Serotine bat
 - Daubenton's bat
 - Natterer's bat
 - Myotic bat species
 - Leisler's bat
 - Noctule bat
 - Nyctalus bat species
 - Nathusius's Pipistrelle bat
 - Common Pipistrelle bat
 - Soprano Pipistrelle bat
 - Pipistrelle bat species
 - Brown Long-eared bat

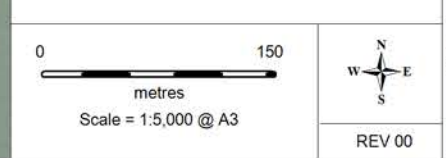


Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

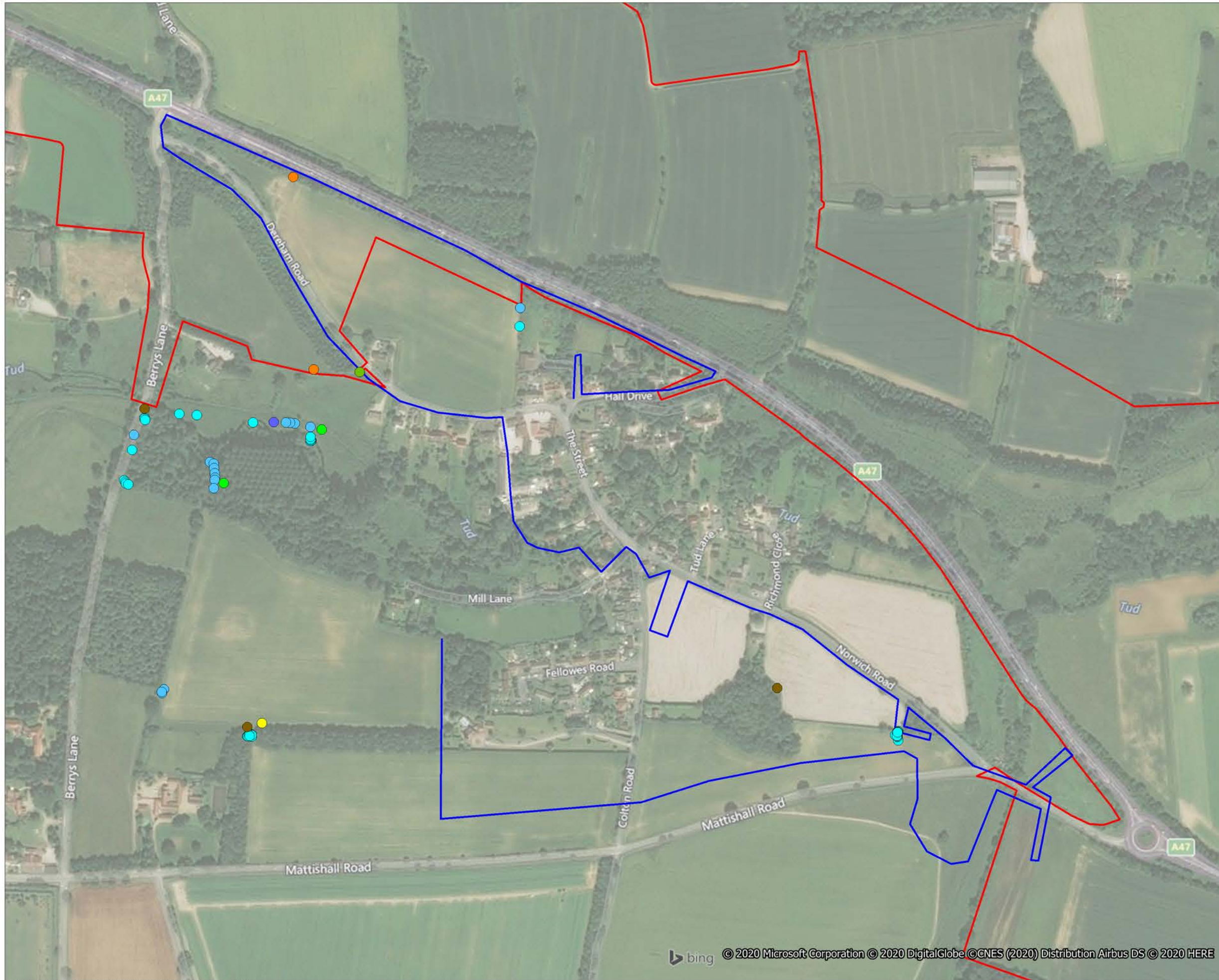
A47 Improvements



Figure 11
Transect 5 - 17th July 2019
Map 1 of 8



Contains Ordnance Survey data © Crown copyright and database right 2019



- Site boundary
 - Bat transect route
- Bat Species**
- Barbastelle bat
 - Serotine bat
 - Daubenton's bat
 - Natterer's bat
 - Myotis bat species
 - Leisler's bat
 - Noctule bat
 - Nyctalus bat species
 - Nathusius's Pipistrelle bat
 - Common Pipistrelle bat
 - Soprano Pipistrelle bat
 - Pipistrelle bat species
 - Brown Long-eared bat

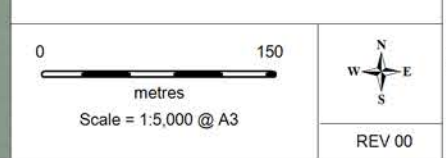


Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

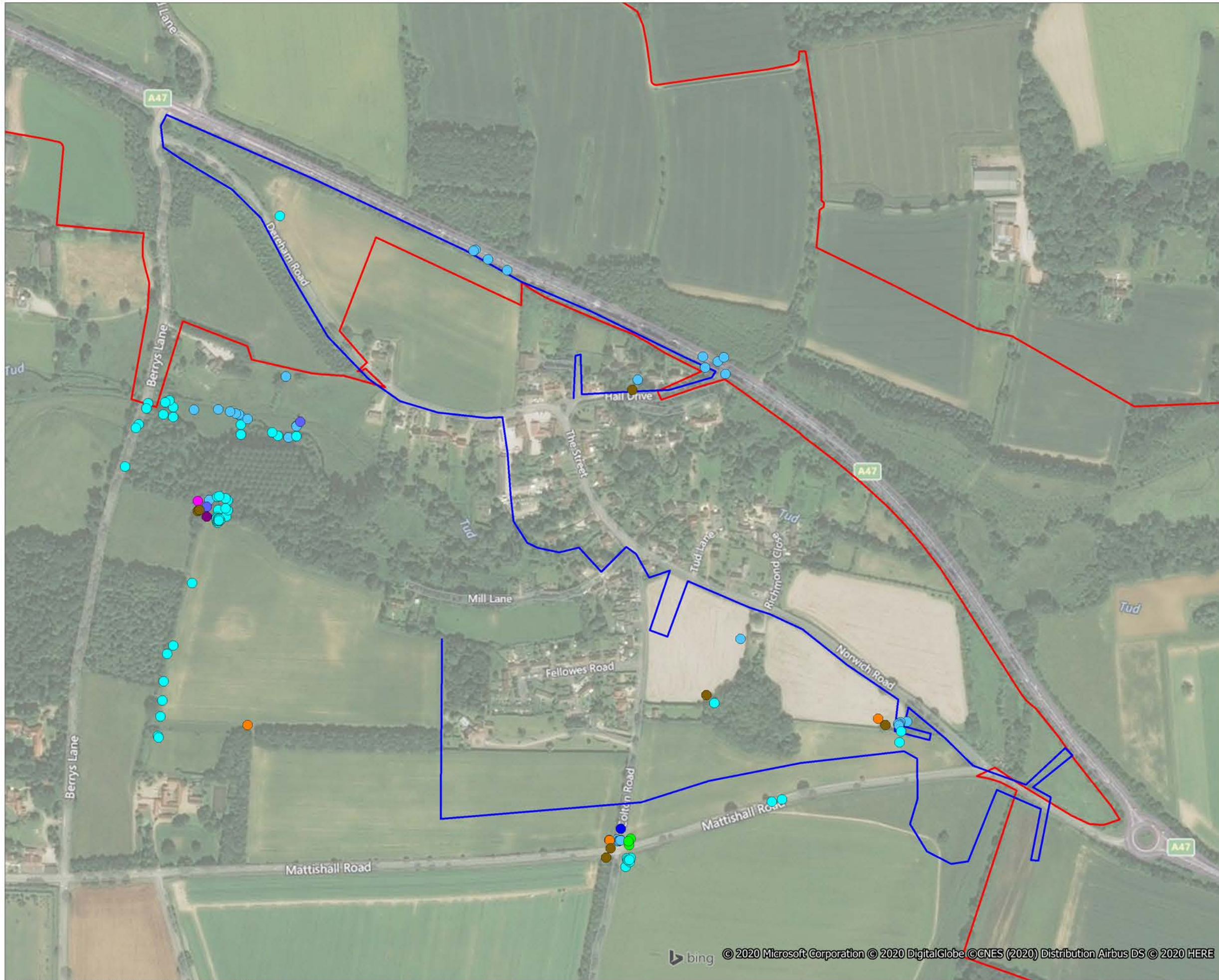
A47 Improvements



Figure 11
Transect 5 - 30th July 2019
Map 2 of 8



Contains Ordnance Survey data © Crown copyright and database right 2019



- Site boundary
 - Bat transect route
- Bat Species**
- Barbastelle bat
 - Serotine bat
 - Daubenton's bat
 - Natterer's bat
 - Myotis bat species
 - Leisler's bat
 - Noctule bat
 - Nyctalus bat species
 - Nathusius's Pipistrelle bat
 - Common Pipistrelle bat
 - Soprano Pipistrelle bat
 - Pipistrelle bat species
 - Brown Long-eared bat

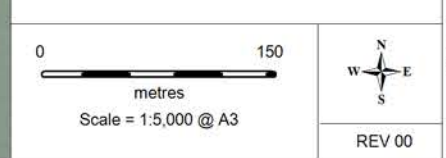


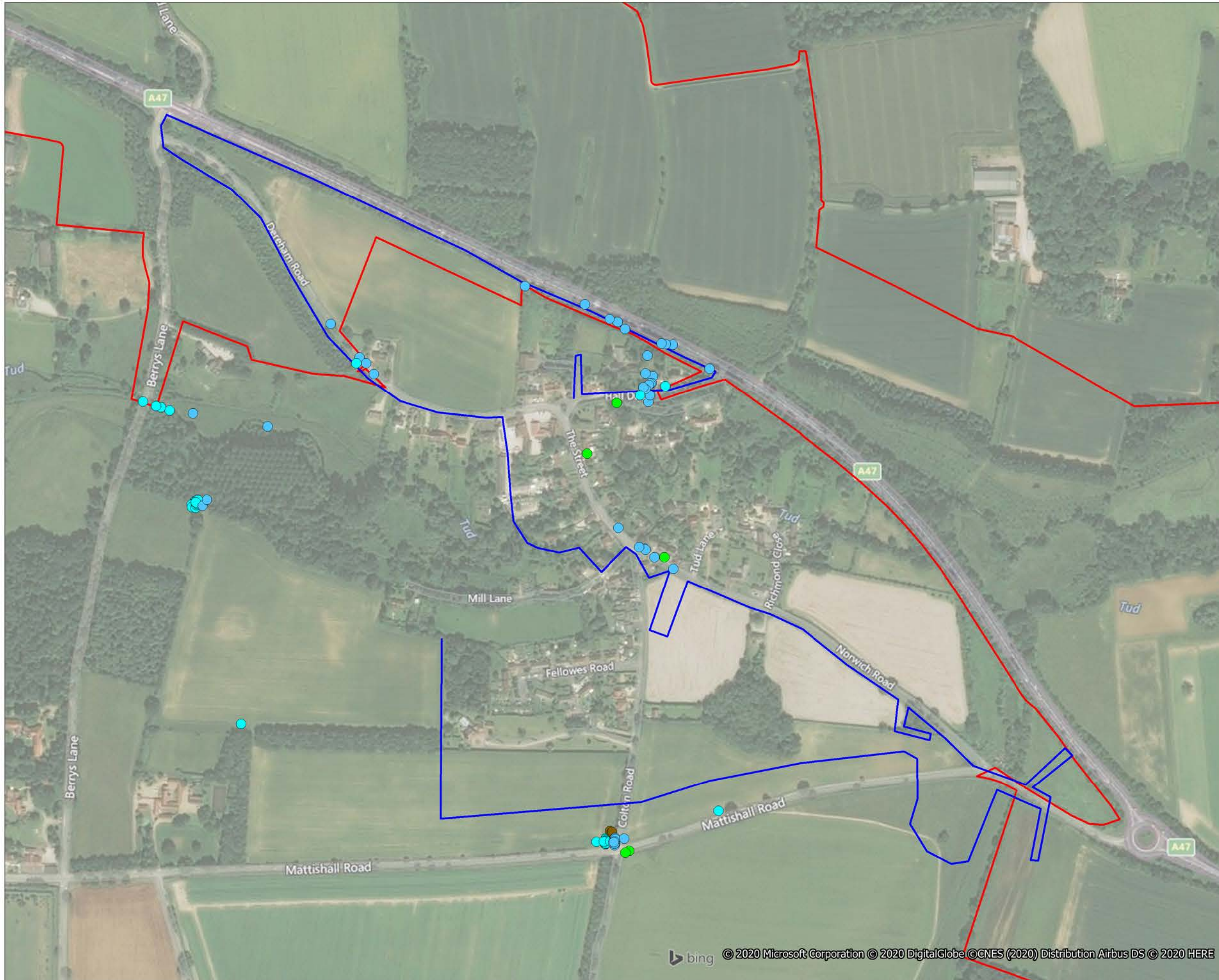
Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

A47 Improvements



Figure 11
Transect 5 - 6th August 2019
Map 3 of 8





- Site boundary
 - Bat transect route
- Bat Species**
- Barbastelle bat
 - Serotine bat
 - Daubenton's bat
 - Natterer's bat
 - Myotis bat species
 - Leisler's bat
 - Noctule bat
 - Nyctalus bat species
 - Nathusius's Pipistrelle bat
 - Common Pipistrelle bat
 - Soprano Pipistrelle bat
 - Pipistrelle bat species
 - Brown Long-eared bat

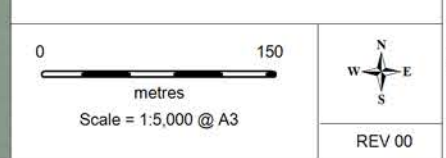


Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

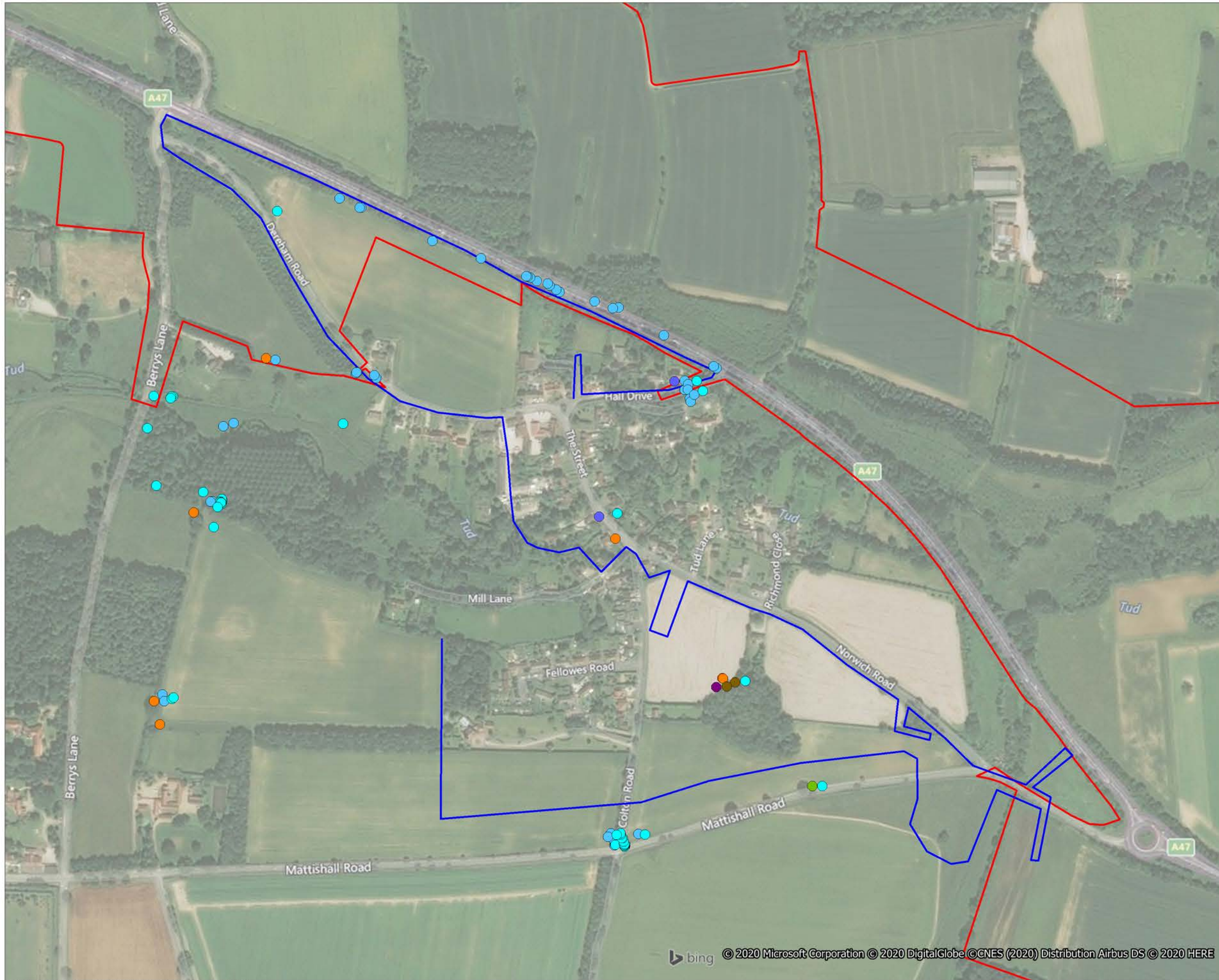
A47 Improvements



Figure 11
Transect 5 - 19th August 2019
Map 4 of 8



Contains Ordnance Survey data © Crown copyright and database right 2019



- Site boundary
 - Bat transect route
- Bat Species**
- Barbastelle bat
 - Serotine bat
 - Daubenton's bat
 - Natterer's bat
 - Myotis bat species
 - Leisler's bat
 - Noctule bat
 - Nyctalus bat species
 - Nathusius's Pipistrelle bat
 - Common Pipistrelle bat
 - Soprano Pipistrelle bat
 - Pipistrelle bat species
 - Brown Long-eared bat

