Bat Survey Report and Outline Non-Licenced Method Statement

13 Netherhall Gardens, Hampstead, London.

Report date: 23rd September 2022

Project No.: VT1005.1

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Project Number:	VT1005.1
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Client PM:	Paul Whitely
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Summary

Purpose

This report was instructed by Paul Whitley of ReCreo Netherhall Gardens Ltd. in respect of bat roost surveys at 13 Netherhall Gardens, Hampstead, London.

The report sets out the current baseline conditions at the site for roosting bats and presents an outline non-licenced precautionary working method statement for future works at the property.

Methods

A daylight survey and four night-time bat roost surveys were undertaken in the summer of 2022 to assess the presence or likely absence of roosting bats in trees and buildings.

Surveys were lead by Robert Sinclair and a team of professional bat surveyors, they used ultrasonic bat detectors, infrared and thermal imaging cameras to record bat activity at the site.

Results

Several potential bat roosting features were found in brickwork, under roof and wall tiles, and in trees.

No bats were observed roosting during surveys. Investigation into the results of previous bat surveys and the 2022 surveys lead to the conclusion that bat roosts are likely absent.

Bats continue to forage and commute at the site.

Impacts and Mitigation

Whilst bats roosts are considered likely to be absent, precautionary working methods are presented in the report to address the residual risk of bats being discovered during works.

If any bats or birds are found at any stage of the demolition works, all works in that area must be suspended and further ecological advice should immediately be sought.

The report sets out outline mitigation to address the loss of potential bat roosting features and to provide enhancements.

Potential biodiversity enhancements are outlined in the report.

1. Introduction

This report has been prepared by Robert Sinclair FdSc. BSc. (Hons), an experienced Associate Ecological Consultant at VesperTech Ltd. in respect of a bat roost presence/absence surveys undertaken at 13 Netherhall Gardens, Hampstead, London.

The survey and report were instructed by Paul Whitely of Re-creo Netherhall Gardens Ltd. in respect of planned future renovation works.

Site description and context

Night-time bat surveys were completed by Corylus Ecology in 2018 in respect of Phase I of the development; no bat roosts were found and bats were considered likely absent. In 2020, Tyler Grange Ltd. completed bat surveys, in respect of Phase II of the development, and reported no bat roosts would be affected. In 2022, ecologists from Tyler Grange Ltd. returned to the site to undertake an updated preliminary ecological appraisal in respect of Phase III, the report identified the need for updated bat surveys to inform a planning application and any potential bat licence required.

The site is located in an urban landscape in Hampstead, London, centred at Ordnance Survey Grid Reference TQ263849 as indicated by the red pin in Figure 1.1 below.

