



Oxfordshire Railfreight Ltd

**Proposed Oxfordshire Strategic Rail Freight Interchange**

**Land west of the B430**

**East of Upper Heyford Former Airfield, Ardley**

**BAT REPORT [DRAFT]**

April 2022

**FPCR Environment and Design Ltd**

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**CONTENTS**

1.0	INTRODUCTION .....	1
2.0	METHODOLOGY.....	3
3.0	RESULTS.....	11
4.0	DISCUSSION.....	23

**APPENDICES**

Appendix A: Bat Building Assessments

Appendix B: Nocturnal Building Assessment Results

Appendix C: Bat Tree Assessments

Appendix D: Automated Detector Survey Results

**FIGURES**

Figure 1: Bat Consultation Results Plan

Figure 2: Bat Roost Assessment Plan – Buildings

Figure 3: Bat Roost Assessment Plan - Trees

Figure 4: Transect Plan (Original Main Site) May 2018

Figure 5: Transect Plan (Original Main Site) July 2018

Figure 6: Transect Plan (Original Main Site) September 2018

Figure 7: Transect Route Plan (Original Main Site) July 2020

Figure 8: Transect Route Plan (Main Site Southern Extension) April 2020

Figure 9: Transect Route Plan (Main Site Southern Extension) July 2020

Figure 10: Transect Route Plan (Main Site Southern Extension) September 2020

Figure 11: Transect Route Plan May 2021 (Main Site North)

Figure 12: Transect Route Plan May 2021 (Main Site South)

Figure 13: Transect Route Plan (Highways Works North) July 2021

Figure 14: Transect Route Plan (Highways Works South) July 2021

Figure 15: Transect Route Plan (Highways Works North) September 2021

Figure 16: Transect Route Plan (Highways Works South) September 2021

Figure 17: Transect Route Plan (Highways Works) Spring 2022 (North)

Figure 18: Transect Route Plan (Highways Works) Spring 2022 (South)

Figure 19: Static Bat Detector Location Plan

This document is work in progress and summarises ecological analysis completed to date.

## 1.0 INTRODUCTION

- 1.1 The following bat report has been prepared by FPCR Environment & Design Ltd. on behalf of Oxfordshire Railfreight Ltd. It provides details of all bat surveys undertaken at the site known as 'Land west of the B430, East of Upper Heyford Former Airfield, Ardley', hereafter referred to as the Application Site.

### Site Location and Context

- 1.2 The proposed development area comprises a 'Main Site' area and adjacent Highway Works Areas broadly described as the Ardley Bypass and associated highways works located to the north and east of the Main Site, and the Middleton Stoney Relief Road to the southeast (Figure 1).

### Main Site

- 1.3 The Main Site is located to the south of Ardley and immediately south of the Chiltern Main Line Railway, between the B430 to the east and the former RAF Upper Heyford airfield to the west. Habitats within the Main Site were dominated by arable field compartments and semi-improved grassland used for grazing, with hedgerows, trees, scrub and semi-improved grassland at the field margins. The Ashgrove farmstead comprising a number of farm buildings and residences was located to the north-east of the Main Site, and a Seven Trent Green Power 'In Vessel Compositing' facility towards the southeast. Other habitats present within the Main Site included small plantation woodlands, a small tributary of the Gagle Brook, wet ditches, four waterbodies, and areas of hardstanding and amenity/ornamental habitats associated with the farm buildings. Agricultural fields extend from the southern boundary and form much of the surrounding landscape.

### Highway Works Area

- 1.4 The Highways Works component of the application site incorporates land to the east and west of Junction 10 of the M40. These areas largely comprised arable land with planted tree groups associated with screening functions of highways infrastructure. Other habitats included managed grassland road verges, scrub and ponds. The route of the proposed Ardley Bypass is located to the north-east of the Main Site and crosses the Chiltern Railway line and arable fields bound by native hedgerows. The route of the proposed Middleton Stoney Relief Road to the south-east of the Main Site crosses arable fields and native hedgerows, a section of the Gagle Brook, and road verges associated with the B4030.

### Survey Overview

- 1.5 Initial fieldwork was undertaken in 2018, however the site red line was subsequently extended and amended a number of times prior to the fixed extent being confirmed in early 2022.
- 1.6 An extended Phase 1 Habitat Assessment, desk study, hedgerow and preliminary protected species surveys were completed across the original site limits in February 2018. These were followed by tree and building assessments, bat activity transects and static automated detector surveys in 2018 and nocturnal surveys of buildings and trees within the Main Site in 2019, with additional surveys undertaken throughout 2020 and 2021. Tree surveys, transect surveys and static detector surveys were undertaken across the Highway Works areas in 2021. **Further surveys comprising a transect survey and static detector survey within the Highway Works areas are scheduled for spring 2022.**

## Development Proposals

- 1.7 The development proposals comprise the construction of
- An intermodal freight terminal and associated infrastructure including container storage and HGV parking, rail sidings to serve individual warehouses, management building and refuelling facility;
  - Up to 603,850 sq m (gross internal area) of warehousing and ancillary buildings, with additional floorspace provided in the form of mezzanines;
  - New road infrastructure and works to the existing road network, including the provision of a new Ardley Bypass, delivered as part of wider improvements to the M40 Junction 10 which will bridge over the Chiltern Main railway line, Middleton Stoney Relief Road to comprise a single carriageway road that will provide a link from the B4030, Heyford Park Link Road which will provide a link from the B430 north of Middleton Stoney to Heyford Park, and related traffic management measures;
  - Relocation of the Severn Trent Green Power IVC Composting Facility;
  - Strategic landscaping and tree planting, including diverted public rights of way and new foot and cycle links and associated drainage;
  - Earthworks and demolition of some existing structures on the SRFI site.
  - Renovation and change of use of retained residential and agricultural buildings.

## 2.0 LEGISLATION

- 2.1 Before any development proposals take place, measures must be taken to ensure that the legislation concerning bats is not breached as a result of works. Bats are afforded full protection under the Wildlife & Countryside Act 1981 (as amended) and the Conservation of Habitats and Species Regulations 2017 (as amended).
- 2.2 Under Regulation 43 of the Conservation of Habitats and Species Regulations 2017 (as amended) it is illegal to:
- Deliberately capture, injure or kill any wild animal of a European protected species,
  - Deliberately disturb wild animals of any such species. This includes in particular any disturbance which is likely to impair their ability to survive, to breed or reproduce, or to rear or nurture their young, or in the case of animals of a hibernating or migratory species, to hibernate or migrate. Disturbance of animals also includes in particular any disturbance which is likely to significantly affect the local distribution or abundance of the species to which they belong.
  - Deliberately take or destroy the eggs of such an animal, or
  - Damage or destroy a breeding site or resting place of such an animal.
- 2.3 Under the Wildlife and Countryside Act 1981 (as amended) it is illegal to:
- Recklessly or intentionally kill, injure or take any wild animals included in Schedule 5.
  - Recklessly or intentionally damage or destroy, or obstruct access to any structure or place which any wild animal included in Schedule 5 uses for shelter or protection,
  - Recklessly or intentionally disturb any such animal while it is occupying a structure or place which it uses for shelter or protection.

- 2.4 If impacts to bats or their roosts cannot be avoided a licence is required from Natural England in order to allow proposals to derogate from the Legislation (licenses cannot be obtained to provide protection against offences under the Wildlife & Countryside Act 1981 (as amended)).
- 2.5 As part of the licence application process the following three tests must be met:
- Regulation 53(9)(a): the appropriate authority shall not grant a licence unless they are satisfied “that there is no satisfactory alternative” to the derogation.
  - Regulation 53(9)(b): the appropriate authority shall not grant a licence unless they are satisfied “that the action authorised will not be detrimental to the maintenance of the population of the species concerned at a favourable conservation status in their natural range”, and
  - Regulation 53(2)(e): a licence can be granted for the purposes of “preserving public health or public safety or other imperative reasons of overriding public interest including those of a social or economic nature and beneficial consequences of primary importance for the environment”.
- 2.6 Conservation status is defined as “*the sum of the influences acting on the species concerned that may affect the long-term distribution and abundance of its population within its territory*”. Conservation status is considered to be favourable when:
- Population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats;
  - The natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
  - There is, or will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

### 3.0 METHODOLOGY

#### Desk Study - Bats

- 3.1 In order to compile existing baseline information the Multi-Agency Geographic Information for the Countryside (MAGIC)<sup>1</sup> website was reviewed for the presence of any statutory designated sites of international importance for bats within 15km of the application area including Special Conservation Areas (SCAs), Special Protection Areas (SPAs) and Ramsar Sites.
- 3.2 As part of the appraisal, consultation was also undertaken with Thames Valley Environmental Records Centre (TVERC) for bat records from within 2km of the application site (initially in 2018, and again in 2020 and 2021). In addition, relevant documents submitted as part of a previous planning application for the site were also reviewed (planning ref: 08/01520/F, permission awarded 19/09/08).
- 3.3 Further inspection, using colour 1:25,000 OS base maps and satellite imagery was undertaken in order to provide additional context and identify any features of potential importance for nature conservation in the wider landscape.

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<sup>1</sup><http://www.magic.gov.uk>

## Roosts

### Internal / External Building Assessment

- 3.4 The exteriors of buildings associated with Ashgrove Farm were visually assessed by a licenced bat worker from FPCR for potential access points and evidence of bat activity on 30<sup>th</sup> April 2018.
- 3.5 Features such as small gaps under barge/soffit/fascia boards, raised or missing ridge tiles and gaps at gable ends, which have potential as access points, were sought. Evidence that bats actively used potential access points includes staining within gaps and bat droppings or urine staining under gaps, a note being made wherever these were present. Where access to potential access points was possible a full inspection using an endoscope was completed to identify current or previous evidence of use such as the physical presence of bats or bat droppings. Indicators that potential access points had not recently been used included the presence of cobwebs and general detritus within the access. An updating survey without the use of an endoscope was completed on 10<sup>th</sup>/11<sup>th</sup> June 2021.
- 3.6 The building interiors, including roof voids where present and accessible, were visually assessed for evidence of bat activity and/or for the potential to be used by bats on 21<sup>st</sup> May 2018 and again on 10<sup>th</sup>/11<sup>th</sup> June 2021. Evidence of a roost was determined as the presence of a dead or live bat(s), concentrated piles or scattered droppings, food remains such as insect wing fragments, as well as scratch marks and/or staining.
- 3.7 The above assessments were completed by a licensed bat worker from FPCR (Natural England Licence Numbers: 2015-11905-CLS-CLS and 2021-51397-CLS-CLS) assisted by an experienced surveyor on each occasion.
- 3.8 Access was subsequently provided to two neighbouring properties (Ashgrove Cottages, buildings B10) and adjacent garage (B11), and to the Severn Trent Composting Facility (B12). These were subject to detailed internal and external surveys as above in April 2021.

### Tree Assessments

#### Ground Level Assessments

- 3.9 Tree assessments were undertaken on 21<sup>st</sup> February 2018 and 30<sup>th</sup> May 2018 from ground level with the aid of a torch and binoculars (where appropriate). Further surveys were undertaken on 17<sup>th</sup>/18<sup>th</sup> May 2020, 22<sup>nd</sup> June 2020, 28<sup>th</sup>/29<sup>th</sup> July 2021, and 11<sup>th</sup>/12<sup>th</sup> August 2021 to assess trees within recently added areas of the extended red line, and to update the original 2018 surveys. During surveys potential roosting features for bats such as the following were sought (based on p16, British Standard 8596:2015<sup>2</sup>):
- Natural holes (e.g. knot holes) arising from naturally shed branches or branches previously pruned back to a branch collar.
  - Man-made holes (e.g. cavities that have developed from flush cuts or cavities created by branches tearing out from parent stems).
  - Woodpecker holes.
  - Cracks/splits in stems or branches (horizontal and vertical).
  - Partially detached, loose or bark plates.
  - Cankers (caused by localised bark death) in which cavities have developed.

<sup>2</sup> British Standard 2015, BS 8596:2015 *Surveying for bats in trees and woodland – Guide*, October 2015.

- Other hollows or cavities, including butt rots.
  - Compression of forks with occluded bark, forming potential cavities.
  - Crossing stems or branches with suitable roosting space between.
  - Ivy stems with diameters  $\geq 50\text{mm}$  with suitable roosting space behind (or where roosting space can be seen where a mat of thinner stems has left a gap between the mat and the trunk).
  - Bat or bird boxes.
  - Other suitable places of rest or shelter.
- 3.10 Certain factors such as the orientation of a feature, its height from the ground, the direct surroundings and its location in respect to other features may enhance or reduce the potential value as a roost resource.
- 3.11 Trees were classified into general bat roost potential groups based upon the presence of potential roost features. Table 1 is based upon Table 4.1 and Chapter 6 in the current Bat Conservation Trust (BCT) Guidelines<sup>3</sup> and broadly classifies the potential categories as accurately as possible. Although the British Standard Document groups trees with moderate and high potential, these have been separated below (as per Table 4.1 in the BCT guidelines) to allow more specific survey criteria to be applied.

Table 1: Classification and Survey Requirements for Bats in Trees

Classification of Tree	Description of Category and Associated Features (based on Potential Roosting Features listed above)	Likely Further Survey work
Confirmed Roost	Evidence of roosting bats in the form of live / dead bats, droppings, urine staining, mammalian fur oil staining, etc.	<p>A Natural England derogation licence application will be required if the tree or roost site is affected by the development or proposed arboricultural works. This will require a combination of aerial assessment by roped access bat workers (where possible, health and safety constraints allowing) and/or nocturnal survey during appropriate periods (e.g. nocturnal survey - May to August) to inform on the licence.</p> <p>Works to a tree undertaken under supervision in accordance with the approved good practice method statement provided within the licence.</p> <p><b>However</b>, where confirmed roost site(s) are not affected by works, work under a precautionary good practice method statement may be possible.</p>
High Potential	<p>A tree with one or more Potential Roosting Features that are obviously suitable for larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter protection, conditions (height above ground level, light levels, etc) and surrounding habitat. Examples include (but are not limited to); woodpecker holes, larger cavities, hollow trunks, hazard beams, etc.</p>	<p>Where the tree(s) will likely be affected by development a combination of aerial assessment by roped access bat workers (if appropriate) and / or nocturnal survey during appropriate period (May to August).</p> <p>Following additional assessments, tree may be upgraded or downgraded based on findings. If roost sites are confirmed and the tree or roost is to be affected by proposals a licence from Natural England will be required.</p> <p>After completion of survey work (and the presence of a bat roost is discounted), a precautionary working method statement may still be appropriate.</p>

<sup>3</sup> Collins, J. (ed.) 2016. *Bat Surveys for Professional Ecologists: Good Practice Guidelines* (3rd edn). The Bat Conservation Trust

Classification of Tree	Description of Category and Associated Features (based on Potential Roosting Features listed above)	Likely Further Survey work
Moderate Potential	A tree with Potential Roosting Features which could support one or more potential roost sites due to their size, shelter protection, conditions (height above ground level, light levels, etc) and surrounding habitat but unlikely to support a roost of high conservation status (i.e. larger roost, irrespective of wider conservation status). Examples include (but are not limited to); woodpecker holes, rot cavities, branch socket cavities, etc.	Where the tree(s) will likely be affected by development a combination of aerial assessment by roped access bat workers <b>and / or</b> nocturnal survey during appropriate period (May to August). Following additional assessments, a tree may be upgraded or downgraded based on findings. After completion of survey work (and the presence of a bat roost is discounted), a precautionary working method statement may still be appropriate. If a roost site/s is confirmed a licence from Natural England will be required.
Low Potential	A tree of sufficient size and age to contain Potential Roosting Features but with none seen from ground or features seen only very limited potential. Examples include (but are not limited to); loose/lifted bark, shallow splits exposed to elements or upward facing holes.	No further survey required but a precautionary working method statement may be appropriate.
Negligible / No potential	Negligible / no habitat features likely to be used by roosting bats	None.

\* The Conservation of Habitats & Species Regulations 2017 (as amended) affords protection to breeding sites and resting places at all times. For an area to be classified as a breeding site or resting place, the Regulations require there to be a reasonably high probability that the species will return to the sites and / or place.

- 3.12 Where features suitable to be used as a roost site were identified, evidence that bats had used the site as a roost where features, where accessible, was sought. Such evidence comprises live or dead bats, droppings, urine staining, and grease /scratch marks on wood.

#### Aerial Tree Inspections

- 3.13 Aerial inspections were completed (where required and access was possible) on trees identified during the ground level inspections having moderate or high potential to support roosting bats. Features surveyed in further detail during the aerial survey included cracks, fissures, cavities, woodpecker/rot holes or missing limbs. Evidence of use sought comprised live or dead bats, droppings, urine staining, internal smoothing and grease/scratch marks on wood. The presence of dense ivy cover was also noted as this can obscure the aforementioned features.
- 3.14 Each feature suitable for roosting bats was visually inspected using torches and/or endoscopes as appropriate. The characteristics of each feature were considered in order to assess its suitability to support roosting bats and to determine a suitable course of action to accommodate tree removal, if required, in line with Table 1. The size and exposure to the elements of each was additionally taken into account, as were features such as dense cobwebs or the habitation of a feature by other species (e.g. woodpeckers, squirrels, wasps etc.).
- 3.15 Trees within the Main Site were surveyed on 29<sup>th</sup> and 30<sup>th</sup> January 2019, with further aerial inspection undertaken on additional trees identified within the extended red line including the Highway Works areas on 13<sup>th</sup> and 18<sup>th</sup> August 2021.
- 3.16 All FPCR tree climbers are NPTC Certified to Climb Trees (J/101/2449) and Perform Aerial Rescue (A/101/2450) – Level 2. The climbing methodology used follows that detailed within the

Arboriculture and Forestry Advisory Group (AFAG) Tree Climbing Operations Leaflet (AFAG401). Climbing equipment was inspected following guidelines outlined in the Lifting Operations and Lifting Equipment Regulations 1998.

- 3.17 The above assessments were completed by a licensed bat worker from FPCR (Natural England Licence Numbers: 2017-32666-CLS-CLS and 2021-51773-CLS-CLS) assisted by an experienced surveyor on each occasion.

### **Emergence / Re-entry Nocturnal Surveys**

- 3.18 Buildings considered to have potential to support roosting bats were subject to dusk emergence and/or dawn re-entry surveys, as identified during the initial daytime assessments.
- 3.19 All trees with moderate or high suitability to support roosting bats, as assessed during the ground-level surveys were also subject to dusk emergence and/or dawn re-entry surveys.
- 3.20 During the nocturnal emergence/re-entry surveys, surveyors were positioned such that suitable access points identified during the daytime surveys could be viewed (see Figures 2a and 2b).
- 3.21 If bats were identified emerging from or returning to roost then the species, location of the roost entrance and number of animals using the roost was recorded. Any bat activity in the immediate vicinity was also recorded. Pre-dawn surveys were completed from c.15 minutes prior to sunset until c.90-120 minutes following sunset, and dusk surveys were undertaken from c.120 to 90 minutes prior to sunrise until 15 minutes after sunrise.
- 3.22 Echo Meter Touch® Pro bat detectors were utilised in conjunction with the Echo Meter Touch® app to aid species identification.
- 3.23 These surveys were completed by licensed bat workers from FPCR (including Natural England Reference Numbers: 2015-11905-CLS-CLS and 2021-51397-CLS-CLS) and trainee bat workers.

**Table 2: Emergence / Roost Surveys (Buildings and Trees) Survey Conditions**

Date	Building / Tree Surveyed (see Figures 2 and 3)	Dusk / Dawn	Sunset / Sunrise	Wind (Beaufort 0-12)	Temperature °C	Cloud Cover %	Rain (0-5)
17.07.19	T10, T7, T15, B3e, B3f, B3d, B5,	Dusk	21:16	1	17	80	0
18.07.19	T18, B1a, B1b, B1c, B1d, B2a,	Dawn	05:06	2-1	18-15	100	0
01.08.19	T16, T18, T25, B1a, B1b, B1c, B1d	Dusk	20:55	2-3	21-17	70-100	0
02.08.19	T10, T15, B1a, B1c, B3a, B3d, B3e, B3f, B5	Dawn	05:28	0-2	14-13	10-40	0
15.08.19	B1a, B3e, B3f, B5	Dusk	20:29	3-0	16-12	10-0	0
16.08.19	T7, T16, T25, B1a, B1b, B1c, B1d	Dawn	05:48	1	11-13	90	0
29.09.20	T17, T30	Dusk	18:45	1	11-15	50	0
10.06.21	B1c, B1d, B3d, B3e, B3f	Dusk	21:08	3-0	19-17	10-15	0
11.06.21	B1a, B1b, B1e, B1f, B5	Dawn	04:45	2-1	16-15	100-90	0
22.07.21	B1c, B1d, B3e, B3f	Dusk	21:10	0-1	26-20	10-50	0
23.07.21	B1a, B1b, B5	Dawn	05:13	0-1	19-16	0	0
26.08.21	T28, T57	Dusk	19:05	0-1	18	80	0
27.08.21	T52, T33	Dawn	05:09	0-1	15	10	0

## Activity Surveys

- 3.24 The potential for the site and immediate surrounds to support feeding and commuting bats was also assessed, particular regard being given to the presence of continuous treelines, water courses and hedgerows providing good connectivity in the landscape, and the presence of varied habitat such as scrub, woodland, grassland and open water in the vicinity.

## Foraging / Commuting Habitat

### Transect Surveys

- 3.25 Walked transects were completed throughout the original extent of the Main Site during spring, summer and autumn 2018 to assess bat activity, including use of potential foraging areas and commuting routes, as well as species composition and species utilisation of the development area. Transects of subsequently incorporated adjacent land to the south were completed in April, July and September 2020, together with an updating survey across the original site in July 2020. These were followed by a further updating survey across the extended Main Site area in May 2021, and by transects in summer (July) and autumn (September) across the Highways Works areas. **Final transect surveys across the Highway Works areas are scheduled for completion in spring 2022.**
- 3.26 The transect route was predetermined prior to surveys in order to cover most areas of the site. These incorporated point count stops to identify activity levels around features of potential value to bats such as hedgerows, tree lines, dense scrub etc., where possible including those that will be affected by proposals. Each point count was between 3 and 6 minutes long, during which time all bat activity was recorded. The transects commenced at sunset and were a minimum of 120 minutes in duration.
- 3.27 Each transect was walked at a steady pace and when a bat passed by, the species, time and behaviour was recorded on a site plan to help to form a general view of the bat activity present on site and to highlight any habitats categories associated with bat activity.
- 3.28 This methodology takes into account the statutory guidance from English Nature (now Natural England)<sup>5</sup> and further guidelines introduced by the Bat Conservation Trust<sup>3</sup> and JNCC<sup>6</sup>. The survey effort was determined from recommendations provided in the above BCT guidance, the relevant survey guidance over the survey period.
- 3.29 Bat activity was monitored and recorded during the transect surveys using Wildlife Acoustics Inc. Echo Meter Touch® bat detectors in conjunction with the Echo Meter Touch® app and Apple Inc. iPad® to detect bats and aid species identification.
- 3.30 Post-survey, bat calls were analysed using the BatSound® Pro (Pettersson Elektronik) software package or Kaleidoscope/Kaleidoscope Pro® (Wildlife Acoustics) software package, by taking measurements of the peak frequency, inter-pulse interval, call duration and end frequency. From this, the level of bat activity across the site in relation to the abundance of individual species foraging and commuting along habitats was assessed.
- 3.31 Transects were undertaken when conditions were representative of the season, see Table 3.

<sup>5</sup> Mitchell-Jones, A.J. 2004. *Bat Mitigation Guidelines*. English Nature, Peterborough.

<sup>6</sup> Mitchell-Jones, A.J. and McLeish, A.P. 2012. *The Bat Workers' Manual 3rd Edition*. JNCC, Peterborough.

**Table 3: Activity Transect Survey Conditions**

Date	Sunset/	Temperature °C	Rain (0-5)	Wind (0-5)	Cloud %	Survey Area
29.05.18	21:11	14-15	0	2	90	Original Main Site
25.07.18	21:06	23-19	0	0	20	Original Main Site
18.09.18	19:13	19-10	0	1-2	90	Original Main Site
27.04.20	20:24	14-15	0	2	100	Main Site Southern Extension Area
06.07.20	21:25	16-11	0	0	20	Original Main Site and Main Site Southern Extension Area
29.09.20	18:45	14-11	0	0	30	Main Site Southern Extension Area
17.05.21	20:54	11-10	0	0	90	Original Main Site and Main Site Southern Extension Area
06.07.21	21:25	15-13	0-4	3-2	60	Highway Works Areas
08.09.21	18:35	17	0	0-1	40	Highway Works Areas
Spring 2022	To be completed					Highway Works Areas

### Automated Surveys

- 3.32 Static (passive) recording broadband detectors were deployed on site to supplement the manual transects surveys. In addition, passive recording is stipulated in the guidance<sup>3</sup>.
- 3.33 Passive monitoring was undertaken using an automated logging system (Wildlife Acoustics Inc. Song Meter® SM2BAT+ bat detectors (during the 2018 surveys) and Wildlife Acoustics Inc. Song Meter® SM4 BAT FS bat detectors (during subsequent surveys), with the output saved to an internal storage device. SM2BAT+ and SM4 BAT FS detectors were placed along linear features considered to be of value to bats such as hedgerows, woodland, water courses and tree lines.
- 3.34 The static detectors were placed in each location for an extended period of time on each occasion during spring, summer and autumn 2018, 2020, and 2021. Detectors were programmed to activate 30 minutes before dusk and recorded continuously until 30 minutes following sunrise. Where possible static detectors were deployed during periods of suitable weather conditions (little no rain/wind and temperatures above 10°C). Where this could not be achieved (for example due to overnight temperatures regularly dropping below 10°C throughout the spring and autumn survey windows) static detector surveys were timed to avoid periods of weather considered atypical for the season.
- 3.35 For the purposes of analysis if the static detector was out over five nights the additional nights were only assessed for Annex II bat species. The recorded data was analysed using the Kaleidoscope® and BatSound® Pro software packages (2018 data) and Kaleidoscope® Pro 5 (Wildlife Acoustics) to identify species recorded and enable an assessment of bat activity on site.

### Limitations

- 3.36 The red line boundary was extended on several occasions over the course of the survey period following the initial surveys undertaken in 2018. The extent of surveys on each occasion reflected that of the proposals at the time as accurately as possible, however there were some limitations to access to land controlled by third parties and to land closely adjacent to existing highways. These areas were relatively small, and where safe access was possible, activity surveys were able to

- incorporate boundary features such as hedgerows from accessible adjacent land. The surveys therefore covered almost the entire extent of the site and as such the minor restrictions to access are not considered to represent a constraint to the overall robustness of the dataset.
- 3.37 During the internal inspections access was either limited or not possible to some sections of the buildings/roof void within B1a, B1c, B2a and B3e. These limitations to access have been considered within the assessment of individual buildings, and the resulting proposed mitigation has accounted for this constraint.
- 3.38 Buildings B10 to B12 were not accessible for survey until spring 2022, therefore have only been subject to internal and external inspection and not to nocturnal surveys. Buildings B10 and B11 are to be retained within the scheme with minor renovation works proposed. They are discussed within the relevant sections together with alternate scenarios and outcomes to ensure that should either be confirmed to support a bat roost this can be protected and retained in situ, or otherwise be replaced under the terms of an agreed Natural England licence. The previous restrictions to access and the possible presence of a statutory constraint (bat roost) within B10 or B11 are not therefore considered to represent a significant constraint to the proposals or to the overall assessment of the scheme. Building B12 was confirmed to have negligible potential to support roosting bats, therefore there is no constraint resulting from the previous restrictions to survey.
- 3.39 Air temperatures dropped below 10°C on occasion during most of the spring and autumn automated detector surveys (with the exception of autumn 2020). The weather conditions were however typical for these periods and bat activity was recorded during all nights except 23/09/18. The resultant dataset is therefore considered to be representative of bat activity at these times.
- 3.40 Owing to the difficulty of detecting brown long-eared bats *Plecotus auritus* due to the low volume of their calls it is considered that the nocturnal data will represent an underestimation of brown long-eared bat activity levels and numbers present.
- 3.41 Where calls could not be identified to species level, for example due to lower recording quality or where there are close similarities between species' echolocation calls (particularly for *Myotis* sp. and *Nyctalus* sp. bats) making a definite identification difficult, contacts were identified to family only.
- 3.42 The SM2BAT+ records sound files of up to 12 seconds in length and SM4 BAT FS 15 seconds in length before a new file is created. The analysis of the SM2BAT+ and SM4 BAT FS files recorded can highlight the presence of more than one bat if they are recorded simultaneously on the same sound file. However, it is not possible to determine whether consecutive sound files have been recorded as the result of multiple bats passing the detector, or by one bat repeatedly triggering the detector as it forages in close proximity for an extended period. Therefore, each sound file is counted as a single bat registration. The number of bat registrations recorded per unit time therefore provides an indication of the relative importance of the location sampled by the detector, rather than a precise count.
- 3.43 It is considered that the overall dataset is representative of the level of bat activity occurring within the site, and that survey constraints have had no significant detrimental impact on the data quality or on the robustness of the conclusions informed by these.