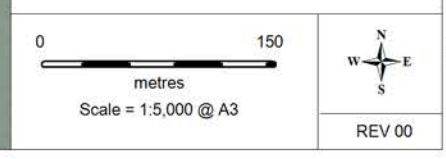


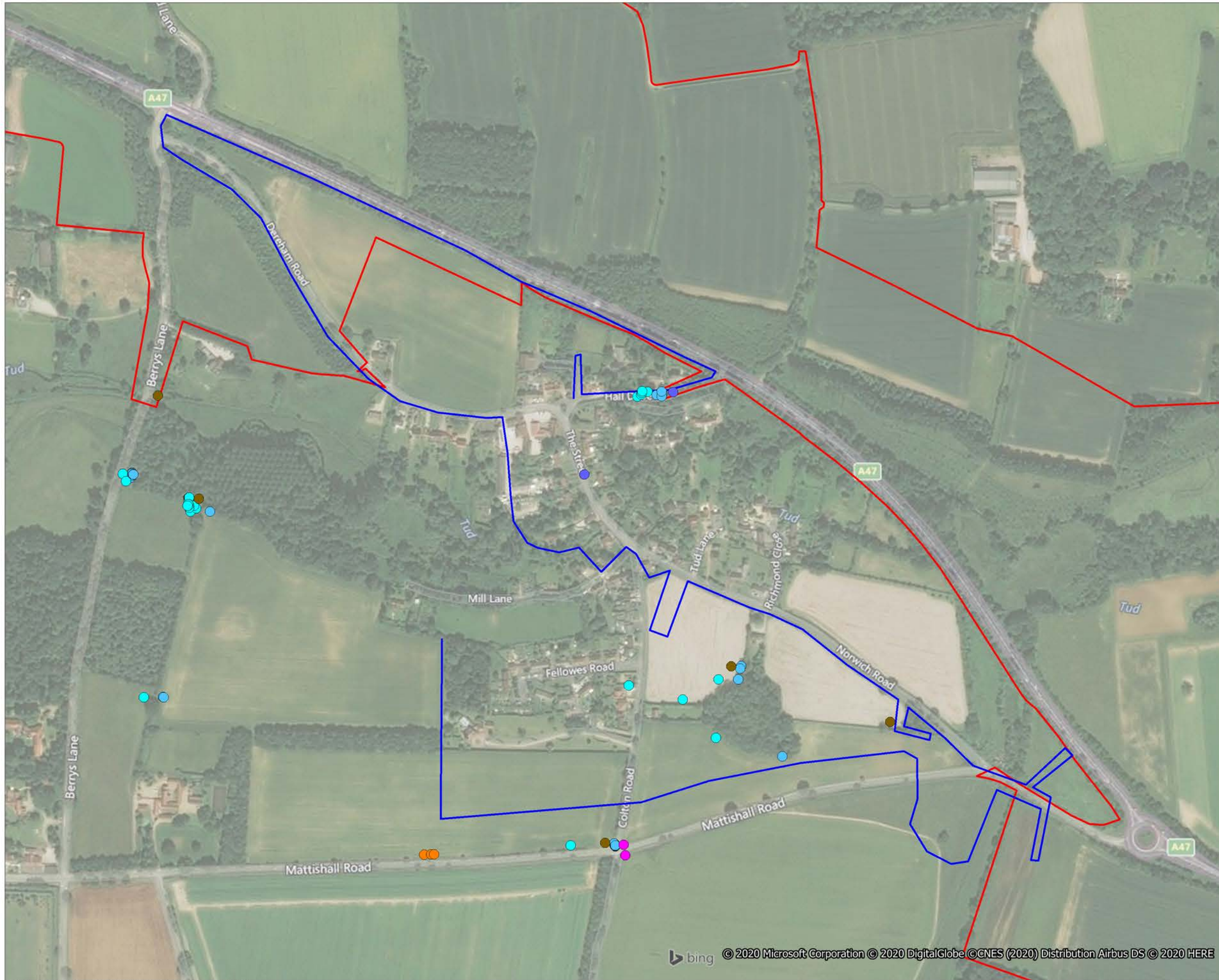
Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

A47 Improvements



Figure 11
Transect 5 - 10th September 2019
Map 5 of 8





- Site boundary
 - Bat transect route
- Bat Species**
- Barbastelle bat
 - Serotine bat
 - Daubenton's bat
 - Natterer's bat
 - Myotis bat species
 - Leisler's bat
 - Noctule bat
 - Nyctalus bat species
 - Nathusius's Pipistrelle bat
 - Common Pipistrelle bat
 - Soprano Pipistrelle bat
 - Pipistrelle bat species
 - Brown Long-eared bat

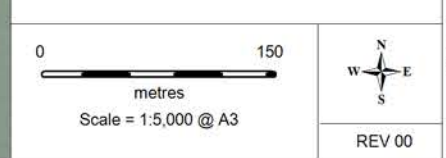


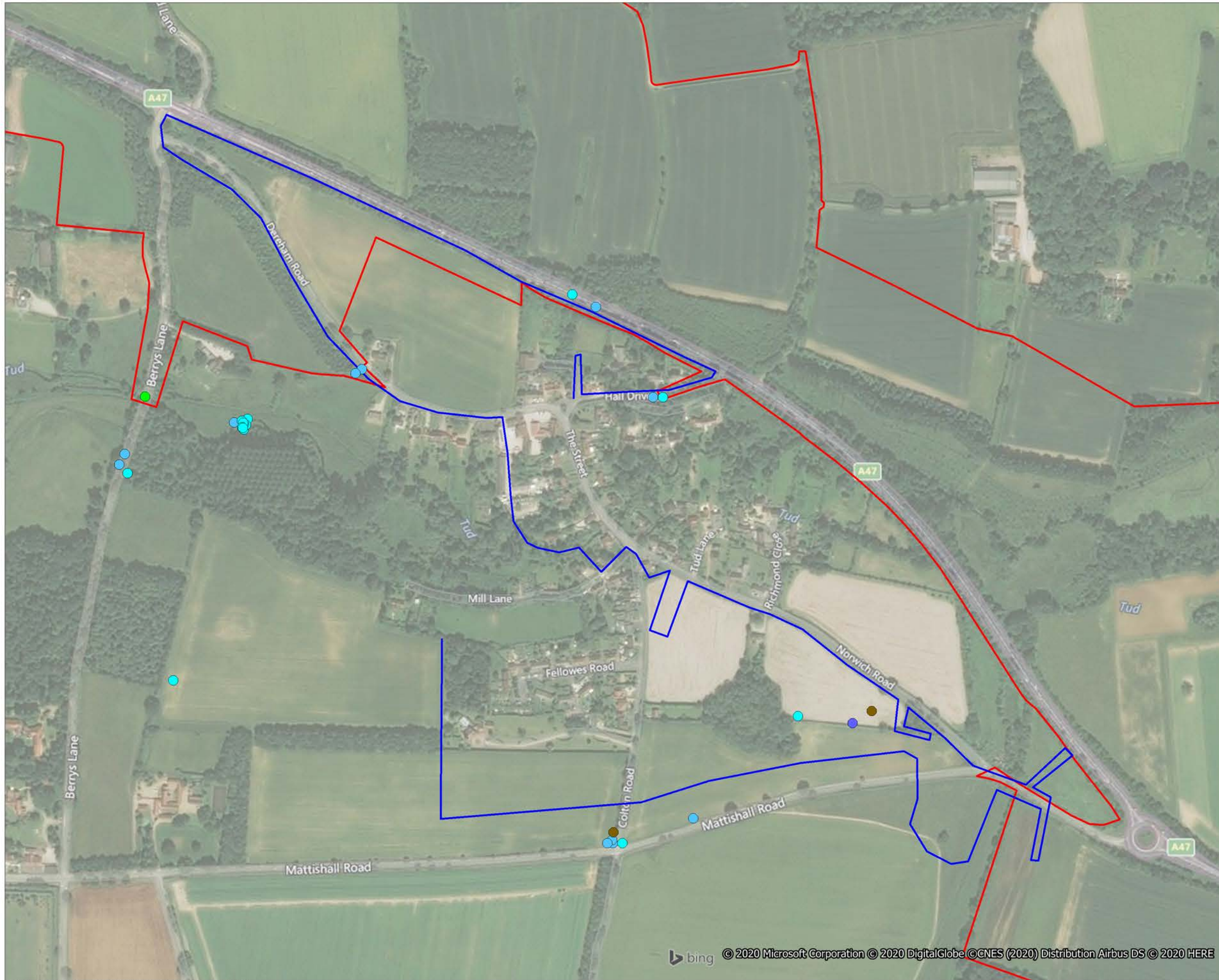
Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

A47 Improvements



Figure 11
Transect 5 - 18th September 2019
Map 6 of 8





- Site boundary
 - Bat transect route
- Bat Species**
- Barbastelle bat
 - Serotine bat
 - Daubenton's bat
 - Natterer's bat
 - Myotis bat species
 - Leisler's bat
 - Noctule bat
 - Nyctalus bat species
 - Nathusius's Pipistrelle bat
 - Common Pipistrelle bat
 - Soprano Pipistrelle bat
 - Pipistrelle bat species
 - Brown Long-eared bat

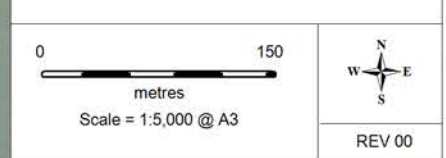


Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

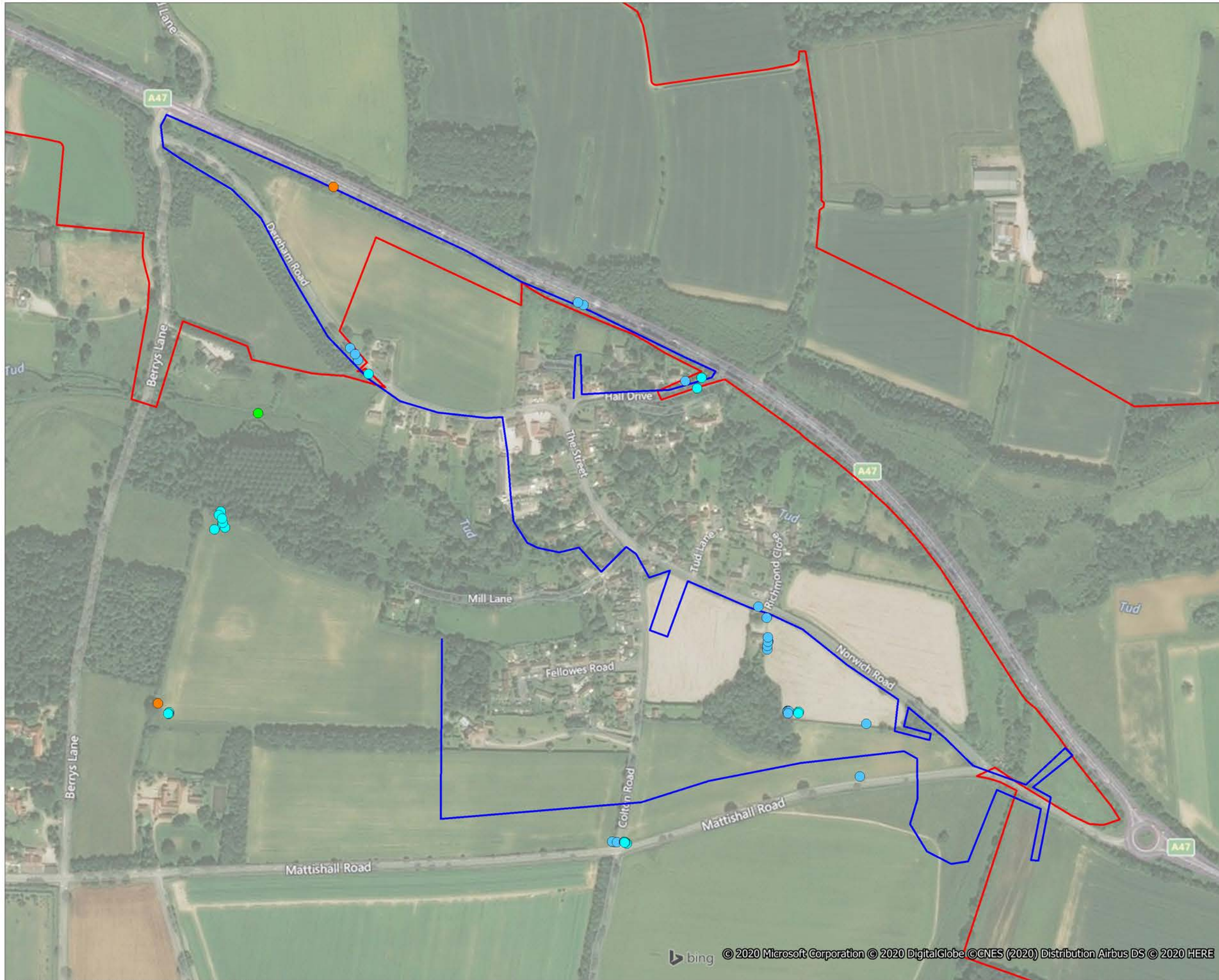
A47 Improvements



Figure 11
Transect 5 - 3rd October 2019
Map 7 of 8



Contains Ordnance Survey data © Crown copyright and database right 2019



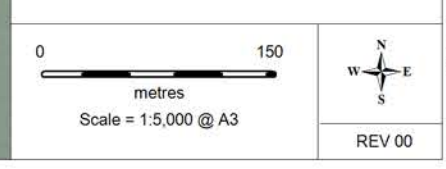
- Site boundary
 - Bat transect route
- Bat Species**
- Barbastelle bat
 - Serotine bat
 - Daubenton's bat
 - Natterer's bat
 - Myotis bat species
 - Leisler's bat
 - Noctule bat
 - Nyctalus bat species
 - Nathusius's Pipistrelle bat
 - Common Pipistrelle bat
 - Soprano Pipistrelle bat
 - Pipistrelle bat species
 - Brown Long-eared bat



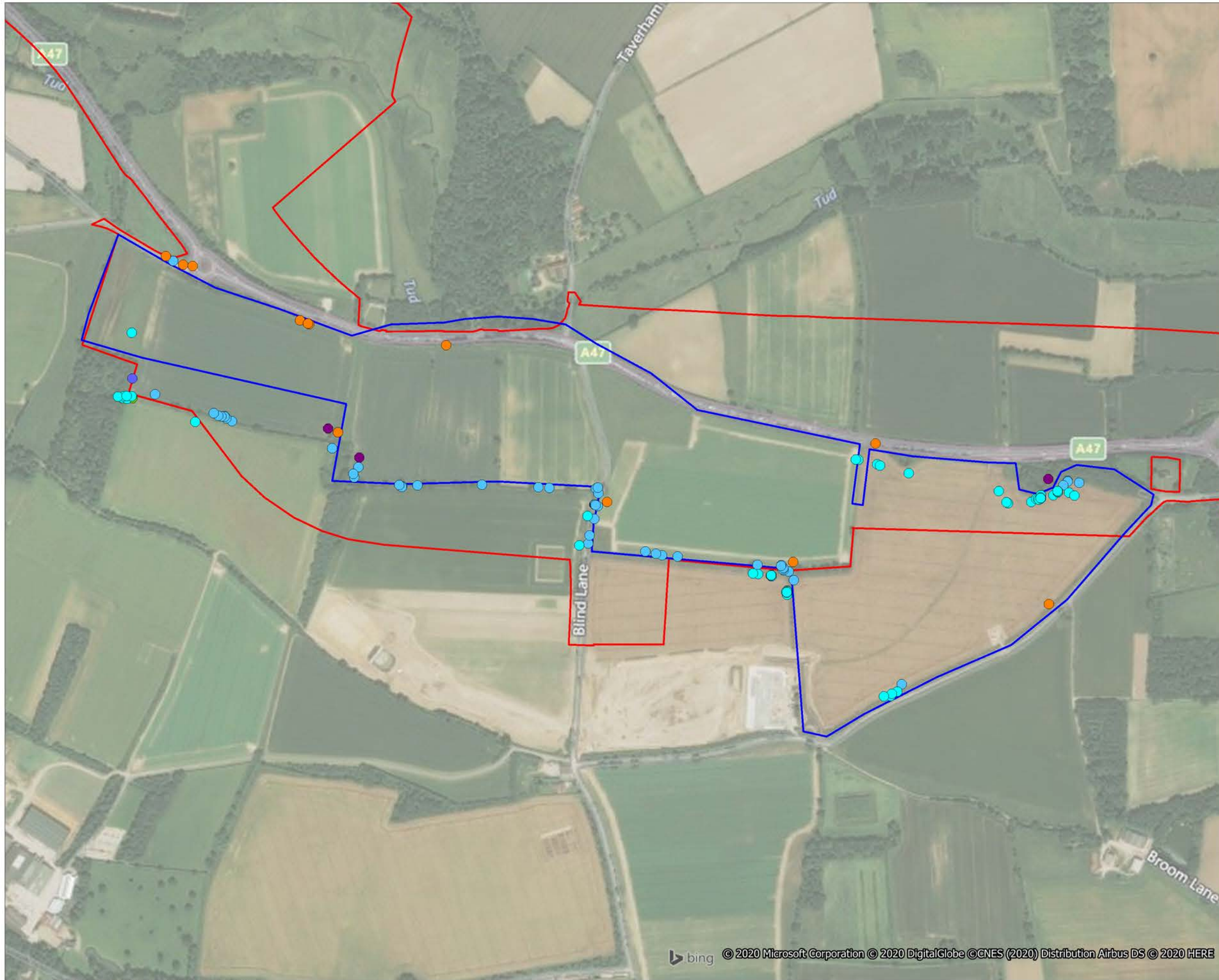
Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

A47 Improvements

Figure 11
Transect 5 - 16th October 2019
Map 8 of 8



Contains Ordnance Survey data © Crown copyright and database right 2019



- Site boundary
 - Bat transect route
- Bat Species**
- Barbastelle bat
 - Serotine bat
 - Daubenton's bat
 - Natterer's bat
 - Myotis bat species
 - Leisler's bat
 - Noctule bat
 - Nyctalus bat species
 - Nathusius's Pipistrelle bat
 - Common Pipistrelle bat
 - Soprano Pipistrelle bat
 - Pipistrelle bat species
 - Brown Long-eared bat