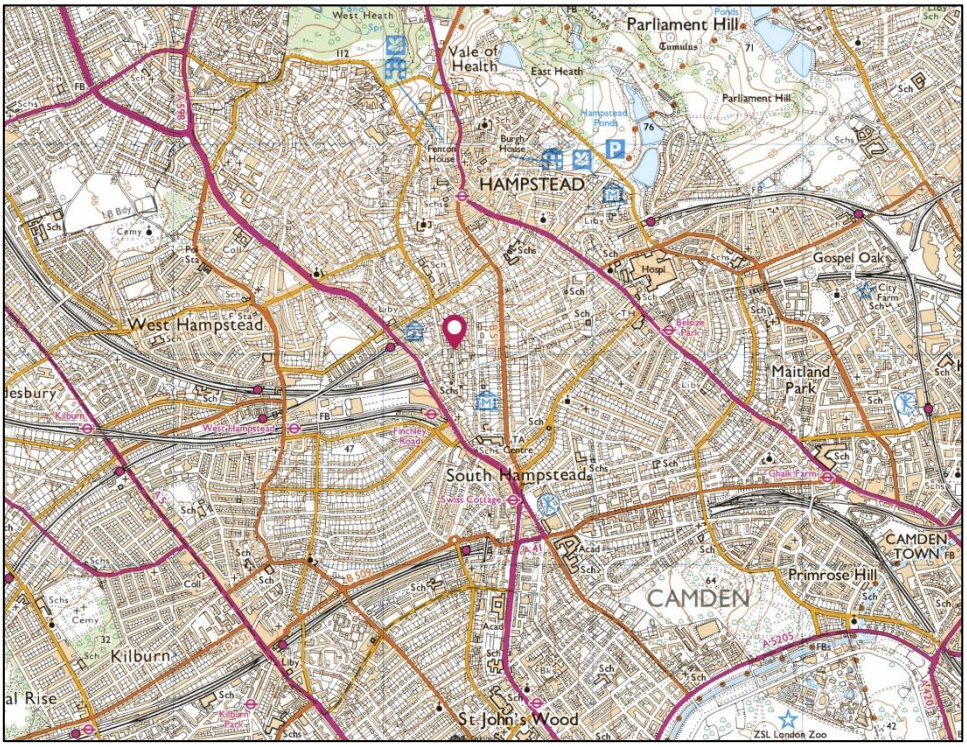


Figure 1.1: Site Location Plan. © Crown copyright 2022 reproduced under OS licence 100063858.

Proposals

The project is a phased development that includes the renovation and extending of the existing building and the construction of a new building to the south of the site.

Previous reports

The property has been subject to several ecological surveys and reports which have been submitted to the Local Planning Authority to support planning applications for the various phases of the project. A Preliminary ecological appraisal report was completed by Corylus Ecology. This was followed up by bat Presence/Absence surveys in 2018. The associated Bat Survey Report states that bats were likely absent at that time.

An updated Preliminary Ecological Appraisal and Preliminary Bat Roost Assessment was completed in 2020 by Tyler Grange Ltd. in respect of Phase II of the development. The Bat Survey Report recorded that bat roosts were likely absent in the Phase II area.

In 2022, in respect of Phase III of the development, a Preliminary Ecological Survey was undertaken by Tyler Grange Ltd. The survey identified that Tree 17 (see Figure A1), supported moderate bat roost potential. They also reported an incidental record of a pipistrelle bat seen possibly emerging from under hanging tiles on the southern elevation of the property. This was not reported as part of the Phase II bat survey report, as it was not likely to be affected by that phase of the development.

The original 2020 survey data was reviewed for this report. The survey form of the surveyor (PM), who made the incidental observation describes 'pipistrelle, possibly emerging from the hanging tiles or flying over building'. Sound analysis of the recording shows the bat was likely to be a soprano pipistrelle.

Purpose

Bat presence/absence data collected in 2018 and 2020 has expired. Repeat bat emergence surveys have been conditioned as part of planning permission (2021/4259/P Condition 12) due to the time elapsed since previous bat surveys and to inform any EPSL bat licence that might be needed to complete the works.

This report presents an up-to-date assessment of the suitability of the property to support roosting bats and the results of bat presence/absence surveys completed in Summer 2022.

The report sets out recommendations for mitigation and presents an outline precautionary working method statement in respect of the proposed works.

2. Policy and Legislation

Legislation

As European Protected Species, bats are afforded protection from disturbance and their roosts (resting and hibernation places). Bat roosts are protected whether the bat is currently in occupation or not, even if the roost is only occasionally used. Some species of bats (such as the soprano pipistrelle *Pipistrellus pygmaeus*) are also listed under Section 41 of the NERC act and therefore are considered Species of Principal Importance (SoPI) and are a material consideration in planning law.

The rarest species of bat in the UK including greater horseshoe, lesser horseshoe, barbastelle and Bechstein's bat are listed under Annex 2 of the European Council Directive 92/43/EEC (integrated into UK legislation by the Conservation of Habitats and Species Regulations 2007 as amended). Sites which support these species are likely to qualify for designation as a Special Area of Conservation (SAC).

Policy

National Planning Policy, The London Plan and Camden Plan

The most recent Preliminary Ecological Assessment (Tyler Grange Ltd. 2022) details the most up to date planning policies relating to the site and therefore they are not repeated in this report.