## 4.0 RESULTS

### Desk Study

- 4.1 No statutory designated sites of international importance for bats occur within 15km of the application area.
- 4.2 Severn bat records were returned by TVERC from within the search radius, all of which were located over 1km from the site boundary. These were all identified as common pipistrelle *Pipistrellus pipistrellus*, Daubenton's bat *Myotis daubentonii*, brown long-eared bat, or unidentified bat species.
- 4.3 A review of documentation submitted for the previous planning application within the site<sup>7</sup> identified a brown long-eared bat roost (feeding remains and droppings) and a possible *Pipistrellus* sp. roost (droppings) at the western end of building B1d, both recorded in 2008.

### Roost Site Assessments

#### Building Assessment (Appendix A)

- 4.4 Twelve buildings (B1 to B12) were identified within the application boundary, some of which were subdivided into section for the purpose of detailed description and assessment (Figure 2a). The following summary descriptions are based on building inspection surveys undertaken in 2021 and 2022, with further detail provided at Appendix A.

#### *Negligible Bat Roost Potential B2b, B3b, B3c, B3d, B3g, B3h, B4, B6, B7, B8, B9, and B12*

- 4.5 B2b was a brick lean-to (previously utilised as a potting shed) on the western aspect of building B2a. The roof was comprised of corrugated metal and Perspex panels. Potential bat access points included gaps beneath the corrugated roofing panels and gaps around the doorway. Internal light levels were high through the day due to the presence of Perspex panels in the roof and windows on the western aspect. No roof underlining was present and no evidence of suitable roosting locations for bats were identified. This building is therefore considered to have **negligible** potential to support roosting bats.
- 4.6 Building section B3b was a breeze block lean-to that adjoins building B3d on the western aspect. The sloping roof was constructed from cement fibre corrugated roof panels and there was no underlining or roof void present internally. No internal or external evidence of bats was observed in association with this building, which is considered to have **negligible** potential to support roosting bats.
- 4.7 Building section B3c was a single storey timber barn with a pitched corrugated metal roof. The building was open on the southern aspect due to missing timber panels and various holes in the structure, and there was no roof void or underlining present internally. No internal or external evidence of bats was observed in association with this building, which is considered to have **negligible** potential for roosting bats.
- 4.8 Building section B3d was a large stone barn with a pitched roof with corrugated panels that were in a state of disrepair and had noticeably deteriorated since the original assessment in 2018. Potential access points for bats included open doorways and numerous gaps in the roof and at the eastern gable. There was no underling or roof void present. The original timber beams displayed splits, and there were gaps beneath the window frames and in the stone work throughout. No

<sup>7</sup> ADAS 2008. *Ashgrove Farm, Ardley Extended Phase 1 Report*. April 2008.

- internal or external evidence of bats was observed in association with building B3d, which is considered to have **negligible** potential to support roosting bats.
- 4.9 Building sections B3g and B3h comprised a lean-to with a corrugated metal roof on the northern aspect of B3d. Both were supported by a metal frame, with timber beams also present in B3h. The roofing panels of B3g had been sprayed with a yellow expanding foam. The panels beneath B3h were unlined. These building had numerous open aspects and therefore were partially open to the elements and as a result had high internal light levels. No evidence of suitable bat roosting locations was identified thus these structures were identified as providing **negligible** potential to support roosting bats.
- 4.10 Building B4 was an aircraft hangar style building constructed from breeze block and corrugated sheet metal panels supported on a metal frame. Overhanging asbestos facia boards were also present. Potential access points for bats were identified throughout the building, including beneath the facia boards, corrugated panels and around the doorway. There was no underling present internally and no evidence of suitable roosting locations for bats were identified. Building B4 was thus identified as providing **negligible** potential to support roosting bats.
- 4.11 Building B6 was a large agricultural structure of breeze block and timber construction with a metal frame and with a pitched cement fibre roof and with a stone and timber lean-to with a metal frame on the western aspect. The building was open on the northern, southern, and eastern aspects and had no roof void or underling present internally. Corrugated Perspex panels were present throughout. No evidence or suitable roosting locations for bats were identified, thus the building is considered to provide **negligible** potential to support roosting bats.
- 4.12 The original internal building assessment undertaken in 2018 recorded a barn owl *Tyto alba* nest box within the southern part of building B6. The updated assessment in 2021 however recorded no evidence of barn owl within this structure.
- 4.13 Building B7 was a single storey outbuilding of stone construction with a corrugated sheet metal sloping roof, with Perspex panels also present, and which was open on the northern aspect. No evidence or suitable roosting locations for bats were identified thus the building is identified as providing **negligible** roost potential.
- 4.14 An inactive bird nest was identified within building B7 during the 2018 internal assessment. No further evidence of nesting birds was recorded however during the updating assessment in 2021.
- 4.15 Building B8 was a large agricultural structure constructed from concrete and corrugated sheet metal supported on a metal frame. It had a pitched corrugated metal roof with a metal facia and soffit box. Cement fibre barge boards were also present, with large gaps noted beneath. The building was open on the southern aspect. Internally there was no roof underlining and no roof void. No evidence or suitable roosting locations for bats were identified thus the building was identified as providing **negligible** potential to support roosting bats.
- 4.16 Owl pellets were recorded in the northwest corner of building B8 during the original inspection in 2018, however no evidence of barn owl was recorded during the 2021 survey. Ledges suitable for barn owl nesting and roosting were noted present throughout the interior.
- 4.17 Building B9 comprised a series of metal corrugated outbuildings on a scaffold frame. A flat corrugated roof was present, and there were Perspex wall panels throughout. The building was open on all aspects. There were no roof voids and no underlining present, and no evidence or

suitable roosting locations for bats were identified. Building B9 was therefore identified as providing **negligible** roost potential to bats.

- 4.18 Building B12 was a large open building in active use by Severn Trent for compost processing. It was constructed primarily from sheet metal supported on a concrete/breeze block base. There were no roof voids or internal divisions, and internal light levels were high due to the presence of multiple skylights in the sheet metal roof. Building 12 was considered to provide **negligible** roost opportunities for bats.

*Low Bat Roost Potential B1e, B1f, B2a, B3a and B11*

- 4.19 Building section B1e (adjoining B1a on the northern aspect) was a single storey lean-to with a slate tiled roof with a gutter present along the eaves. Potential bat access points included a broken window, gaps under lead flashing and gaps above the doorway on the eastern aspect. Internally there was timber sarking present but no enclosed roof void. No internal or external evidence of bats was observed in association with this building, which was considered to have **low** potential for roosting bats.
- 4.20 Building section B1f (adjoining B1a on the north eastern aspect) was also a lean-to with a slate tiled roof with a brick chimney and with a gutter along the eaves. The structure was generally in good condition, with potential bat access points limited to gaps beneath the tiles. There was a plastered ceiling present internally, but no roof void. No internal or external evidence of bats was documented in association with this building, which was considered to have **low** potential to support roosting bats.
- 4.21 Building B2a was a one storey outhouse of brick construction and with a brick lean-to (B2b) on the western aspect. The building had a slate tiled hipped roof with a concrete ridge. Timber sarking was present on the southern aspect and there were gaps present along the eaves. Other potential bat access points included gaps around the doorways / windows, gaps beneath loose tiles or where there were missing roofing tiles, and gaps created in missing brickwork. Internally there was no underlining or roof void present. Gaps were noted in the brick work and in the timber frame of the building. No access was possible for survey into the most eastern section of the building as the door was blocked. No internal or external evidence of bats was observed in association with this building, which is considered to have **low** potential for to support roosting bats.
- 4.22 Building section B3a was a single storey stone-built barn with a pitched roof comprising corrugated felt roofing panels. Potential bat access points included gaps beneath the roofing panels. There was no roof void or underlining present internally. Gaps were present in the stone work and timber window surrounds. No internal or external evidence of bats was observed in association with this building, which is considered to have **low** potential for roosting bats.
- 4.23 Building B11 was a garage adjacent to a residential property, constructed from concrete panels supported on a concrete frame and with a flat corrugated composite panel roof. The main garage door was supported by a solid timber frame. Internally the space was divided into two sections, with the larger boarded out, with evidence of previous use as a workroom. Potential access points for bats included gaps between the concrete panels and around the eaves. This structure was considered to have **low** potential to support roosting bats.

*Moderate Bat Roost Potential B1b, B1c, B3e, and B3f*

- 4.24 Building B1b was a single storey brick outhouse with a hipped slate tiled roof and concrete ridge connected to B1a on the western aspect. An open walkway with a tiled roof with felt underlining ran north-south through the building. Internally two roof voids were present, however access was

not possible for inspection as the ceilings were plastered and there was no access hatch. Potential bat access points into these areas were via the open access of the walkway and gaps at the wall tops of the walkway. Bat droppings were identified along the open walkway during the 2018 assessment, but not during the 2021 update survey. Given the limitations to access for survey the building was considered to have **moderate** potential to support roosting bats.

- 4.25 Two swallow nests and a further bird nest (unknown species) were noted within building B1b.
- 4.26 Building B1c was a two-story brick barn linking B1a and B1d with a pitched slate tiled roof and a concrete ridge. Potential bat access points included gaps where mortar was missing from the eastern gable, gaps in the brickwork on the southern aspect, gaps beneath the lead flashing on the northern aspect, and gaps beneath the eaves. A plastered ceiling was present internally, with no access hatch to enable the inspection of the roof void. No external evidence of bats was observed in association with this building, which is considered to have **moderate** potential to support roosting bats.
- 4.27 Building section B3e was a single storey stone barn with a pitched slate tiled roof, located to the south of B3d. Potential bat access points included gaps beneath the ridge, open aspects on the eastern aspect, and gaps beneath the eaves. No internal survey was possible due to the presence of dense vegetation surrounding the building preventing access. No external evidence of bats was observed in association with this building, which, given the restrictions to access is considered to have **moderate** potential to support roosting bats.
- 4.28 Building section B3f was located on the southern aspect of B3e. This was a single storey stone barn with a pitched slate tiled roof. Potential bat access points included gaps amongst the mortar on the eastern gable, gaps beneath the barge boards, and gaps along the eaves. Internally a plastered ceiling was present. No evidence of bats was observed in association with building B3f, which is considered to have **moderate** potential to support roosting bats.

#### *High Bat Roost Potential B5 and B10*

- 4.29 Building B5 was a two-storey stone barn with a pitched corrugated metal roof. Potential bat access points comprised gaps around doorways, windows, at the eaves and beneath the metal corrugated roofing panels. There were also open doorways on the northern aspect. There were no roof voids or underlining present internally. During the 2018 assessment a single brown long-eared bat present was recorded on the timber ridge in the south east corner. Brown long-eared bat and *Pipistrellus* species droppings were recorded on the ground floor. Five pairs of butterfly wings were recorded in the upper story in the southwest. No evidence of bat activity was recorded however during the updating assessment in 2021. Given the previous presence of droppings building B5 is considered to have **high** potential to support roosting bats.
- 4.30 Building B10 comprised a pair of adjoining semi-detached two-storey residential properties (Ashgrove Cottages). These were of stone and brick construction with a shared main roof void and a perpendicular section with a separate void. Potential access points included cracks in brick and stonework and at wall tops, around the chimneys and sections of mortar, and under slates and ridge tiles. A small number of bat droppings (probable *Pipistrellus* sp. and brown long-eared bat) of indeterminate age were recorded within the roof voids. As such this building was considered to have **high** potential to support roosting bats.

#### *Confirmed Bat Roost Potential B1a, B1d*

- 4.31 Building B1a was a three storey 'L' shaped residential property of brick construction with a pitched slate roof. Six dormer windows were present, along with four brick chimneys. Gutters were present

along the eaves and climbing plants had established up the exterior walls. Potential bat access points included gaps under the eaves on the southern aspect, gaps beneath the lead flashing around the dormers on the eastern / north eastern aspect, and cracks present among the brickwork. Internally the rooms extended into the apex and had plastered ceilings with no access hatch. A cellar on the western aspect was accessible to bats via an open doorway. Internally, the cellar was dark, damp and cold. Gaps were present in the walls, not all of which could be fully inspected with an endoscope. The inspection surveys recorded no internal or external evidence of bats in association with this building.

- 4.32 Nocturnal surveys conducted in 2019 and 2021 recorded small numbers of common pipistrelle entering and emerging from roosts associated with the third-floor dormer window and chimney base of building B1a.
- 4.33 Building B1d was a single storey stable with a pitched slate tiled roof adjoining building B1c. Potential bat access points included open doorways and windows, and gaps beneath the eaves and beneath the north eastern gable. Internally the majority of the structure was accessible for survey, however two sections were inaccessible due to their dilapidated condition. No roof voids were present. There was partial underlining present on the southern roof aspect (wool and/or bituminous membrane), whereas the northern aspect was unlined. Gaps were present within the stone walls and between timber beam joints. Bat droppings and evidence of recent bat foraging activity were noted during the 2018 assessment. The updating surveys in 2021 recorded a single common pipistrelle returning to roost under the eaves.
- 4.34 Several bird nests including swallow nests were identified throughout the interior of B1d.

#### Emergence / Re-entry Nocturnal Surveys (Appendix B)

- 4.35 All buildings identified with low, moderate or high use by bats were subject to nocturnal surveys in 2019 and again in 2021. A small number of individual common pipistrelle (maximum count = 3) were recorded returning to roost within building sections B1a and B1d on four occasions over the 2019 and 2021 survey periods. No bats were observed emerging or returning to roost within any other building surveyed.
- 4.36 The results of the nocturnal surveys are summarised in Table 5 and in Figure 2.

**Table 5: Bat Roost Summary**

Date	Time	Building	Species	Roost details
02.08.19	04.27	B1a	Common pipistrelle	Single individual returning under lifted tile at base of chimney.
16.08.19	05.17	B1a	Common pipistrelle	Two individuals entered overhanging eaves of eastern 3 <sup>rd</sup> floor dormer window.
16.08.19	05.25			
16.08.19	05.30	B1a	Common pipistrelle	Single individual entered overhanging eaves of western 3 <sup>rd</sup> floor dormer window.
11.06.21	04:30	B1d	Common pipistrelle	Single individual entered under eaves of building on southern elevation.
23.07.21	03:35	B1a	Common pipistrelle	Single individual emerged from lifted flashing on 3 <sup>rd</sup> floor dormer window.

#### Tree Assessment (Appendix C)

- 4.37 The tree assessments undertaken from ground level identified 70 trees across the total survey area that exhibited features with potential to support roosting bats, each of which was categorised as having Low, Moderate or High roost potential, in accordance with Table 1 (Appendix C). Of these

8 were located outside of the finalised works area, and as such are listed within Appendix C as ‘off-site retained’. A further 21 (potentially +4 southern junction) are located on or immediately adjacent to the site within areas of proposed green infrastructure and such are to be retained and buffered within the scheme.

- 4.38 The aerial inspection surveys undertaken in 2019 and 2021 recategorized a number of trees originally classed as having Moderate potential down to Low or Negligible potential.

#### *Confirmed Roosts*

- 4.39 No bat roosts in tree features were confirmed during the ground-based or aerial inspection assessments.

#### *High Roost Potential Trees*

- 4.40 From the completed assessments, no trees were identified within the works area as having a high potential to support roosting bats.

#### *Moderate Roost Potential Trees*

- 4.41 From the completed assessments, 10 trees within the works area were identified as having moderate bat roosting potential (T7, T10, T15, T16, T18, T25, T28, T30, T33, T57). Two further trees T51 and T52 may additionally be lost, dependent on the final scheme details.

#### *Low Roost Potential Trees*

- 4.42 23 trees were categorised as having low potential to support roosting bats: T1, T3, T4, T8, T9, T12, T13, T14, T17, T19, T21, T22, T23, T24, T27, T29, T31, T32, T38, T45, T49, T50 and T56. An additional two trees: T54 and T63 may additionally be lost, dependent on the final scheme details.

#### Nocturnal Surveys (Figure 3)

- 4.43 Nocturnal surveys undertaken in 2019 and 2021 on all moderate risk trees within the works area listed above identified no evidence of occupation/use by roosting bats within any tree. Surveys did however note small numbers of common pipistrelle, soprano pipistrelle, *Myotis* sp., and *Nyctalus* sp. bats active within the local vicinity (data not shown).

**Further surveys of trees T7, T10, T15, T16, T18 and T25 are scheduled for summer 2022 to update 2019/2020 data.**

#### **Foraging / Commuting**

- 4.44 The following section summarises the results of bat activity surveys undertaken across the 2018, 2020 and 2021 field seasons. A more detailed breakdown of the field data is provided in the associated appendices and figures. **Spring transects and static detector surveys are scheduled for the Highways Works area for 2022.**

#### **Activity Transects (Figures 4-16)**

##### 29th May 2018 – Original Main Site (Figure 4)

- 4.45 In total 17 bat registrations were recorded during the May bat transect, dominated by common pipistrelle. Other bat species recorded during this transect included occasional unidentified *Myotis* species, noctule *Nyctalus noctula* and a single soprano pipistrelle *Pipistrellus pygmaeus* registration. Bat activity was largely associated with internal field hedgerows (H6, H11, H13 and

H20) and the central mixed plantation adjacent to H18, which included foraging activity. In addition, four passes were recorded at the western site boundary.

25<sup>th</sup> July 2018 – Original Main Site (Figure 5)

- 4.46 Very low levels of bat activity were noted in July, with a total of 11 bat registrations recorded, again dominated by common pipistrelle. Other bat species recorded in July included two unidentified *Nyctalus* sp. registrations, and single registrations of soprano pipistrelle, unidentified *Myotis* sp. and brown long-eared bat. Bat activity in July was largely recorded within the south east of the site, associated with the plantation woodland and hedgerow H11. Activity largely comprised commuting behaviour, though foraging common pipistrelle were recorded at the southern boundary adjacent to the woodland.

18th September 2018 – Original Main Site (Figure 6)

- 4.47 The lowest levels of activity were recorded during the September transect, comprising largely common pipistrelle with soprano pipistrelle recorded on one occasion. Activity was largely associated with the habitats towards the centre of the site including the watercourse / hedgerow H10 and neighbouring woodland. Bat activity was predominantly identified as foraging behaviour.

6th July 2020 – Original Main Site (Figure 7)

- 4.48 Moderate levels of bat activity were recorded, the majority of which was comprised of common pipistrelle which was recoded multiple times through the survey with two registrations for both brown long-eared bat and *Myotis* species. Activity was largely associated with the habitats towards the centre of the site and to the north of the site along hedgerows H6, H5 and H18 and neighbouring woodland. Bat activity was predominantly identified as commuting behaviour.

27th April 2020 – Main Site Southern Extension (Figure 8)

- 4.49 Low levels of bat activity were recorded during the April transect, comprising largely of common pipistrelle and soprano pipistrelle with small numbers of noctule and *Myotis* species recorded. The majority of activity recorded was located in the west and southwest associated with woodland edges at the boundary. Activity largely comprised commuting behaviour, though foraging common pipistrelle were recorded at the southwestern boundary adjacent to the woodland.

6th July 2020 – Main Site Southern Extension (Figure 9)

- 4.50 Similar levels of bat activity were recorded for the main site southern extension as there were for the main site for the July transects, lower levels of foraging activity were recorded for the main site southern extension. Activity was largely associated with the habitats towards the centre of the site including the watercourse / hedgerow H29 and H15 and neighbouring woodland to the south. Bat activity was predominantly identified as commuting behaviour

29th September 2020 – Main Site Southern Extension (Figure 10)

- 4.51 A greater diversity of species was recorded during the September transect which included common and soprano pipistrelles, *Pipistrellus* sp., noctule, serotine *Eptesicus serotinus*, *Nyctalus* sp. brown long-eared bat and *Myotis* sp. bats. The majority of activity recorded was identified as foraging behaviour and was located in the west and southwest, associated with woodland edge habitats.

17th May 2021 – Main Site (North) (Figure 11)

- 4.52 Low levels of activity were recorded during the May transect for the main site, comprising largely common pipistrelle with occasional commuting passes from noctules and *Myotis* bats. Activity was largely associated with the habitats towards the centre of the site along the Gagle Brook tributary and hedgerow H5. Bat activity was entirely identified as commuting behaviour.

17th May 2021 – Main Site (South) (Figure 12)

- 4.53 Very low levels of activity were also recorded in the main site southern extension during the May transect with a total of 27 registrations recorded comprising largely of noctule and common pipistrelle with the occasional *Myotis* sp. Activity was relatively spread out throughout the site with foraging activity focused along hedgerows H29 and H27. Bat activity was predominantly identified as commuting behaviour.

6th July 2021 – Highways Works Area (North) (Figure 13)

- 4.54 Moderate levels of bat activity was recorded during the July transect which was focused on the newly expanded site boundary comprising of the highways works area north. The majority of bat activity comprised of common pipistrelle with the occasional commuting pass by soprano pipistrelle, *Pipistrellus* sp. and brown long-eared bat. Activity was largely associated with the eastern boundary along hedgerow H49 and H51 with occasional foraging and commuting passes along hedgerow H76 and H77. Activity was largely commuting behaviour, though foraging common pipistrelle were recorded to the south east and western boundary.

6th July 2021 – Highways Works Area (South) (Figure 14)

- 4.55 Lower levels of foraging and commuting activity were recorded during July transect in the highways works area south in comparison to the highways works area north, although the species composition was similar, predominantly comprising pipistrelles. Activity was largely spread throughout the site with the most registrations recorded along Burntclose Copse woodland to the southeast. Bat activity was a combination of foraging and commuting behaviour with foraging behaviour being predominantly identified along the Burntclose Copse woodland.

8th September 2021 – Highways Works Area (North) (Figure 15)

- 4.56 Similarly to the July transect at highways works area north moderate levels of bat activity was recorded with a majority of bat activity comprised of *Nyctalus* sp, common pipistrelle and soprano pipistrelle. Activity was relatively spread out through the site with the most registrations recorded along the eastern boundary associated with the nearby woodland. Bat activity was predominantly identified as commuting behaviour with continuous foraging behaviour along the eastern boundary.

8th September 2021 – Highways Works Area (South) (Figure 16)

- 4.57 The lowest levels of activity were recorded during the September transect for the highways works area south, comprising largely soprano pipistrelle and common pipistrelle with noctule recorded on one occasion. Activity was largely associated with the habitats towards the south eastern aspect of the site including the neighbouring woodland. Bat activity was predominantly identified as commuting behaviour.

Spring 2022 – Highways Works Area (North)

- 4.58 **To be completed during the 2022 spring surveys (April-May).**

Spring 2022 – Highways Works Area (South)**4.59 To be completed during the 2022 spring surveys (April-May).****Activity Transects Surveys Summary**

- 4.60 Overall, results of the monthly activity surveys indicated that the Site is primarily used by foraging and commuting common and soprano pipistrelles, with both noctule, *Nyctalus* sp. and *Myotis* sp. bats also frequently utilising habitats present. Brown long-eared bats were noted only infrequently, but were likely under recorded given the typical very low volume of their calls. The distribution of bat activity highlighted that mature hedgerow boundaries, tree lines and woodland edges represented key habitat resources for both foraging and commuting individuals. Notable foraging areas/flight lines recorded include those associated with woodland edges and hedgerows throughout the main site, main southern extension and highways works areas.

**Automated Static Detector Surveys (Figure 19)**

- 4.61 SM2BAT+ detectors were deployed within the Main Site area in spring, summer and autumn 2018 and 2020, and in spring 2021. Single detectors were deployed during the initial four survey periods, and two detectors during each of the latter three surveys, totalling 10 detector survey periods and a sum of 543 recording hours.

- 4.62 Two detectors were deployed within the Highway Works area in summer and autumn 2021, one to the north, one to the south on each occasion, and cumulatively operated for a total of 207 hours. **The final static detector survey of the Highway Works area will be undertake in spring 2022.**

- 4.63 A summary of the automated static detector survey results is set out in the following paragraphs.

May 2018

- 4.64 The May SM2BAT+ detector was located towards the south-eastern end of hedgerow H5, north of the farm buildings and recorded a total of 3346 registrations over the five-night recording period. Bat activity was dominated by common pipistrelle activity (c.65.5 registrations per hour and c.97% of total registrations recorded), the majority of which was recorded during the second and third nights of the survey (c.48% and 39% respectively). Soprano pipistrelle was also most frequently recorded during the second night (c.78% of 80 registrations). Other species recorded in May included unidentified *Myotis* sp. (10 registrations, noctule (4 registrations) and single unidentified *Pipistrellus* sp. and brown long-eared bat registrations.

July 2018

- 4.65 The July static was located at the northern boundary of the main site, adjacent the railway embankment and recorded comparatively low levels of activity with a total of 247 registrations. Bat activity was again dominated by common pipistrelle (approximately 2.7 registrations per hour / c.62%) with occasional noctule (69 registrations, c.28%). Other species recorded included rarely occurring soprano pipistrelle (8 registrations), brown long-eared bat (8 registrations), an unidentified *Nyctalus* / *Eptesicus* sp. (3 registrations), unidentified *Myotis* sp. (3 registrations), and Nathusius' pipistrelle *Pipistrellus nathusii* (2 registrations). Most common pipistrelle activity occurred during the initial two nights of recording (c.42% and 36% respectively), whereas most noctule behaviour was recorded during the 2<sup>nd</sup> and 3<sup>rd</sup> nights (c.48% and 35%).

September 2018

- 4.66 The September static was located on the northern edge of plantation W3 and recorded a total of 242 registrations over the five-night period. Bat activity was dominated by common pipistrelle (c.2.4 registrations per hour, c.81%). Other species rarely recorded species included soprano pipistrelle (22 registrations), noctule (21 registrations) and unidentified *Myotis* sp. (2 registrations). Most common pipistrelle activity occurred during the initial two nights (c.45% and 42%), most soprano pipistrelle activity occurred during the second night (c.91%), and all the noctule registrations were recorded during the fourth night.

April-May 2020

- 4.67 The spring SM4 BAT FS static detector was deployed along the edge of plantation W5. This logged a total of 1446 registrations across the five-night recording period, of which the majority were common pipistrelle (962 registrations, c.66%), with most activity occurring during the first and third nights. 26 of the 27 soprano pipistrelle registrations occurred during the initial night, whereas most *Myotis* sp. activity (429 of 452 registrations) occurred during nights 1 to 3. Less frequently encountered species comprised noctule (3 registrations) and single registration each of brown long-eared bat and serotine *Eptesicus serotinus* (not previously recorded). Most bat activity occurred between 21:00 and 00:00 (c.63.6%).

June 2020

- 4.68 Two static detectors were deployed in June 2020, one along a tree line located to the south of Severn Trent Composting Facility, and the second located along hedgerow H5, adjacent a small plantation woodland stand, north of the farm buildings.
- 4.69 The first detector recorded 3645 bat registrations in total. These comprised common pipistrelle (1996 registrations), soprano pipistrelle (1056), noctule (57), *Myotis* sp. (422), brown long-eared bat (9), unidentified *Nyctalus* / *Eptesicus* (5), *Nyctalus* (7) and *Pipistrellus* sp. (13). Also recorded were 80 barbastelle *Barbastella barbastellus* registrations, this species is listed on Annex II of the Habitats Directive. Most barbastelle activity was recorded during the final night of the survey (46 registrations), however this species was recorded by the detector during each of the five nights (nights 1-4 ranged between 3 and 18 registrations). Most of the barbastelle activity recorded (70%) occurred between 01:00 and 03:00.
- 4.70 The detector located along hedgerow H5 recorded a total of 1012 bat registrations. These comprised common pipistrelle (486), *Myotis* species (246), soprano pipistrelle (186), noctule (56), barbastelle (21), brown long-eared bat (9), *Nyctalus* / *Eptesicus* sp. (5), and *Nyctalus* sp. (3). Most of the barbastelle activity recorded by this unit occurred during the initial night of the survey (13 registrations), with 1 to 4 registrations recorded across the remaining nights. Soprano pipistrelle and *Myotis* sp. activity was also highest during the first night (83 and 106 registrations respectively), however common pipistrelle activity has highest during the final night (172). The highest activity levels in the overall dataset were recorded between 22:00 and 00:00.

September 2020

- 4.71 One static detector was located at tree TH1 within the highways works area in September 2020. This recorded 233 bat registrations, comprising common pipistrelle (42), soprano pipistrelle (59), noctule (37), *Myotis* sp. (84), barbastelle (5), *Nyctalus* sp. (4) and single registrations brown long-

eared bat and *Pipistrellus* sp. Most activity occurred between 19:00 and 21:00 (c.65%), with very little activity recorded after midnight (c.12.4%).