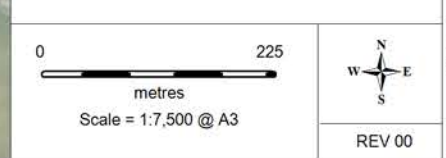


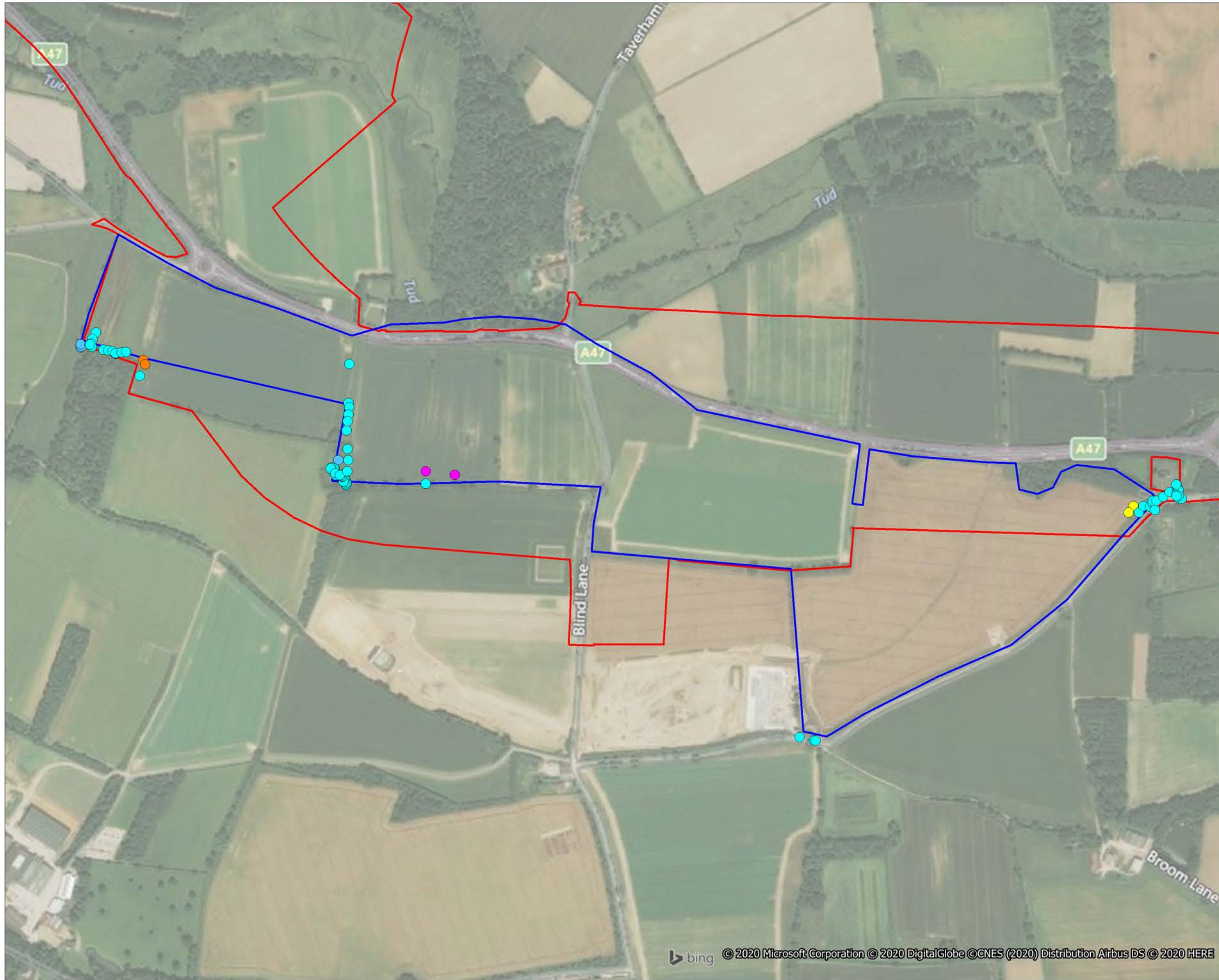
Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

A47 Improvements



Figure 12
Transect 6 - 18th July 2019
Map 1 of 8





- Site boundary
 - Bat transect route
- Bat Species**
- Barbastelle bat
 - Serotine bat
 - Daubenton's bat
 - Natterer's bat
 - Myotis bat species
 - Leisler's bat
 - Noctule bat
 - Nyctalus bat species
 - Nathusius's Pipistrelle bat
 - Common Pipistrelle bat
 - Soprano Pipistrelle bat
 - Pipistrelle bat species
 - Brown Long-eared bat

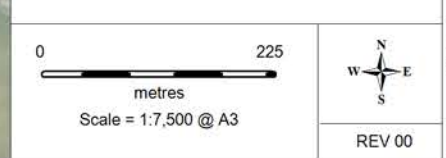


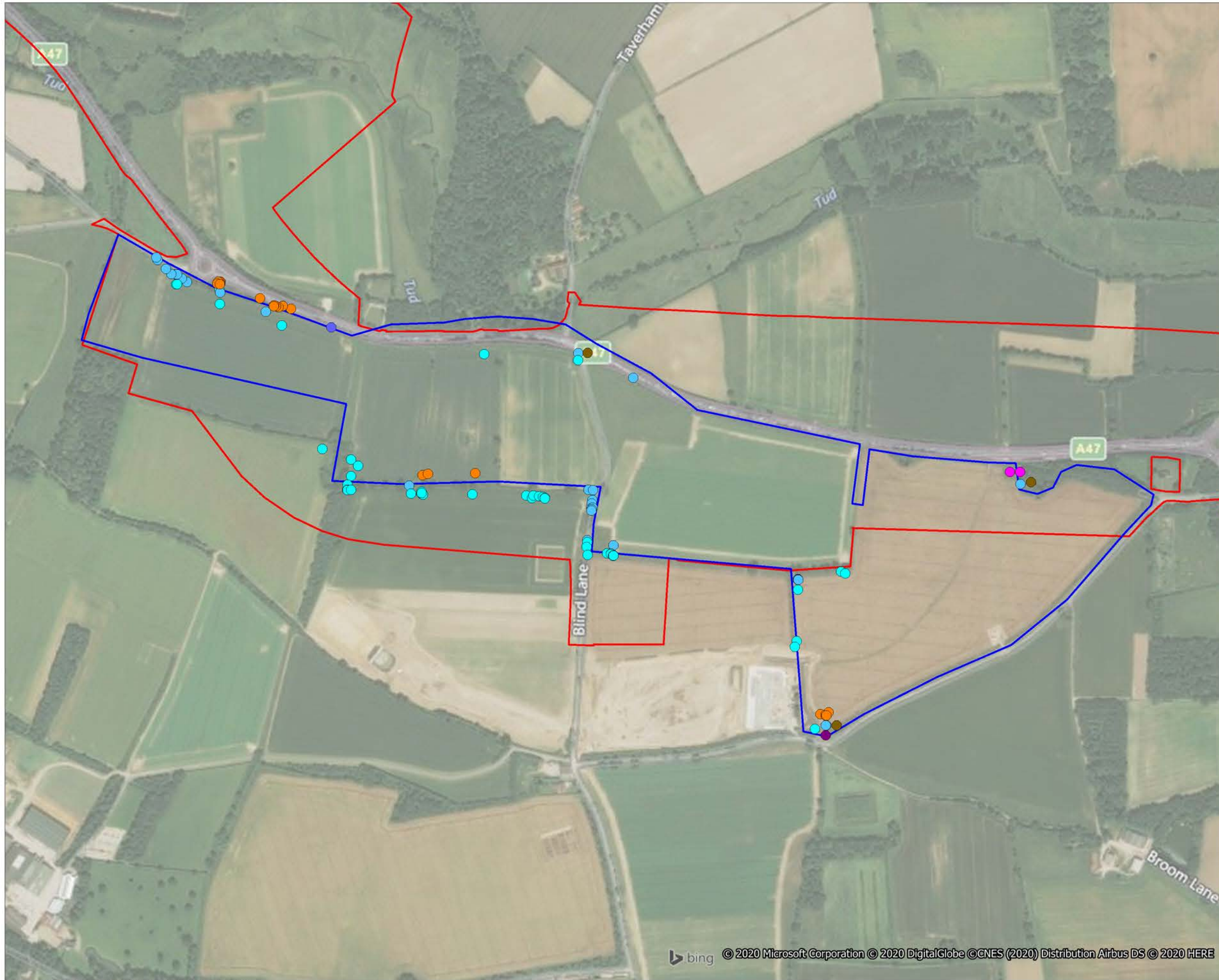
Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

A47 Improvements



Figure 12
Transect 6 - 30th July 2019
Map 2 of 8





- Site boundary
 - Bat transect route
- Bat Species**
- Barbastelle bat
 - Serotine bat
 - Daubenton's bat
 - Natterer's bat
 - Myotis bat species
 - Leisler's bat
 - Noctule bat
 - Nyctalus bat species
 - Nathusius's Pipistrelle bat
 - Common Pipistrelle bat
 - Soprano Pipistrelle bat
 - Pipistrelle bat species
 - Brown Long-eared bat

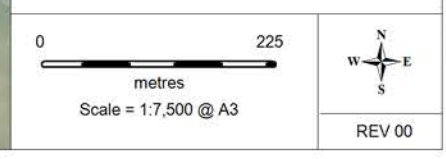


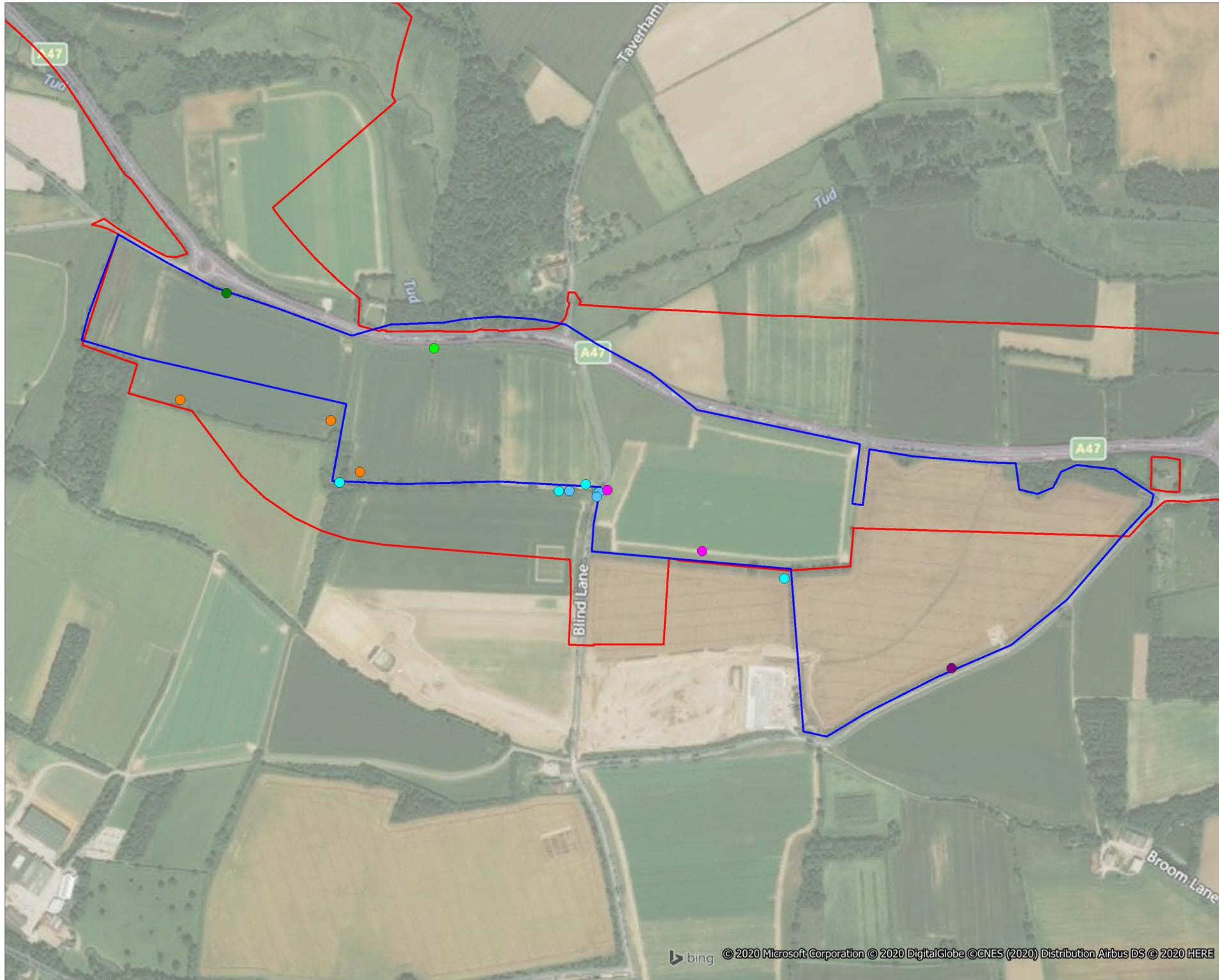
Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

A47 Improvements



Figure 12
Transect 6 - 8th August 2019
Map 3 of 8





- Site boundary
 - Bat transect route
- Bat Species**
- Barbastelle bat
 - Serotine bat
 - Daubenton's bat
 - Natterer's bat
 - Myotis bat species
 - Leisler's bat
 - Noctule bat
 - Nyctalus bat species
 - Nathusius's Pipistrelle bat
 - Common Pipistrelle bat
 - Soprano Pipistrelle bat
 - Pipistrelle bat species
 - Brown Long-eared bat

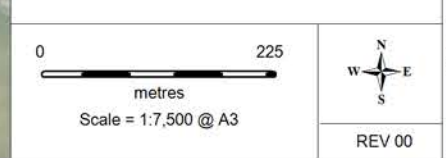


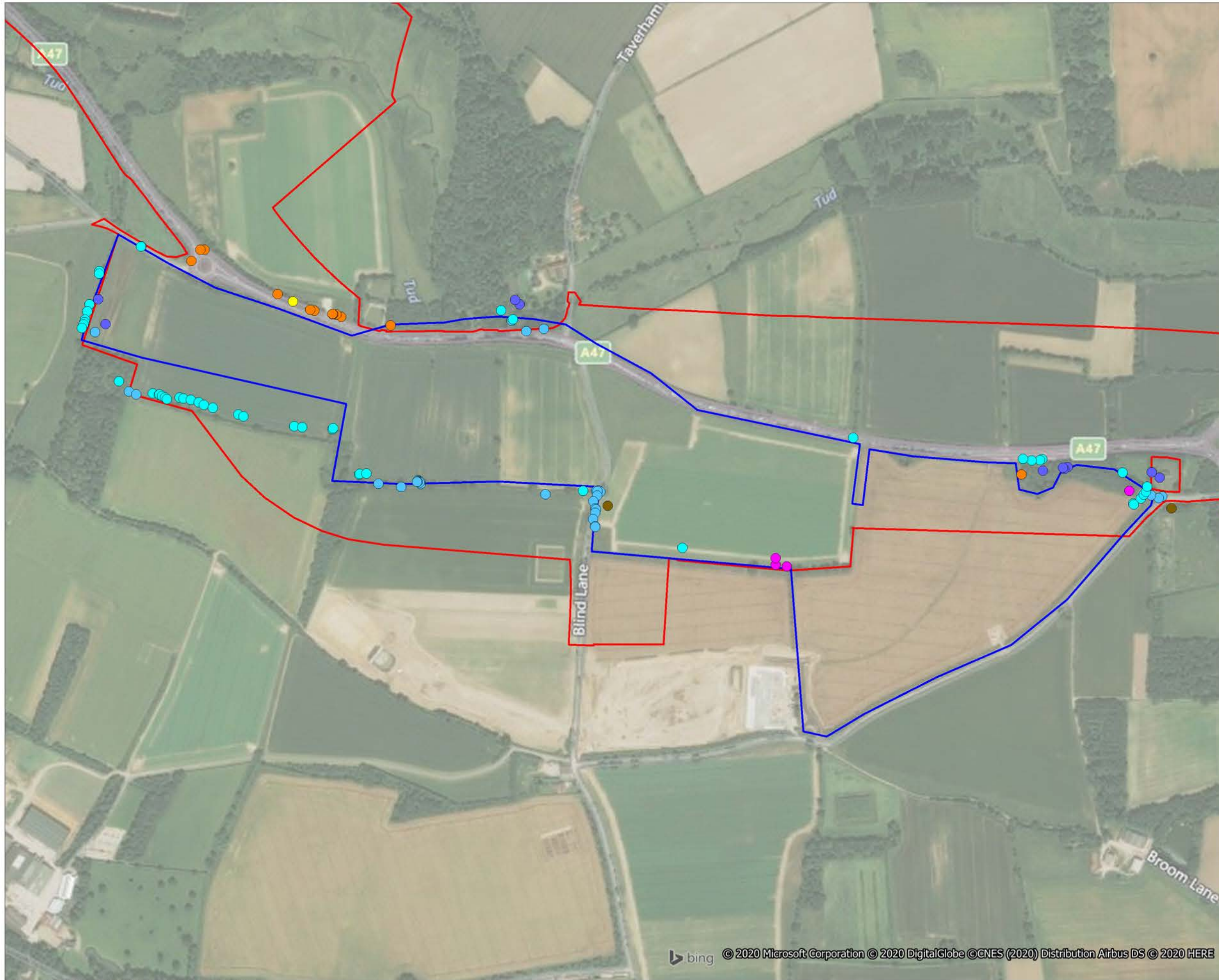
Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

A47 Improvements



Figure 12
Transect 6 - 19th August 2019
Map 4 of 8





- Site boundary
 - Bat transect route
- Bat Species**
- Barbastelle bat
 - Serotine bat
 - Daubenton's bat
 - Natterer's bat
 - Myotis bat species
 - Leisler's bat
 - Noctule bat
 - Nyctalus bat species
 - Nathusius's Pipistrelle bat
 - Common Pipistrelle bat
 - Soprano Pipistrelle bat
 - Pipistrelle bat species
 - Brown Long-eared bat