3. Methodology

Field Surveys

Day-time Inspection

The buildings and trees at the site were reassessed on 27th May 2022, in advance of the first bat presence/absence surveys, to determine if any new bat roosting features were present, and, to assess if features identified by previous reports remained suitable for roosting. The assessment was completed in accordance with Section 5.2 of '*Bat Surveys for Professional Ecologists – Good Practice Guidelines 3rd Ed.'* (Collins 2016). The assessment consisted of an external inspection of trees and the buildings to identify potential roosting features (PRF's) such as gaps, crevices, holes and sheltered spaces suitable for use by bats. Trees and buildings were inspected with high power (Clulite) torches and binoculars to identify bat field signs that might indicate use such as:

- Droppings;
- Urine or fur oil staining;
- Live bats;
- Odour;
- Feeding remains

Thermal imaging surveys were undertaken of buildings and trees using a hand-held thermal imager (HIKMicro Gryphon Gq50l Pro), to identify heat sources that may indicate the presence of bats, birds and other wildlife. The survey was repeated on each survey visit.

Bat Presence / Absence Surveys

Bat presence / absence surveys were undertaken in accordance with the guidance set out in Section 7.1 of Collins (2016) and Bat Conservation Trust's *Interim Guidance Note: Use of night vision aids for bat emergence surveys and further comment on dawn surveys* (BCT 2022).

Surveyors, thermal and night-vision infrared cameras were positioned around the building and towards trees to cover all potential roosting features. Surveyors used ultrasonic bat detectors to pick-up the sounds emitted by bats as they echolocate to navigate and hunt. The frequency of the bat calls is then reduced in frequency and speed to they are audible to a human hearing. An automated bat detector was also placed with each camera.

Dusk emergence survey

Two dusk emergence surveys were undertaken; the first on the 27th May 2022, early in the bat maternity season; and second on 1st August 2022 following the end of the bat maternity season. Five surveyors and two cameras were utilized on each occasion. Surveyors and cameras observe potential roosting features looking for bats emerging from their daytime roosts, the flight path and behaviour of bats is also noted.

Dawn re-entry survey

Two dawn re-entry surveys were undertaken; the first on 28th June 2022 and the second on 2nd July 2022. Two cameras, one surveyor, and one assistant were present on both occasions. Surveyors and

equipment were set to view potential roosting features, observing the characteristic behaviour of bats returning to daytime roosts.

Equipment

Optical

Sony Handycam DCR-SR35E using NightShot Plus mode with 2 x HIKMICRO IR TORCH HM-LO28IR 850mw illuminators. The NightShot recordings were made directly onto the internal Hard Disk Drive.

HIKMICRO GRYPHON GH50L bi-spectrum thermal (12µm <35mK) and IR optical scope. Recordings were made directly onto the device flash memory in the highest available quality and using the WiFi feed recorded onto a Samsung Active Tablet A10.

Audio

Surveyors used a variety of professional, high-quality recording equipment with ultrasonic microphones. Each camera was paired with a Titley Scientific Anabat Swift with an omnidirectional ultrasonic microphone which was placed with the microphone pointing upwards under the feature being observed.

One surveyor (AD) used an Elekon Batlogger M2 with a SiSonic ultrasonic microphone. The other surveyors used Wildlife Acoustics Echometer Touch Pro 2 with an android mobile device (Pixel 3, Pixel 6 pro, Samsung Galaxy S8, Samsung Galaxy S9+).

Analysis

Sound recordings made using the Batlogger M2 and Echometer Touch Pro detectors were analysed using Elekon BatExplorer version 2.1.10.1., whilst the Anabat Swift recordings were analysed using Anabat Insight version 2.0.5-1-g2369787. Bat calls were classified to species level by surveyors in the field. Once the data had been downloaded, a 10% sample of bats classified by surveyors as pipistrelle spp. bats in the field were assured in the lab. Recordings of all non-pipistrelle spp. and were analysed using Bat ID auto-classification software and then verified by an experienced bat analyst.

Video recordings were analysed using VideoLAN VLC Media Player version 3.0.17.4. All recordings were first viewed by an ecologist at double speed, noting timecodes of movement. Video recorded at these timecodes, and the timecodes when the bat detector was triggered were then reviewed and determine if the trigger was a result of a bat emerging or returning to a roost.

Personnel

The field surveys were led by Robert Sinclair FdSc. BSc. (Hons) an experienced Ecological Consultant. Robert holds a Natural England Bat Survey Licence Level 2 (2017-30685-CLS-CLS).