- 4.72 The second detector was located at hedgerow H37 within the main site but close to the B430. This recorded a total of 73 bat registrations, comprising common pipistrelle (53), soprano pipistrelle (7), *Myotis* sp., (11) and single noctule and barbastelle registrations. Most of the common pipistrelle activity was recorded during the initial night (c.77%). Only two registrations were recorded after midnight (one *Myotis* sp. and one noctule registration)

#### May 2021

- 4.73 One static detector was located along hedgerow H28 within the main site boundary. This recorded 232 registrations, the majority of which were identified as common pipistrelle (177 registrations c.76%), with the remainder composed of soprano pipistrelle (18), noctule (12) and *Myotis* sp. (25). Bat activity levels were broadly consistent across the four-hour period 21:00 to 01:00 (21%, 22%, 29% and 22%), and with no bat activity noted after 02:25.
- 4.74 The second detector was located within plantation near to hedgerow H18 within the main site boundary and recorded 255 registrations over the same period. Common pipistrelle was the most frequently recorded species (128 registrations), followed by noctule (68), *Myotis* sp. (37), soprano pipistrelle (12) brown long-eared bat (6) and barbastelle (4). The highest common and soprano pipistrelle and *Myotis* sp. activity levels all occurred on the third night, however most of the noctule activity occurred on the final night. There were peaks in the overall data set between 22:00-23:00, 00:00-01:00 and 03:00-04:00, mostly attributable to pipistrelle species on each occasion. The peak between 03:00 and 04:00 was the only instance of a potential pre-dawn activity peak noted.

#### June-July 2021

- 4.75 One detector was located along the edge of the linear plantation southwest of Pickford Farm buildings from 29<sup>th</sup> June 2021. This recorded a total of 432 registrations, of which c.81% of activity (351 registrations) was identified as common pipistrelle. Other species were detected infrequently, comprising noctule (30), soprano pipistrelle (23), *Myotis* sp. (16), barbastelle (11), and *Pipistrellus* sp. (1). Much of the pipistrelle activity occurred during the initial night of recording (common 190 registrations, c.54.1%, soprano pipistrelle 10 registrations, 43.5%). Barbastelle was recorded during four of the five nights (range 1-5 registrations). Common pipistrelle activity levels were highest between 22:00 and 00:00 (53%), and most noctule behaviour was noted between 2:00-23:00 (63%). All barbastelle activity occurred between 01:00 and 04:00.
- 4.76 The second detector was located at hedgerow H37 within the main site but close to the B430 and recorded a total of 415 registrations across the five nights. Activity was again dominated by common pipistrelle (243, 58.36%), with less frequently occurring *Myotis* sp. (79), soprano pipistrelle (49), noctule (24), brown long-eared bat (14), barbastelle (4), and Nathusius' pipistrelle (2). Pipistrelle and noctule activity was highest between 22:00-23:00 (common pipistrelle 107, c.44%, soprano pipistrelle 22, c.45%, noctule 15, 62.5%), whereas *Myotis* activity was broadly consistent between 22:00-03:00. The two Nathusius' pipistrelle registrations were both recorded during the fourth night, one 22:00-23:00 and one 23:00-00:00. Most brown long-eared bat activity (seven of eight registrations) and all barbastelle activity occurred 00:00-03:00.

#### July 2021

- 4.77 A static detector deployed along hedgerow H50 within the north-eastern highways works area in early July recorded a total of 891 registrations, the majority of which were again identified as

common pipistrelle (844, c.95%). The remainder was made up of infrequently recorded soprano pipistrelle (9), noctule (10). *Myotis* sp. (14), brown long-eared bat (5), barbastelle (6), *Nyctalus / Eptesicus* sp. (2) and *Pipistrellus* sp. (1). Most of the common pipistrelle activity occurred between 22:00 and 01:00 (c.64%), with a second, smaller peak in activity between 03:00 and 05:00 (c.24%).

- 4.78 The second detector was located along Gagle Brook at the proposed crossing point of the Middleton Stoney Relief Road. This recorded a total of 6445 registrations, across the five-night period, 4848 of which (c.75%) were identified as common pipistrelle. The remainder of the bat activity comprised soprano pipistrelle (617), noctule (581), *Myotis* sp. (156), brown long-eared bat (10), barbastelle (27) and serotine (206). Most of the common pipistrelle activity occurred during the first two nights (c.61%), whereas soprano pipistrelle activity mostly occurred during the first, second and final nights (c.79%), with broadly consistent, high levels of activity noted between 23:00 and 04:00. Soprano pipistrelle activity was highest between 00:00 and 04:00, whereas noctule mostly occurred 22:00-01:00, with a second small peak in activity 04:00-05:00. Almost all of the serotine activity occurred between 00:45 and 02:00 on 8<sup>th</sup> July, with the remainder all occurring between 00:30 and 00:40 on the final night. Low levels of barbastelle activity were recorded across all nights except the third (range 0-10). Across the amalgamated dataset bat activity levels were lowest during the hour following dusk and the hour before dawn.

#### September 2021

- 4.79 The first detector, located at hedgerow H50 within the north-eastern highways works area recorded 5261 registrations in early September, again predominantly common pipistrelle (c.58%). *Myotis* sp. were the next most frequently encountered (1291), followed by soprano pipistrelle (712) and noctule (165). Lower numbers of barbastelle (24), brown long-eared bat (9) and *Pipistrellus* sp. (1) were also recorded. Common pipistrelle activity was broadly constant between 20:00 and 03:00, and similarly for soprano pipistrelle between 21:00 and 04:00. Barbastelle were recorded across all nights, but with single registrations only recorded on the initial and final night of recording.
- 4.80 The second detector was again located along Gagle Brook at the proposed crossing point of the Middleton Stoney Relief Road. This recorded 4206 registrations, of which 2177 (c.52%) were identified as common pipistrelle, and 1450 (c.34%) as soprano pipistrelle. The remainder comprised noctule (110), *Myotis* sp. (383), barbastelle (50), brown long-eared bat (29) and *Nyctalus* sp. (7). Common pipistrelle and soprano pipistrelle activity levels were highest during the second night of recording (c.62% and c40.5% respectively), whereas *Myotis* sp. were recorded more frequently during the third night (c30.5%). Common pipistrelles were most active between 20:00 and 21:00, and soprano pipistrelle between 21:00 - 22:00 and between 02:00 - 04:00. Barbastelle were recorded across all nights, but with c.48% of activity occurring during the second night. Slight peaks in barbastelle activity were noted between 20:00-21:00 and between 03:00-04:00. Across all species, activity levels were lowest during the hour following dusk and the hour before dawn.

## 5.0 DISCUSSION

- 5.1 All UK species of bat are listed on the Conservation of Habitats and Species Regulations 2017 (*as amended*) making it illegal to deliberately disturb any such animal or damage / destroy a breeding site or roosting place of any such animal. Bats are also afforded full legal protection under Schedule 5 of the Wildlife and Countryside Act 1981 (*as amended*). Under this legislation it is illegal to recklessly or intentionally kill, injure or take a species of bat or recklessly or intentionally damage or obstruct access to or destroy any place of shelter or protection or disturb any animal whilst they are occupying such a place of shelter or protection. Some bat species, including soprano pipistrelle, are Species of Principal Importance under Section 41 of the Natural Environment and Rural Communities Act 2006 (NERC).

### Roost Sites

#### Buildings

- 5.2 From the survey work completed it is concluded that buildings/sections B2b, B3b, B3c, B3d, B3g, B3h, B4, B6, B7, B8, B9 and B12 have negligible potential to support roosting bats, hence the presence of a bat roost is not a statutory constraint to the demolition or renovation of these buildings.
- 5.3 Of the remaining buildings / building sections B1e, B1f, B2, B3a and B11 were categorised as having low potential to support roosting bats, and buildings B1b, B1c, B3e, and B3f as having moderate potential.
- 5.4 Nocturnal surveys confirmed the presence of a bat roost within building B1a, with common pipistrelle bats recorded returning to three different locations within building B1a, with a maximum count of three individual bats recorded on each occasion. Evidence of roosting behaviour was also recorded within B1d (bat droppings and feeding remains), which was consistent with previously recorded evidence of roosting bats by ADAS in 2008. Given the low numbers of individuals recorded in association with this roost it is considered that B1a supports an occasional day roost used by small numbers of non-breeding common pipistrelle, and building section B1d supports a brown long-eared bat feeding roost and occasional (non-breeding) pipistrelle roost (both common and widespread species of low conservation significance) used by individual or small numbers of bats.
- 5.5 Bat droppings were recorded on the floor of building B5 during inspection undertaken in 2018, and the presence of a single roosting brown long-eared bat was also confirmed visually. No further evidence of roosting behaviour was recorded during the nocturnal surveys however, or during the subsequent updating internal inspection completed in 2021. This building is therefore considered to have **high** potential to support roosting bats having previously supported an occasional day roost used by individual or low numbers of non-breeding brown long-eared bats.
- 5.6 Inspection of building B10 in April 2021 recorded the presence of bat droppings of indeterminate age scattered within the roof voids. As such this building was considered to have high potential to support roosting bats. No nocturnal surveys have been undertaken of this property or of the adjacent garage B11.
- 5.7 Buildings B1a, B1d, B5, B10 and B11 are to be retained within the scheme, however B1a and B1d are to be renovated to form part of a Farm Campus, and B10 is to be renovated and converted to a site office.

- 5.8 Proposed works to Building B1 comprise localised roof repairs (with the roof lining retained), minor internal re-modelling, the potential introduction of insulation, removal of a boiler flu, removal of an attached lean-to conservatory, and replacement of areas of corrugated asbestos roofing.
- 5.9 As the presence of a bat roost is a statutory constraint to development if it is not possible to proceed with the above works and retain the roost sites and associated entrances unmodified, the proposed renovation of buildings B1a/B1d would proceed under the strict terms of a **Natural England Licence** to allow derogation from the law. The licencing process will entail the submission of a method statement and mitigation details to Natural England for agreement and would include the following:
- Pre-works check of suitable roosting features using endoscopes, torches and inspection mirrors, as appropriate;
  - Toolbox talk, setting out legislation, the potential presence of roosting bats, the agreed method statement and what to do if a roosting bat is found;
  - Works supervised by a licenced or accredited bat worker;
  - Suitable features to be removed by hand / using hand tools; and
  - Provision of appropriate long-term roost replacements such as bat boxes.
- 5.10 Proposed works to building B10 comprise minor roof repairs, the installation of new windows below the roof level, and the removal of a conservatory. Once the detailed proposals for the roof repairs and associated works are identified these will be assessed for their potential to impact the roof structure and/or supporting walls. If appropriate these structures will then be subject to nocturnal surveys and an updating internal assessment to further assess their potential to support roosting bats. In the event that the presence of a bat roost is confirmed a Natural England Licence would be secured as above to allow works to proceed.

### Trees

- 5.11 Tree inspections from ground level and canopy surveys with aerial access identified no trees on site with high potential to support roosting bats required to be removed as part of the proposals.
- 5.12 Nine (to 12) trees that will be lost under the proposed development were identified as having moderate potential to support roosting bats (T7, T10, T15, T16, T18, T25, T28, T33, T57 (T30, T51, T52).
- 5.13 Visual inspection and nocturnal surveys recorded no evidence of bat roosts within trees with moderate potential that will be lost under the proposed development.
- 5.14 The removal of trees with low or moderate bat roost potential or arboricultural works that could affect potential roost sites will be carried out during the bat active season (May to September inclusive) in accordance with a precautionary method statement in order to ensure legal compliance. The statement will cover the appropriate mitigation measures to ensure that bats are adequately protected during tree works and will include pre-works checking surveys (nocturnal surveys and/or aerial tree climbing inspection). Providing that the checking survey records no evidence of roosting bats each tree will be section felled by experienced arborists under the supervision of an appropriately licensed bat worker. Cut sections will be left in-situ for a period of at least 24 hours to allow any bats present to disperse.
- 5.15 In the event that the checking surveys confirm the presence of roosting bats then works will be halted until an appropriate Natural England derogation licence is put in place. The licence would

detail the appropriate timing and safe working practices necessary to ensure that the risk to bats is minimised and that suitable alternative roosting sites are provided in the form of bat boxes erected on suitable trees in the vicinity. The type of bat boxes and location would be determined by the bat worker at that time and would reflect the nature of the roost identified.

- 5.16 Should any trees on site be subject to further damage beyond that noted in Appendix C, for example by future storms or strong winds, further survey work may be required prior to tree removal. Ecological advice should therefore be sought prior to the removal of any such tree.

### **Foraging/ Commuting**

- 5.17 From the completed survey work the following bat species were identified using the on-site habitats: common pipistrelle, soprano pipistrelle bat, Nathusius' pipistrelle bat, *Myotis* sp., noctule/*Nyctalus* sp., barbastelle, brown long-eared bat, and serotine. This species assemblage is considered typical for a site of this size and nature within Oxfordshire given the habitats present on site and the largely rural setting, albeit with adjacent transport infrastructure and active quarry sites. Furthermore the species assemblage within the site as was similar in composition to that described by the desk study data, with the exception that the desk study had additionally identified the presence of Daubenton's bat locally.
- 5.18 Bat activity within the site was consistently dominated by common pipistrelle, a common and widespread species throughout the UK. Soprano pipistrelle, noctule/*Nyctalus* sp. and *Myotis* sp. bats were also regularly recorded during each survey period, though far less frequently than common pipistrelle. Low numbers of brown long-eared bat and barbastelle registrations were recorded during several of the static detector survey periods, and brown long-eared bat was also occasionally encountered during the transect surveys. Notably no barbastelle activity was noted during the 2018 survey season and only very rarely during the subsequent transect surveys. Nathusius' pipistrelle and serotine were each recorded by only two of the 16 static detector survey positions and were not identified by the transect surveys.
- 5.19 Whilst individual bats were occasionally observed commuting across or over field compartments, the vast majority of bat activity comprised commuting and foraging behaviour along field boundary hedgerows, plantation/woodland edges, and vegetated watercourses.

### **Common Pipistrelle**

- 5.20 Common pipistrelle was consistently the most frequently recorded species. The highest levels of common pipistrelle activity (>1000 registrations each) were recorded by the static detectors on the eastern edge of hedgerow H5 (May 2018), along the tree line south of the Severn Trent Composting Facility (June 2020), along Gagle Brook at the proposed crossing point of the Middleton Stoney Relief Road (July 2021 and September 2021), and along hedgerow H50 within the north-eastern Highway Works area (also September 2021).
- 5.21 There was no clear seasonal pattern across the full common pipistrelle dataset, with the highest activity levels recorded by static detectors during the 2018, 2020 and 2021 field seasons occurring in May, June and July/September respectively. As the detectors were often moved between recording periods in order to sample different parts of the site, no conclusions can be drawn regarding possibly seasonal patterns at any given feature. The high activity levels at the Gagle Brook crossing point recorded in both summer and early autumn suggest however that this watercourse and associated woodland corridor represent an important resource, with high levels of activity 11:00-04:00 in July, and 20:00-03:00 in September indicating regular foraging behaviour.

Whilst there was also an apparent peak in the September activity data between 20:00 and 21:00 (532 registrations, 24.9%) this mostly occurred during a single evening (306 registrations) hence is not evidence of a regularly used commuting route to a nearby roost site.

#### Soprano Pipistrelle

- 5.22 Soprano pipistrelle was also regularly recorded across the site, though far less frequently than common pipistrelle. This species is considered to be more closely associated with riparian habitat than other *Pipistrellus* species therefore the lower activity levels are likely a consequence of the absence of any significant water bodies on site.
- 5.23 The highest levels of soprano pipistrelle activity recorded by the static detectors were noted along the tree line south of the Severn Trent Composting Facility in June 2020, with a total count of 1056 registrations recorded, representing c.29% of the data recorded by this detector. Most of this activity however occurred during the final night of recording (766, 72.5%), and primarily during a 3-hour window (594 between 01:00 and 04:00). As such the data is not indicative of the presence of a regularly used commuting route.

#### Nathusius' Pipistrelle

- 5.24 The static detector survey recorded Nathusius' pipistrelle on only two nights, the first on 25/07/18 at 03:26 and 03:27 (two registrations) to the north of the main site, adjacent the railway embankment, and the second on 02/07/21 (22:41 and 23:57) amongst an area of scrub adjacent the B430. This species is widespread but rare across the UK, and most commonly encountered on migration in late summer/autumn (although some individuals do remain all year and breed in the UK). Nathusius' pipistrelle is considered a seasonal migrant within Oxfordshire<sup>8</sup> though is likely under recorded. The very occasional presence of this species within the site is therefore not considered significant as the site is located within the species' natural range.

#### *Myotis* species

- 5.25 Unidentified *Myotis* sp. bats were identified during most transects and all static surveys accounting for c.11.39% of the total static detector dataset. The highest levels of *Myotis* sp. activity were noted by the static detectors located along the edge of plantation W5 (April-May 2020), along the tree line south of Severn Trent Green Power Ardley Composting Facility and along hedgerow H5 north of the farm buildings (both June 2020), along hedgerow H50 within the north-eastern highways works area and along Gagle Brook at the proposed crossing point of the Middleton Stoney Relief Road (both September 2021).

#### Noctule/*Nyctalus* species

- 5.26 Noctule and unidentified *Nyctalus* sp. were recorded during most transects and all static surveys (range 1-581 registrations), accounting for c.4.5% of the total static detector dataset. The highest levels of noctule/*Nyctalus* activity were recorded within the highways works area, both at the Gagle Brook crossing point (July and September 2021) and along hedgerow H50 to the northeast (September 2021). All other detector locations recorded less than 100 registrations.

#### Barbastelle

- 5.27 Barbastelle mostly occurs across southern and central England and Wales and is considered rare but widespread within Oxfordshire<sup>8</sup>. This species was not recorded during any survey undertaken

<sup>8</sup> Oxfordshire Mammal Group 2017. *Oxfordshire Mammal Guide*. Oxfordshire Mammal Group.

in 2018 however was subsequently detected during the September 2020 transect towards the south of the main site. Barbastelle also represented 0.95% of the registrations recorded by the static detectors in 2020 and 2021.

- 5.28 The highest number of barbastelle registrations was recorded by a static detector located along the tree line south of Severn Trent Composting Facility (80 registrations in June 2020), with the second highest number recorded in September 2021 alongside woodland adjacent to Gagle Brook (50 registrations). Other detectors recorded only low levels of barbastelle activity (range 0 to 27 registrations for each 5-night recording period in 2020 and 2021). The majority of the 80 registrations recorded at the tree line in June 2020 occurred during a single night (57.5%), with no peak in activity apparent post-dusk or pre-dawn indicative of commuting behaviour from/to a roost site. At the Gagle Brook location slightly higher activity levels were noted between 20:00-22:00 and between 03:00-04:00 however there was no consistent pattern of use, with nearly half the registrations recorded on the second night (24, 48%) and very low numbers on the first and third nights (4 and 3 registrations respectively), indicating likely foraging behaviour rather than evidence of a regularly used commuting route.
- 5.29 Barbastelle is relatively light sensitive species that shows a preference for pastoral landscapes with woodland and riparian habitat, though will forage over large territories of mixed habitats and flight lines up to 20km from a roost have been documented<sup>9,10</sup>. Typically this species roosts within old, established woodland, habitat that is poorly represented within the Proposed Development Area but is present in the surrounding landscape. Based upon the timing and frequency of barbastelle activity recorded it is considered that on-site features most likely form a small proportion of a larger home range and do not provide a significant commuting or foraging resource for this species.

#### Brown long-eared bat

- 5.30 Low levels of brown long-eared bat activity were detected during the majority of the static detector recording periods, but with some recording periods noting no evidence of this species (range 0-29). Four of the transect surveys noted brown long-eared bat activity: in July 2018 to the north of the main site, adjacent the southern railway embankment, in July 2020 along the Gagle Brook tributary, southwest of the farm buildings, in September 2020 towards the south of the main site, west of the farm buildings, and in July 2021 within the north-eastern highway works area, adjacent the northern railway embankment. Brown long-eared bat is a common and widespread species within the UK however as previously noted its echolocation calls are very low amplitude. The species is therefore often being difficult to detect and it is considered likely under recorded by transect and static detector surveys.

#### Serotine

- 5.31 Serotine is a relatively uncommon bat species within the UK and considered widespread but infrequent within Oxfordshire<sup>9</sup>. A single serotine registration was recorded by the static detector located adjacent to woodland block W5 within the west of the main site at 01:04 on 28/04/2020. This species was only recorded at one other location: at the proposed crossing point of the Gagle brook, when 192 serotine registrations were recorded during the night of 07/07/21second night of

<sup>9</sup> Greenway 2004. English Nature Research Report 657 - *Advice for the management of flightlines and foraging habitat of the barbastelle bat *Barbastellus barbastellus**

<sup>10</sup> Zeal, M. R, Davidson-Watts, I. & Jones, G. 2012. Home range use and habitat selection by Barbastelle bats (*Barbastella barbastellus*) implications for conservation. *Journal of Mammalogy* 93:110-118.

recording, and 14 registrations during the night of 10/07/20 (206 registrations in total). No evidence of serotine activity was recorded during the transect surveys.

#### Foraging / Commuting Overview

- 5.32 The survey results indicate that on-site habitats, notably field perimeter hedgerows/ treelines and connecting watercourses, ponds and woodland/plantation edge habitats are used by a range of bat species within their natural range. Furthermore whilst several habitat features were used regularly by foraging bats, no significant peaks in activity post-dusk and pre-dawn were evident that might signify important commuting routes to neighbouring roost sites. The utilisation of on-site habitats by local bat species is considered typical of the site composition and context., with the Development Area considered to represent a roosting/foraging/commuting resource for bat species of Local level importance.
- 5.33 The proposals will result in the partial removal of existing suitable bat foraging and commuting habitat from within the site, including the removal of the majority of existing habitat corridors through the interior of the Main Site. The proposed B430 Ardley Bypass and the Middleton Stoney Relief Road will sever a number of linear features including hedgerows and also the woodland belt along Gagle Brook that currently provide suitable dark habitat corridors for bats through the local landscape. Furthermore, off-site habitats along the embankments of the adjacent Chiltern Main Line will be indirectly impacted by the construction of a road bridge to take the B430 Ardley Bypass across the rail tracks and potentially also by the illumination of the new rail terminal once operational.

#### Mitigation and Enhancement

##### Roost Sites - Buildings

- 5.34 Buildings B1a/B1d, B5 and B10 are to be retained and renovated as part of the proposed scheme. As there is potential for associated roost sites to be impacted or lost as a result of the proposals updating surveys will be undertaken as appropriate and a mitigation strategy will be put in place to ensure that the risk of harm to bats during works is minimised. Suitable alternative roosting opportunities as outlined below will be provided in advance of the works commencing and works in these areas will proceed under the supervision of an appropriately licenced bat worker.
- 5.35 Where there is potential for works to impact a confirmed roost site and/or roost entrance this strategy will be delivered through an appropriate Natural England derogation licence that will be in place prior to works commencing.
- 5.36 Six bat boxes will be provided on suitable retained features or mature trees for each roost site lost/modified as part of the building works. Appropriate designs include, but are not limited to: Beaumaris Woodstone Bat Box or Schwegler 2F, 1FF, 2FN, 3FN, 1FD, 1FS, or 2F-DFP (with double front panel) box designs. These are manufactured from long-lasting woodstone/woodcrete and will last for at least 20 - 25 years.
- 5.37 Bat boxes will be located in in unlit and clutter free environments adjacent or within continuous greenspace. Those placed on trees will ideally be in groups of 2-3 boxes per tree, at a height of c.3m from the ground but no higher than 4m to allow safe future inspection. Bat boxes will be orientated in a south west, south or south easterly direction. Trees with three boxes should also include a box facing a northerly direction.

## Roost Sites - Trees

- 5.38 The removal of low and moderate roost potential trees will be carried out according to a precautionary method statement in order to ensure legal compliance. The statement will cover the appropriate mitigation measures to ensure that bats are adequately protected during tree works. This will include precautionary nocturnal surveys and/or aerial tree climbing inspections to update the previous inspections and to ensure the sensitive removal of a tree only when it is confirmed to be unoccupied by bats. Providing that no bats are present the trees will be section felled by experienced arborists under the supervision of an appropriately licensed bat worker. In the event that bats are confirmed to be present then works will immediately halt and remain so until an appropriate Natural England derogation licence is put in place. This licence would detail the appropriate timing and safe working practices necessary to ensure that the risk to bats is minimised and that suitable alternative roosting sites are provided.
- 5.39 In addition to the provision of bat boxes to mitigate any impacts to roosts within the farm buildings a further 30 bat boxes of the above or equivalent designs will be installed on suitable retained trees within the habitat corridors throughout the site to provide enhanced roosting opportunities for bats.
- 5.40 The above measures are considered sufficient to ensure that the availability of suitable roosting opportunities across the Development Area is maintained and enhanced for all local bat populations.

## Foraging &amp; Commuting Habitats

- 5.41 The proposals incorporate generous native species hedgerow, scrub and tree/woodland planting, particularly around the perimeter and to the south of the Main Site, and along each of the new arterial roads. The green infrastructure will therefore maintain connectivity around the site and link to retained habitats and the surrounding landscape to provide suitable corridors of movement for bats and other local wildlife.
- 5.42 The bypass bridge over the rail tracks will have minimum headroom of 5.1m above the tracks and will be designed such that the bridge span provides open flight corridors along each embankment to facilitate the uninterrupted movement of bats along the rail track corridor. The western verge along the entire length of the bypass will be planted with native tree and shrubs to provide a new continuous habitat corridor and therefore alternative commuting/foraging opportunities for bats through the local landscape.
- 5.43 The earthworks required to enable the construction of the Middleton Stoney Relief Road will inevitably require the removal of a section of broadleaf woodland where this road will cross Gagle Brook, fragmenting a mature habitat corridor that represents an important feature for local bat populations within the local landscape. The loss of existing tree cover within this area will be minimised as far as possible, and post construction new mixed native tree species planting will be established up each road embankment to replace sections of previously adjacent woodland and largely close the gap made in this feature. It is recommended that no lighting is used on this short section of the road. The result will therefore be a relatively narrow permanent break in the woodland belt at this location, albeit this will be elevated above the current ground levels. The proposed green infrastructure at this point links to a continuous corridor of native tree and shrub planting that will extend along the length of the relief road from the B430 to Middleton Stoney, providing alternative commuting/foraging opportunities for bats through the local landscape.

- 5.44 Where gaps are introduced into linear habitat features ‘hop-overs’ will be created to facilitate the continued, unhindered movement of bats along these features. ‘Hop-overs’ shall consist of a progression of increased canopy heights leading up to heavy standard trees located either on each side of the gap or (for larger breaches) at intervals across the gap to encourage bats (and birds) to naturally increase their flight altitude across the road. Management of mature trees either side of new roads should raise the crown height by regular pruning of lower branches back to the trunk in order to promote the most suitable flight line above the maximum vehicle height, thereby reducing the potential for road traffic mortalities.
- 5.45 Whilst there will inevitably be some minor permanent loss of habitat continuity from within the proposed Development the scheme will provide several new habitat corridors that will form new linkages to retained habitats on and off site. It is therefore considered that local bat populations will continue to have a range of alternative commuting/foraging routes available to them in addition to similar habitats within the wider landscape.
- 5.46 Additional considerations to be incorporated within the soft landscaping include:
- The creation of new permanent waterbodies and areas of species-rich wildflower grassland planting to provide high quality habitat for invertebrate prey.
  - “Gapping up” of retained hedgerows with mixed locally native hedgerow species to increase species diversity, strengthen and improve habitat corridors for foraging bats.
  - Preference will be given to the inclusion of nectar and fruit producing native shrub and tree species to provide foraging for insects, birds and mammals. Suitable species include alder *Alnus glutinosa*, beech *Fagus sylvatica*, silver birch *Betula pendula*, wych elm *Ulmus glabra*, wild cherry *Prunus avium*, hornbeam *Carpinus betulus*, English oak *Quercus robur*, rowan *Sorbus aucuparia*, goat willow *Salix caprea*, hawthorn *Crataegus monogyna*, hazel *Corylus avellana*, field maple *Acer campestre*, blackthorn *Prunus spinosa*, dogwood, *Cornus sanguinea*, guelder rose *Viburnum opulus*, field rose *Rosa arvensis* and dog rose *R. canina*.
  - Management of the hedgerows should be undertaken in an ecologically sensitive manner to enhance the nature conservation value. Suitable management actions include:
    - Allowing hedgerows to reach a height of at least 3m. They can then be ‘topped out’ to maintain the height or to suit circumstances, with a width of at least 1-2m;
    - A proportion of trees within the hedgerow such as oak and field maple should be allowed to mature into standard trees to provide nesting and foraging opportunities for local wildlife and a varied habitat structure; and
    - Grassland along the hedgerow base should be maintained with a long sward for most of the year to provide a graduated sward height and habitat.

### Lighting and Noise

- 5.47 Large-scale development can result in higher levels of light pollution which is an increasing problem for bats<sup>11</sup>, for example where lighting disrupts their usage of existing habitat corridors for commuting purposes, which can compound impacts resulting from associated habitat fragmentation.
- 5.48 Elevated light levels can result in a number of effects such as the disturbance or loss of roost sites and commuting routes, disturbance of the feeding behaviour of bats or the availability of resources,

<sup>11</sup> Stone, E.L. 2013. *Bats and lighting: Overview of current evidence and mitigation*.

and increased risk of being preyed upon<sup>12</sup>. As such a sensitive lighting design will be incorporated into the development to minimise impacts arising as a result of artificial lighting.