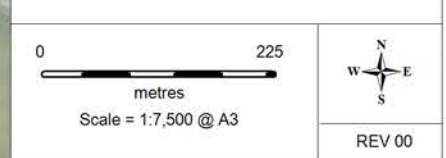


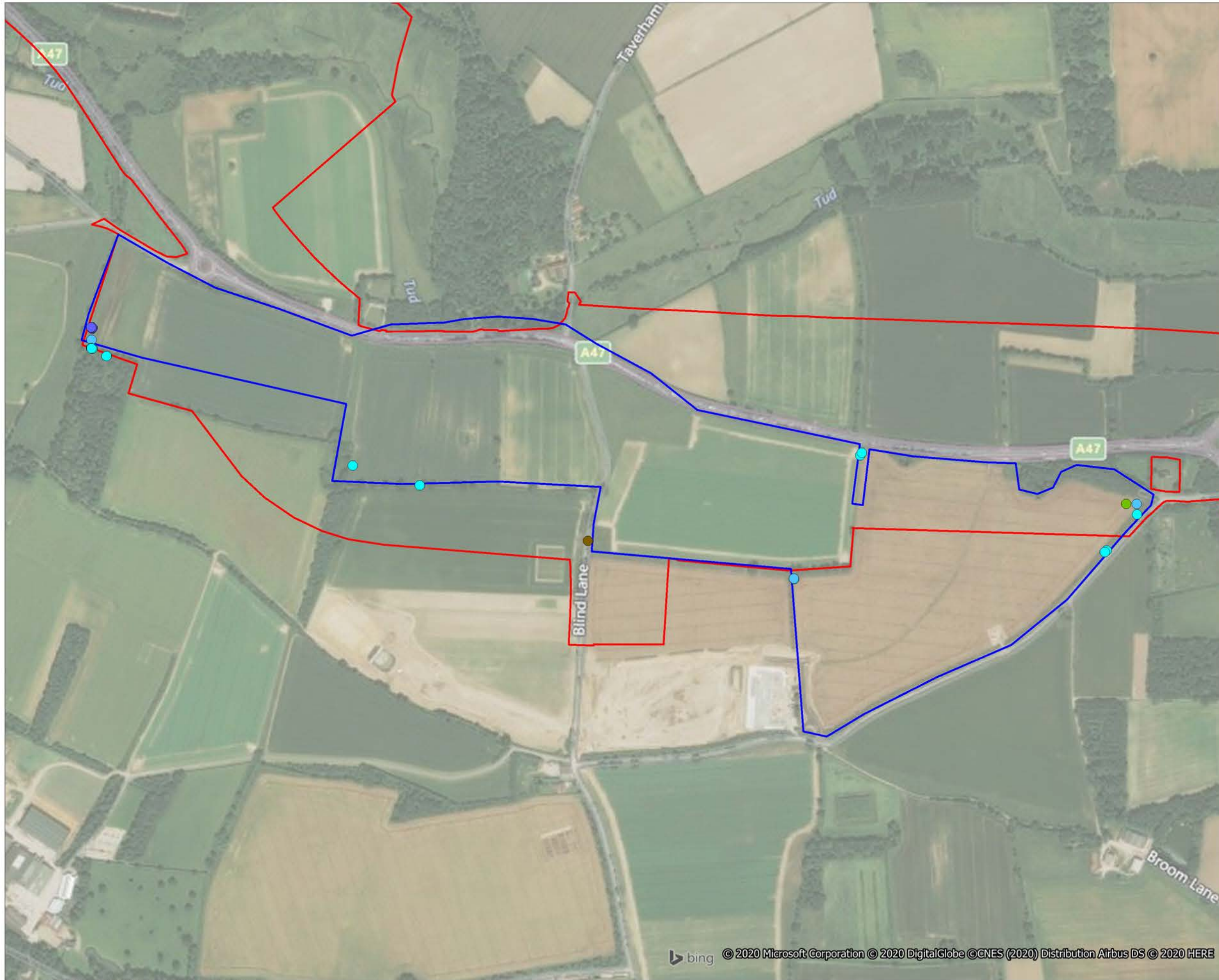
Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

A47 Improvements



Figure 12
Transect 6 - 11th September 2019
Map 5 of 8





- Site boundary
 - Bat transect route
- Bat Species**
- Barbastelle bat
 - Serotine bat
 - Daubenton's bat
 - Natterer's bat
 - Myotis bat species
 - Leisler's bat
 - Noctule bat
 - Nyctalus bat species
 - Nathusius's Pipistrelle bat
 - Common Pipistrelle bat
 - Soprano Pipistrelle bat
 - Pipistrelle bat species
 - Brown Long-eared bat



Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

A47 Improvements



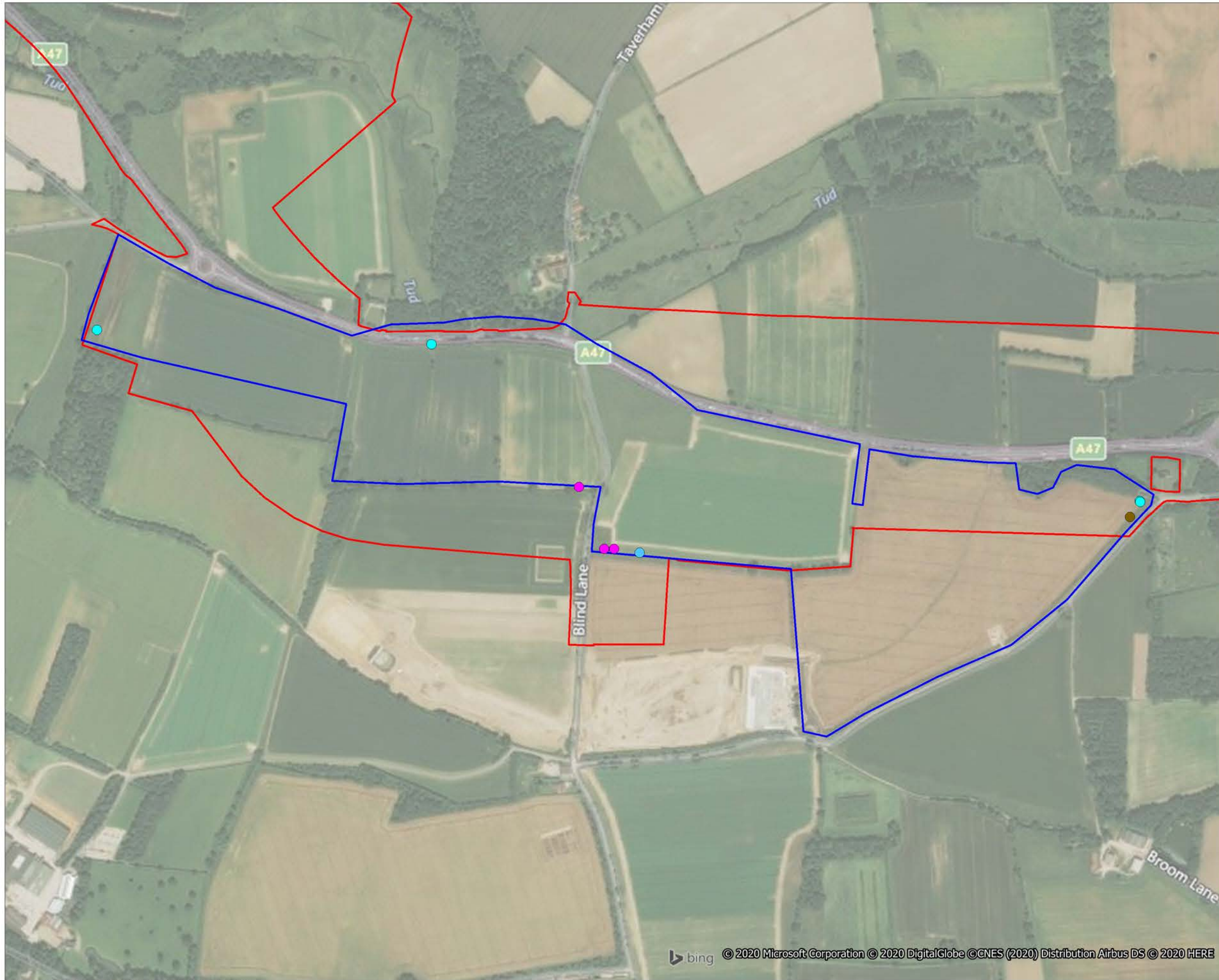
Figure 12
Transect 6 - 18th September 2019
Map 6 of 8

0 225

metres

Scale = 1:7,500 @ A3

REV 00



- Site boundary
 - Bat transect route
- Bat Species**
- Barbastelle bat
 - Serotine bat
 - Daubenton's bat
 - Natterer's bat
 - Myotis bat species
 - Leisler's bat
 - Noctule bat
 - Nyctalus bat species
 - Nathusius's Pipistrelle bat
 - Common Pipistrelle bat
 - Soprano Pipistrelle bat
 - Pipistrelle bat species
 - Brown Long-eared bat

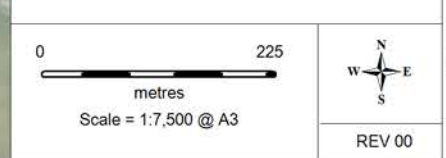


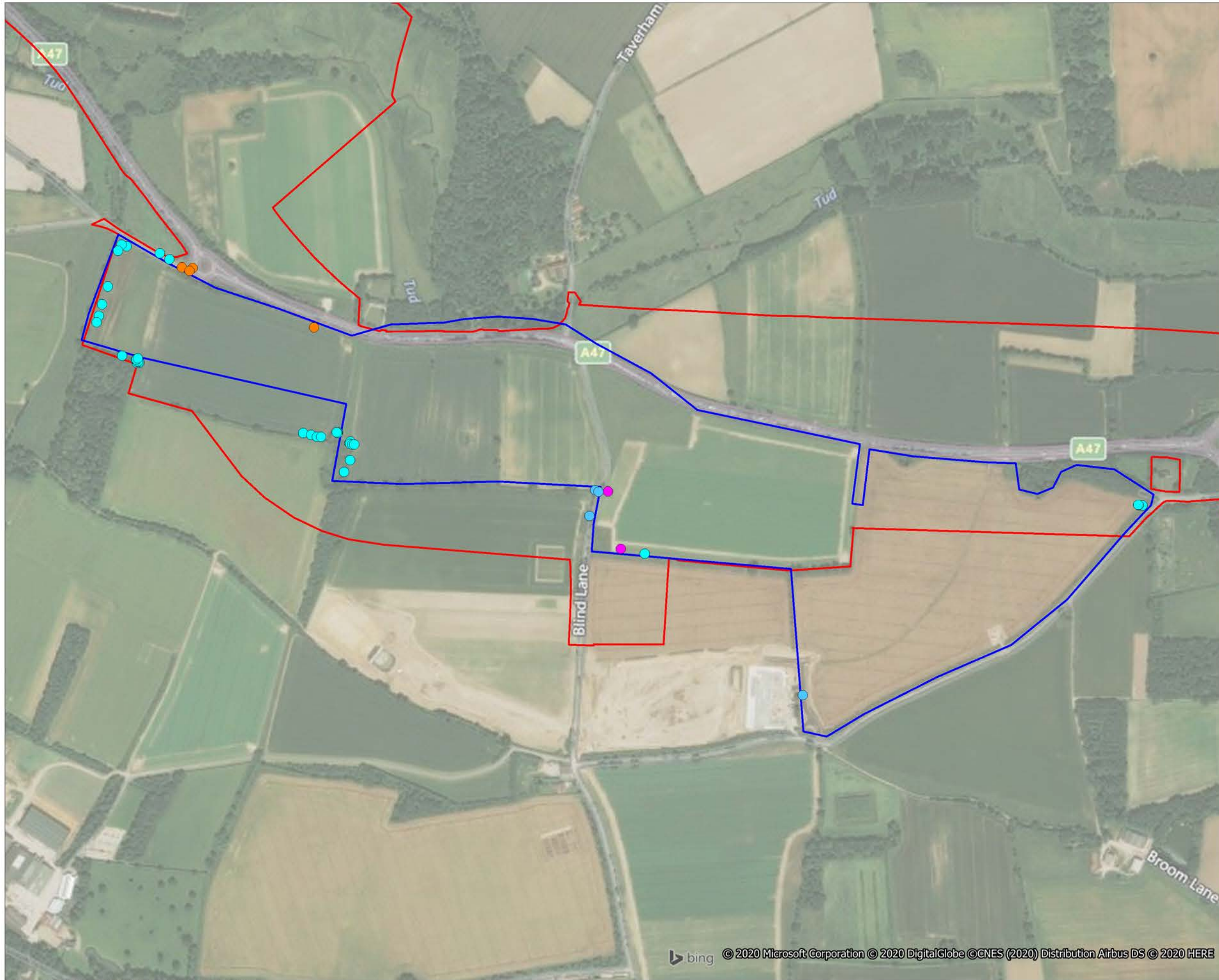
Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

A47 Improvements



Figure 12
Transect 6 - 3rd October 2019
Map 7 of 8





- Site boundary
 - Bat transect route
- Bat Species**
- Barbastelle bat
 - Serotine bat
 - Daubenton's bat
 - Natterer's bat
 - Myotic bat species
 - Leisler's bat
 - Noctule bat
 - Nyctalus bat species
 - Nathusius's Pipistrelle bat
 - Common Pipistrelle bat
 - Soprano Pipistrelle bat
 - Pipistrelle bat species
 - Brown Long-eared bat

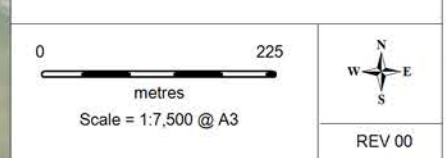


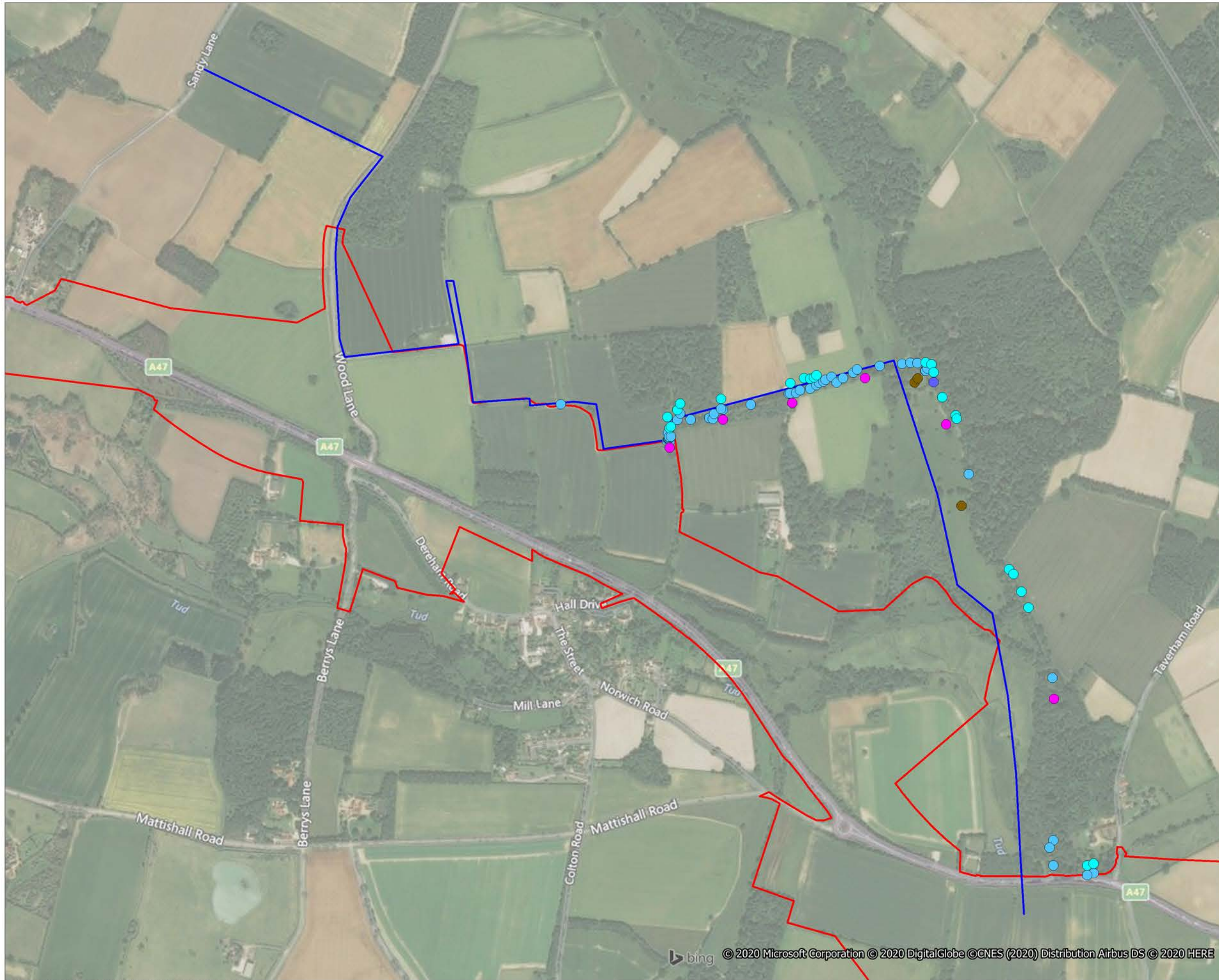
Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

A47 Improvements



Figure 12
Transect 6 - 16th October 2019
Map 8 of 8





- Site boundary
 - Bat transect route
- Bat Species**
- Barbastelle bat
 - Serotine bat
 - Daubenton's bat
 - Natterer's bat
 - Myotic bat species
 - Leisler's bat
 - Noctule bat
 - Nyctalus bat species
 - Nathusius's Pipistrelle bat
 - Common Pipistrelle bat
 - Soprano Pipistrelle bat
 - Pipistrelle bat species
 - Brown Long-eared bat

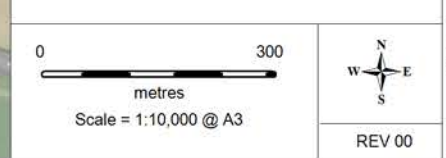


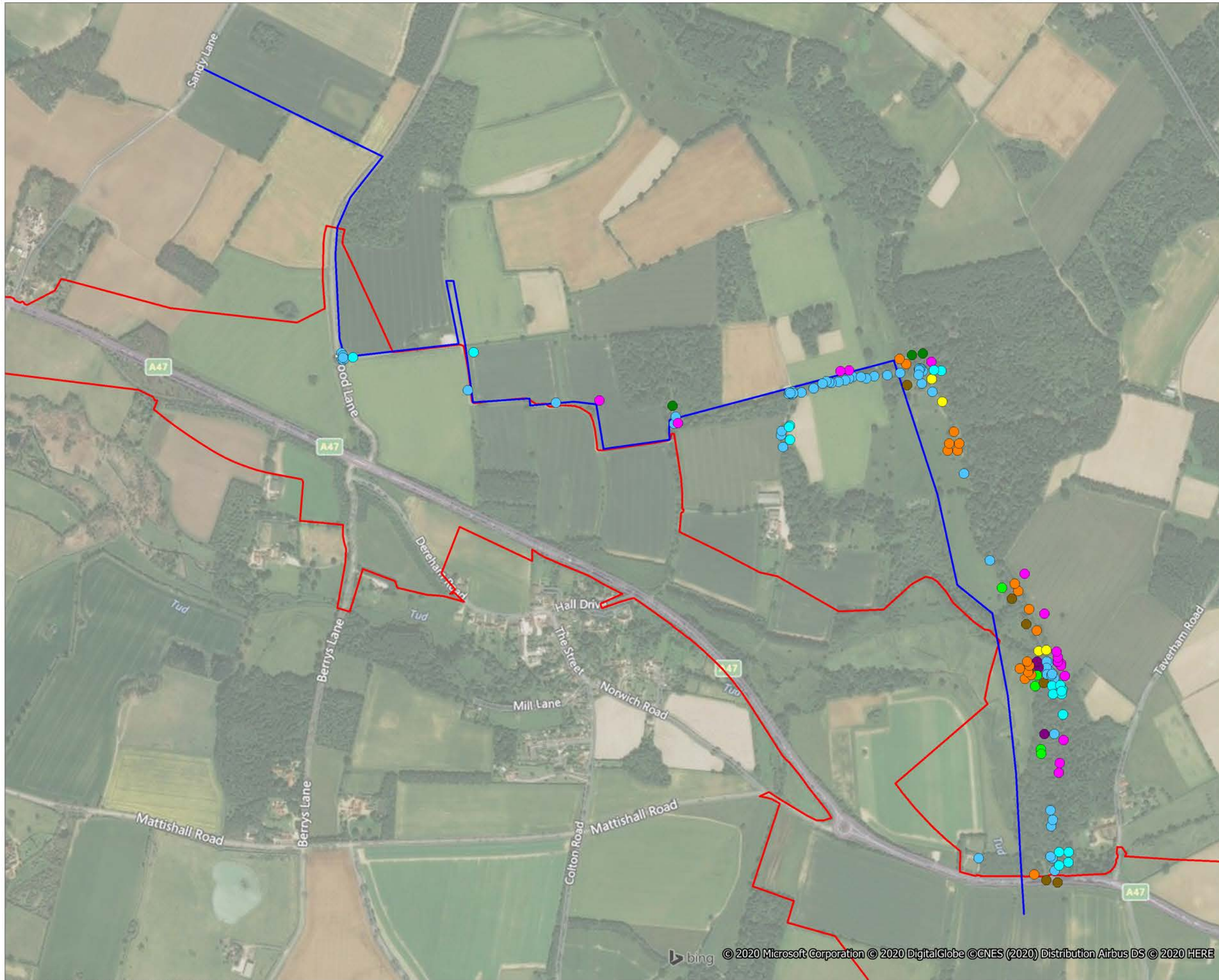
Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