Rob was assisted by experienced bat surveyors Abigail Long BA MA., Aaron Dore BA. MFA., Georgina Watson BA. MA., and Rebekah Baker BSc. MSc. PGCE. QCIEEM.

Bat call sound analysis and video analysis was conducted by Rob Sinclair.

4. Baseline Ecological Conditions

Findings from previous surveys

A single soprano pipistrelle *Pipistrellus pygmaeus* was recorded 'possibly' emerging from under hanging tiles on the south elevation on one occasion during 2020 bat surveys. No roosting bats have been recorded at any other potential roosting features on any survey to date.

Daytime inspection

Buildings

Building B1, Elm Tree House

Since the 2020 surveys the condition of the building has deteriorated. Several gaps in the brickwork at the rear of the building which were considered moderately suitable for use by bats at the time, now have vegetation growing from them, lowering their potential for use as a roost entrance.

Since the 2020 survey, additional features include:

- Four missing hip ridge tiles from the ridge of the southern rear dormer;
- A new gap is now present between the lintel and the sash window on the front elevation

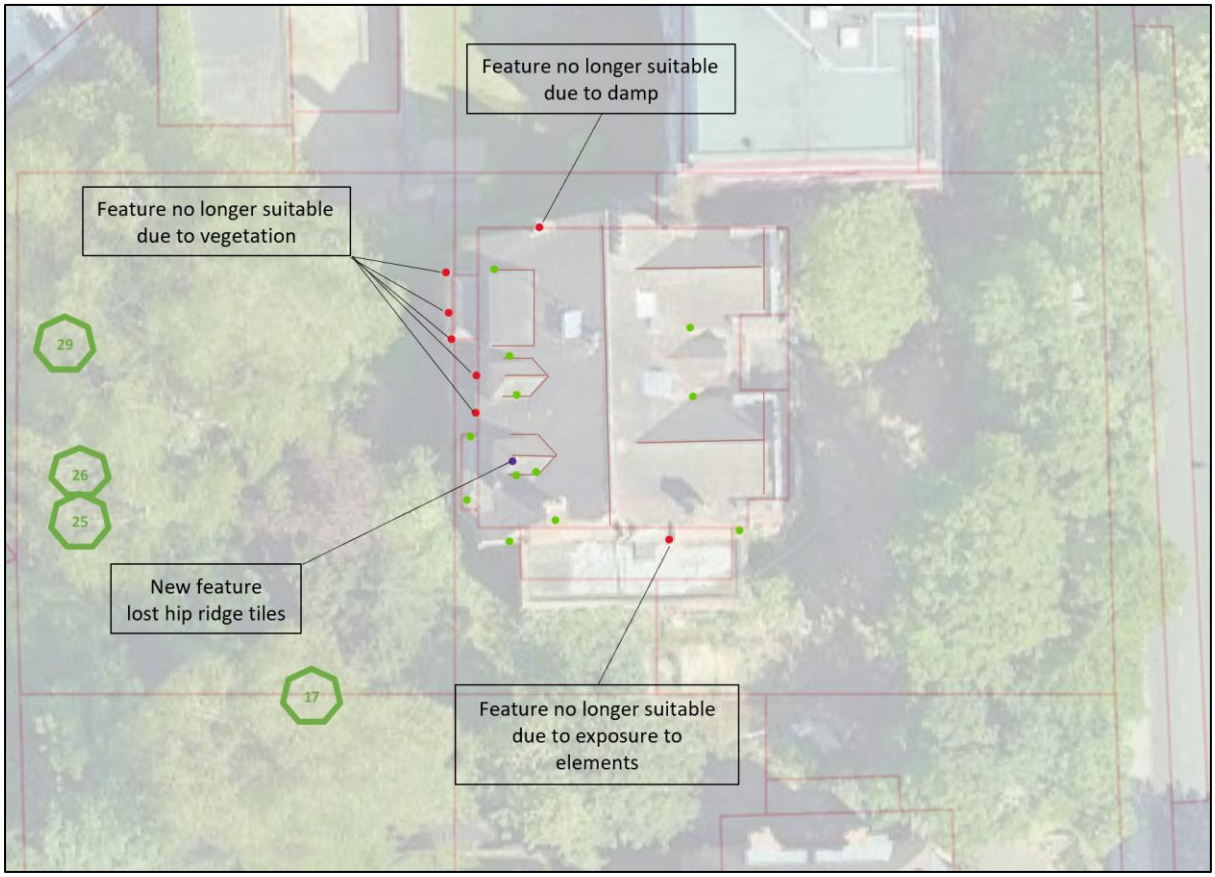
Features which are no longer suitable are:

- Gable end pointing at south, rear slope - this has been repaired
- Missing brickwork on north elevation - is now covered with Russian vine;
- A chimney flue on the south elevation is damaged and is now considered to be of low suitability for use by roosting bats
- Missing brick in centre of rear (west) elevation – is now inaccessible to bats due to buddleia plant growing from the wall.

Several windows on the third floor have been boarded up. Some rooms are no longer occupied and are unheated, this may have resulted in reduction of the suitability of wall cavities to support bat roosts.

The living spaces in the property extend into the eaves of the roof and there are no accessible roof voids. Any potential roosting spaces present are therefore likely to be narrow crevices, rather than lofts and voids.

Figure 4.1 Locations of potential roosting features at Elm Tree House B1.

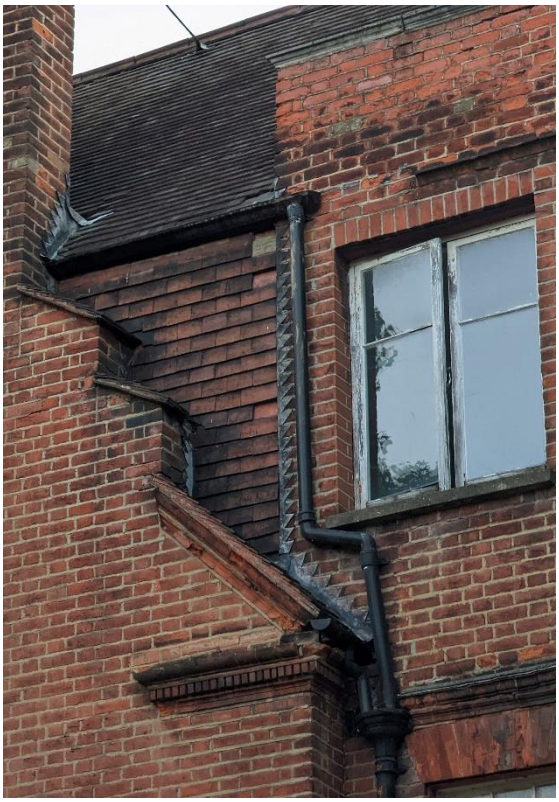


Previous Possible Roosting Location

Photographs taken in 2020, when the possible roost was recorded, have been compared with photos taken in 2022. Whilst there appear to be some signs of degradation, including the loss of an additional roof tile above the possible roost location, it appears that the location remains in a similar condition to 2020.

Thermal imaging surveys of the previous roosting location were conducted on each visit. No hotspots indicating the presence of bats was found on any occasion.

Images 5.1 a and b: Location of soprano pipistrelle roost found in 2020 in comparison to 2022 images.

2020 Imagery (Tyler Grange Ltd)	**2022 Imagery**
	

Building B2, Air Raid Shelter

The air raid shelter is now completely covered with vegetation. There are no opportunities for bats to gain access and therefore it is considered to be of negligible potential for use by roosting or hibernating bats. This structure will not be considered further in this report.

Trees

Trees with Moderate bat roost potential were included in the survey; trees T29, T26, and T17. Tree T25, with Low bat roost potential was also captured in surveys. The locations of the trees are shown on Figure 5.2. A detailed description of the trees and their suitability to support roosting bats is presented in Appendix 1.

All four trees were inspected with the thermal scope on each survey visit, no hotspots indicating potential use by bats were identified, although a nesting bird was identified in tree T29 on 27th May 2022. The nest was in active on all other visits.