5.49 Lighting considerations and constraints to be implemented during construction and to be incorporated into the development in order to ensure minimal resulting light spill include:

- No use of lighting at night during the construction period in areas where this will illuminate retained or created habitats including ponds.
- The lighting scheme including along the new roads will direct lighting to where it is needed, using deflectors where appropriate to minimise light spill.
- Any upward lighting should be avoided or otherwise minimised via the use of baffles/cowls.
- Dark corridors (<1lux and ideally <0.5lux) should be designed to incorporate habitats of value to bats for foraging, potential roosting and commuting purposes. Retained and newly created hedgerows, trees, ponds and watercourses should be sufficiently buffered to ensure that a low light level is maintained alongside and in the vicinity of these features.
- Lighting will be appropriately designed to avoid light spill onto hop-overs and buffer zones.
- Lighting that is incorporated into the development design should be low pressure sodium lights as light is emitted at one wavelength and as such has a low attraction to insects or LED luminaires as these have a sharp cut-off, lower intensity, good colour rendition and dimming capability. All luminaires should lack UV elements when manufactured. Metal halide, fluorescent sources should not be used<sup>10</sup>.
- Luminaires should feature peak wavelengths higher than 550nm to avoid the component of light most disturbing to bats<sup>9</sup>.
- The bridged section of the B430 Ardley Bypass will be unlit by street lighting in order to avoid lighting disruption to bats to commuting along the railway line underneath. Structural planting (native species woodland/scrub mix) will be established along both sides of the road south of the bridge, and to the west of the road north of this point to reduce the noise levels from vehicles as this can additionally disturb foraging bats<sup>13</sup>. Noise-reducing barriers/screens may also be installed which can also double as lighting deflectors if lighting cannot be avoided entirely.

5.50 In summary the implementation of the above will mitigate the loss of existing habitats, ensure habitat connectivity is maintained for bats around the site and linking to the wider area, and provide an overall enhancement in terms of foraging, commuting and roosting opportunities suitable to promote the favourable conservation status of local bat populations confirmed present via surveys. Overall the proposed design is considered likely to result in permanent enhancements in terms of the quality and extent of suitable resources available to the local bat population at the site level.

<sup>12</sup> Bat Conservation Trust & UK Institute of Lighting Professional 2009. *Bats and Lighting in the UK*. Bats and Built Environment Series. Bat Conservation Trust & Institute of Lighting Professionals (ILP) 2018. *Guidance Note 8: Bats and artificial lighting in the UK*. Bats and the Built Environment Series.

<sup>13</sup> Schaub, A., Ostwald, J., and Siemers, B.M. 2008. *Foraging bats avoid noise*. The Journal of Experimental Biology 211, 3174-3180.

**Appendix A: Bat Building Assessments**

Building number	Building Description	Structural Features Present						Other Structural Features of Note	Potential Bat Access Points	Internal Features	Evidence recorded.	Bat Potential	History
		Gables	Barge Boards	Soffit Boards	Fascia Boards	Flashing	Roof Void						
B1a	A three storey 'L' shaped residential house of brick construction with a pitched slate roof. Cellar on the western aspect	Y	X	Y	X	Y	X	Six dormer windows. 4 brick chimneys Gutters along the eaves and climbers present. Cellar.	Gaps under the eaves on the southern aspect, gaps beneath lead flashing around the dormers on the eastern / north eastern aspect and cracks present in-between brickwork. Open door way on western aspect.	Plastered ceiling, rooms in the area where the void should be. Likely to be roosting potential behind tiles. Cellar has gaps in the stone work. Dark, damp, cold environment	5x Common pipistrelle day roost. No evidence in cellar.	Confirmed roost. Cellar has Moderate hibernation potential	N/A
B1b	A single storey brick outhouse connected to B1a on the western aspect. A hipped slate tiled roof with a concrete ridge is present.	X	X	X	Y	X	Y	An open walkway is present running through the building from the south to the north.	Open access of the walkway and gaps above the bricks in the walkway	2 x inaccessible roof voids due to plastered ceiling. Felt underlining is present beneath the tiles.	None during the 2021 PRA	Moderate	Three fresh bat droppings (likely brown long-eared bat) and one bat dropping (likely <i>Pipistrellus</i> sp.) were identified along the open walkway on 30.04.18, and a further three bat droppings (unknown species) on 10.05.18. No further evidence recorded during the 2021 updating survey
B1c	Two storey brick barn connected to B1a and B1d. A pitched slate tiled roof with a concrete ridge is present.	Y	X	X	X	X	Y		Gaps where mortar is missing on the eastern gable, gaps in the brickwork on the southern aspect, gaps beneath lead flashing on the northern aspect and gaps beneath the eaves.	Plastered ceiling no access to roof void.	None during the 2021 PRA	Moderate	N/A
B1d	B1d is a single storey stable adjoining building B1c. A pitched slate tiled roof is present.	Y	X	X	X	X	X	None	Open doorways and windows, gaps beneath the eaves and north eastern gable.	Lined on southern aspect wool/black membrane underlining. Beams present and gaps in stone walls.	1x Common pipistrelle day roost	Confirmed	Brown long-eared bat feeding perch & pipistrelle species occasional roost. 23 x pairs butterfly wings, 1 x pair yellow underwing moth, 1 x fresh BLE dropping in 2018
B1e	Building section B1e (adjoining B1a on the northern aspect) is a single storey lean too with a slate tiled roof.	Y	X	X	Y	Y	X	A gutter is present along the eaves	Broken window, gaps under lead flashing and gaps above the doorway on the eastern aspect.	Wooden underlining and no roof void.	None during the 2021 PRA	Low	N/A
B1f	A lean too with a slate tiled roof in good condition.	Y	X	X	Y	Y	X	A brick chimney and gutter along the eaves.	Gaps beneath the tiles.	Plastered ceiling no roof void.	None during the 2021 PRA	Low	N/A
B2a	One storey outhouse of brick construction with a hipped roof which is slate tiled with a concrete ridge.	X	X	X	Y	X	X	Wooden sarking is present on the southern aspect.	Gaps along the eaves though a gutter is present. Gaps around the doorways / windows, gaps beneath loose tiles or where there are missing roofing tiles and gaps created in missing brickwork	No underlining and no roof void. Eastern internal area no accessible. Gaps in brock work and wooden frame present.	None during the 2021 PRA	Low	N/A
B2b	A brick lean too on the western aspect of building B2a. The roof is comprised of corrugated metal and Perspex panels.	Y	X	X	Y	X	X		Gaps beneath the corrugated roofing panels and gaps around the doorway.	Light environment due to the Perspex panels and windows on the western aspect. No underlining is present.	None during the 2021 PRA	Negligible	N/A
B3a	A single storey stone barn with a pitched roof comprising corrugated felt roofing panels.	Y	Y	X	X	X	X	None	Gaps beneath the roofing panels.	Unlined no roof void. Gaps in the stone work and wooden window frames.	None during the 2021 PRA	Low	N/A
B3b	A lean too constructed from breeze block located adjoining B1d on the western aspect. The sloping roof comprises cement fibre corrugated roof panels	Y	Y	X	Y	X	X	None	Gaps above doorway and under corrugated roof panels.	No underlining, no roof void. No suitable roosting locations.	None during the 2021 PRA	Negligible	N/A
B3c	A single storey wooden barn with a pitched corrugated metal roof.	X	X	X	X	X	X	None	Open on the southern aspect due to missing wooden panels and various holes in the wood.	No roof void or underlining.	None during the 2021 PRA	Negligible	N/A
B3d	A large stone barn in a state of disrepair. A pitched roof with corrugated panels are present.	Y	Y	X	X	X	X	None	Open doorways, numerous gaps in the roof and at the eastern gable	No underling or roof void. Wooden beams with splits, gaps in wooden window frames and stone work.	None during the 2021 PRA	Negligible	N/A

Building number	Building Description	Structural Features Present						Other Structural Features of Note	Potential Bat Access Points	Internal Features	Evidence recorded.	Bat Potential	History
		Gables	Barge Boards	Soffit Boards	Fascia Boards	Flashing	Roof Void						
B3e	A single storey stone barn with a pitched slate tiled roof. This building section is located on the south of B3d.	X	X	X	Y	Y	X	N/A	Gaps beneath the ridge, open aspects on the eastern aspect and gaps beneath the eaves	No access.	None during the 2021 PRA	Moderate	N/A
B3f	Located on the southern aspect of B3e. The building is a single storey stone barn with a pitched slate tiled roof.	Y	Y	X	Y	X	Y	N/A	Gaps where missing mortar occurs on the eastern gable, gaps beneath the barge board and along the eaves.	Plastered ceiling no access to void.	None during the 2021 PRA	Moderate	N/A
B3g	A lean too on the northern aspect of B3d, with a corrugated metal roof and metal frame.	Y	X	X	X	X	X	N/A	Open aspects	Yellow expanding foam sprayed on panels	None during the 2021 PRA	Negligible	N/A
B3h	A lean too on the northern aspect of B3d, with a corrugated metal roof and metal frame.	Y	X	X	X	X	X	Wooden beams	Open aspects	Unlined panels	None during the 2021 PRA	Negligible	N/A
B4	Aircraft hangar style building constructed from single sheets of metal corrugated panels and breeze block.	X	X	X	Y	X	X	Overhanging asbestos fascia boards were also present	Beneath the fascia, corrugated panels and doorway.	No underling occurs and a metal frame is present	None during the 2021 PRA	Negligible	N/A
B5	A two-storey barn of stone construction. A pitched corrugated metal roof is present	Y	Y	X	Y	X	X	None	Gaps around doorways, windows, at the eaves and beneath the metal corrugated roofing panels. Open doorways on the northern aspect	No underling and no roof void. Wooden planks for support present. Very dark and cool inside no windows.	None during the 2021 PRA	High	In 2018 single brown long-eared bat present on wooden ridge south east corner during internal survey in 2018, plus c.60 droppings. Bat droppings x5 ground floor (4 BLE, pip), south west 2 <sup>nd</sup> storey 5 x butterfly wing pairs.
B6	A large agricultural structure utilised for lambing. The building is of a breeze block / wooden construction with metal frame and a pitched cement fibre corrugated roof.	Y	Y	X	X	X	X	. A lean to is present on the western aspect of this building constructed from stone / wood again with a metal frame.	Open on the northern, southern and eastern aspect.	Corrugated Perspex panels occur throughout. No roof voids or underling is present.	None during the 2021 PRA	Negligible	N/A
B7	Single storey outbuilding of stone construction and a metal frame. A sloping metal corrugated roof is present with Perspex panels also present.	Y	Y	X	X	X	X	None	Open on the northern aspect.	No underlining or roof void.	None during the 2021 PRA	Negligible	N/A
B8	A large agricultural structure constructed from concrete and metal corrugated sheeting upon a metal frame. Pitched corrugated metal roof with a metal fascia and soffit box. Cement fibre barge boards are also present with large gaps beneath.	Y	Y	Y	Y	X	X	None	Open on the southern aspect	No underlining of the corrugated metal roofing sheets and no roof void.	None during the 2021 PRA	Negligible	N/A
B9	A series of metal corrugated outbuildings on a scaffold frame. A flat corrugated roof is present. Perspex wall panels occur throughout.	X	X	X	X	X	X	None	Open on all aspects.	No roof voids and the no underlining present.	None during the 2021 PRA	Negligible	N/A
B10	Pair of semi-detached two-storey cottages of brick and stone construction with a two-storey perpendicular section to the rear leading to an attached single storey brick outbuilding. The pitched roofs are slate tiled.	Y	Y	X	X	X	Y	Chimneys, air vents, air gaps	Cracks in brick/stonework, at wall tops, around mortar and chimney, under slates and ridge tiles.	The main loft void is continuous between the two properties and this roof section is lined with modern plastic sheet backed insulation. The adjoining two-storey roof section is felt lined.	Small number of droppings (probable <i>Pipistrellus</i> and brown long-eared bat within the 2-storey voids.	High	N/A
B11	Concrete garage with a corrugated composite panel flat roof. Solid timber frame to garage door.	Y	Y	X	X	X	X	None	Gaps between concrete panels and around the eaves.	No roof void. Roof is lined with boarding	None during the 2022 PRA	Low	N/A
B12	Large metal agricultural style building on a concrete/breeze block base. Corrugated sheet metal roof with multiple skylights.	Y	Y	X	Y	X	X	None	Gaps under fascia and barge boards	No underlining or roof void. Light environment due to the skylights.	None during the 2022 PRA	Negligible	N/A

**Appendix B: Nocturnal Building Assessment Results**

**[TO BE COMPLETED]**

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**Appendix C: Bat Tree Assessments**

Old ref.	Ref.	Species	Features	Ground Assessment Category	Final Assessment Category	Retained / Lost	Comments / Action
T1	T1	English oak	SE: crack/split at c.6m	Low	Low	Lost	Soft fell
T2	T2	English oak	W: Canker plat at c.4m S: Knot hole at c.4m and woodpecker hole at c.5m & tear-out at c.5m	Moderate	Negligible	Lost	Remove with no bat constraints
T3	T3	English oak	E: Branch tear out at c. 4m	Moderate	Low	Lost	Soft fell
T4	T4	English oak	NW: Knot hole at c.3m SW: Branch tear out at c.4m (albeit downward facing cavity)	Moderate	Low	Lost	Soft fell
T5	T5	English oak	W: Branch tear out at c. 5m S: Knot hole at c. 4m	Moderate	Negligible	Lost	Remove with no bat constraints
T6	T6	Field maple	NE: Two branch tear outs with cavities at c.4 and c.5m	Moderate	Negligible	Lost	Remove with no bat constraints
T7	T7	Ash	SE: Knot hole at c.6m	Moderate	Moderate	Lost	Nocturnal survey undertaken
T8	T8	English oak	SW: Knot hole at c. 5m	Low	Low	Lost	Soft fell
T9	T9	Willow	W: Woodpecker hole at c.4m and knot hole at c.5m	Moderate	Low	Lost	Soft fell
T10	T10	Ash	NW: Woodpecker hole at c.5m SE: Knot hole at c. 7m	Moderate	Moderate	Lost	Nocturnal survey undertaken
T11	T11	Unknown	NE: 2x knot holes at c.5m	Moderate	Negligible	Lost	Remove with no bat constraints
T12	T12	English oak	S: 4 knot and woodpecker holes at c.4-5m (albeit branches appear like they may be hollow and open at top)	Low	Low	Lost	Soft fell
T13	T13	English oak	SW: Knot hole at c.3m	Moderate	Low	Lost	Soft fell
T14	T14	English oak	S: Knot hole at c.7m Number of split limbs	Moderate	Low	Lost	Soft fell
T15	T15	Unknown (dead)	W: cavity at c.3m (albeit not sure if goes anywhere)	Low	Moderate	Lost	Nocturnal survey undertaken
T16	T16	Ash	S: Cavities in trunk c.1m & 3m	Moderate	Moderate	Lost	Nocturnal survey undertaken
TA3/T17	T17	Ash	N: Knot hole at c.6m E: Branch tear out at c. 4m (downward facing cavity) S: Limb with split/lifted bark	Moderate	Low	Lost	Nocturnal survey undertaken
T18	T18	Ash	SE: Cavity in base extending up main stem SW: Knot hole at c. 6m NE: Branch tear out at c. 8m	Moderate	Moderate	Lost	Nocturnal survey undertaken
T19	T19	English oak	W: Partially detached, platey bar at c.6m	Low	Low	Lost	Soft fell
T20	T20	Horse-chestnut	N: crack or split at c.3m Partially detached, platey bark at c.3m	Low	Low	Retained	Retained and buffered
T21	T21	Ash	NW: Vertical split in branch at c. 5m	Low	Low	Lost	Soft fell
T22	T22	Ash	E & N: 3x Woodpecker hole at c.5m	Moderate	Low	Lost	Soft fell
T23	T23	Ash	NE & NW: 3x Woodpecker hole at c.4m E: Knot hole at c.6m	Moderate	Low	Lost	Soft fell
T24	T24	Ash	SW: Woodpecker hole at c.6m	Low	Low	Lost	Soft fell
T25	T25	Ash	SW: Knot hole at c.4m	Low	Moderate	Lost	Nocturnal survey undertaken
T26	T26	English oak	W: Horizontal crack in branch at c.5m	Low	Low	Retained	Retained and buffered
T27	T27	Dead - Unknown	E: Butt rot at c.6m	Low	Low	Lost	Soft fell
T3C	T28	Ash	N: Branch tear-out on secondary leader at c.5m, 5cm diameter entrance, cavity extends upwards E: Branch tear-out on secondary leader at c.5m, 14x4cm narrowing, no upward cavity, mouldy debris	Moderate	Moderate	Lost	Nocturnal survey undertaken

Old ref.	Ref.	Species	Features	Ground Assessment Category	Final Assessment Category	Retained / Lost	Comments / Action
			S: woodpecker hole c.3m with 4cm diameter entrance, no upward cavity, 10cm downward cavity; knot hole (natural) at c.3m with 3x5cm entrance, cavity downwards to 30cm, old nest material present				
T1C	T29	Field maple	W: Split along branch, possibly occluded	Low	Low	Lost	Soft fell
TA1	T30	Ash	NE: Woodpecker hole x 2 c.6m & 6.5m	Moderate	Moderate	Lost	Nocturnal survey undertaken
T2C	T31	Ash	S: Upward facing cavity and tear out at c.4m	Low	Low	Lost	Soft fell
TA2	T32	Beech	S: Broken limb with split/cracked end	Low	Low	Lost	Soft fell
T3C (near TA2)	T33	Ash	E: Knot hole (natural) at c.4m. 6cm diameter entrance, lined with fresh ash leaves. Cavity extends 10cm horizontally and upwards by 20cm. S: Crack in bark with cavity. 4x6cm entrance with 8cm horizontal cavity. No evidence of a roost. Split in main trunk with open cavity c.8m, wet inside with 6cm entrance with no significant cavity. Branch tear-out at c.11m. 5cm diameter with 6cm downward cavity.	Moderate	Moderate	Lost	Nocturnal survey undertaken 2021
TA4	T34	Ash	Dense ivy all aspects	Low	Low	Retained	Retained and buffered
TA5	T35	Ash	Dense ivy all aspects	Low	Low	Retained	Retained and buffered
TA6	T36	English oak	Dense ivy all aspects	Low	Low	Retained	Retained and buffered
TA7	T37	Field maple	Dense ivy all aspects	Low	Low	Retained	Retained and buffered
TH1	T38	Sycamore	S: Knothole (natural) c.2m	Low	Low	Lost	Soft fell
TH2	T39	Sycamore	N: Vertical split c.5m	Moderate	Moderate	Retained	Retained and buffered
TH3	T40	Sycamore	N: Knot hole c.4m S: Cavity at c.3m	Moderate	Moderate	Retained	Retained and buffered
TH4	T41	Beech	S: Possible cavity c.7m	Low	Low	Retained	Retained and buffered
TH5	T42	Beech	E: x3 woodpecker holes	Moderate	Moderate	Retained	Retained and buffered
TH6	T43	Beech	E: Deadwood and multiple small cavities	Moderate	Moderate	Retained	Retained and buffered
HT6	T44	Ash	S: Knot hole (natural) at c.4m; SW: Knot hole (natural) at c.5m	Low	Low	Retained	Retained and buffered
T4CW	T45	Horse-chestnut	N: Ivy on main stem, not plate forming, E: Minor cracks in bark on secondary limb	Low	Low	Lost	Soft fell
T2CW	T46	Horse-chestnut	N: Minor plate ivy, cluttered	Low	Low	Retained	Retained and buffered
T1CW	T47	Horse-chestnut	N: Ivy on main stem, not plate forming, S: Occasional minor flaking bark, largely superficial	Low	Low	Retained	Retained and buffered
T9CW	T48	Ash	E: Small knot hole on main stem, but no cavity	Low	Negligible	Retained	Retained and buffered
T6CW	T49	Beech	W: small wound on trunk above branch, cavity appear occluded minor	Low	Low	Lost	Soft fell
T5CW	T50	White poplar	E: Woodpecker hole c.7m on hazzard beam from main stem. 6cm diameter entrance, now upward cavity, downward cavity 15cm with feathers present	High	Low	Lost	Soft fell
T11CW	T51	Ash	W: Occasional upward facing knothole, hazard beam and tear out at c.4m	Moderate	Moderate	Potentially retained	Potentially retained. Requires further survey if cannot be retained in final scheme
T12CW	T52	Ash	N: Woodpecker hole c.6m on twin leader and platey bark from hole	Moderate	Moderate	Potentially retained	Potentially retained Nocturnals survey undertaken
T12cw	T53	Ash	N: Branch tear-out at c.2m on main stem but no cavity present.	Moderate	Negligible	Potentially retained	Potentially retained
T13CW	T54	Hawthorn?	N: exposed platey bark	Low	Low	Potentially retained	Potentially retained
TX4	T55	Ash	N: Large branch tear-out at c.6m but no cavities, woodpecker hole c.8m with 4cm diameter, not upward cavity, old nest material present, squirrel bite marks, knot hole (natural) at c.5m with cavity which extends 25cm with 3x3cm entrance and nest material present E: Knot hole (natural) at c.6m but no cavity; W: Hazard beam at c.6m but no internal cavities and exposed from above, Old tear out at c.6m, small 15cm lateral cavity,	High	Moderate	Retained	Retained and buffered

Old ref.	Ref.	Species	Features	Ground Assessment Category	Final Assessment Category	Retained / Lost	Comments / Action
			damp with old nest material; SW: Branch tear out at c.8m with 15x5cm cavity which extends 20cm upwards				
TX2	T56	English oak	N: Dense ivy but only localised matting.	Low	Low	Lost	Soft fell
TX3	T57	Ash	N: Dense ivy but only localised matting; NE: Woodpecker hole c.7m & hazard beam with potential dead wood - could not fully inspect due to active pigeon nest.	Moderate	Moderate	Lost	Nocturnal survey undertaken
TX1	T58	Ash	NE: Hollow within main trunk but fully exposed to elements	Low	Low	Retained	Retained and buffered
TX7	T59	English oak	N: Dense ivy with >5cm plating at c.3m and platey bark, very limited flight path	Low	Low	Retained	Retained and buffered
TX8	T60	Ash	Dense ivy all aspects	Low	Low	Retained	Retained and buffered
TX10	T61	Ash	W: Branch tear out at c.3m but angled upwards; S: Hollow surrounded by loose platey bark but open to elements	Low	Low	Retained	Off-site retained
HT1	T62	Horse-chestnut	W: Dead limb with loose platey bark at c.5m Some dense ivy grown on main trunk but only localised matting	Low	Low	Retained	Off-site retained
HT2	T63	Horse-chestnut	NW: Branch tear out with shallow hole and fungus c.4m Localised matting of ivy	Low	Low	Potentially lost.	Off-site but potentially lost. Soft fell if unsafe to retain
HT3	T64	Ash	S: Branch tear out at c.4m	Low	Low	Retained	Offsite retained
TXX	T65	White poplar	E: Branch tear-out at c.12m, 20x6cm entrance with 35cm dome shaped upward cavity. Staining present at the base.	Moderate	High	Retained	Off-site retained
Tx	T66	White poplar	NE: Woodpecker hole at c.12m but no cavity, N: Branch tear-out c.8m with upward cavity. Pigeon nest present.	Moderate	Low	Retained	Off-site retained
T8CW	T67	White poplar	W: Knot hole (natural) c.8m with 35cm upward cavity at 4.5cm diameter with 2.5cm opening.	High	Moderate	Retained	Off-site retained
TC7	T68	Ash	S: Vertical split with 40cm upward cavity 3-4cm diameter, top 5cm damp with rod wood present.	High	Moderate	Retained	Off-site retained
TX	T69	Ash	N: Knot hole natural c.7m; SE: Knot hole (natural) c.8m; S: Dense ivy at c.5cm but only localised matting	Moderate	Moderate	Retained	Retained and buffered
TY	T70	Ash	N: Dense ivy at c.3m but only localised matting E: Knot hole (natural) at c.5m	Low	Low	Retained	Retained and buffered

**Appendix D: Automated detector survey results**

Survey Dates	Survey Hours	Total Avg. per hour	Total Registrations	Common Pipistrelle			Soprano Pipistrelle			Noctule			Myotis Species			Brown Long-eared Bat			Nyctalus / Eptesicus			Nathusius' Pipistrelle			Pipistrellus Species			Barbastelle			Serotine			Nyctalus Species		
				Avg. per hour	Peak Count	Period Total	Avg. per hour	Peak Count	Period Total	Avg. per hour	Peak Count	Period Total	Avg. per hour	Peak Count	Period Total	Avg. per hour	Peak Count	Period Total	Avg. per hour	Peak Count	Period Total	Avg. per hour	Peak Count	Period Total	Avg. per hour	Peak Count	Period Total	Avg. per hour	Peak Count	Period Total	Avg. per hour	Peak Count	Period Total	Avg. per hour	Peak Count	Period Total
10/05 - 15/05/18	49	67.49	3342	65.55	1556	3246	1.62	62	80	0.08	3	4	0.20	3	10	0.02	1	1	0.00	0	0	0.00	0	0	0.02	1	1	0.00	0	0	0.00	0	0	0.00	0	0
25/07 - 31/07/18	57	4.30	247	2.68	65	154	0.14	6	8	1.20	33	69	0.03	3	3	0.14	7	8	0.05	2	3	0.03	2	2	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0
18/09 - 24/09/18	81	2.98	242	2.43	88	197	0.27	20	22	0.26	21	21	0.02	2	2	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0
27/04 - 02/05/20	50	28.92	1446	19.04	546	962	0.53	26	27	0.06	2	3	8.95	171	452	0.02	1	1	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.02	1	1	0.00	0	0
22/06 - 27/06/20	41.5	87.83	3645	48.1	1118	1996	25.5	766	1056	1.37	23	57	10.2	177	422	0.22	2	9	0.12	4	5	0.00	0	0	0.31	5	13	1.93	46	80	0.00	0	0	0.17	2	7
22/06 - 27/06/20	41.5	24.39	1012	11.7	172	486	4.48	73	186	1.35	25	56	5.93	106	246	0.22	4	9	0.12	3	5	0.00	0	0	0.00	0	0	0.51	13	21	0.00	0	0	0.07	2	3
23/09 - 28/09/20	65.5	3.56	233	0.64	19	42	0.90	47	59	0.56	18	37	1.28	57	84	0.02	1	1	0.00	0	0	0.00	0	0	0.02	1	1	0.08	4	5	0.00	0	0	0.06	3	4
23/09 - 28/09/20	65.5	1.11	73	0.81	41	53	0.11	4	7	0.02	1	1	0.17	5	11	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.02	1	1	0.00	0	0	0.00	0	0
14/05 - 19/05/21	46	5.04	232	3.85	114	177	0.39	17	18	0.26	8	12	0.54	9	25	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0
14/05 - 19/05/21	46	5.54	255	2.78	121	128	0.26	8	12	1.48	41	68	0.80	25	37	0.13	4	6	0.00	0	0	0.00	0	0	0.00	0	0	0.09	4	4	0.00	0	0	0.00	0	0
29/06-04/07/21	42	10.29	432	8.36	190	351	0.55	10	23	0.71	11	30	0.38	6	16	0	0	0	0.00	0	0	0.00	0	0	0.02	1	1	0.26	5	11	0.00	0	0	0.00	0	0
29/06-04/07/21	42	9.88	415	5.79	72	243	1.17	17	49	0.57	10	24	1.88	37	79	0.33	6	14	0.00	0	0	0.05	2	2	0.00	0	0	0.10	3	4	0.00	0	0	0.00	0	0
06/07 - 11/07/21	43	20.72	891	19.63	319	844	0.21	7	9	0.23	5	10	0.33	6	14	0.12	3	5	0.05	2	2	0.00	0	0	0.02	1	1	0.14	3	6	0.00	0	0	0.00	0	0
06/07 - 11/07/21	43	149.9	6445	112.7	1535	4848	14.4	208	617	13.5	179	581	3.63	56	156	0.23	3	10	0.00	0	0	0.00	0	0	0.00	0	0	0.63	10	27	4.79	192	206	0.00	0	0
08/09-13/09/21	60.5	86.96	5261	50.6	1442	3059	11.8	398	712	2.73	78	165	21.3	349	1291	0.15	7	9	0.00	0	0	0.00	0	0	0.02	1	1	0.40	9	24	0.00	0	0	0.00	0	0
08/09-13/09/21	60.5	69.52	4206	36.0	1350	2177	24.0	588	1450	1.82	51	110	6.33	117	383	0.48	11	29	0.00	0	0	0.00	0	0	0.00	0	0	0.83	24	50	0.00	0	0	0.12	7	7

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### Key

-  Site Boundary
-  1km Site Boundary Buffer
- Bats**
-  Brown Long-Eared
-  Common Pipistrelle
-  Daubenton's bat
-  Unidentified bat sp.



client  
Oxfordshire Railfreight Limited  
project  
Proposed Oxfordshire Strategic Rail  
Freight Interchange  
drawing title  
BAT CONSULTATION RESULTS PLAN