A47 Improvements



Figure 13
Transect 7 - 26th June 2019
Map 1 of 8





- Site boundary
 - Bat transect route
- Bat Species**
- Barbastelle bat
 - Serotine bat
 - Daubenton's bat
 - Natterer's bat
 - Myotis bat species
 - Leisler's bat
 - Noctule bat
 - Nyctalus bat species
 - Nathusius's Pipistrelle bat
 - Common Pipistrelle bat
 - Soprano Pipistrelle bat
 - Pipistrelle bat species
 - Brown Long-eared bat

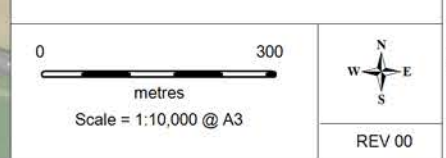


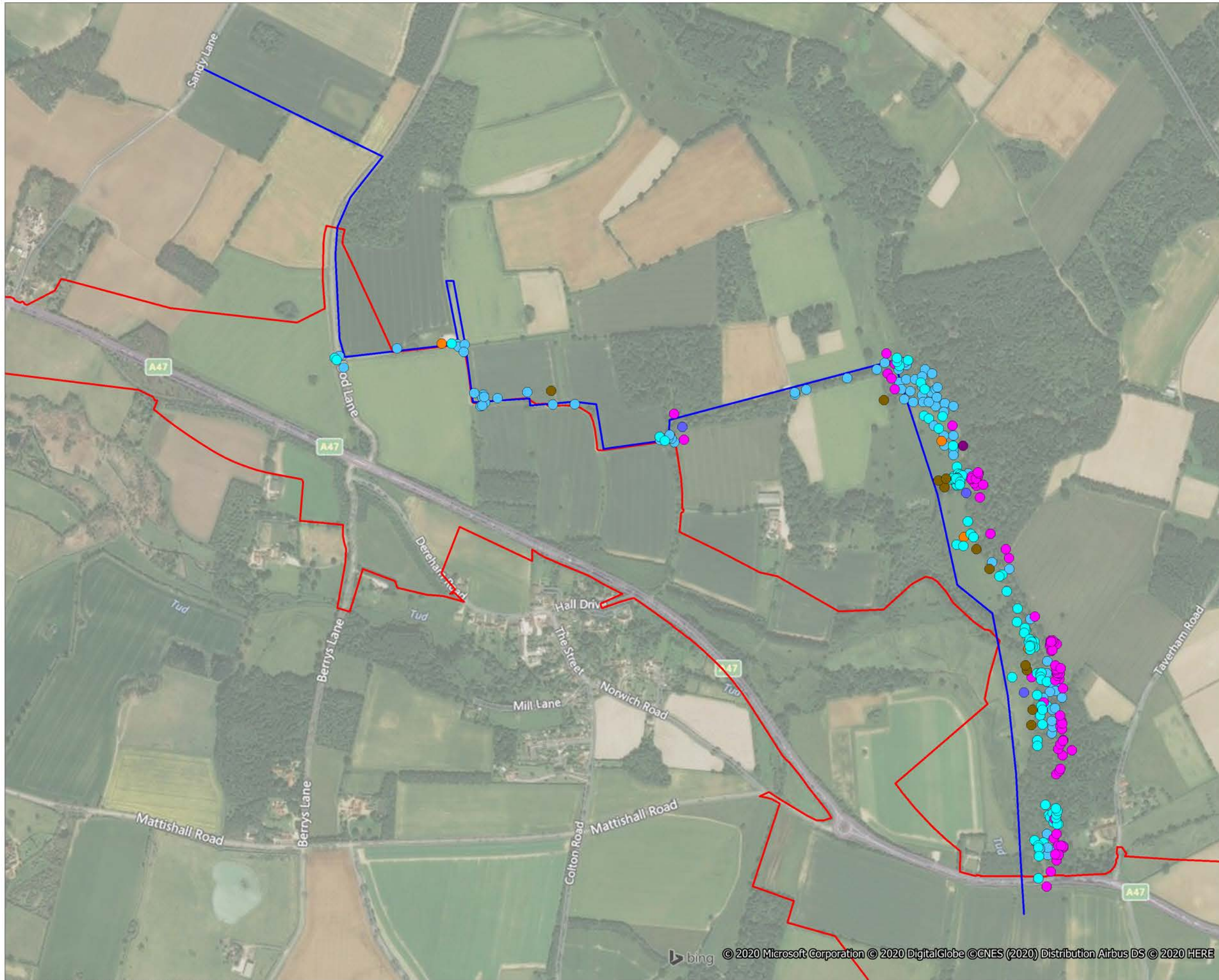
Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

A47 Improvements



Figure 13
Transect 7 - 18th July 2019
Map 2 of 8





- Site boundary
 - Bat transect route
- Bat Species**
- Barbastelle bat
 - Serotine bat
 - Daubenton's bat
 - Natterer's bat
 - Myotis bat species
 - Leisler's bat
 - Noctule bat
 - Nyctalus bat species
 - Nathusius's Pipistrelle bat
 - Common Pipistrelle bat
 - Soprano Pipistrelle bat
 - Pipistrelle bat species
 - Brown Long-eared bat



Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

A47 Improvements



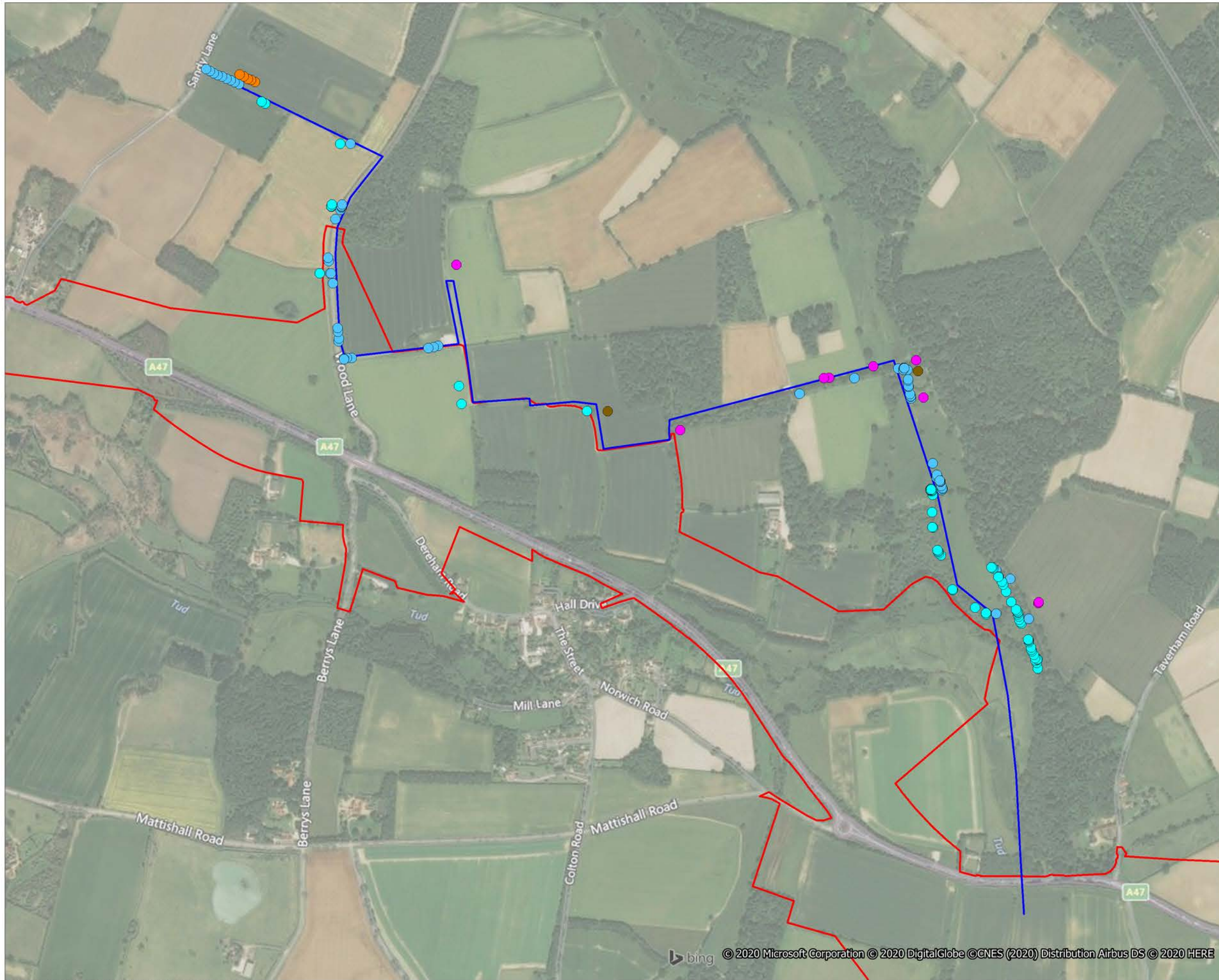
Figure 13
Transect 7 - 7th August 2019
Map 3 of 8

0 300

metres

Scale = 1:10,000 @ A3

REV 00



- Site boundary
 - Bat transect route
- Bat Species**
- Barbastelle bat
 - Serotine bat
 - Daubenton's bat
 - Natterer's bat
 - Myotis bat species
 - Leisler's bat
 - Noctule bat
 - Nyctalus bat species
 - Nathusius's Pipistrelle bat
 - Common Pipistrelle bat
 - Soprano Pipistrelle bat
 - Pipistrelle bat species
 - Brown Long-eared bat

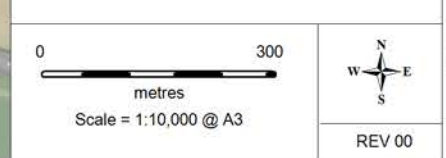


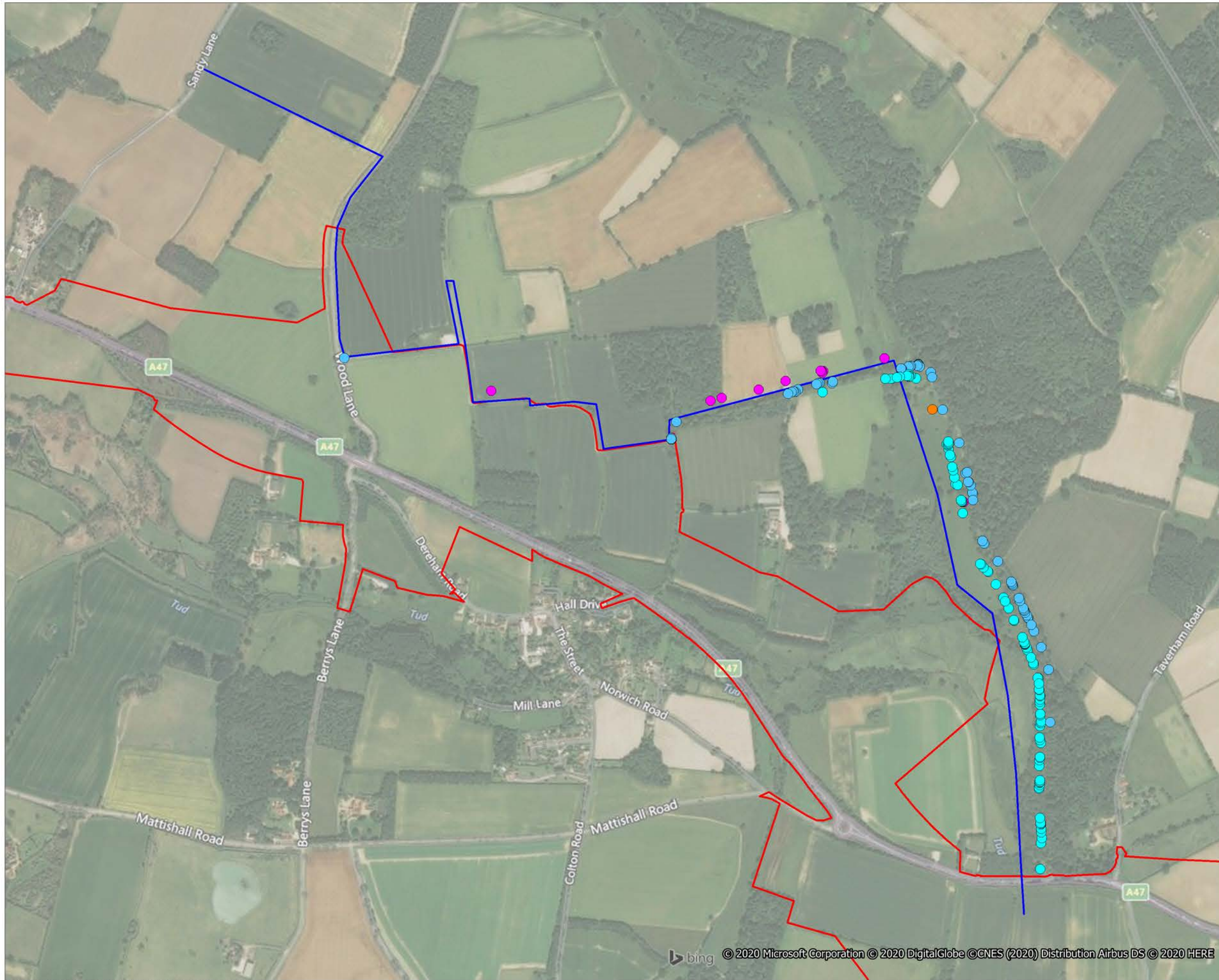
Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

A47 Improvements



Figure 13
Transect 7 - 27th August 2019
Map 4 of 8





- Site boundary
 - Bat transect route
- Bat Species**
- Barbastelle bat
 - Serotine bat
 - Daubenton's bat
 - Natterer's bat
 - Myotis bat species
 - Leisler's bat
 - Noctule bat
 - Nyctalus bat species
 - Nathusius's Pipistrelle bat
 - Common Pipistrelle bat
 - Soprano Pipistrelle bat
 - Pipistrelle bat species
 - Brown Long-eared bat



Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

A47 Improvements

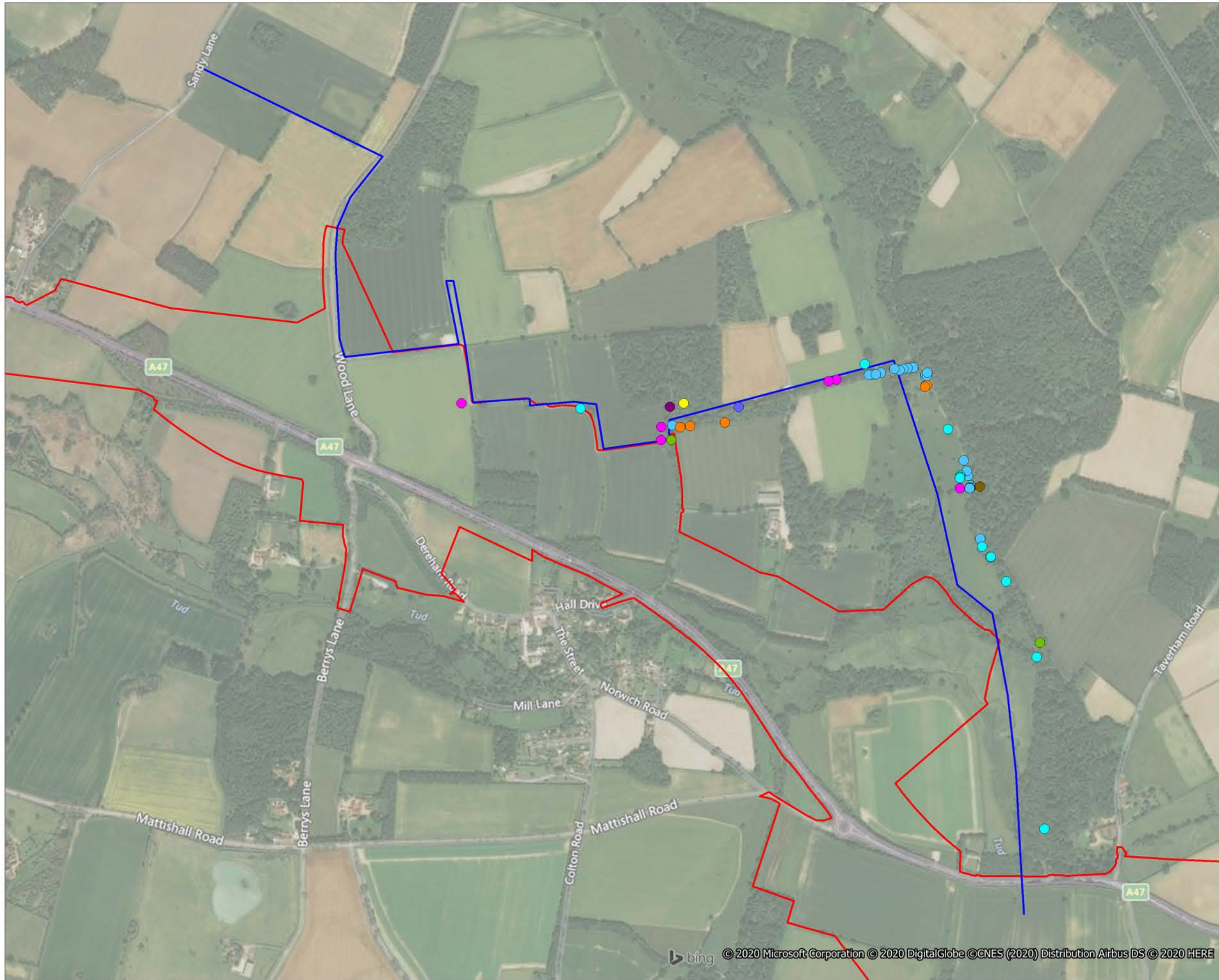
Figure 13
Transect 7 - 2nd September 2019
Map 5 of 8