Bat Presence/ Likely Absence Survey Results

Four bat presence absence surveys were undertaken in the summer of 2022, comprising two dusk emergence surveys and two dawn re-entry surveys. Detailed results are presented in Appendix 2 and are summarised below.

Dusk Emergence Survey – 27th May 2022

The first bat was observed 11 minutes after sunset, a common pipistrelle commuting to the site from the north and likely indicating a roost fairly close by. The majority of bat activity observed was foraging common pipistrelles at the south of Elm Tree House, with soprano pipistrelles joining 26 minutes after sunset and a brief contact with a small *Myotis* sp. (likely whiskered/Brandt's). **No bats were observed emerging from the building or trees.** The level of bat activity at the site was considered moderate for an urban site.

Dawn Re-entry Survey – 28th June 2022

The first bat was observed 1hr and 12 minutes before sunrise, a common pipistrelle foraging over the garden, west of Elm Tree House. Soprano pipistrelle was the only other species recorded. The final bat observed was a foraging soprano pipistrelle 34 minutes before sunrise, it foraged briefly and then commuted north-east towards the road. **No bats were observed returning to roost in buildings or trees.** The level of activity was low.

Dawn Re-entry Survey – 2nd July 2022

The first bat, a foraging common pipistrelle, was observed at 04:00, 48 minutes prior to sunrise. Soprano pipistrelle was recorded foraging briefly at the west of the site, then at the south and west before commuting south. The final bat, a common pipistrelle was recorded 38 minutes prior to sunrise. **No bats were observed returning to roost in buildings or trees**. The level of bat activity was very low.

Dusk Emergence Survey – 1st August 2022

Overcast conditions at the start of the survey gave rise to darker than normal conditions. The first bat, a commuting common pipistrelle was recorded very early in the survey, two minutes after sunset indicating an early emergence from a nearby roost to the east. A soprano pipistrelle was also observed foraging early, commuting to the site from the south. Frequent pipistrelle foraging and feeding behaviour was observed throughout the survey, with up-to three bats foraging, chasing and social calling observed at one time.

A single noctule *Nyctalus noctule* was observed flying high above the site from west to east, 20 minutes after sunset.

No bats were observed emerging from the building or trees. The level of bat activity at the site was considered moderate for an urban area.

5. Discussion

The following section assesses the likely impacts of the proposed development on bats at the site. Measures to mitigate the impacts, as far as reasonably practicable, are set out in Section 6.

Survey conclusions

B1 - Elm Tree House

Numerous potential bat roosting features, of varying suitability, are present at Elm Tree House. All features have been resurveyed according to their suitability status (Low, Moderate or High).

No bats were recorded roosting during the 2022 bat surveys. No bats presented behaviour (false returns) indicating the likely presence of a bat roost. No bat field signs have been found to indicate the presence of a roost.

Out of the nine occasions when night-time bat surveys had been conducted at Elm Tree House in the past four years, only one survey indicated a possible bat emergence; at hanging tiles on the south elevation. During that survey, no surveyors were positioned on the opposite side of the building at the time of the possible emergence, and no infrared or thermal cameras were used, so it could not be determined if the bat was in fact flying over the building. Both common pipistrelle and soprano pipistrelle bats flew over the roof during 2022 surveys (27.05.2022 dusk - flightline E and 01.08.2022 dusk – flightline G and K).

Based on the available information from surveys, it is considered unlikely that the building supports a bat roost. Roosting opportunities for use by bats remain available in the High, Moderate and Low suitability PRFs; additionally, as the building ages, more potential roosting features may become available.

Trees

Bat presence/absence surveys of trees T17, T25, T26 and T29 have been completed. No roosting bats have been observed.

Sufficient surveys have been completed to conclude that bat roosts are likely to be absent.

Proposed works and potential impacts

Bats are opportunistic and may occupy new roosts on a temporary or transitional basis from time to time. Some bats may occupy up to 15 different roosting sites at different times of year depending on prevailing weather, season, and availability of insect prey. Whilst no bats have been observed roosting at the property during surveys completed to date, given the moderate levels of bat activity at the site and the presence of roosts nearby, there remains a residual risk of bat(s) being discovered during the works. Therefore, an outline precautionary working method statement has been presented in section 6 below. Table 5.1 presents the potential impact of task to be undertaken.