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1:35000

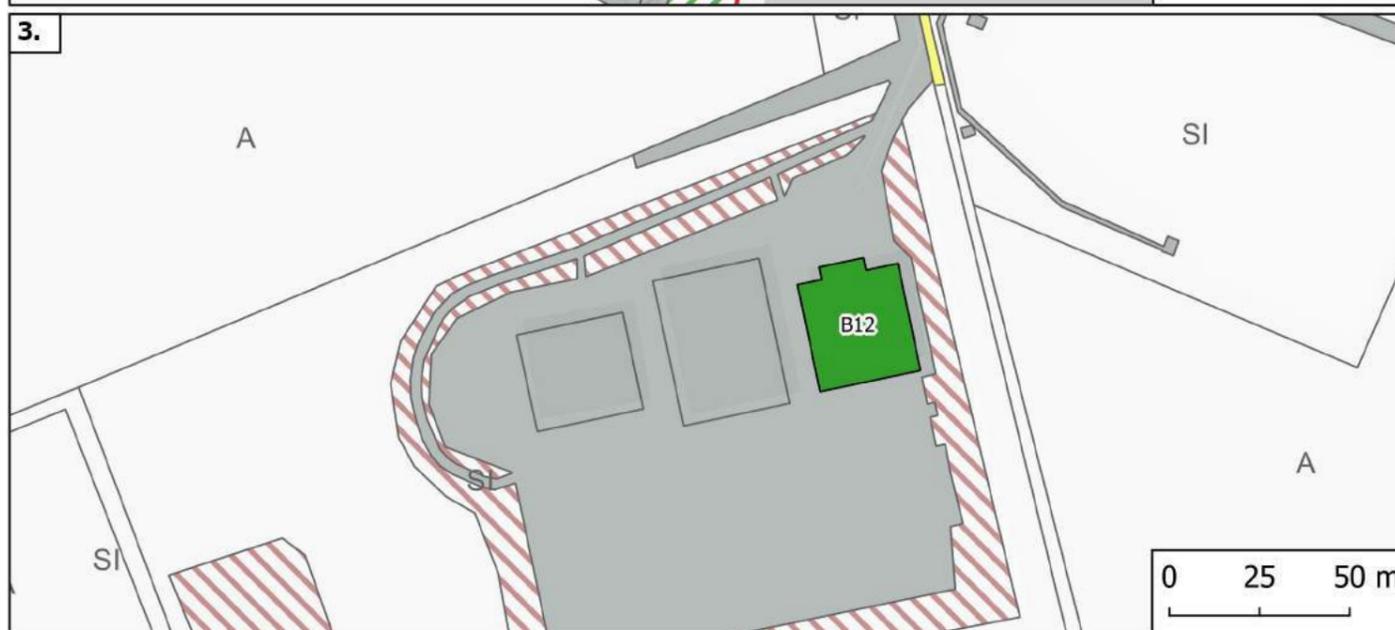
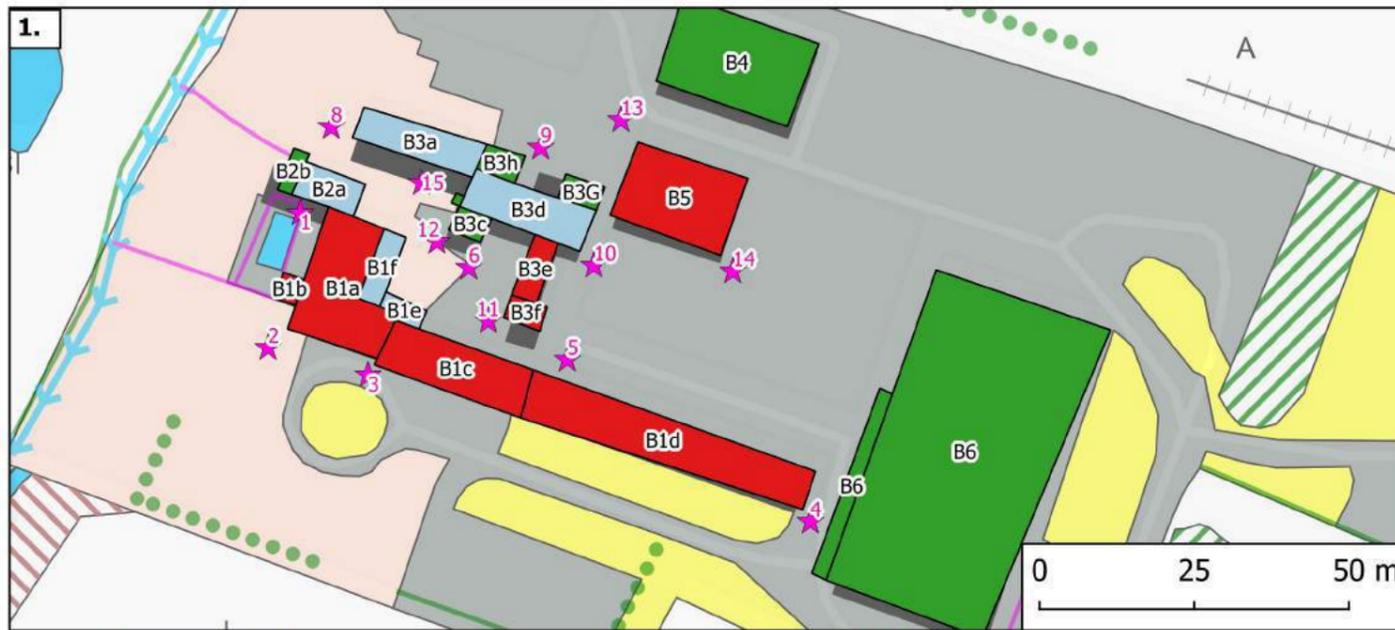
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CW/RG

date  
14/4/2022



drawing / figure number  
**Figure 1**

ref  
**8308-E-01**

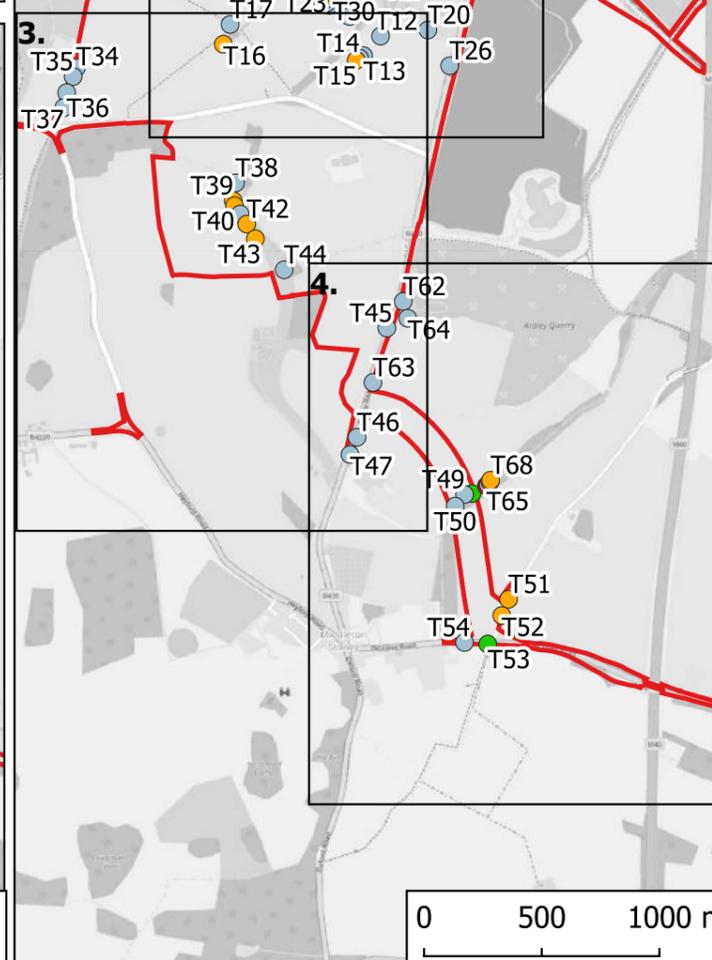
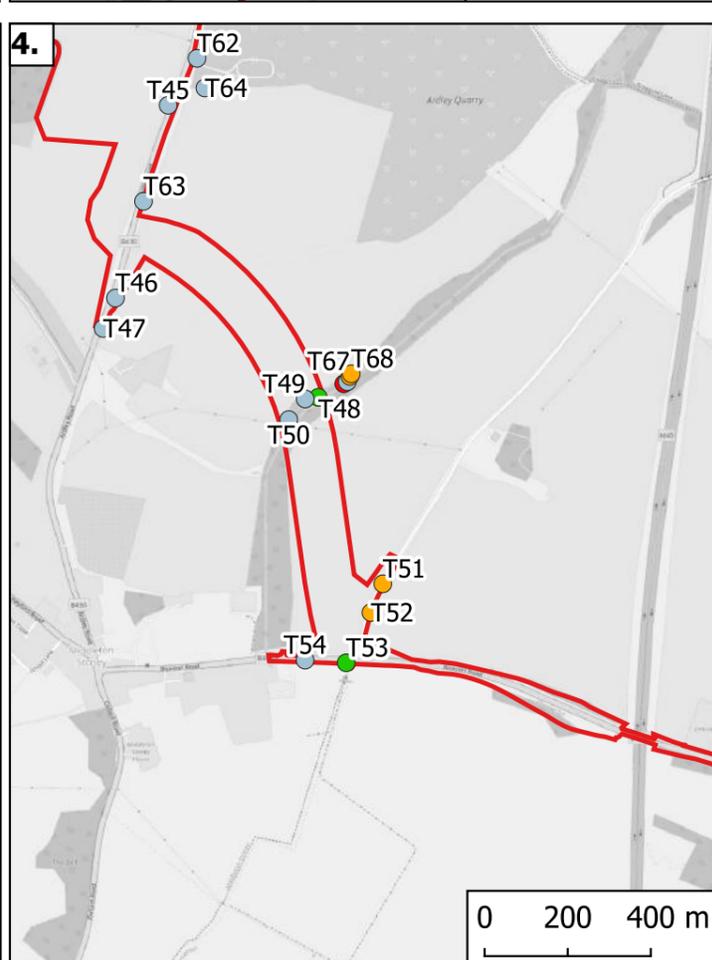
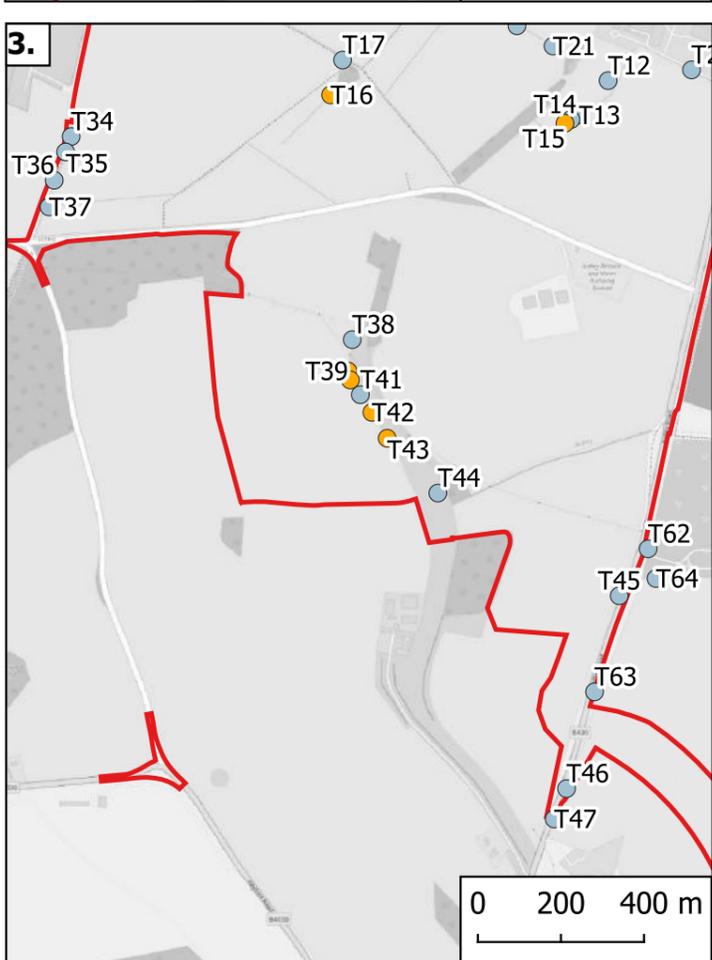
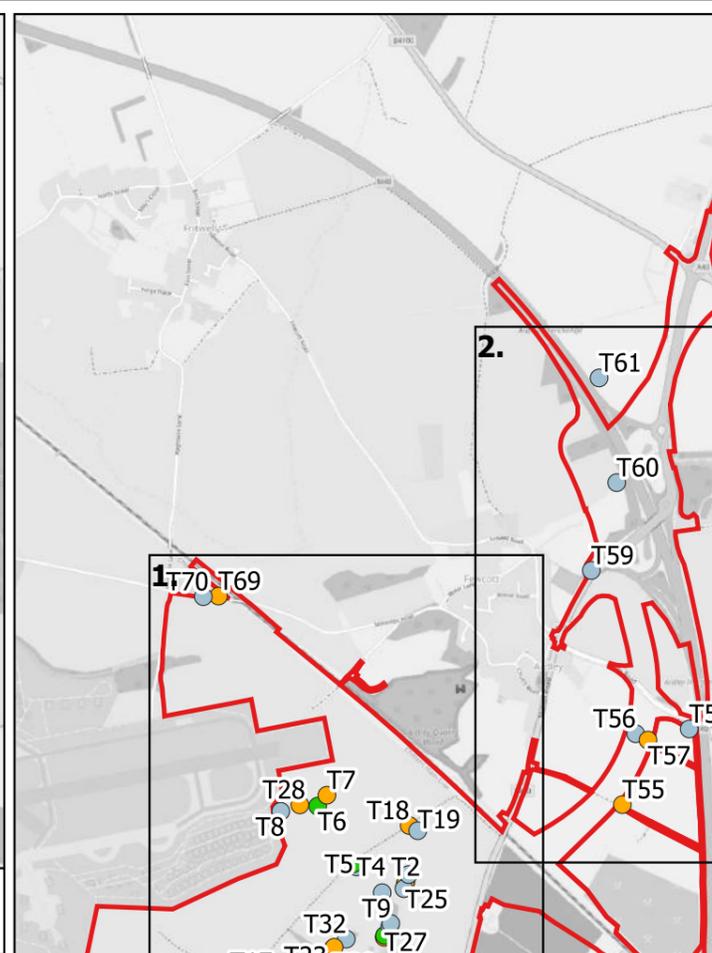
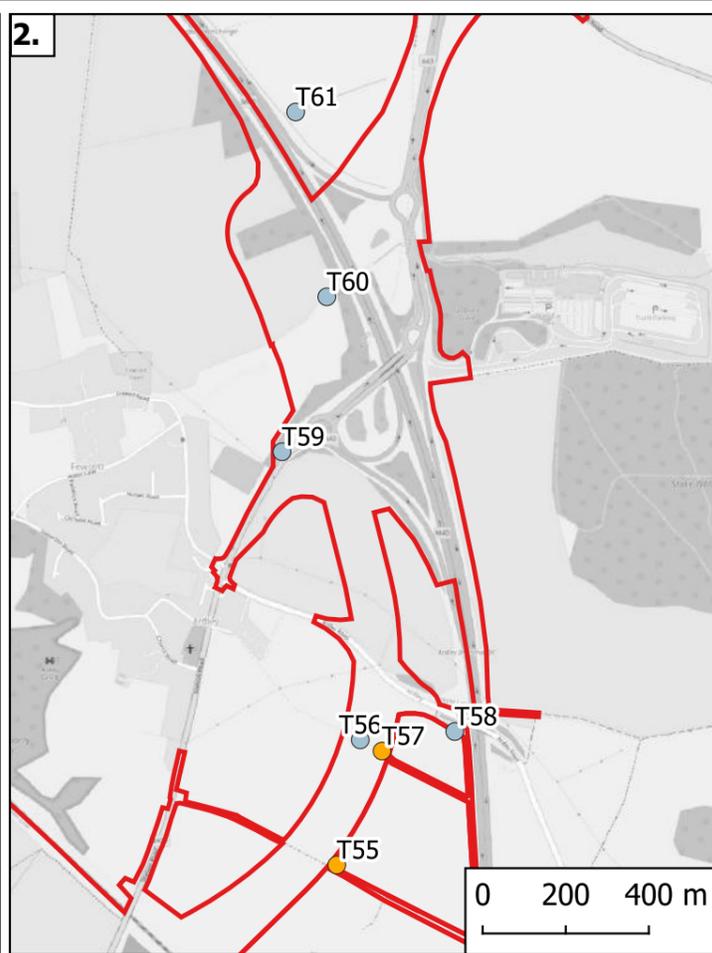
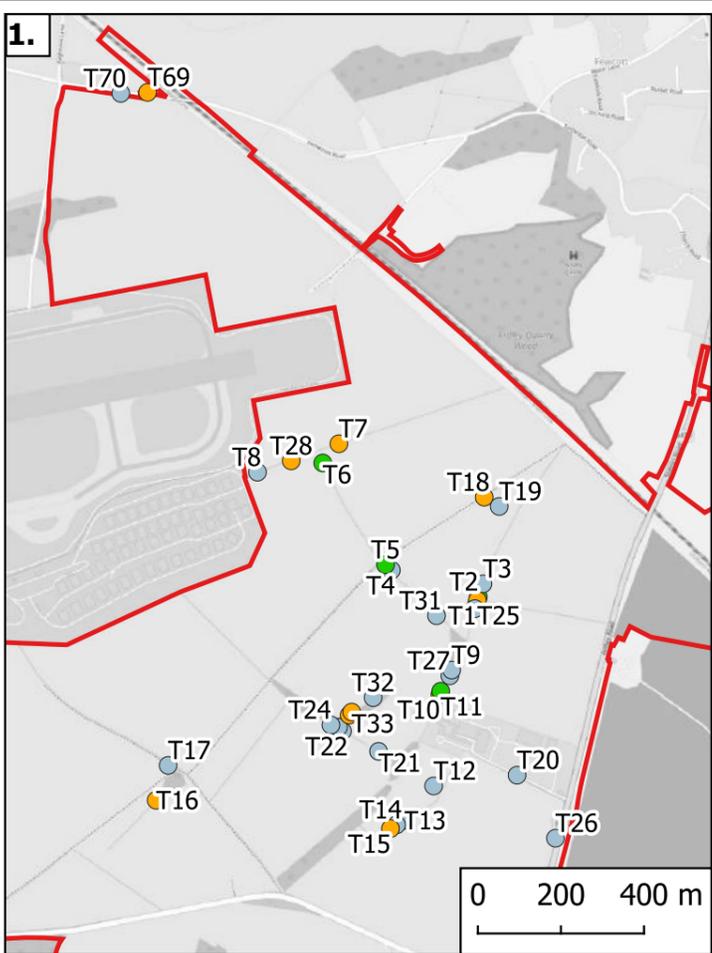


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- Site Boundary
  - ★ Surveyors Locations
- Building Assesment Results  
(with building reference)
- High
  - Low
  - Negligible

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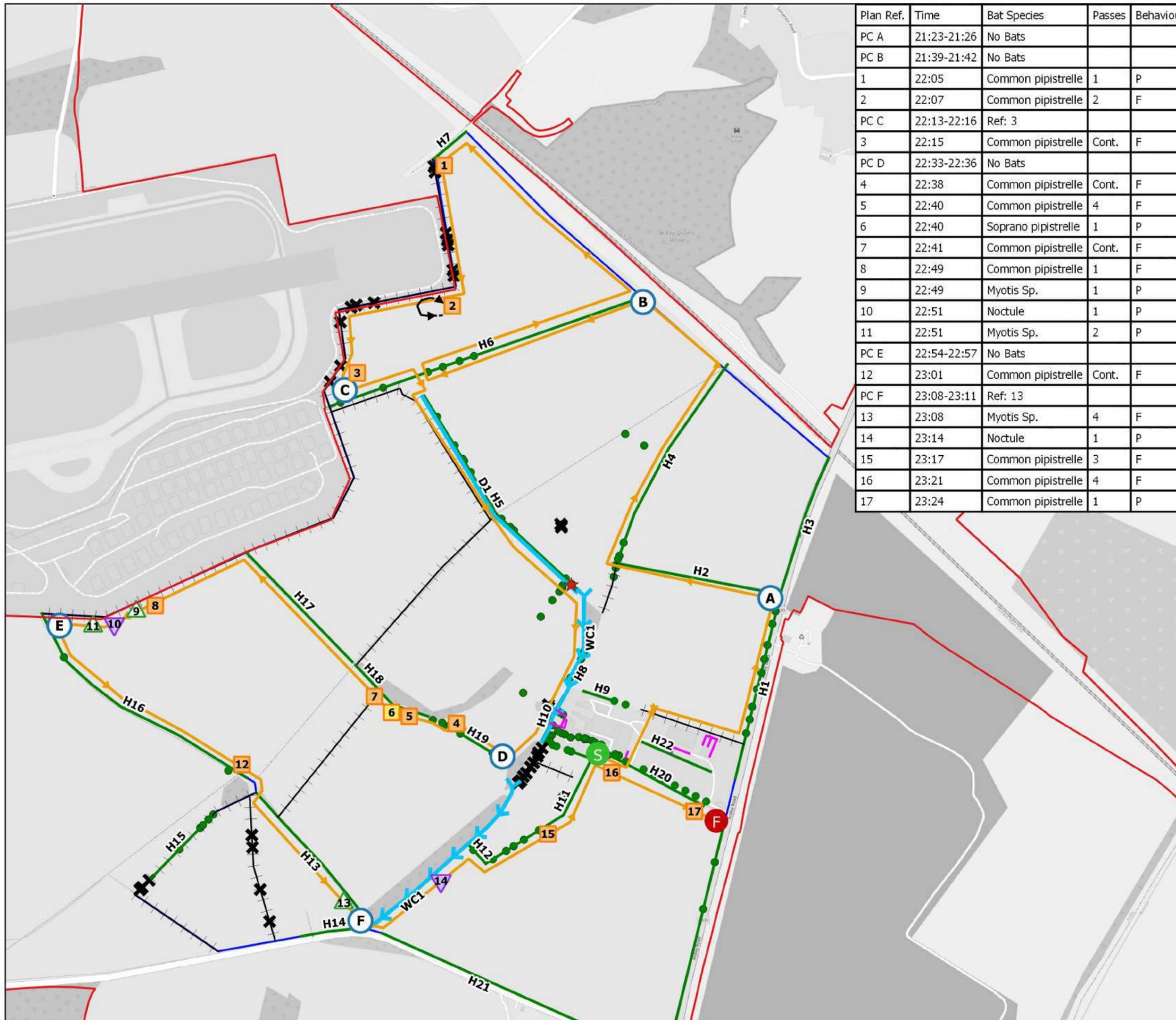
**KEY**

Site Boundary

Final Assessment Category (with tree reference)

- High
- Low
- Moderate
- Negligible

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 Bats & Trees Plan 1.qgs



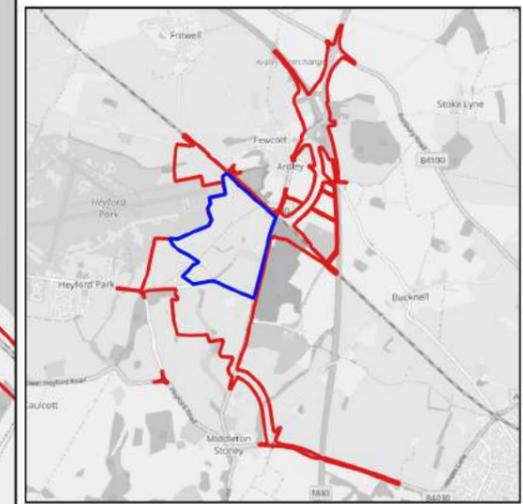
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PC A	21:23-21:26	No Bats		
PC B	21:39-21:42	No Bats		
1	22:05	Common pipistrelle	1	P
2	22:07	Common pipistrelle	2	F
PC C	22:13-22:16	Ref: 3		
3	22:15	Common pipistrelle	Cont.	F
PC D	22:33-22:36	No Bats		
4	22:38	Common pipistrelle	Cont.	F
5	22:40	Common pipistrelle	4	F
6	22:40	Soprano pipistrelle	1	P
7	22:41	Common pipistrelle	Cont.	F
8	22:49	Common pipistrelle	1	F
9	22:49	Myotis Sp.	1	P
10	22:51	Noctule	1	P
11	22:51	Myotis Sp.	2	P
PC E	22:54-22:57	No Bats		
12	23:01	Common pipistrelle	Cont.	F
PC F	23:08-23:11	Ref: 13		
13	23:08	Myotis Sp.	4	F
14	23:14	Noctule	1	P
15	23:17	Common pipistrelle	3	F
16	23:21	Common pipistrelle	4	F
17	23:24	Common pipistrelle	1	P

**Key:**

- Site Boundary
- Survey Area 2018
- S Start Point
- F Finish Point
- ★ May 2018 Static Location
- Point Count Locations
- Transect Route
- - - Flight Arrow

**Bat Contacts**

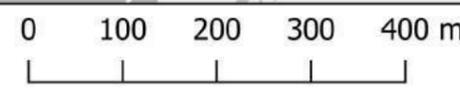
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- Soprano Pipistrelle
- ▲ Myotis Species
- ▼ Noctule

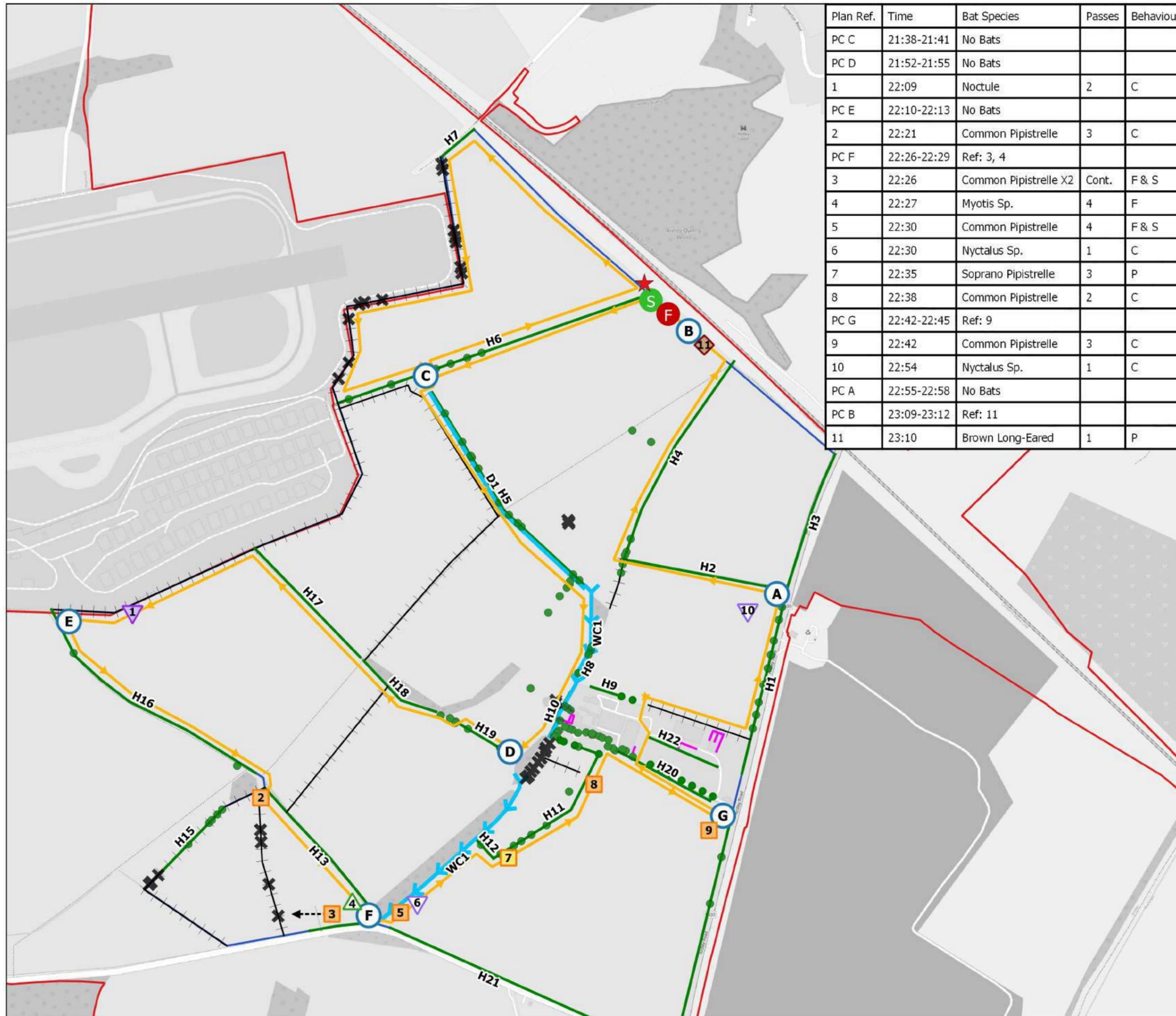


Client: Oxfordshire Rail Freight  
 Project: Proposed Oxfordshire Strategic Rail Freight Interchange  
 Drawing Title: Transect Plan (Original Main Site) May 2018