0 300

metres

Scale = 1:10,000 @ A3

REV 00



- Site boundary
 - Bat transect route
- Bat Species**
- Barbastelle bat
 - Serotine bat
 - Daubenton's bat
 - Natterer's bat
 - Myotic bat species
 - Leisler's bat
 - Noctule bat
 - Nyctalus bat species
 - Nathusius's Pipistrelle bat
 - Common Pipistrelle bat
 - Soprano Pipistrelle bat
 - Pipistrelle bat species
 - Brown Long-eared bat

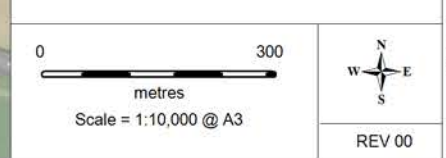


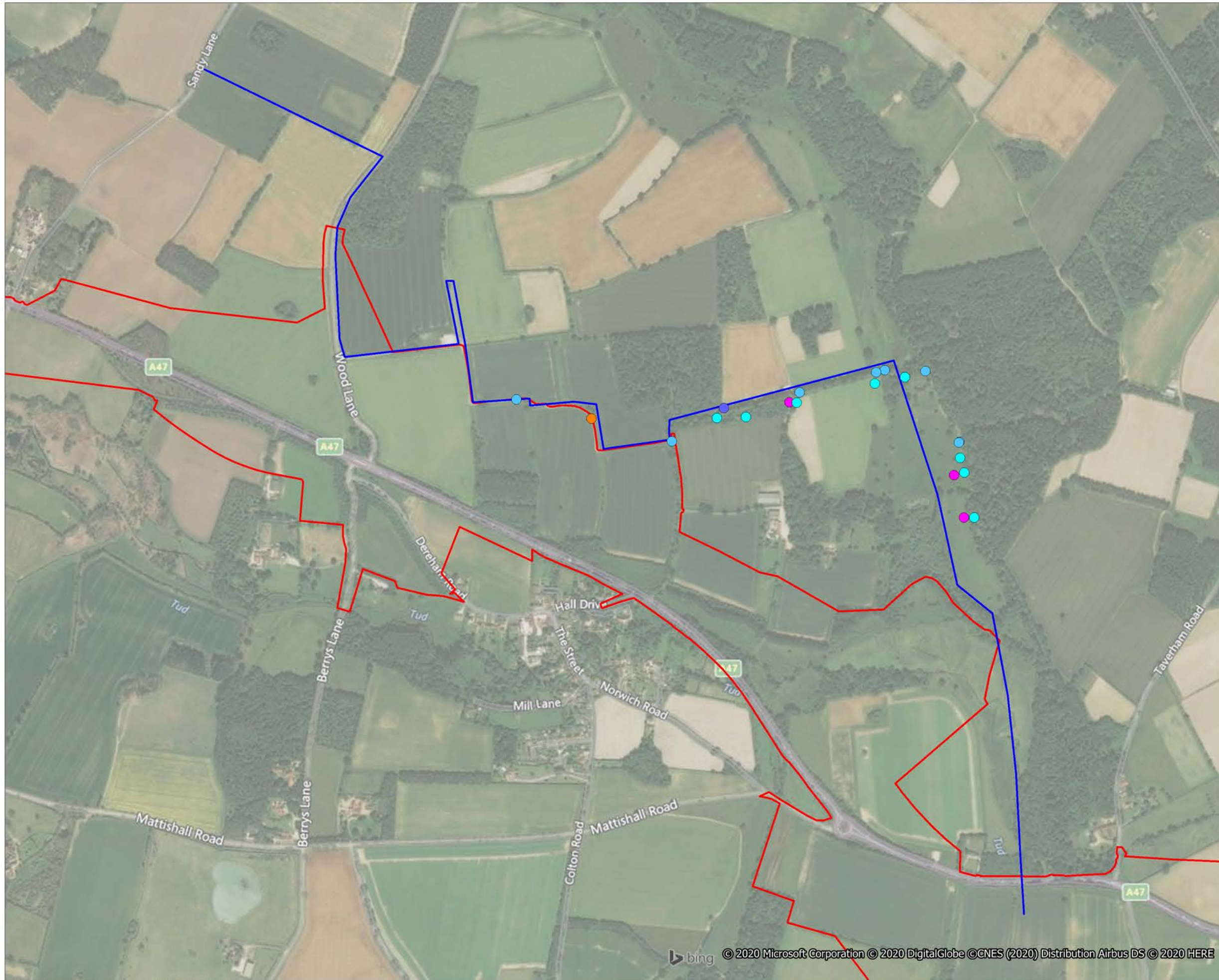
Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

A47 Improvements



Figure 13
Transect 7 - 16th September 2019
Map 6 of 8





- Site boundary
 - Bat transect route
- Bat Species**
- Barbastelle bat
 - Serotine bat
 - Daubenton's bat
 - Natterer's bat
 - Myotis bat species
 - Leisler's bat
 - Noctule bat
 - Nyctalus bat species
 - Nathusius's Pipistrelle bat
 - Common Pipistrelle bat
 - Soprano Pipistrelle bat
 - Pipistrelle bat species
 - Brown Long-eared bat

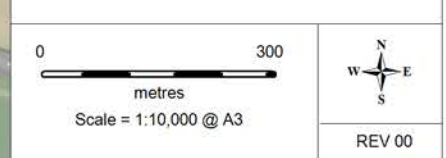


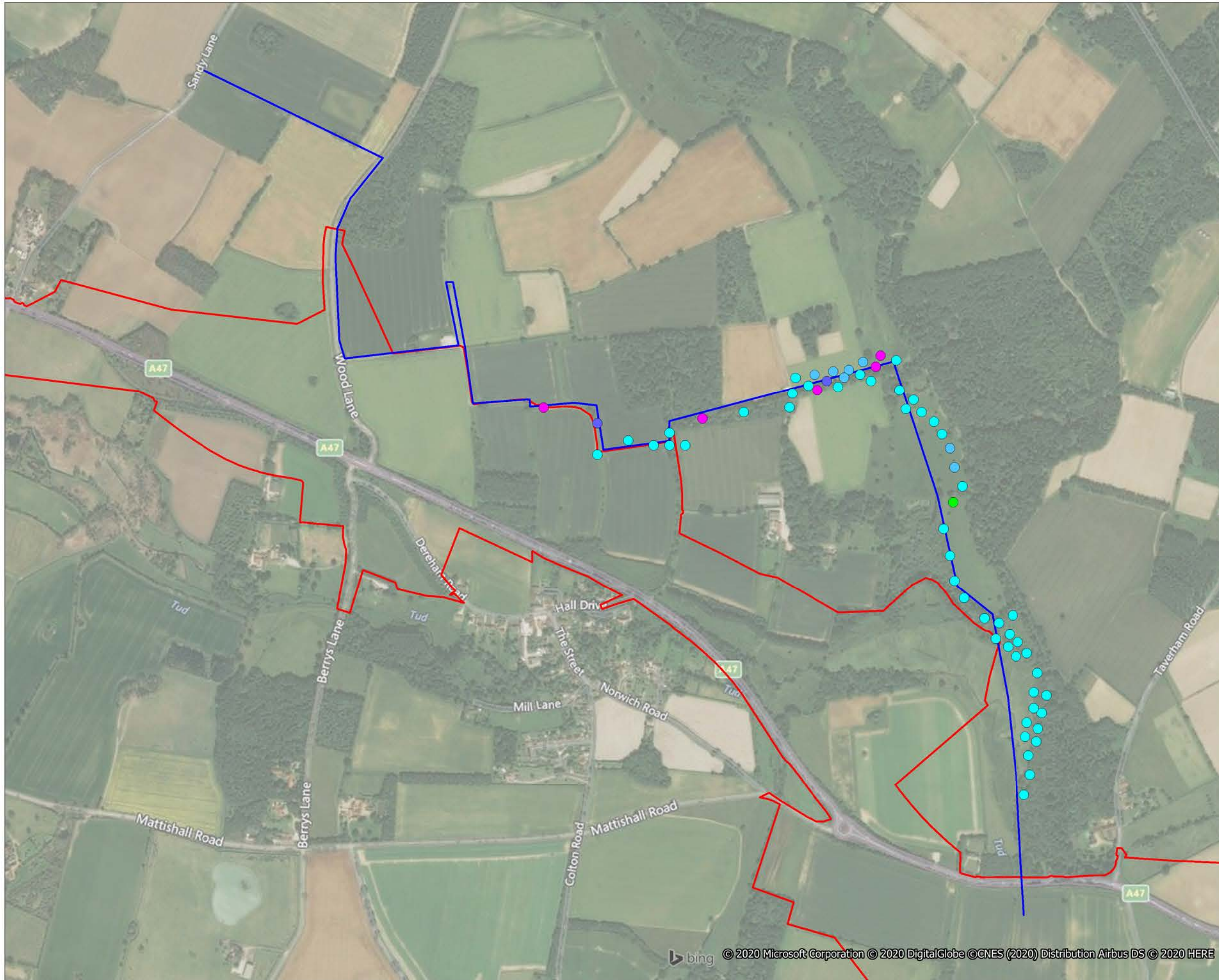
Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

A47 Improvements



Figure 13
Transect 7 - 9th October 2019
Map 7 of 8





- Site boundary
 - Bat transect route
- Bat Species**
- Barbastelle bat
 - Serotine bat
 - Daubenton's bat
 - Natterer's bat
 - Myotis bat species
 - Leisler's bat
 - Noctule bat
 - Nyctalus bat species
 - Nathusius's Pipistrelle bat
 - Common Pipistrelle bat
 - Soprano Pipistrelle bat
 - Pipistrelle bat species
 - Brown Long-eared bat

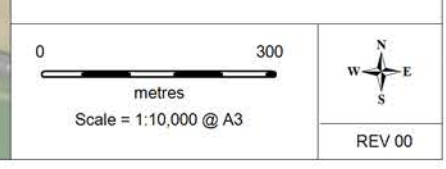


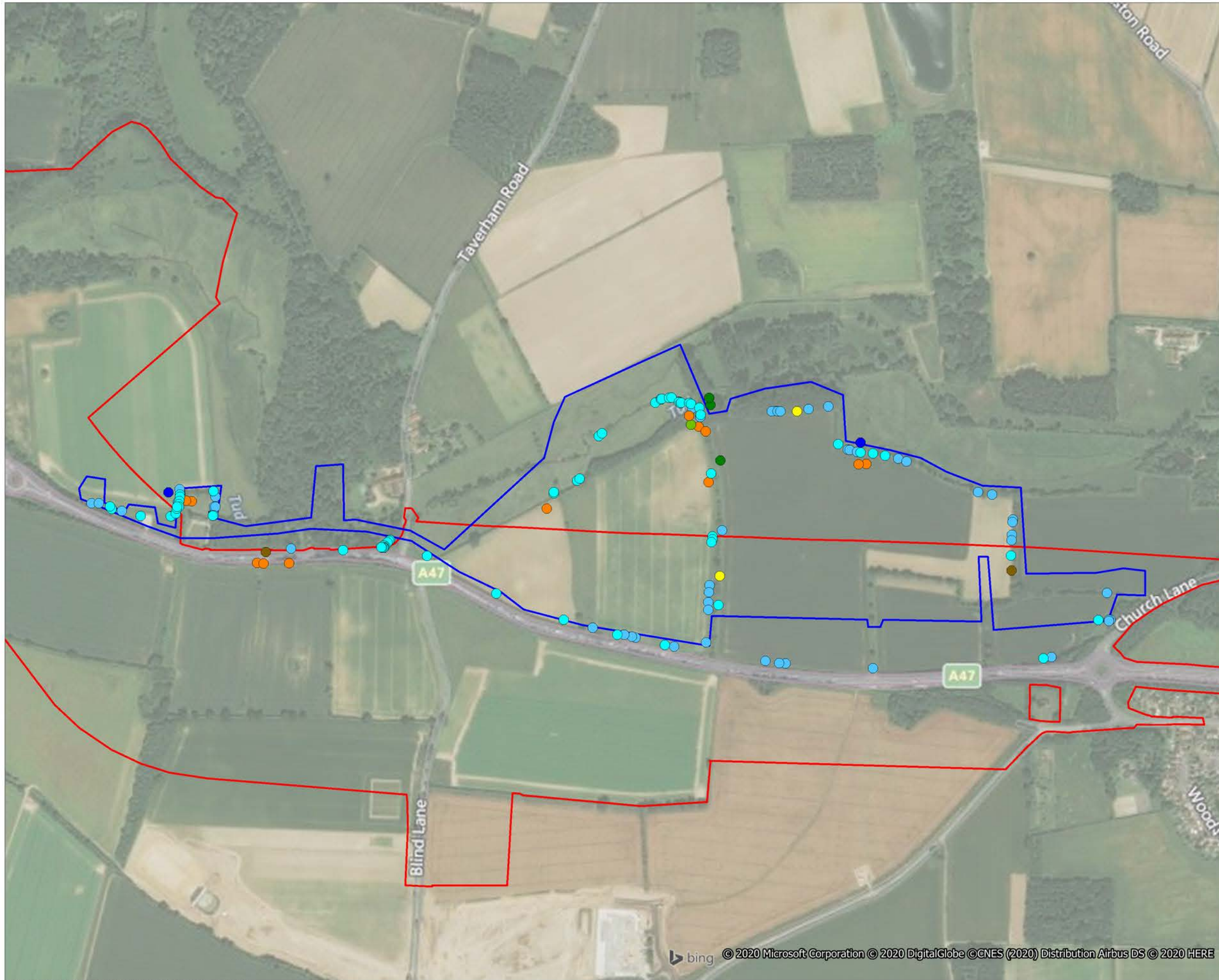
Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

A47 Improvements



Figure 13
Transect 7 - 21st October 2019
Map 8 of 8





- Site boundary
 - Bat transect route
- Bat Species**
- Barbastelle bat
 - Serotine bat
 - Daubenton's bat
 - Natterer's bat
 - Myotic bat species
 - Leisler's bat
 - Noctule bat
 - Nyctalus bat species
 - Nathusius's Pipistrelle bat
 - Common Pipistrelle bat
 - Soprano Pipistrelle bat
 - Pipistrelle bat species
 - Brown Long-eared bat

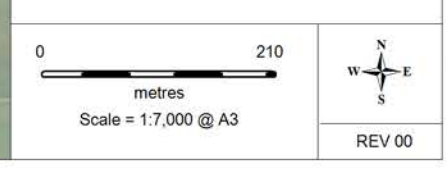


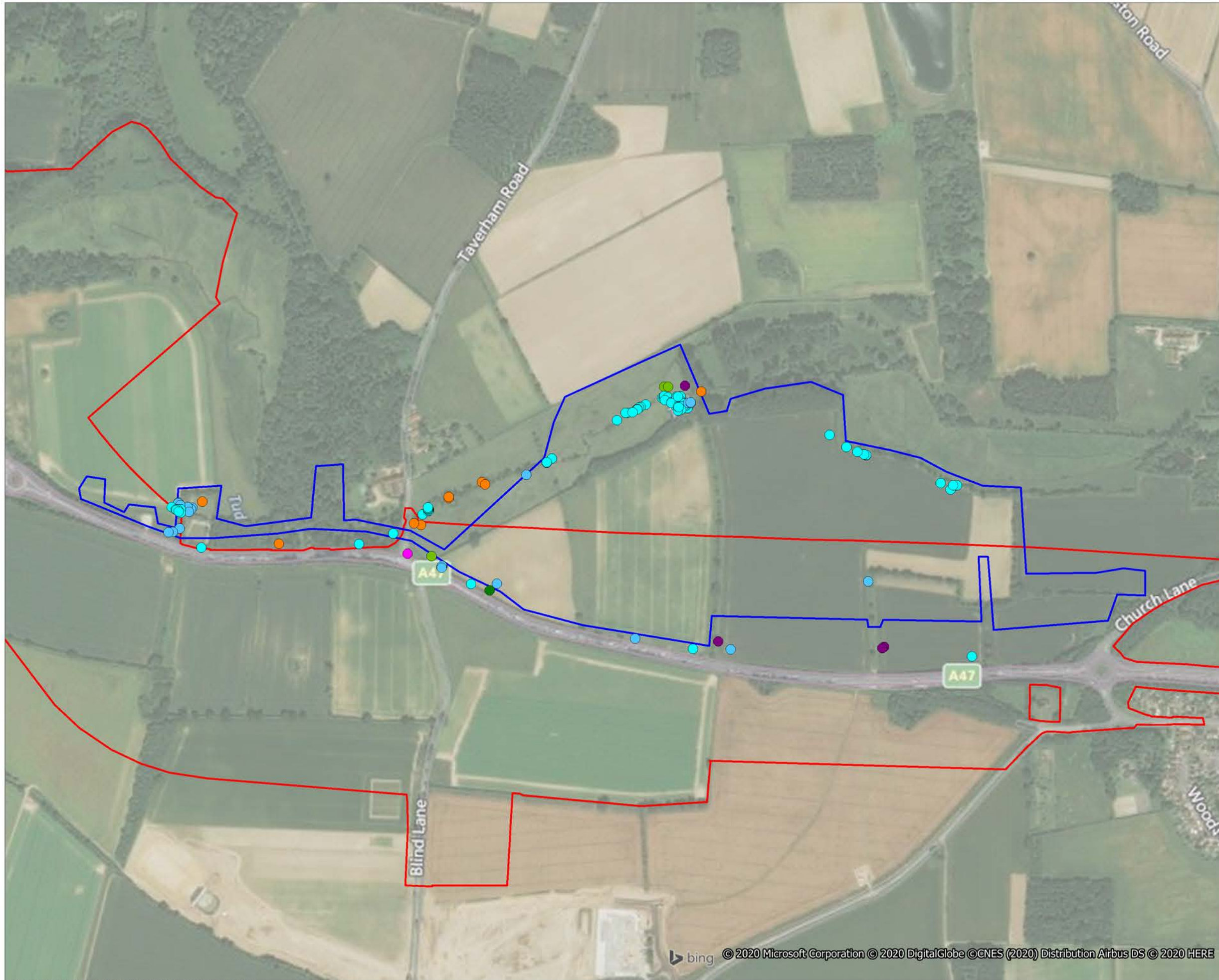
Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

A47 Improvements



Figure 14
Transect 8 - 18th July 2019
Map 1 of 7





- Site boundary
 - Bat transect route
- Bat Species**
- Barbastelle bat
 - Serotine bat
 - Daubenton's bat
 - Natterer's bat
 - Myotic bat species
 - Leisler's bat
 - Noctule bat
 - Nyctalus bat species
 - Nathusius's Pipistrelle bat
 - Common Pipistrelle bat
 - Soprano Pipistrelle bat
 - Pipistrelle bat species
 - Brown Long-eared bat



Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

A47 Improvements

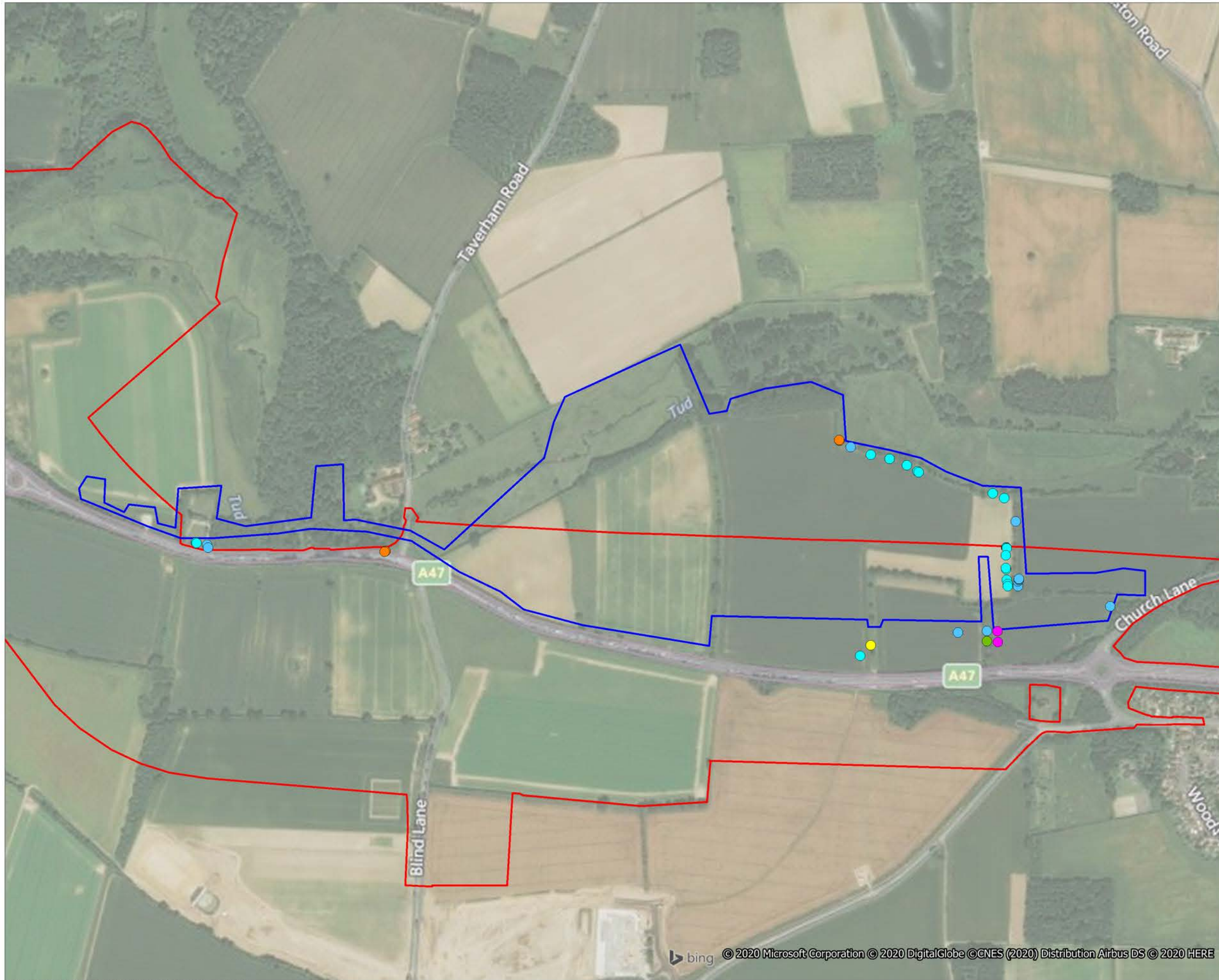
Figure 14
Transect 8 - 7th August 2019
Map 2 of 7

0 210

metres

Scale = 1:7,000 @ A3

REV 00



- Site boundary
 - Bat transect route
- Bat Species**
- Barbastelle bat
 - Serotine bat
 - Daubenton's bat
 - Natterer's bat
 - Myotic bat species
 - Leisler's bat
 - Noctule bat
 - Nyctalus bat species
 - Nathusius's Pipistrelle bat
 - Common Pipistrelle bat
 - Soprano Pipistrelle bat
 - Pipistrelle bat species
 - Brown Long-eared bat

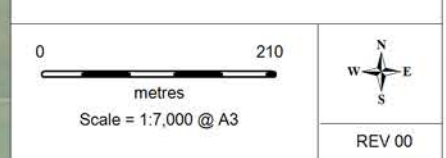


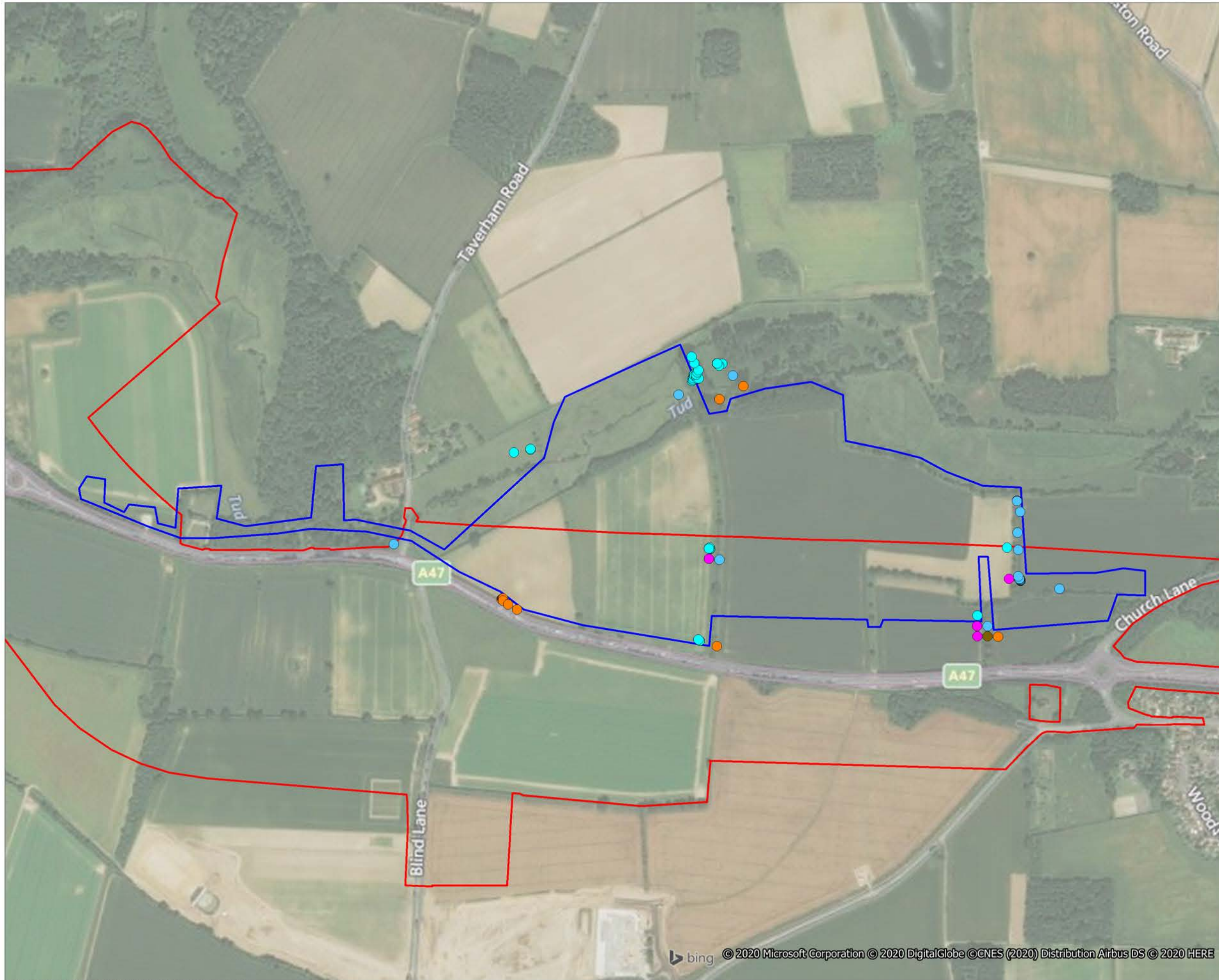
Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

A47 Improvements



Figure 14
Transect 8 - 27th August 2019
Map 3 of 7





- Site boundary
 - Bat transect route
- Bat Species**
- Barbastelle bat
 - Serotine bat
 - Daubenton's bat
 - Natterer's bat
 - Myotic bat species
 - Leisler's bat
 - Noctule bat
 - Nyctalus bat species
 - Nathusius's Pipistrelle bat
 - Common Pipistrelle bat
 - Soprano Pipistrelle bat
 - Pipistrelle bat species
 - Brown Long-eared bat

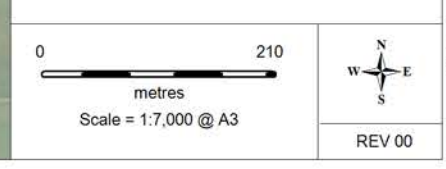


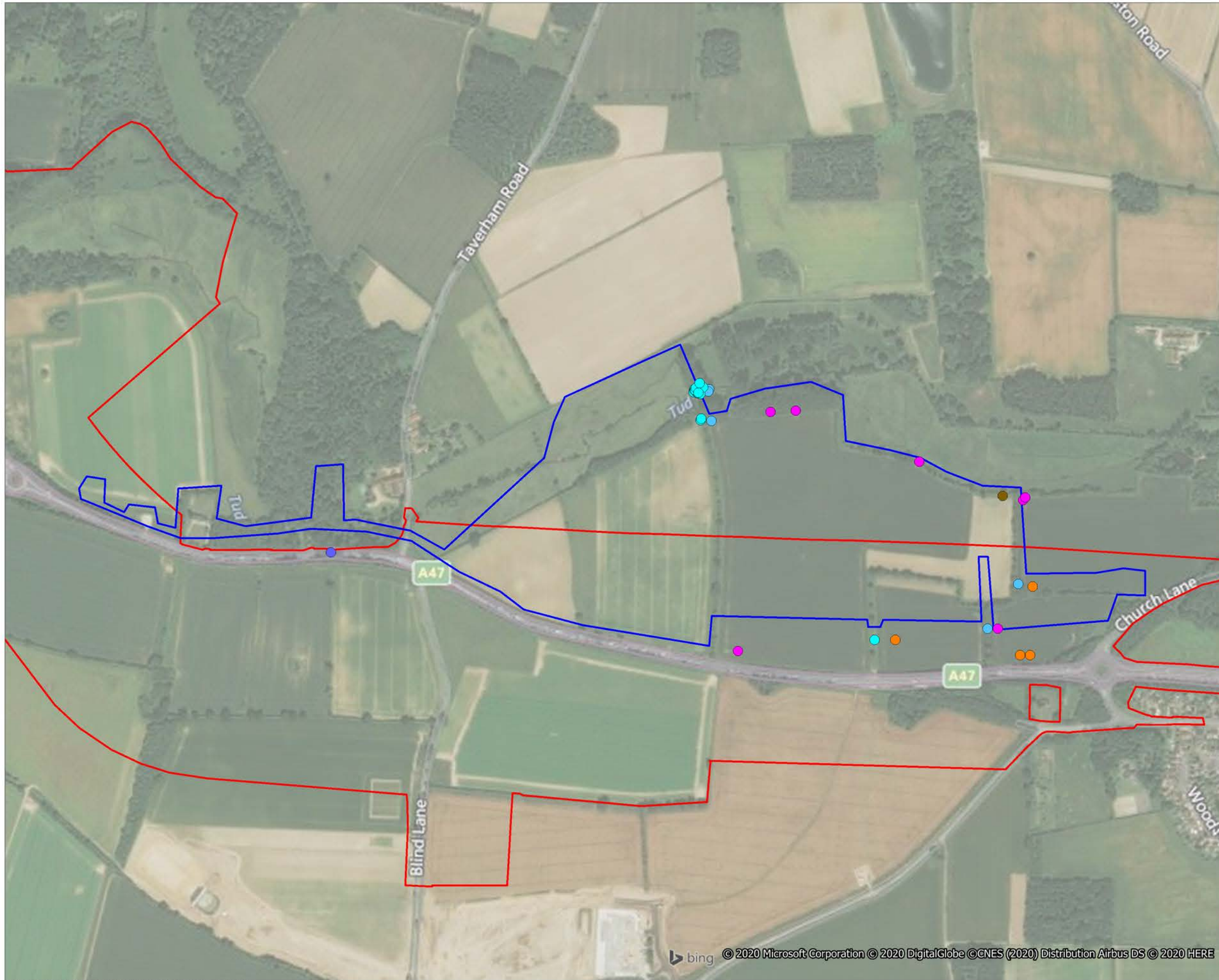
Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

A47 Improvements



Figure 14
Transect 8 - 2nd September 2019
Map 4 of 7





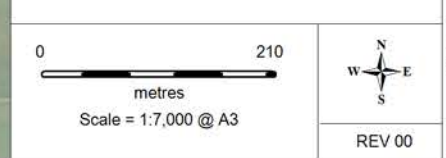
- Site boundary
 - Bat transect route
- Bat Species**
- Barbastelle bat
 - Serotine bat
 - Daubenton's bat
 - Natterer's bat
 - Myotic bat species
 - Leisler's bat
 - Noctule bat
 - Nyctalus bat species
 - Nathusius's Pipistrelle bat
 - Common Pipistrelle bat
 - Soprano Pipistrelle bat
 - Pipistrelle bat species
 - Brown Long-eared bat

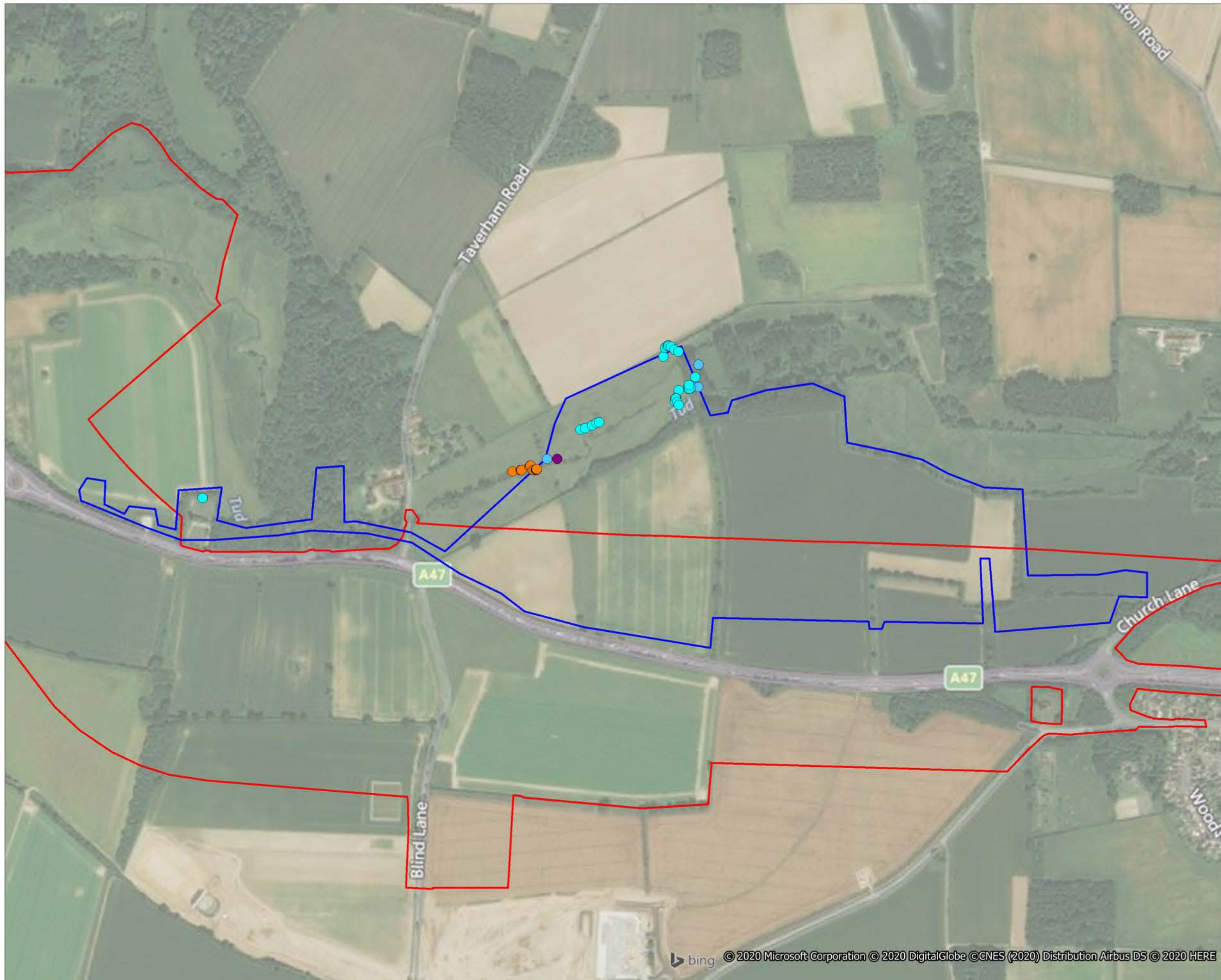


Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

A47 Improvements

Figure 14
Transect 8 - 16th September 2019
Map 5 of 7





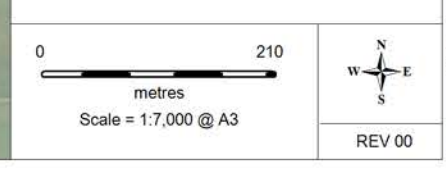
- Site boundary
 - Bat transect route
- Bat Species**
- Barbastelle bat
 - Serotine bat
 - Daubenton's bat
 - Natterer's bat
 - Myotic bat species
 - Leisler's bat
 - Noctule bat
 - Nyctalus bat species
 - Nathusius's Pipistrelle bat
 - Common Pipistrelle bat
 - Soprano Pipistrelle bat
 - Pipistrelle bat species
 - Brown Long-eared bat