**fpcr**

Scale: A3 1:7500  
 Drawing / figure number: **Figure 4**  
 Drawn: CW/RG  
 Issue date: 20/4/2022  
 Rev: **8308-E-04**





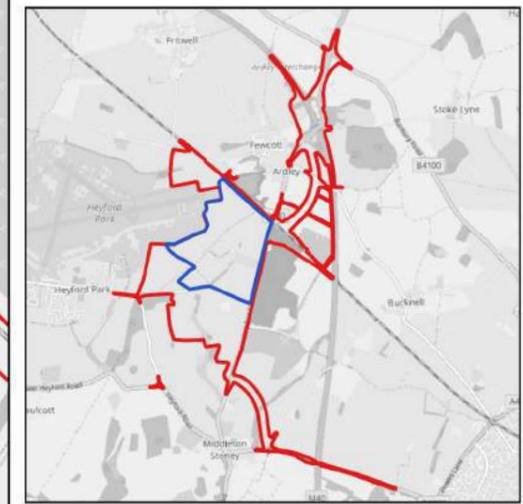
Plan Ref.	Time	Bat Species	Passes	Behaviour
PC C	21:38-21:41	No Bats		
PC D	21:52-21:55	No Bats		
1	22:09	Noctule	2	C
PC E	22:10-22:13	No Bats		
2	22:21	Common Pipistrelle	3	C
PC F	22:26-22:29	Ref: 3, 4		
3	22:26	Common Pipistrelle X2	Cont.	F & S
4	22:27	Myotis Sp.	4	F
5	22:30	Common Pipistrelle	4	F & S
6	22:30	Nyctalus Sp.	1	C
7	22:35	Soprano Pipistrelle	3	P
8	22:38	Common Pipistrelle	2	C
PC G	22:42-22:45	Ref: 9		
9	22:42	Common Pipistrelle	3	C
10	22:54	Nyctalus Sp.	1	C
PC A	22:55-22:58	No Bats		
PC B	23:09-23:12	Ref: 11		
11	23:10	Brown Long-Eared	1	P

**Key:**

- Site Boundary
- Survey Area 2018
- S Start Point
- F Finish Point
- ★ July 2018 Static Location
- O Point Count Locations
- Transect Route
- - - > Flight Path

**Bat Contacts**

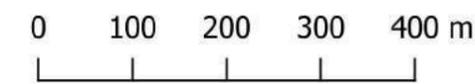
- Common Pipistrelle
- Soprano Pipistrelle
- △ Myotis Species
- ▽ Nyctalus Species
- ▽ Noctule
- Brown Long-eared



Client: Oxfordshire Rail Freight Limited  
 Project: Proposed Oxfordshire Strategic Rail Freight Interchange  
 Drawing title: Transect Plan (Original Main Site) July 2018

fpcr

Scale: A3  
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 Drawing / Issue number: CW/RG  
 Date: 20/4/2022

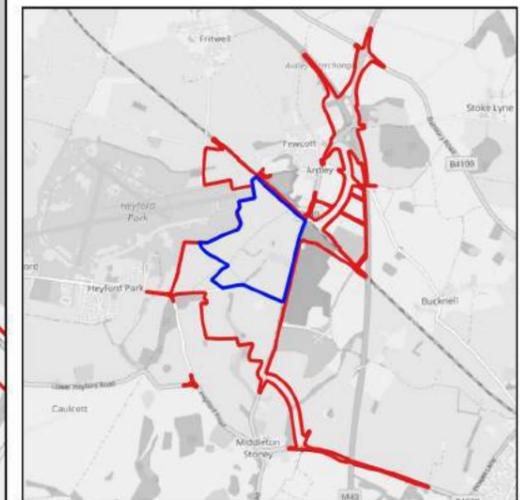
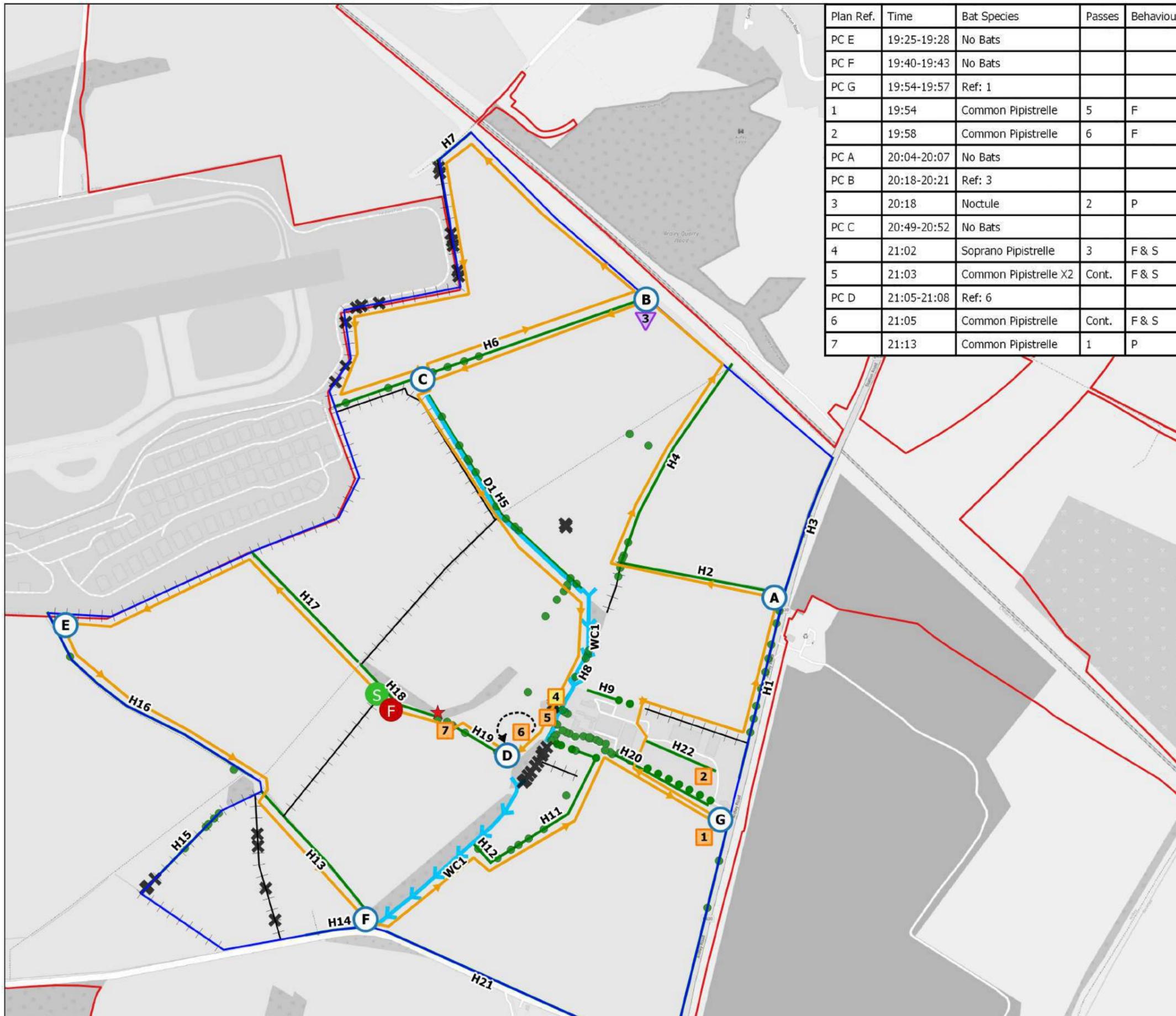


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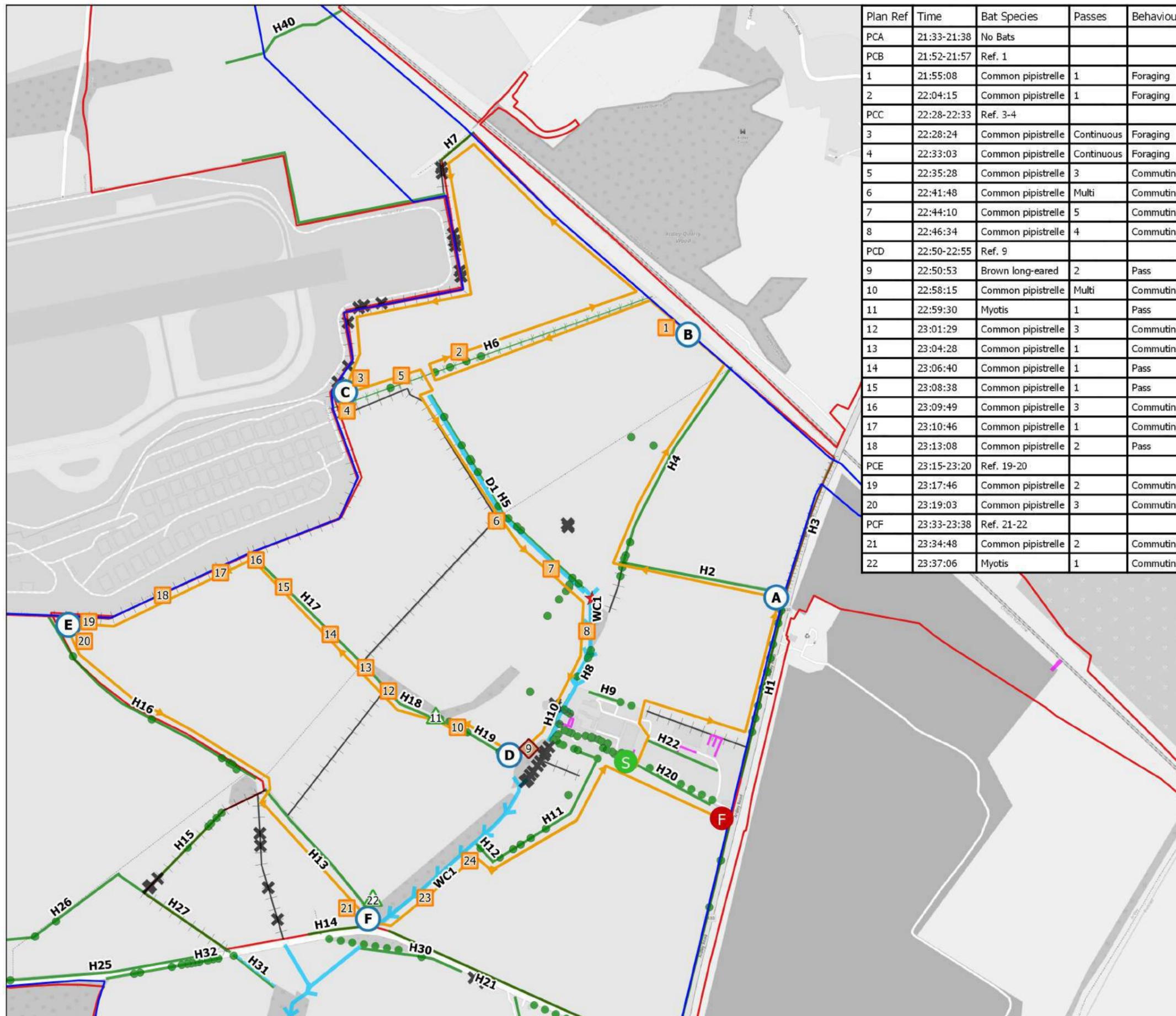
Plan Ref.	Time	Bat Species	Passes	Behaviour
PC E	19:25-19:28	No Bats		
PC F	19:40-19:43	No Bats		
PC G	19:54-19:57	Ref: 1		
1	19:54	Common Pipistrelle	5	F
2	19:58	Common Pipistrelle	6	F
PC A	20:04-20:07	No Bats		
PC B	20:18-20:21	Ref: 3		
3	20:18	Noctule	2	P
PC C	20:49-20:52	No Bats		
4	21:02	Soprano Pipistrelle	3	F & S
5	21:03	Common Pipistrelle X2	Cont.	F & S
PC D	21:05-21:08	Ref: 6		
6	21:05	Common Pipistrelle	Cont.	F & S
7	21:13	Common Pipistrelle	1	P

**Key:**

- Site Boundary
  - Survey Area 2018
  - S Start Point
  - F Finish Point
  - ★ September 2018 Static Location
  - Point Count Locations
  - Transect Route
  - - - Flight Path
- Bat Contacts**
- Common Pipistrelle
  - Soprano Pipistrelle
  - ▼ Noctule



**client** Oxfordshire Rail Freight  
**project** Proposed Oxfordshire Strategic Rail Freight Interchange  
**drawing title** Transect Plan (Original Main Site) September 2018  
 Scale: A3 1:7500  
 drawing / figure number **Figure 6**  
 Drawn: CW/RG  
 Issue date: 20/4/2022  
**8308-E-06**



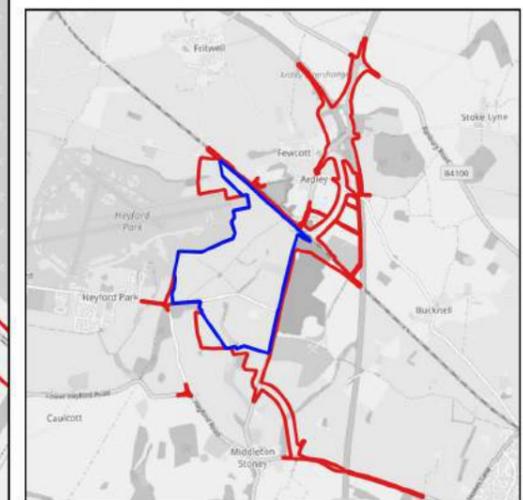
Plan Ref	Time	Bat Species	Passes	Behaviour
PCA	21:33-21:38	No Bats		
PCB	21:52-21:57	Ref. 1		
1	21:55:08	Common pipistrelle	1	Foraging
2	22:04:15	Common pipistrelle	1	Foraging
PCC	22:28-22:33	Ref. 3-4		
3	22:28:24	Common pipistrelle	Continuous	Foraging
4	22:33:03	Common pipistrelle	Continuous	Foraging
5	22:35:28	Common pipistrelle	3	Commuting
6	22:41:48	Common pipistrelle	Multi	Commuting
7	22:44:10	Common pipistrelle	5	Commuting
8	22:46:34	Common pipistrelle	4	Commuting
PCD	22:50-22:55	Ref. 9		
9	22:50:53	Brown long-eared	2	Pass
10	22:58:15	Common pipistrelle	Multi	Commuting
11	22:59:30	Myotis	1	Pass
12	23:01:29	Common pipistrelle	3	Commuting
13	23:04:28	Common pipistrelle	1	Commuting
14	23:06:40	Common pipistrelle	1	Pass
15	23:08:38	Common pipistrelle	1	Pass
16	23:09:49	Common pipistrelle	3	Commuting
17	23:10:46	Common pipistrelle	1	Commuting
18	23:13:08	Common pipistrelle	2	Pass
PCE	23:15-23:20	Ref. 19-20		
19	23:17:46	Common pipistrelle	2	Commuting
20	23:19:03	Common pipistrelle	3	Commuting
PCF	23:33-23:38	Ref. 21-22		
21	23:34:48	Common pipistrelle	2	Commuting
22	23:37:06	Myotis	1	Commuting

**Key:**

- Site Boundary
- Survey Area July 2020
- S Start Point
- F Finish Point
- ★ July 2020 Static Location
- Point Count Locations
- Transect Route

**Bat Contacts**

- Common Pipistrelle
- ▲ Myotis Species
- ◆ Brown Long-eared



client  
Oxfordshire Rail Freight Limited

project  
Proposed Oxfordshire Strategic Rail Freight Interchange

drawing title  
Transect Route Plan (Original Main Site) July 2020

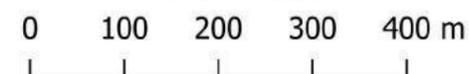
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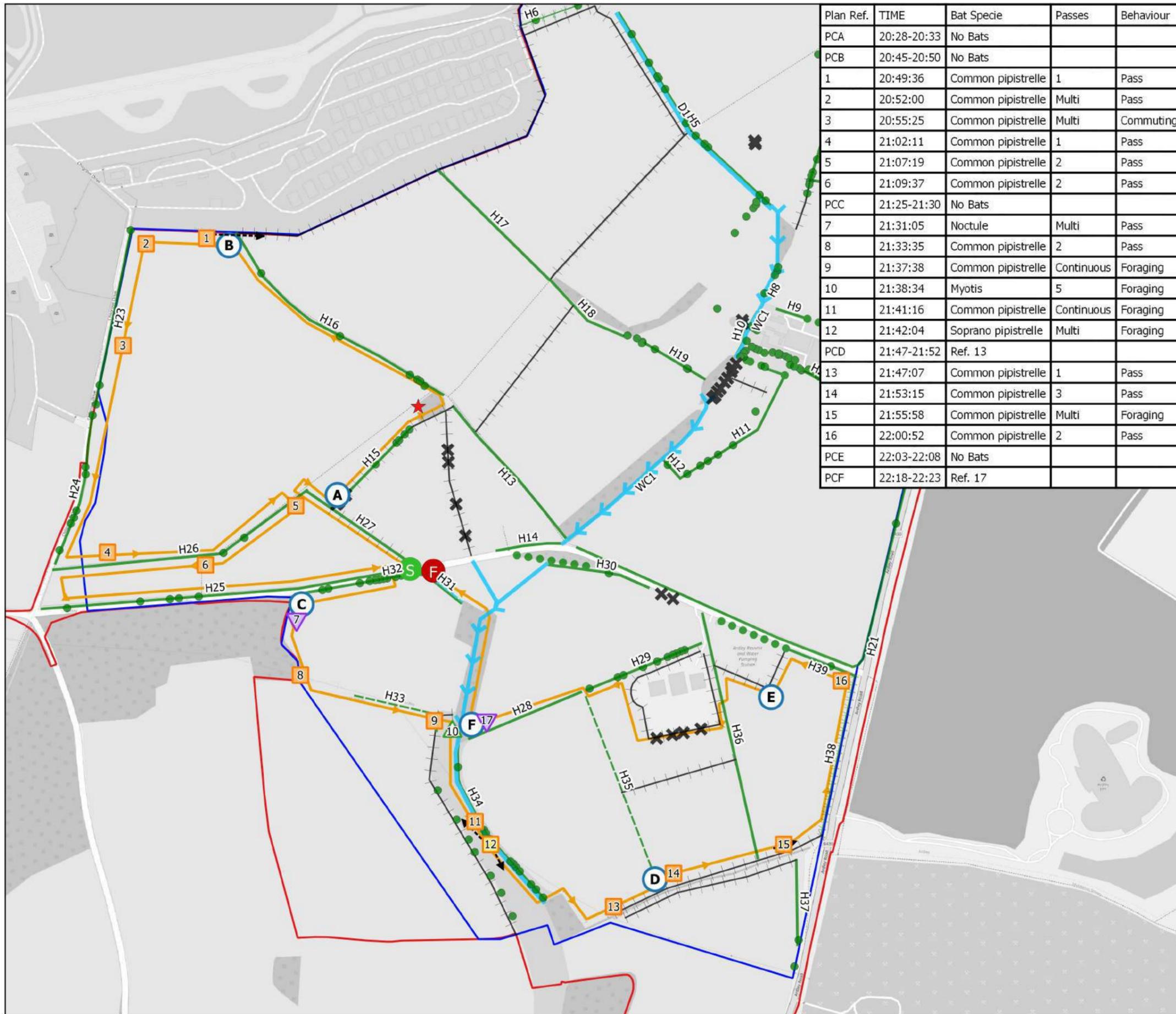
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drawn  
CW/RG

date  
20/4/2022

rev  
**8308-E-07**





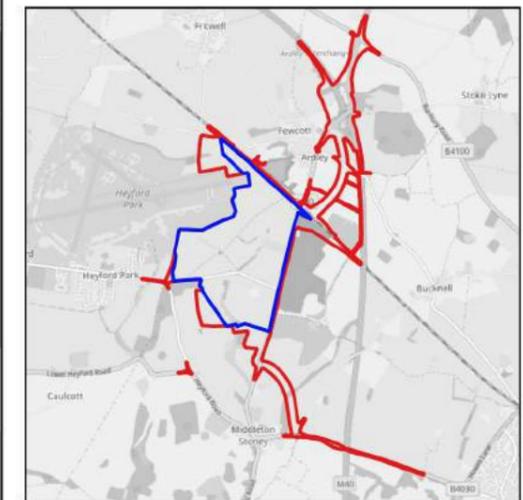
Plan Ref.	TIME	Bat Specie	Passes	Behaviour
PCA	20:28-20:33	No Bats		
PCB	20:45-20:50	No Bats		
1	20:49:36	Common pipistrelle	1	Pass
2	20:52:00	Common pipistrelle	Multi	Pass
3	20:55:25	Common pipistrelle	Multi	Commuting
4	21:02:11	Common pipistrelle	1	Pass
5	21:07:19	Common pipistrelle	2	Pass
6	21:09:37	Common pipistrelle	2	Pass
PCC	21:25-21:30	No Bats		
7	21:31:05	Noctule	Multi	Pass
8	21:33:35	Common pipistrelle	2	Pass
9	21:37:38	Common pipistrelle	Continuous	Foraging
10	21:38:34	Myotis	5	Foraging
11	21:41:16	Common pipistrelle	Continuous	Foraging
12	21:42:04	Soprano pipistrelle	Multi	Foraging
PCD	21:47-21:52	Ref. 13		
13	21:47:07	Common pipistrelle	1	Pass
14	21:53:15	Common pipistrelle	3	Pass
15	21:55:58	Common pipistrelle	Multi	Foraging
16	22:00:52	Common pipistrelle	2	Pass
PCE	22:03-22:08	No Bats		
PCF	22:18-22:23	Ref. 17		

**Key:**

- Site Boundary
- Survey Area 2020
- S Start Point
- F Finish Point
- ★ April 2020 Static Location
- A Point Count Locations
- Transect Route

**Bat Contacts**

- Common Pipistrelle
- Soprano Pipistrelle
- △ Myotis Species
- ▽ Noctule



client  
Oxfordshire Rail Freight Limited

project  
Proposed Oxfordshire Strategic Rail Freight Interchange

drawing title  
Transect Route Plan (Main Site Southern Extension) April 2020

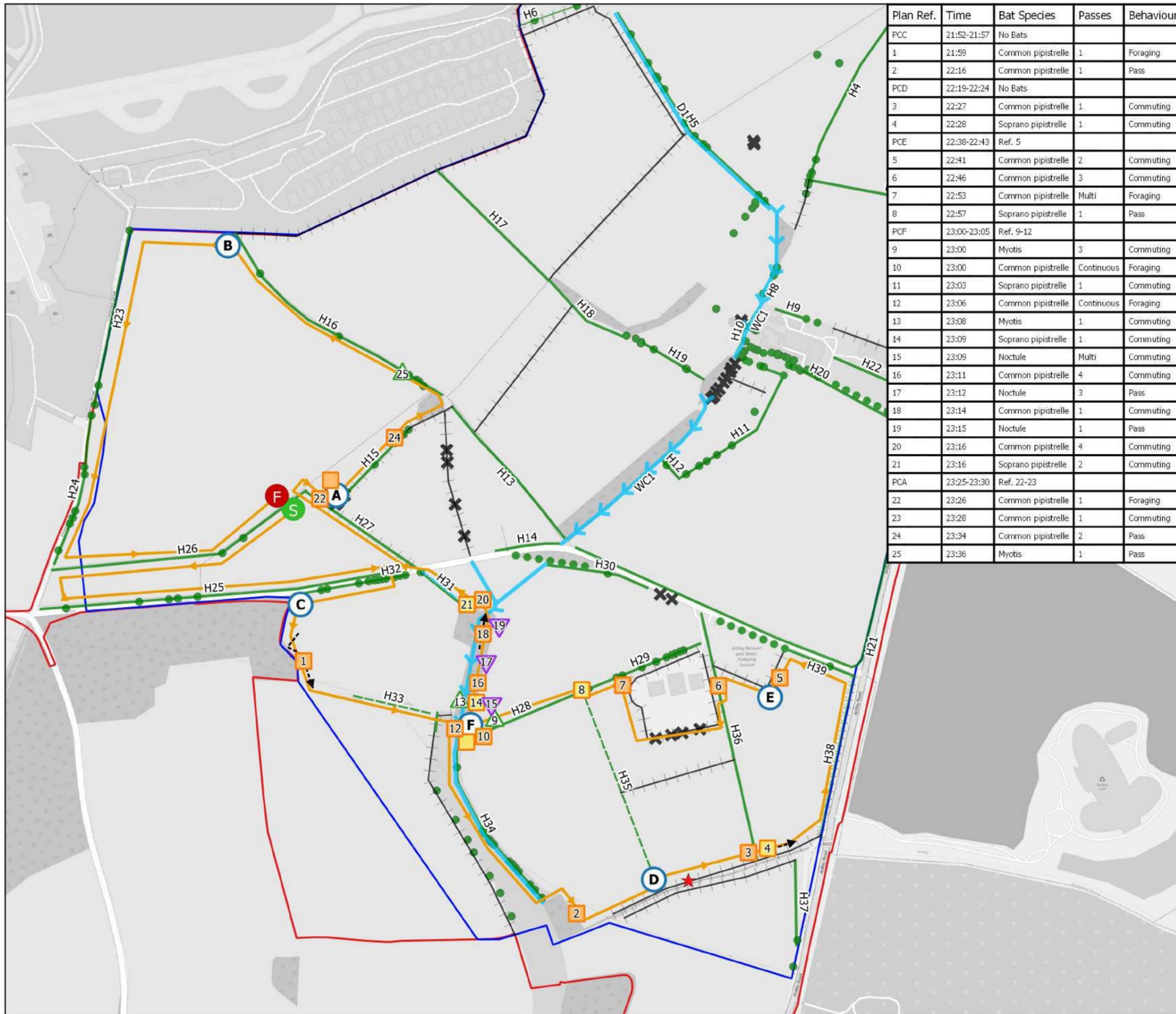
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CW/RG

date  
20/4/2022

drawing / figure number  
**Figure 8**

ref  
**8308-E-08**



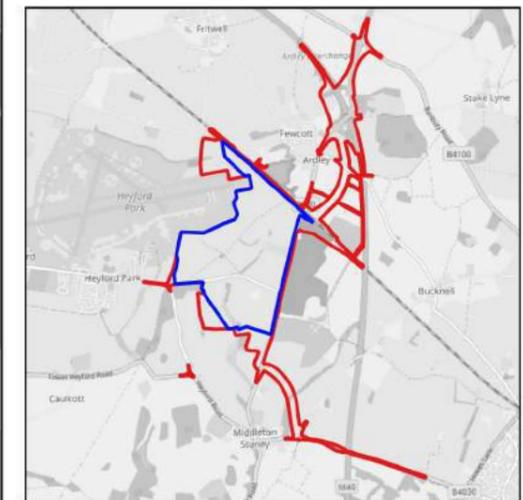
Plan Ref.	Time	Bat Species	Passes	Behaviour
PCC	21:52-21:57	No Bats		
1	21:59	Common pipistrelle	1	Foraging
2	22:16	Common pipistrelle	1	Pass
PCD	22:19-22:24	No Bats		
3	22:27	Common pipistrelle	1	Commuting
4	22:28	Soprano pipistrelle	1	Commuting
PCE	22:38-22:43	Ref. 5		
5	22:41	Common pipistrelle	2	Commuting
6	22:46	Common pipistrelle	3	Commuting
7	22:53	Common pipistrelle	Multi	Foraging
8	22:57	Soprano pipistrelle	1	Pass
PCF	23:00-23:05	Ref. 9-12		
9	23:00	Myotis	3	Commuting
10	23:00	Common pipistrelle	Continuous	Foraging
11	23:03	Soprano pipistrelle	1	Commuting
12	23:06	Common pipistrelle	Continuous	Foraging
13	23:08	Myotis	1	Commuting
14	23:09	Soprano pipistrelle	1	Commuting
15	23:09	Noctule	Multi	Commuting
16	23:11	Common pipistrelle	4	Commuting
17	23:12	Noctule	3	Pass
18	23:14	Common pipistrelle	1	Commuting
19	23:15	Noctule	1	Pass
20	23:16	Common pipistrelle	4	Commuting
21	23:16	Soprano pipistrelle	2	Commuting
PCA	23:25-23:30	Ref. 22-23		
22	23:26	Common pipistrelle	1	Foraging
23	23:28	Common pipistrelle	1	Commuting
24	23:34	Common pipistrelle	2	Pass
25	23:36	Myotis	1	Pass

**Key:**

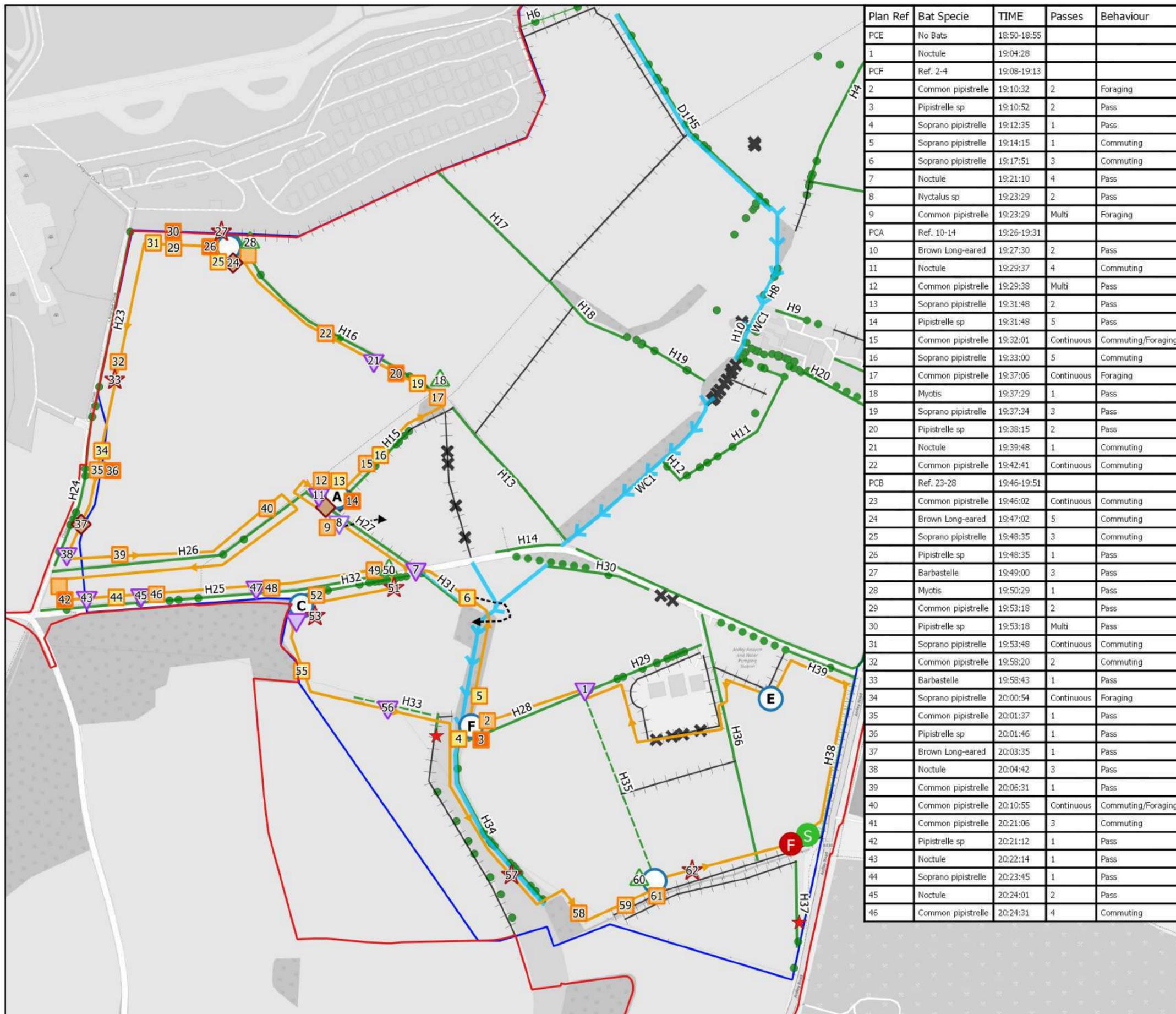
- Site Boundary
- Survey Area July 2020
- S Start Point
- F Finish Point
- ★ July 2020 Static Location
- Point Count Locations
- Transect Route
- Flight Arrows

**Bat Contacts**

- Common Pipistrelle
- Soprano Pipistrelle
- ▲ Myotis Species
- ▼ Noctule



**fpcr** client: Oxfordshire Rail Freight Limited  
 project: Proposed Oxfordshire Strategic Rail Freight Interchange  
 drawing title: Transect Route Plan (Main Site Southern Extension) July 2020  
 scale: 1:7500 | drawing: CW/RG | date: 20/4/2022  
**Figure 9** | ref: **8308-E-09**



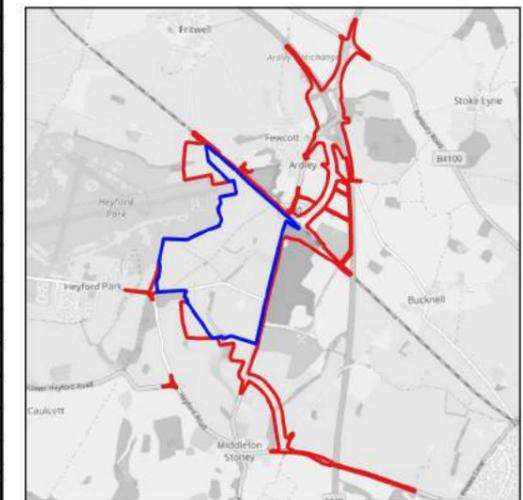
Plan Ref	Bat Specie	TIME	Passes	Behaviour
PCE	No Bats	18:50-18:55		
1	Noctule	19:04:28		
PCF	Ref. 2-4	19:08-19:13		
2	Common pipistrelle	19:10:32	2	Foraging
3	Pipistrelle sp	19:10:52	2	Pass
4	Soprano pipistrelle	19:12:35	1	Pass
5	Soprano pipistrelle	19:14:15	1	Commuting
6	Soprano pipistrelle	19:17:51	3	Commuting
7	Noctule	19:21:10	4	Pass
8	Nyctalus sp	19:23:29	2	Pass
9	Common pipistrelle	19:23:29	Multi	Foraging
PCA	Ref. 10-14	19:26-19:31		
10	Brown Long-eared	19:27:30	2	Pass
11	Noctule	19:29:37	4	Commuting
12	Common pipistrelle	19:29:38	Multi	Pass
13	Soprano pipistrelle	19:31:48	2	Pass
14	Pipistrelle sp	19:31:48	5	Pass
15	Common pipistrelle	19:32:01	Continuous	Commuting/Foraging
16	Soprano pipistrelle	19:33:00	5	Commuting
17	Common pipistrelle	19:37:06	Continuous	Foraging
18	Myotis	19:37:29	1	Pass
19	Soprano pipistrelle	19:37:34	3	Pass
20	Pipistrelle sp	19:38:15	2	Pass
21	Noctule	19:39:48	1	Commuting
22	Common pipistrelle	19:42:41	Continuous	Commuting
PCB	Ref. 23-28	19:46-19:51		
23	Common pipistrelle	19:46:02	Continuous	Commuting
24	Brown Long-eared	19:47:02	5	Commuting
25	Soprano pipistrelle	19:48:35	3	Commuting
26	Pipistrelle sp	19:48:35	1	Pass
27	Barbastelle	19:49:00	3	Pass
28	Myotis	19:50:29	1	Pass
29	Common pipistrelle	19:53:18	2	Pass
30	Pipistrelle sp	19:53:18	Multi	Pass
31	Soprano pipistrelle	19:53:48	Continuous	Commuting
32	Common pipistrelle	19:58:20	2	Commuting
33	Barbastelle	19:58:43	1	Pass
34	Soprano pipistrelle	20:00:54	Continuous	Foraging
35	Common pipistrelle	20:01:37	1	Pass
36	Pipistrelle sp	20:01:46	1	Pass
37	Brown Long-eared	20:03:35	1	Pass
38	Noctule	20:04:42	3	Pass
39	Common pipistrelle	20:06:31	1	Pass
40	Common pipistrelle	20:10:55	Continuous	Commuting/Foraging
41	Common pipistrelle	20:21:06	3	Commuting
42	Pipistrelle sp	20:21:12	1	Pass
43	Noctule	20:22:14	1	Pass
44	Soprano pipistrelle	20:23:45	1	Pass
45	Noctule	20:24:01	2	Pass
46	Common pipistrelle	20:24:31	4	Commuting

**Key:**

- Site Boundary
- Survey Area July 2020
- S Start Point
- F Finish Point
- ★ September 2020 Static Locations
- Point Count Locations
- Transect Route
- - - > Flight Arrows

**Bat Contacts**

- Common Pipistrelle
- Soprano Pipistrelle
- Pipistrelle Species
- △ Myotis Species
- ▽ Nyctalus Species
- ▽ Noctule
- ◆ Brown Long-eared
- ★ Barbastelle



client  
Oxfordshire Rail Freight Limited

project  
Proposed Oxfordshire Strategic Rail Freight Interchange

drawing title  
Transect Route Plan (Main Site Southern Extension) September 2020

scale  
1:7500

drawing / figure number  
**Figure 10**

drawn  
CW/RG

base  
20/4/2022

rev  
**8308-E-10**

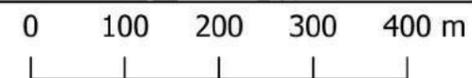
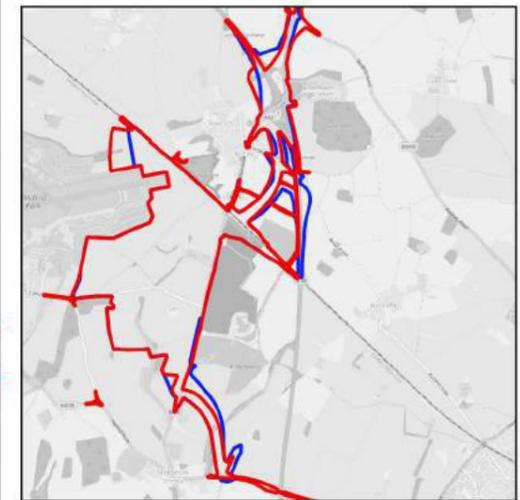
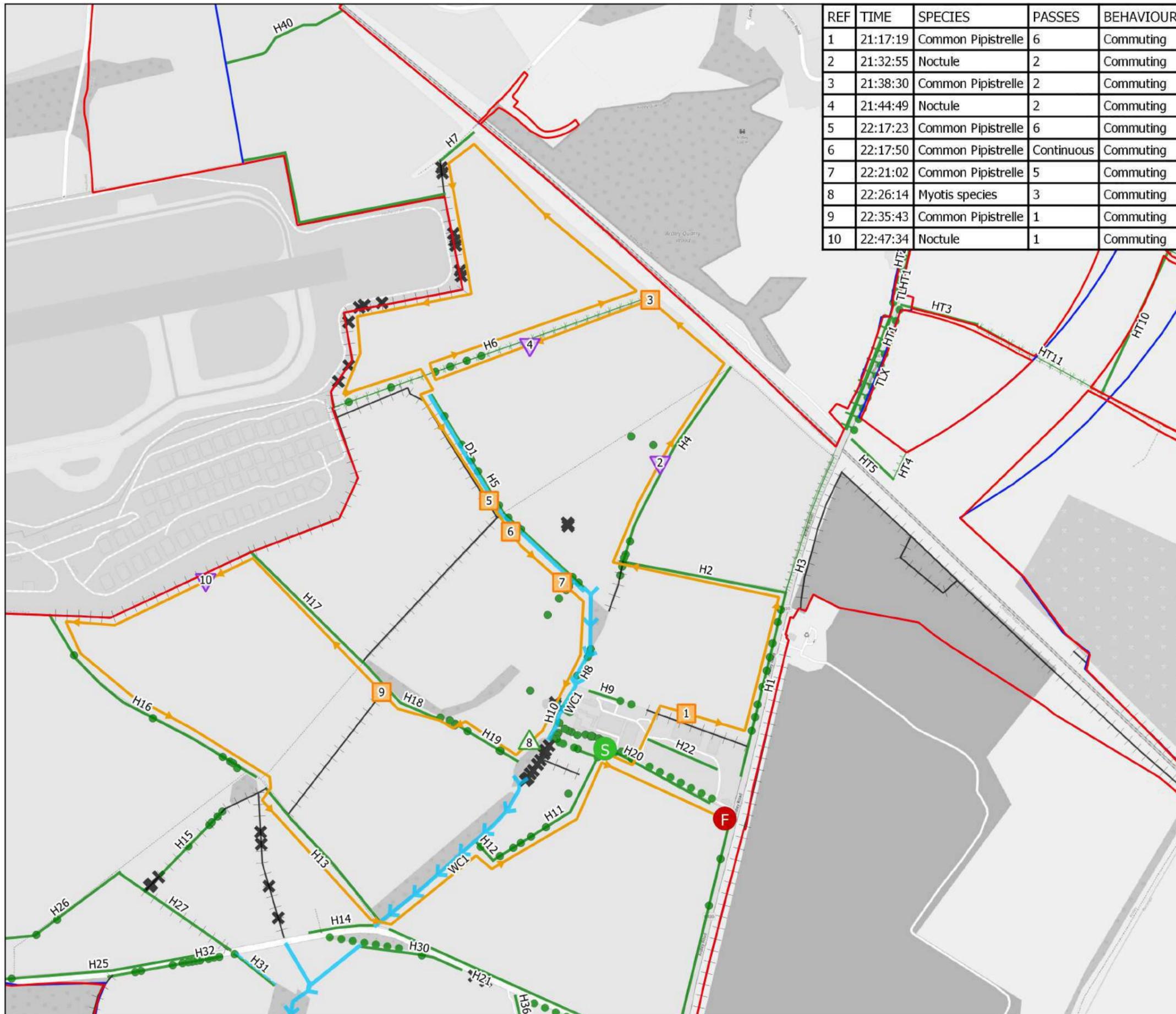
REF	TIME	SPECIES	PASSES	BEHAVIOUR
1	21:17:19	Common Pipistrelle	6	Commuting
2	21:32:55	Noctule	2	Commuting
3	21:38:30	Common Pipistrelle	2	Commuting
4	21:44:49	Noctule	2	Commuting
5	22:17:23	Common Pipistrelle	6	Commuting
6	22:17:50	Common Pipistrelle	Continuous	Commuting
7	22:21:02	Common Pipistrelle	5	Commuting
8	22:26:14	Myotis species	3	Commuting
9	22:35:43	Common Pipistrelle	1	Commuting
10	22:47:34	Noctule	1	Commuting

**Key:**

- Site Boundary
- Survey Area 2021
- S Start point
- F Finish point
- Transect Route

**Bat Contacts**

- Common Pipistrelle
- △ Myotis Species
- ▽ Noctule



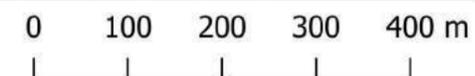
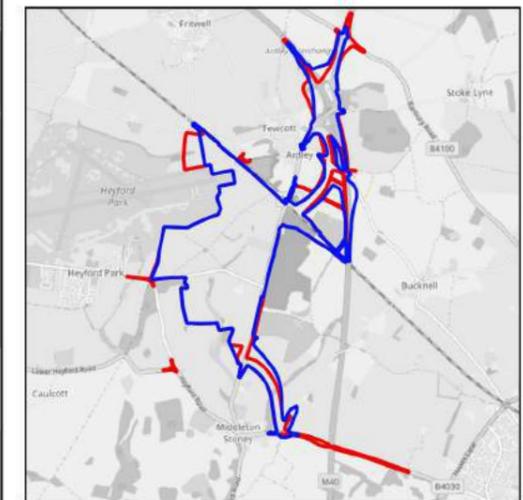
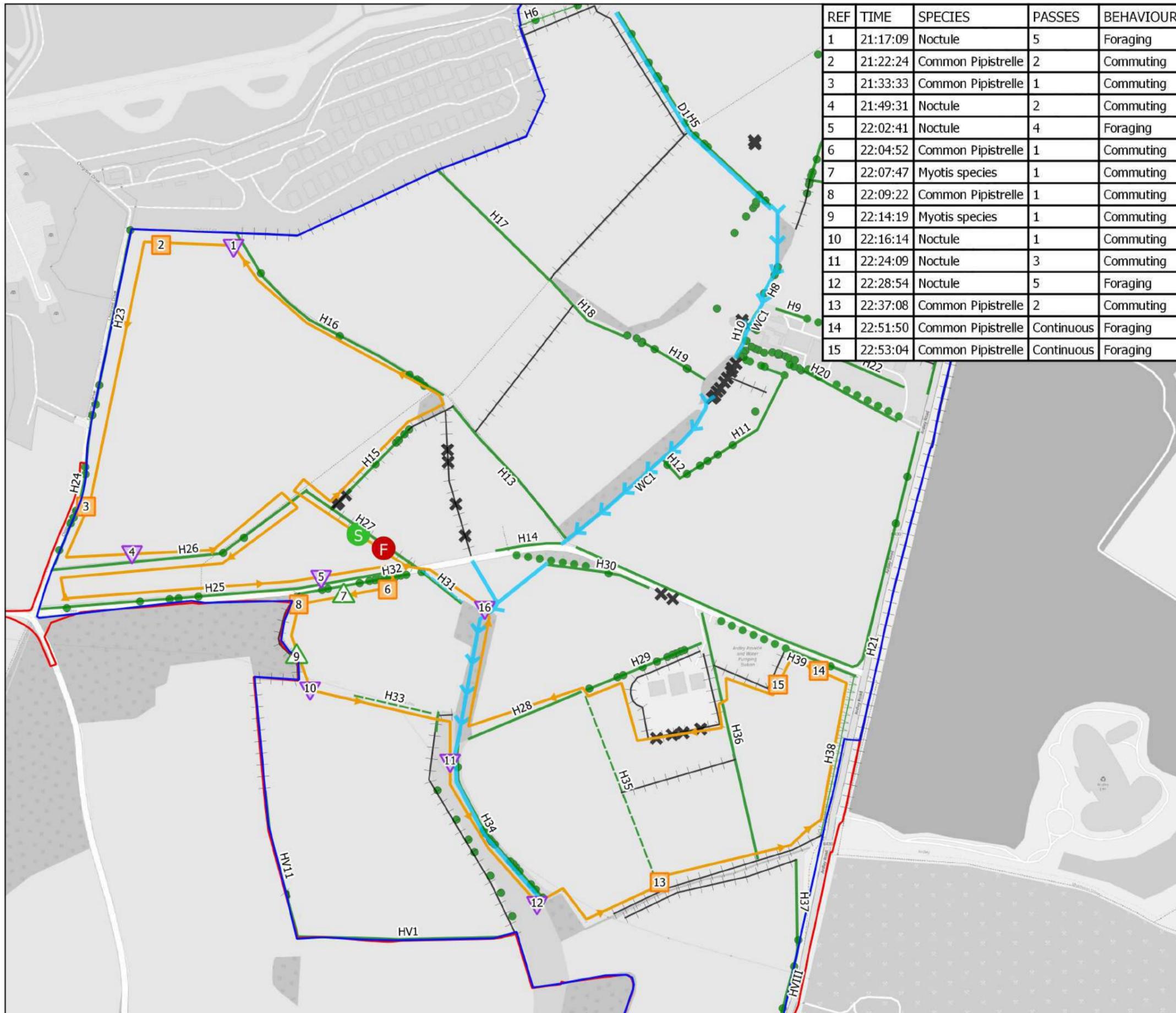
REF	TIME	SPECIES	PASSES	BEHAVIOUR
1	21:17:09	Noctule	5	Foraging
2	21:22:24	Common Pipistrelle	2	Commuting
3	21:33:33	Common Pipistrelle	1	Commuting
4	21:49:31	Noctule	2	Commuting
5	22:02:41	Noctule	4	Foraging
6	22:04:52	Common Pipistrelle	1	Commuting
7	22:07:47	Myotis species	1	Commuting
8	22:09:22	Common Pipistrelle	1	Commuting
9	22:14:19	Myotis species	1	Commuting
10	22:16:14	Noctule	1	Commuting
11	22:24:09	Noctule	3	Commuting
12	22:28:54	Noctule	5	Foraging
13	22:37:08	Common Pipistrelle	2	Commuting
14	22:51:50	Common Pipistrelle	Continuous	Foraging
15	22:53:04	Common Pipistrelle	Continuous	Foraging

**Key:**

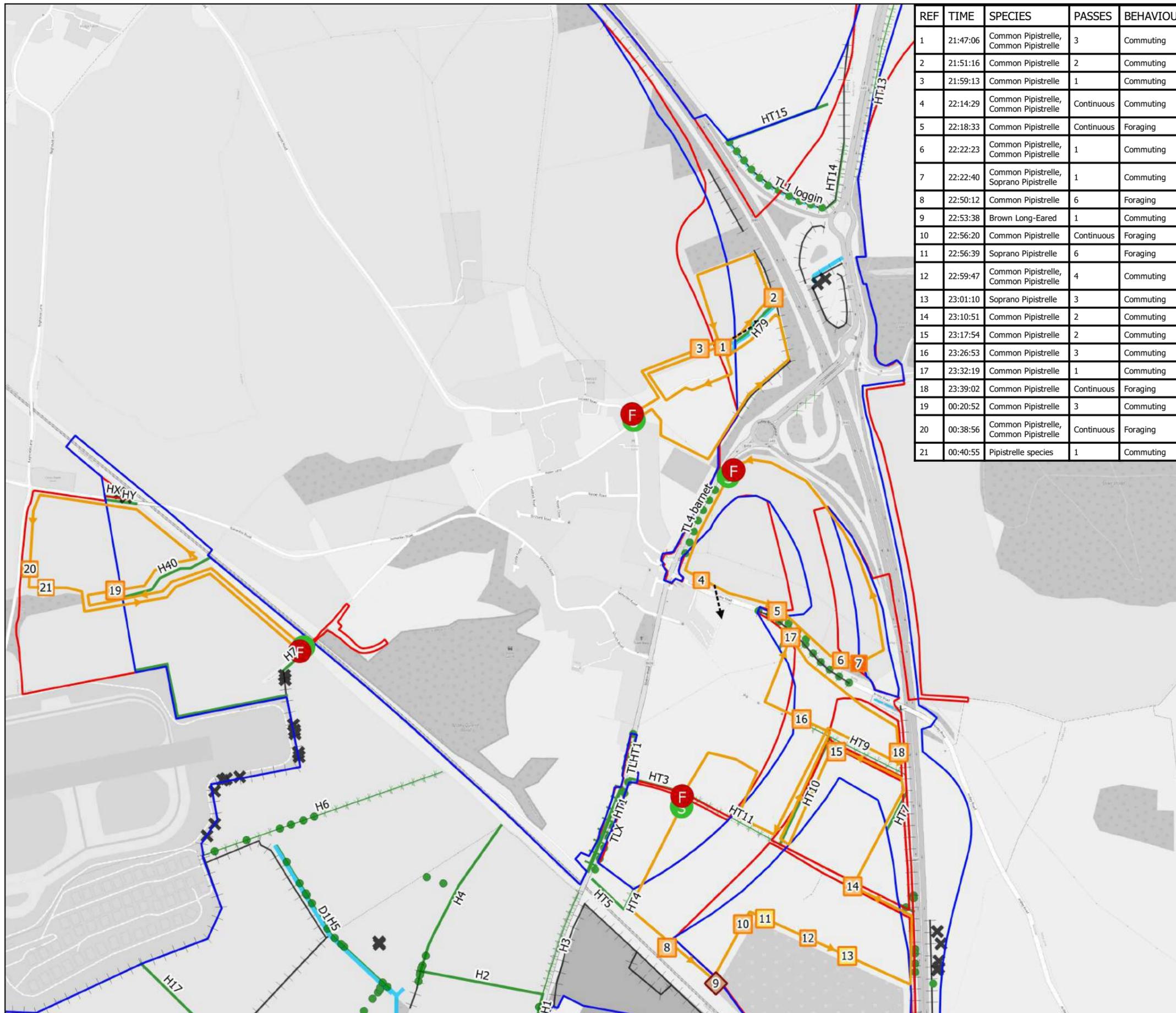
- Site Boundary
- Survey Area 2021
- S Start point
- F Finish point
- Transect Route

**Bat Contacts**

- Common Pipistrelle
- △ Myotis Species
- ▽ Noctule



**Client:** Oxfordshire Rail Freight Limited  
**Project:** Proposed Oxfordshire Strategic Rail Freight Interchange  
**Drawing Title:** Transect Route Plan May 2021 (Main Site South)  
 scale: A3 1:7500  
 drawing / figure number: **Figure 12**  
 drawn: CW/RG  
 date: 20/4/2022  
 rev: **8308-E-12**



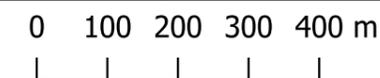
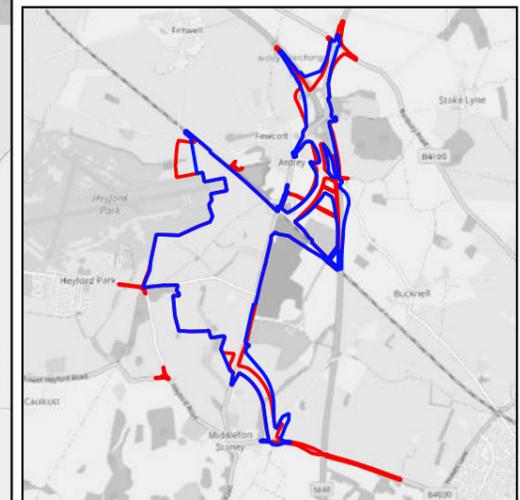
REF	TIME	SPECIES	PASSES	BEHAVIOUR
1	21:47:06	Common Pipistrelle, Common Pipistrelle	3	Commuting
2	21:51:16	Common Pipistrelle	2	Commuting
3	21:59:13	Common Pipistrelle	1	Commuting
4	22:14:29	Common Pipistrelle, Common Pipistrelle	Continuous	Commuting
5	22:18:33	Common Pipistrelle	Continuous	Foraging
6	22:22:23	Common Pipistrelle, Common Pipistrelle	1	Commuting
7	22:22:40	Common Pipistrelle, Soprano Pipistrelle	1	Commuting
8	22:50:12	Common Pipistrelle	6	Foraging
9	22:53:38	Brown Long-Eared	1	Commuting
10	22:56:20	Common Pipistrelle	Continuous	Foraging
11	22:56:39	Soprano Pipistrelle	6	Foraging
12	22:59:47	Common Pipistrelle, Common Pipistrelle	4	Commuting
13	23:01:10	Soprano Pipistrelle	3	Commuting
14	23:10:51	Common Pipistrelle	2	Commuting
15	23:17:54	Common Pipistrelle	2	Commuting
16	23:26:53	Common Pipistrelle	3	Commuting
17	23:32:19	Common Pipistrelle	1	Commuting
18	23:39:02	Common Pipistrelle	Continuous	Foraging
19	00:20:52	Common Pipistrelle	3	Commuting
20	00:38:56	Common Pipistrelle, Common Pipistrelle	Continuous	Foraging
21	00:40:55	Pipistrelle species	1	Commuting

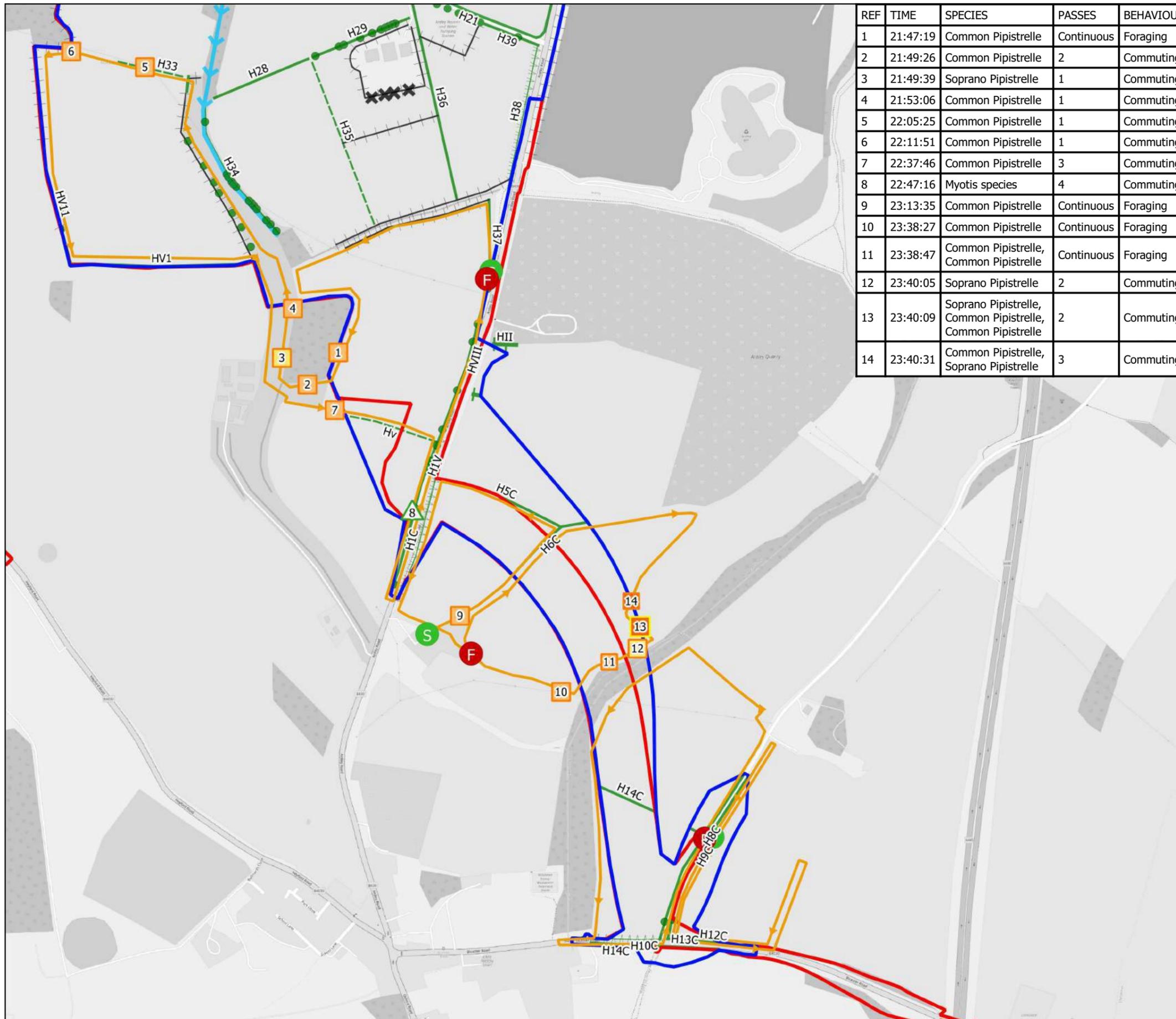
**Key:**

- Site Boundary
- Survey Area 2021
- S Start Point
- F Finish Point
- ▶ Transect Route
- - - ▶ Flight Arrow