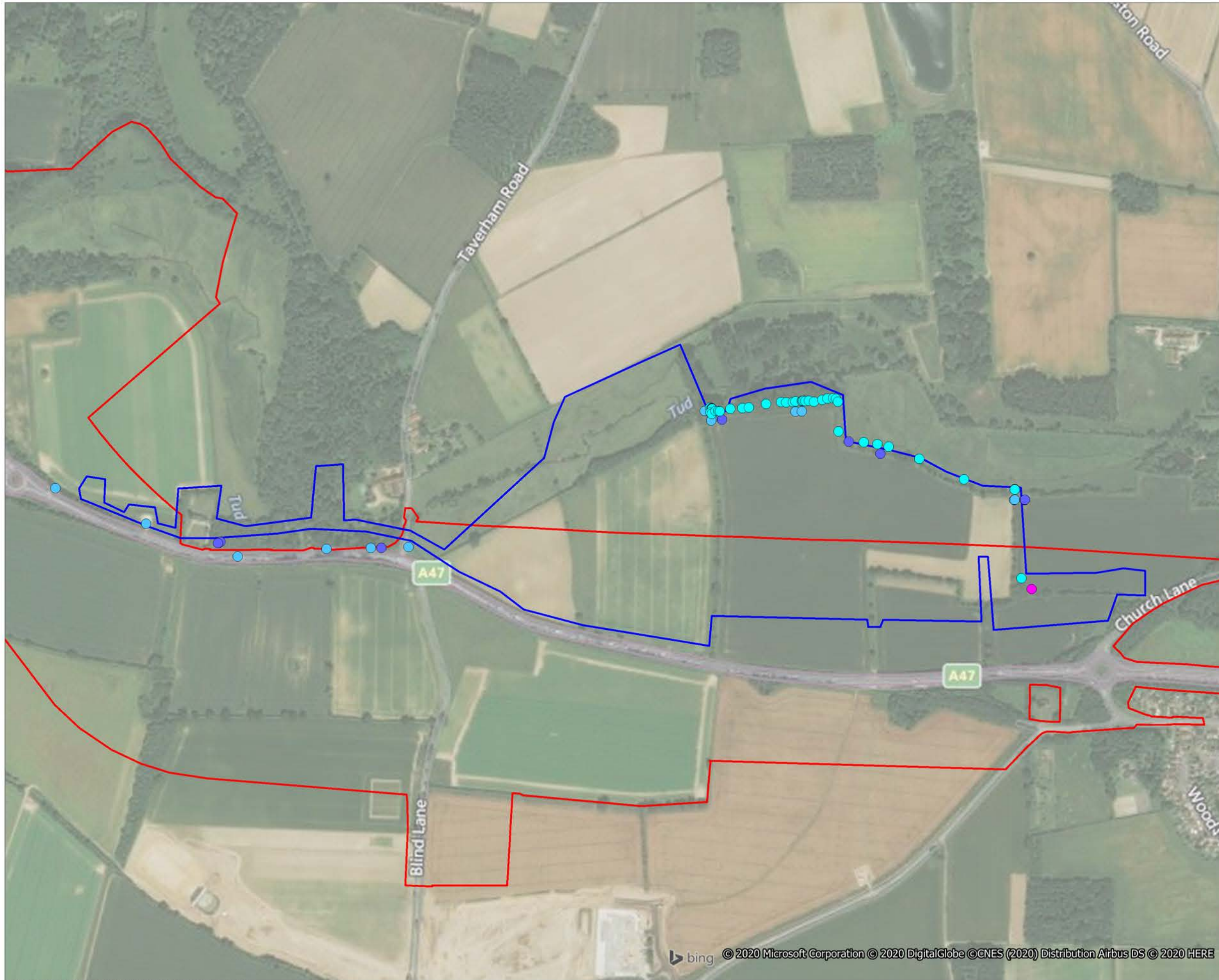


Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

A47 Improvements

Figure 14
Transect 8 - 10th October 2019
Map 6 of 7





- Site boundary
 - Bat transect route
- Bat Species**
- Barbastelle bat
 - Serotine bat
 - Daubenton's bat
 - Natterer's bat
 - Myotic bat species
 - Leisler's bat
 - Noctule bat
 - Nyctalus bat species
 - Nathusius's Pipistrelle bat
 - Common Pipistrelle bat
 - Soprano Pipistrelle bat
 - Pipistrelle bat species
 - Brown Long-eared bat



Rev	Date	Description	Drn	Chk	App
00	17.12.19	858484	SP	RG	DC

A47 Improvements

Figure 14
Transect 8 - 21st October 2019
Map 7 of 7

0 210

metres

Scale = 1:7,000 @ A3

REV 00

Annex F April 2020 bat activity surveys

1.1 Introduction

- 8.1.1. This Annex details the results of the bat activity transect surveys undertaken in April 2020. Collins (2016), in good practice guidelines, recommends that activity surveys in habitat with high suitability for bats include two surveys per month from April to October inclusive. Bat activity transect surveys were undertaken in 2019 however due to late commissioning of the surveys the full suite of surveys (April to October inclusive) was not achieved. Activity surveys in 2019 were undertaken from July to October 2019, with 2 of the eight transects also undertaken in June 2019 (RSK, 2020).
- 8.1.2. The activity surveys undertaken in April 2020 were undertaken *in lieu* of surveys in April 2019 in order to survey bat activity at the beginning of the bat active season. COVID-19 and its associated welfare restrictions prevented survey in May 2020 and surveys in June comprised of more targeted crossing point activity surveys in order to enable mitigation in the design.

1.2 Methodology

- 8.1.3. Methodology for the April 2020 activity transect surveys is in line with those activity surveys previously undertaken in 2019 (see Annex E) RSK, 2020)) and follows good practice guidelines in Collins (2016).

Limitations

- 8.1.4. During several of the bat surveys light rain was recorded and a short period of heavy rain was recorded during survey of transect eight on 30 April 2020 (see Table 6 below). Rain is considered less than optimal weather conditions for bat surveys, however as the rain was only light and bats were recorded during each of these surveys this is not considered a significant limitation.
- 8.1.5. During the survey of transect one undertaken on 27 April 2020 the detector malfunctioned and made no recordings. The surveyor's notes for this survey state that no bats were recorded/observed, however it is possible that some bat calls went unheard by the surveyors during the survey and as such were not recorded. The lack of automated recorded data is therefore considered a limitation to this survey as some bat passes may have been missed.
- 8.1.6. During the survey of transect one undertaken on 23 April 2020 there was a malfunction with the detector used and whilst data was recorded this data was not able to be viewed and analysed in any software and/or data format. Field

notes from surveyors of visual sightings have been used to determine where bats were observed for this transect.

- 8.1.7. During the survey of transect eight undertaken on 30 April 2020 there was no access to the grazing marsh north of the arable fields and adjacent to the River Tud due to the presence of cattle in this field. During the survey of transect eight undertaken on 25 April 2020 this area and the section of transect adjacent to the A47 to the west of Taverham Road only were surveyed. As such all sections of the transect have been subject to a minimum of one survey in April 2020.
- 8.1.8. Bat calls and their characteristics can vary within species both due to natural differences between calls and also depending on numerous factors including the habitat the bat was flying in when emitting the call and the behaviour when emitting the call (socialising, commuting, foraging). This can make analysis to species level sometimes difficult. There are two unidentified calls within the data (one on transect two on 24 April 2020 and one on transect six on 27 April 2020). Unidentified calls are considered a limitation, however unavoidable, to the survey as bats which are previously unrecorded at a location may not be identified.

Table 6: survey information for transect surveys undertaken in April 2020, including date, times, weather conditions and surveyors

Transect	Date and Time of survey	Survey type and sunset/sunrise time	Weather conditions (at the start and end of the survey)	Surveyors
1	23 April 2020 20:09 – 22:09	Dusk 20:09	Rain: none Cloud cover (Oktas): 2/8 – 1/8 Wind (Beaufort): 1 - 2 Temperature: 12°C - 9°C	MLM Group; MB and SW
	27 April 2020 20:10 – 22:17	Dusk 20:17	Rain: none Cloud cover (Oktas): 2/8 Wind (Beaufort): none Temperature: 9°C	MLM Group; JS and RWS
2	24 April 2020 20:11 – 22:11	Dusk 20:11	Rain: none Cloud cover (Oktas): 8/8 – 8/8 Wind (Beaufort): 4 - 3 Temperature: 10°C - 8°C	MLM Group: MB and SW
	30 April 2020 20:22 – 22:22	Dusk 20:22	Rain: none Cloud cover (Oktas): 5/8 – 7/8 Wind (Beaufort): 5 - 2 Temperatures: 9°C - 9°C	MLM Group; MB and SW
3	23 April 2020 20:09 – 22:09	Dusk 20:09	Rain: none Cloud cover (Oktas): 2/8 – 1/8 Wind (Beaufort): 1 - 2 Temperature: 12°C - 9°C	MLM Group; AJ and NH
	27 April 2020 20:17 – 22:17	Dusk 20:17	Rain: none Cloud cover (Oktas): 2/8 – 4/8 Wind (Beaufort): 2 - 1 Temperature: 9°C - 7°C	MLM Group; AJ and SB
4	24 April 2020 20:11 – 22:11	Dusk 20:11	Rain: none Cloud cover (Oktas): 8/8 – 8/8 Wind (Beaufort): 4 - 3 Temperature: 10°C - 8°C	MLM Group; AJ and NH

Transect	Date and Time of survey	Survey type and sunset/sunrise time	Weather conditions (at the start and end of the survey)	Surveyors
	30 April 2020 20:22 – 22:22	Dusk 20:22	Rain: none Cloud cover (Oktas): 5/8 – 7/8 Wind (Beaufort): 5 - 2 Temperatures: 9°C - 9°C	MLM Group; AJ and SB
5	23 April 2020 20:05 – 22:06	Dusk 20:09	Rain: none Cloud cover (Oktas): 1/8 – 1/8 Wind (Beaufort): 1 – 2/3 Temperature: 12°C - 9°C	Ben Jervis and Christine Hipperson-Jervis (Bench Ecology)
	28 April 2020 3:25 – 5:27	Dawn 5:28	Rain: light rain towards the end of the survey Cloud cover (Oktas): 8/8 – 8/8 Wind (Beaufort): 2 – 2/3 Temperature: 9°C - 8°C	Ben Jervis and Christine Hipperson-Jervis (Bench Ecology)
6	24 April 2020 3:34 – 5:34	Dawn 5:36	Rain: none Cloud cover (Oktas): 6/8 – 8/8 Wind (Beaufort): 2 – 0/1 Temperature: 6°C - 7°C (misty throughout the survey)	Ben Jervis and Christine Hipperson-Jervis (Bench Ecology)
	27 April 2020 20:11 – 22:13	Dusk 20:16	Rain: none Cloud cover (Oktas): 1/8 – 7/8 Wind (Beaufort): 1 – 3 Temperature: 10°C - 8°C	Ben Jervis and Christine Hipperson-Jervis (Bench Ecology)
7	24 April 2020 20:07 – 22:11	Dusk 20:11	Rain: none Cloud cover (Oktas): 8/8 – 8/8 Wind (Beaufort): 4 – 2 Temperature: 10°C - 8°C	Ben Jervis and Christine Hipperson-Jervis (Bench Ecology)
	1 May 2020 3:18 – 5:20	Dawn 5:22	Rain: intermittent light rain Cloud cover (Oktas): 7/8 – 8/8 Wind (Beaufort): 3/4 – 3/4 Temperature: 7°C - 7°C	Ben Jervis and Christine Hipperson-Jervis (Bench Ecology)

Transect	Date and Time of survey	Survey type and sunset/sunrise time	Weather conditions (at the start and end of the survey)	Surveyors
8	25 April 2020 3:32 – 5:34	Dawn 5:34	Rain: none Cloud cover (Oktas): 8/8 – 8/8 Wind (Beaufort): 1 – 3/4 Temperature: 8°C - 8°C	Ben Jervis and Christine Hipperson-Jervis (Bench Ecology)
	30 April 2020 20:16 – 22:18	Dusk 20:22	Rain: intermittent light rain. Moderate rain between 21:15 – 21:25 Cloud cover (Oktas): 6/8 – 7/8 Wind (Beaufort): 5 – 2/3 Temperature: 9°C - 9°C	Ben Jervis and Christine Hipperson-Jervis (Bench Ecology)

8.1.9. Tables 7 to 14 below detail the results of the transect surveys undertaken in April 2020. The total number of detections refers to the total number of files with that species recorded within the raw data. Analysis of this raw data taking into account the times of bat detections and locations of bat detections, and using professional judgement, has been used to identify the 'likely number of passes' of each species per survey. A pass is considered one instance of a single bat flying past the surveyor's location.

8.1.10. Within Tables 7 to 14, pipistrelle sp. refers to either common or soprano pipistrelle calls where the peak frequency of the call is at approximately 50Khz and therefore it cannot be determined which of the two species it originated from. "NSL" refers to either a noctule, Leisler's or serotine bat, the calls of which can be indistinguishable from each other.

Table 7: transect results for transect one in April 2020

Date	Species recorded	Total detections	Likely number of passes
23 April 2020	None	N/A	N/A
27 April 2020	None*	N/A	N/A

*During the survey the bat detector malfunctioned and no recordings were made. The surveyor's notes confirm no bats were seen or heard during the survey.

Table 8: transect results for transect two in April 2020

Date	Species recorded	Total detections	Likely number of passes
24 April 2020	Soprano pipistrelle	1	1
	Unidentified bat sp.	1	1
30 April 2020	Soprano pipistrelle	4	3
	Barbastelle	1 (potential detection)	(1)
	Pipistrelle sp.	1	1

Table 9: transect results for transect three in April 2020

Date	Species recorded	Total detections	Likely number of passes
23 April 2020	Soprano pipistrelle	1	1
27 April 2020	Soprano pipistrelle	5	3
	Common pipistrelle	8	6
	Pipistrelle sp.	1	1

Table 10: transect results for transect four in April 2020

Date	Species recorded	Total detections	Likely number of passes
24 April 2020	None	N/A	N/A

Date	Species recorded	Total detections	Likely number of passes
30 April 2020	Soprano pipistrelle	7	3
	Common pipistrelle	6	3

Table 11: transect results for transect five in April 2020

Date	Species recorded	Total detections	Likely number of passes
23 April 2020	Soprano pipistrelle	20	8
	Common pipistrelle	33	14
	NSL*	1	1
	Myotis sp.	3	2
28 April 2020	Soprano pipistrelle	5	2
	Myotis sp.	1	1

Table 12: transect results for transect six in April 2020

Date	Species recorded	Total detections	Likely number of passes
24 April 2020	None	N/A	N/A
27 April 2020	Soprano pipistrelle	8	7
	Common pipistrelle	6	4
	Serotine	3	1/2
	Unidentified bat sp.	1	1

Table 13: transect results for transect seven in April 2020

Date	Species recorded	Total detections	Likely number of passes
24 April 2020	Soprano pipistrelle	11	5
	Common pipistrelle	5	3
	Noctule	1	1
	Serotine	1	1
	Myotis sp.	1	1
1 May 2020	Common pipistrelle	2	2

Table 14: transect results for transect eight in April 2020

Date	Species recorded	Total detections	Likely number of passes
25 April 2020	None	N/A	N/A
30 April 2020	Common pipistrelle	13	4*
	Pipistrelle sp.	1	1

*Ten of the 13 recorded common pipistrelle detections were recorded within the churchyard of St Andrews church. A common pipistrelle emergence was recorded at 20:35 from beneath the eaves of the south-west corner of St Andrews church.

1.3 Conclusions

- 8.1.11. The results of the April 2020 activity transect surveys have revealed no new information regarding the species present at each transect location. The species identified (see Tables 7 to 14 above) were all previously found on those same transects in 2019 (see Annex E) RSK, 2020)). One potential call of the rarer species barbastelle was recorded on transect two on 30 April 2020. This species has previously been recorded on this transect (see Annex E) RSK, 2020)). A generally overall lower level of bat activity was recorded in April 2020 than those levels recorded in July – October 2019.
- 8.1.12. See Annex G for plans displaying the activity transect data from the April 2020 surveys. This data shows the detections of bat calls during the surveys (see 8.1.7).
- 8.1.13. No bats were recorded on transect one during the April 2020 surveys.
- 8.1.14. Very low levels of bat activity were recorded on transect two in April 2020 relative to those levels of activity recorded on most of the other transects. A cluster of calls were recorded on Mattishall Lane where it crosses the River Tudd, however it is suspected that these might be made by only one or two bats due to the times of the detections. These levels of activity are not in line with the higher levels of activity across the transect recorded in surveys undertaken in 2019 (Annex E (RSK, 2020)).
- 8.1.15. Transect three surveys undertaken in April 2020 have identified very small clusters of activity along Mill Lane and around the margins of the woodland to the south-east of Hockering.
- 8.1.16. The majority of bat activity on transect four recorded in April 2020 was clustered in the woodland to the west of Berry's Lane adjacent to the River Tud and a cluster of buildings. In other areas of the transect there was little activity recorded.
- 8.1.17. Data from the survey of transect five undertaken on 23 April 2020 shows a scattering of bat activity in areas around the village of Honingham with areas of higher levels of activity including; on the perimeters of the woodland to the west of the village, on Colton Road and its junction with Mattishall Road to the south of the village and near the Norwich Road/Matthishall Road junction and in the corner of a field to the south of that junction. These areas have previously been found to be areas of high bat activity in a minimum of one of the surveys undertaken in 2019 (Annex E (RSK, 2020)).
- 8.1.18. Results from the April 2020 surveys of transect six have shown sparse levels of activity along linear features such as the field margins and Blind Lane within the

transect route. Similar results were observed during the 2019 surveys. Small concentrations of activity on Blind Lane and on the woodland margins south-west of St Peters church have been recorded during the survey undertaken on 27 April 2020.

- 8.1.19. The survey of transect seven on 24 April 2020 has, whilst showing an overall lower level of bat activity than that recorded in surveys in 2019, shown a relatively high level (for the season) of multi-species bat activity along the western edges of the large areas of woodland to the west of Taverham Road. This pattern of higher levels of activity here has also been recorded in 2019 (Annex E (RSK, 2020)).
- 8.1.20. The results from the April 2020 surveys undertaken at transect eight show two areas of activity which have previously been identified (Annex E (RSK, 2020)) as areas where slightly more activity occurs; St Andrews churchyard and an area of land just to the south-west of a woodland block adjacent to the River Tud (see Annex G).
- 8.1.21. A common pipistrelle was recorded emerging from the south-west corner of St Andrews' church on 30 April 2020. This roost has already been identified as a day roost during surveys undertaken in 2019 (see Table 4.3 in the main body of the report and Annex A). An impact assessment upon this roost has been undertaken in the main body of the report (see Section six) (Impact assessment) and mitigation for this and all roosts has been included in Section seven of the report.

Annex G: April 2020 bat activity transect results

- 8.1.22. The following plans have been created on Google Earth using the georeferenced raw data from the transect surveys.
- 8.1.23. The following coloured points and shortened versions of species names have been used as labels on the plans: P. pip (teal) = common pipistrelle, P. pyg (red) = soprano pipistrelle, Pip. sp. (pink) = pipistrelle species (either common or soprano pipistrelle), Barb. (purple) = barbastelle, myotis (lime green) = species of the genus *Myotis*, E. ser (orange) = serotine, N.noc (green) = noctule and unknown/unidentified (yellow) = recordings which are considered bats however it has not been possible to determine a species.
- 8.1.24. The transect and date of survey are provided in the top left corner of each plan.