**Bat Contacts**

- Common Pipistrelle
- Soprano Pipistrelle
- Common/Soprano Pipistrelle
- Pipistrelle Species
- Brown Long-eared





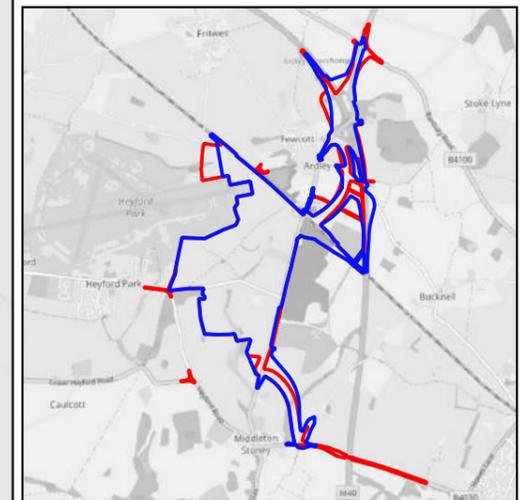
REF	TIME	SPECIES	PASSES	BEHAVIOUR
1	21:47:19	Common Pipistrelle	Continuous	Foraging
2	21:49:26	Common Pipistrelle	2	Commuting
3	21:49:39	Soprano Pipistrelle	1	Commuting
4	21:53:06	Common Pipistrelle	1	Commuting
5	22:05:25	Common Pipistrelle	1	Commuting
6	22:11:51	Common Pipistrelle	1	Commuting
7	22:37:46	Common Pipistrelle	3	Commuting
8	22:47:16	Myotis species	4	Commuting
9	23:13:35	Common Pipistrelle	Continuous	Foraging
10	23:38:27	Common Pipistrelle	Continuous	Foraging
11	23:38:47	Common Pipistrelle, Common Pipistrelle	Continuous	Foraging
12	23:40:05	Soprano Pipistrelle	2	Commuting
13	23:40:09	Soprano Pipistrelle, Common Pipistrelle, Common Pipistrelle	2	Commuting
14	23:40:31	Common Pipistrelle, Soprano Pipistrelle	3	Commuting

**Key:**

- Site Boundary
- Survey Area 202
- S Start Point
- F Finish Point
- Transect Route

**Bat Contacts**

- Common Pipistrelle
- Soprano Pipistrelle
- Common/Soprano Pipistrelle
- △ Myotis Species



client  
Oxfordshire Rail Freight Limited

project  
Proposed Oxfordshire Strategic Rail Freight Interchange

drawing title  
Transect Route Plan (Highways Works South)  
July 2021

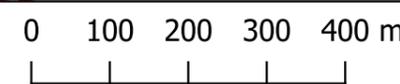
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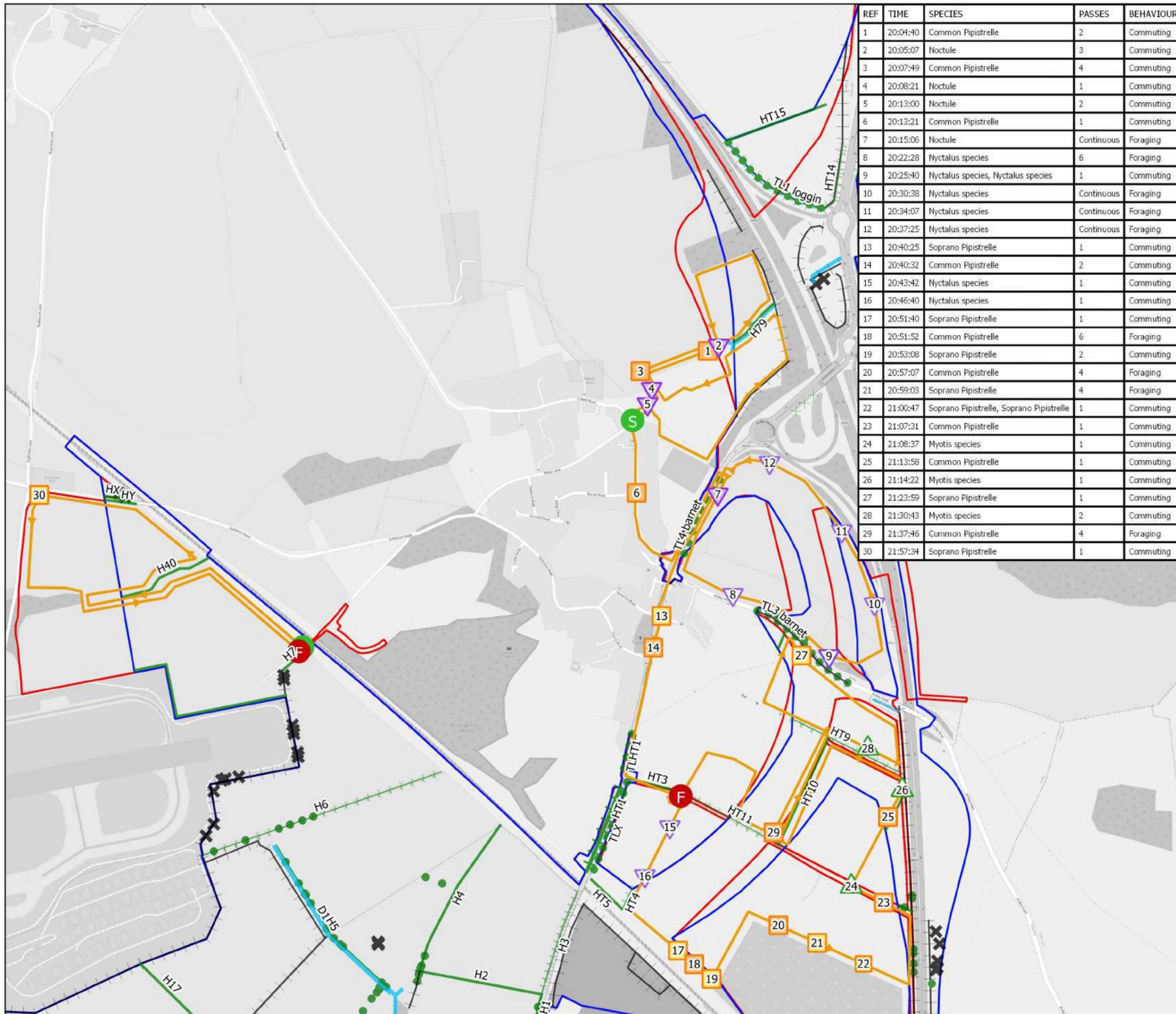
drawn  
CW/RG

issue  
20/4/2022

drawing / figure number  
**Figure 14**

rev  
**8308-E-14**





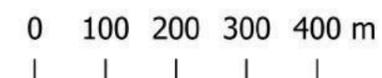
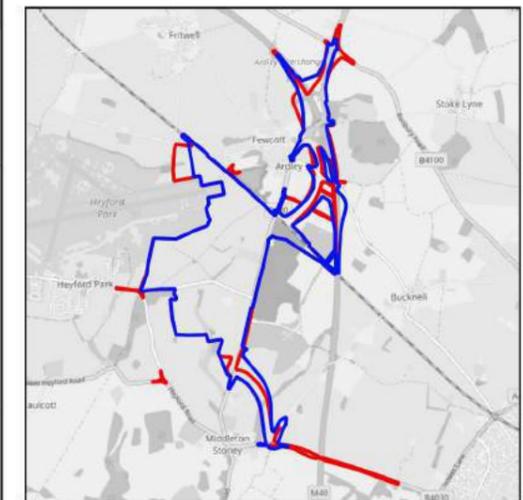
REF	TIME	SPECIES	PASSES	BEHAVIOUR
1	20:04:40	Common Pipistrelle	2	Commuting
2	20:05:07	Noctule	3	Commuting
3	20:07:49	Common Pipistrelle	4	Commuting
4	20:08:21	Noctule	1	Commuting
5	20:13:00	Noctule	2	Commuting
6	20:13:21	Common Pipistrelle	1	Commuting
7	20:15:06	Noctule	Continuous	Foraging
8	20:22:28	Nyctalus species	6	Foraging
9	20:25:40	Nyctalus species, Nyctalus species	1	Commuting
10	20:30:38	Nyctalus species	Continuous	Foraging
11	20:34:07	Nyctalus species	Continuous	Foraging
12	20:37:25	Nyctalus species	Continuous	Foraging
13	20:40:25	Soprano Pipistrelle	1	Commuting
14	20:40:32	Common Pipistrelle	2	Commuting
15	20:43:42	Nyctalus species	1	Commuting
16	20:46:40	Nyctalus species	1	Commuting
17	20:51:40	Soprano Pipistrelle	1	Commuting
18	20:51:52	Common Pipistrelle	6	Foraging
19	20:53:08	Soprano Pipistrelle	2	Commuting
20	20:57:07	Common Pipistrelle	4	Foraging
21	20:59:03	Soprano Pipistrelle	4	Foraging
22	21:00:47	Soprano Pipistrelle, Soprano Pipistrelle	1	Commuting
23	21:07:31	Common Pipistrelle	1	Commuting
24	21:08:37	Myotis species	1	Commuting
25	21:13:58	Common Pipistrelle	1	Commuting
26	21:14:22	Myotis species	1	Commuting
27	21:23:59	Soprano Pipistrelle	1	Commuting
28	21:30:43	Myotis species	2	Commuting
29	21:37:46	Common Pipistrelle	4	Foraging
30	21:57:34	Soprano Pipistrelle	1	Commuting

**Key:**

- Site Boundary
- Survey Area 2021
- S Start Point
- F Finish Point
- Transect Route

**Bat Contacts**

- Common Pipistrelle
- Soprano Pipistrelle
- △ Myotis Species
- ▽ Nyctalus Species
- ▽ Noctule



Client: Oxfordshire Rail Freight Limited  
 Project: Proposed Oxfordshire Strategic Rail Freight Interchange  
 Drawing Title: Transect Route Plan (Highways Works North)  
 Date: September 2021  
 Scale: A3 1:10000  
 Drawing Number: CW/RG  
 Date: 20/4/2022  
**Figure 15** **8308-E-15**

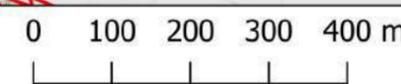
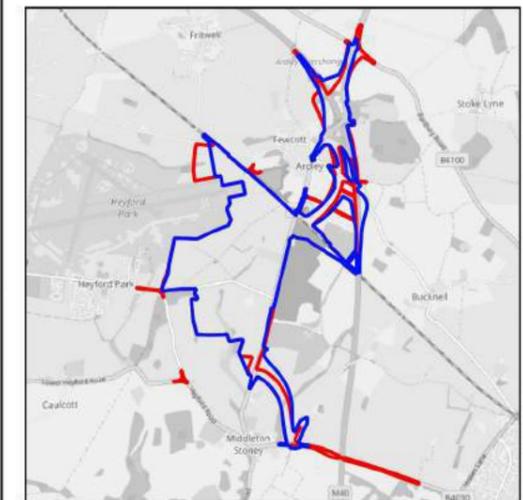
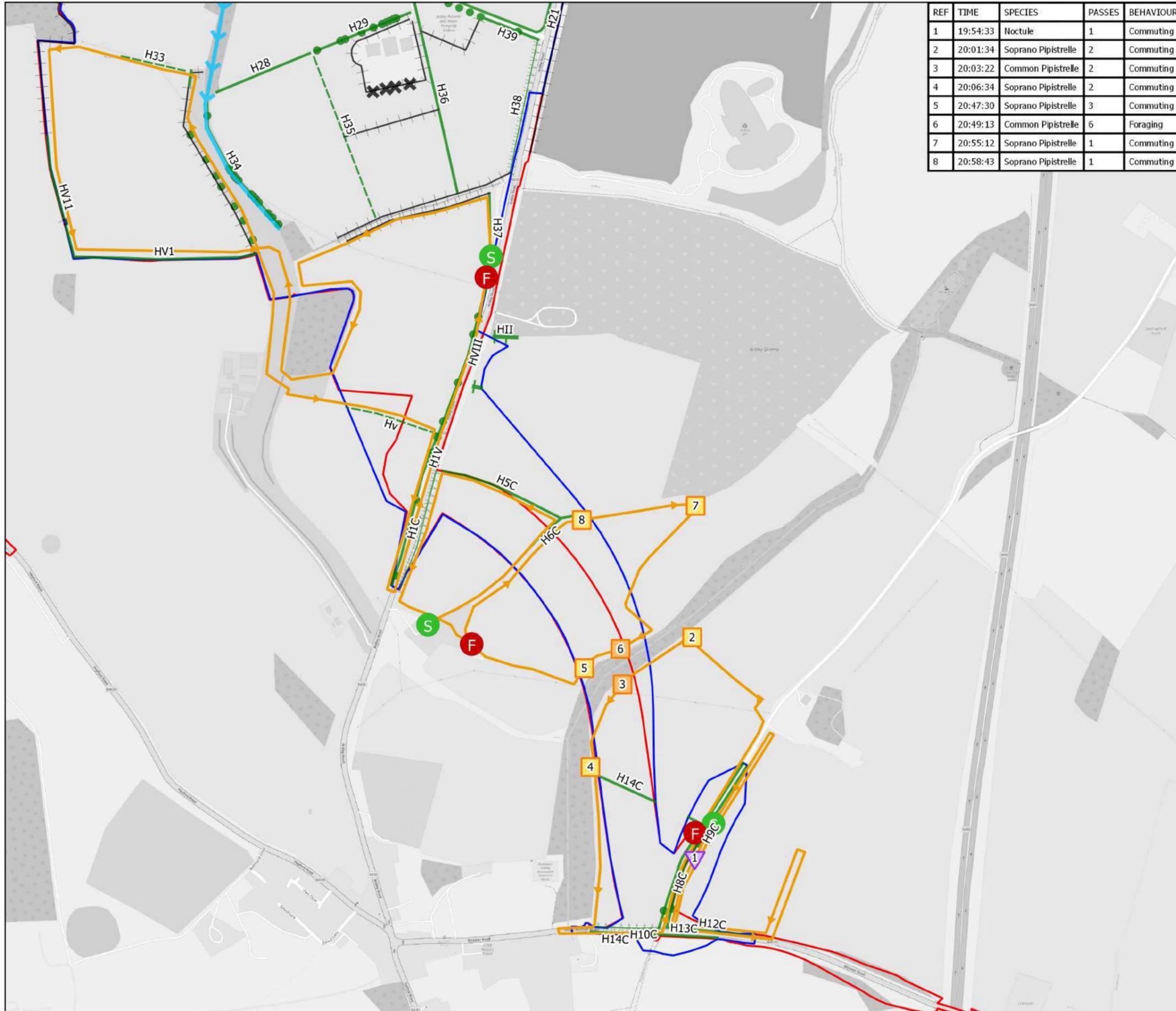
REF	TIME	SPECIES	PASSES	BEHAVIOUR
1	19:54:33	Noctule	1	Commuting
2	20:01:34	Soprano Pipistrelle	2	Commuting
3	20:03:22	Common Pipistrelle	2	Commuting
4	20:06:34	Soprano Pipistrelle	2	Commuting
5	20:47:30	Soprano Pipistrelle	3	Commuting
6	20:49:13	Common Pipistrelle	6	Foraging
7	20:55:12	Soprano Pipistrelle	1	Commuting
8	20:58:43	Soprano Pipistrelle	1	Commuting

**Key:**

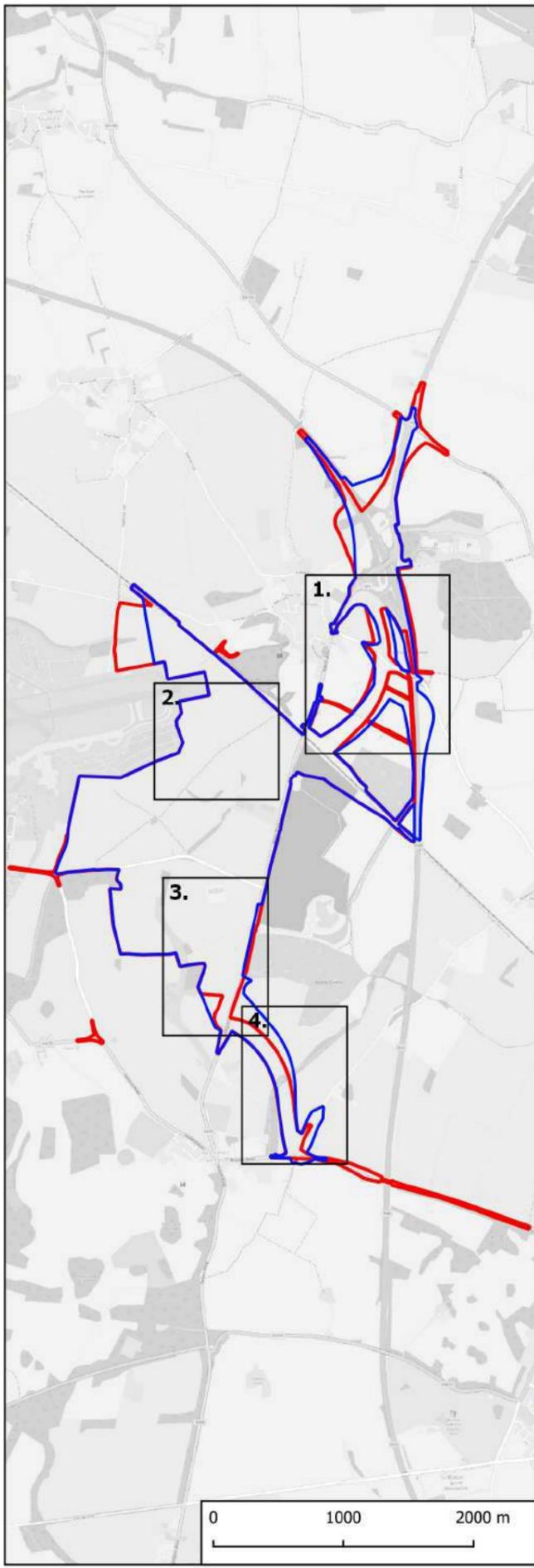
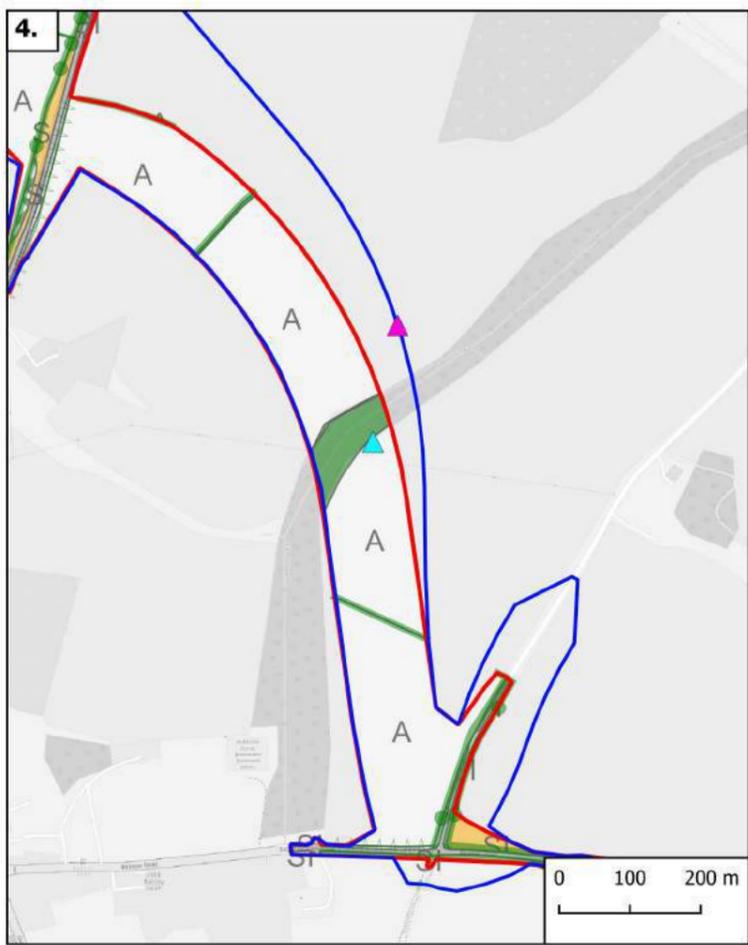
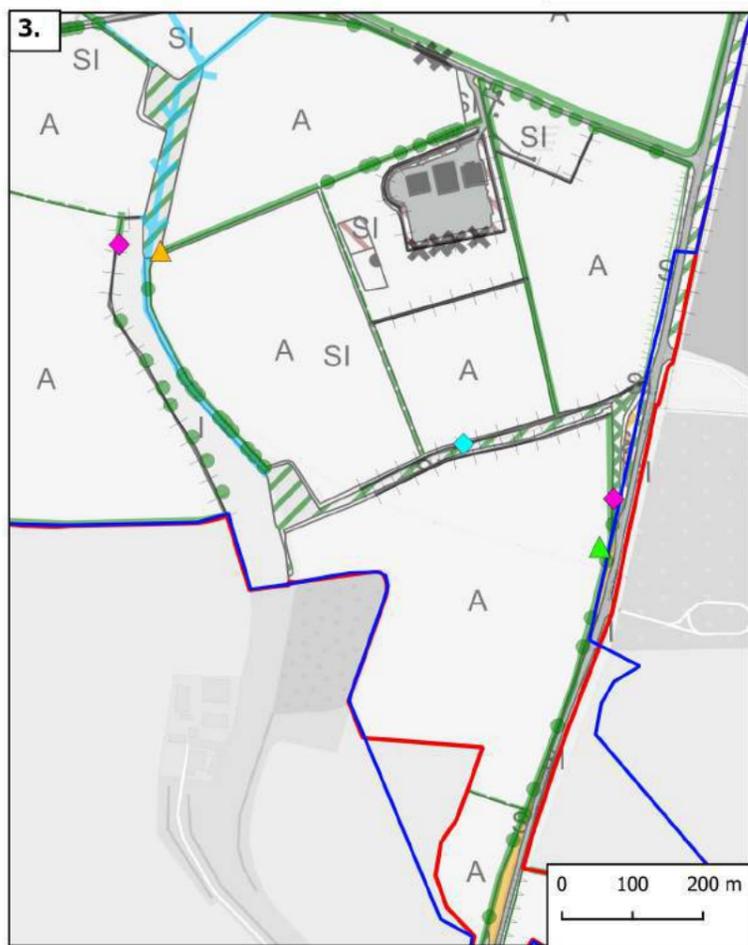
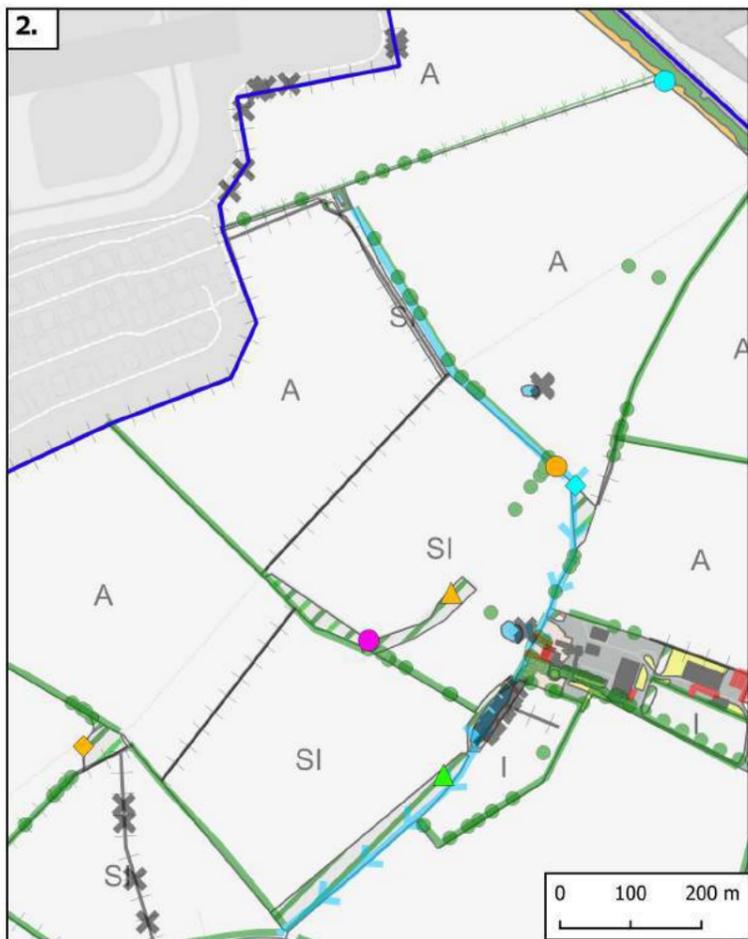
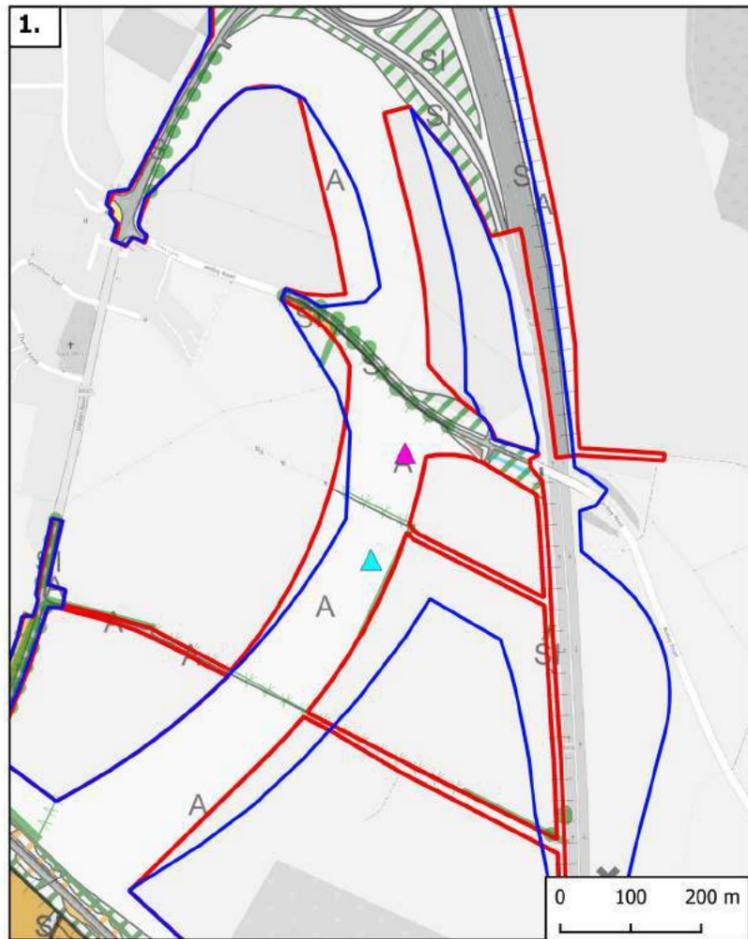
- Site Boundary
- Survey Area 2021
- S Start Point
- F Finish Point
- Transect Route

**Bat Contacts**

- Common Pipistrelle
- Soprano Pipistrelle
- ▼ Noctule



**Client:** Oxfordshire Rail Freight Limited  
**Project:** Proposed Oxfordshire Strategic Rail Freight Interchange  
**Drawing Title:** Transect Route Plan (Highways Works South) September 2021  
 scale: A3 1:9000  
 drawing: CW/RG  
 date: 20/4/2022  
**Figure 16** **8308-E-16**



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- Key**
- Site Boundary
  - Survey Area 2018-2021 (inclusive)
- Static Detector Locations 2018**
- May
  - July
  - September
- Static Detector Locations 2020**
- ◆ May
  - ◆ July
  - ◆ September
- Static Detector Locations 2021**
- ▲ May
  - ▲ June
  - ▲ July
  - ▲ September