Table 5.1 - Works with the potential to impact bats

Task	Potential impacts in the absence of mitigation
Direct impacts	
Tree works – Felling, pruning	• Roost loss; • Injuring bats with saws; • Injuring bats within roosts during felling

Installation of scaffolding	• Temporary roost loss by blocking access back into roost(s)
Removal of roofing materials and dormers	• Roost loss; • Disturbance to roosting or hibernating bats; • Injury or killing of bats whilst removing materials from roof
Replacement of roofing tiles, sarking, flashing, and pointing	• Roost loss; • Entombing of roosting bats by blocking exit points; • Causing entanglement of bats by using unsuitable materials i.e. non-bat safe roofing membrane
Replacement of brickwork, and repointing	• Roost loss; • Entombing of roosting bats by blocking exit points
Replacement and repair of soffits and rainwater goods	• Roost loss;
Removal and replacement of hanging tiles.	• Roost loss; • Disturbance to roosting or hibernating bats; • Injury of killing of bats whilst removing tiles
Indirect impacts	
Installation of new external lighting	• Blocking access to roosts through light disturbance
Habitat loss	• Blocking access to roosts or decreasing suitability for bats to fly at the site through removing vegetation which currently blocks existing lighting; • Removal of vegetation which supports foraging and commuting habitats; • Removal of habitats that supports insect prey.

6. Outline Mitigation Strategy

Potential Roost Loss – Continued Ecological Functionality

At present, the buildings and trees at the site have the potential to support bat roosts, even though they are not currently utilised. Once completed, the new building (Sycamore house – Phase III) will support two new integrated bat roost units in the west elevation. However, the loss of other potential roosting features at Elm Tree House through the repairs and extensions has not been addressed in previous applications.

To maintain and enhance to potential suitability of the building to support roosting bats, two additional bat roosting units should be integrated into the walls of Elm Tree House.

To provide potential alternative bat roosting features during the construction phase, two bat roosting units should also be installed in retained trees. In the unlikely event that a bat is discovered during works, these bat boxes could be used as a compensatory roost.

Habitats – Continued Ecological Functionality

The landscape and lighting schemes presented in planning applications for Phases I, II and III have addressed the continued use of the site by foraging and commuting bats. Whilst it will not be possible to provide temporary alternative habitats during the construction phases, the surrounding gardens and SINC are likely to adequately provide alternative foraging and commuting habitats in the interim.

Precautionary Working Methods and Reasonable Avoidance

In advance of any tree works, destructive works, brickwork or repointing works operatives should receive a toolbox talk briefing on the identification of bats and what to do if bats are found.

Tree works

In advance of planned tree works such as pruning, crown raising or felling trees with Moderate bat roost potential (T29, T26, T17), an Ecological Clerk of Works (ECoW) with a Natural England Level 2 Class Licence should undertake a pre-fell endoscopic inspection of potential roosting features to check that no bats are in occupation. This should be completed on the same day as felling and can be facilitated by using a mobile elevated work platform (MEWP) or by climbing the tree (Aerial tree inspection with a rope and harness). If the inspection confirms that the tree remains free of roosting bats, the tree can be soft felled. If it is not possible to climb the tree due to safety or the features cannot be fully inspected, the tree should be soft felled and left on the ground for 48 hours to allow any animals occupying features the opportunity to escape.

The optimal timing for tree works with bat features not suitable for hibernation (such as those at the site) is autumn/winter or early spring before bird nesting season.

In advance of tree works all operatives must receive a toolbox talk relating to bats.

Installation of scaffolding

Care should be taken to avoid blocking gaps in brickwork, missing pointing, or gaps under hanging/roof tiles. Debris netting, poles or toe boards could block potential bat roosting features. Scaffold should be constructed in a way that will allow for inspection under tiles and gaps in brickwork.

Dismantling of roof dormers, removal of tiles, flashing

Once scaffolding has been constructed, an ECoW with a Natural England Level 2 Class Licence should undertake an endoscopic inspection of potential roosting features under roofing coverings. Then the materials should be carefully removed by hand under the supervision of the ECoW. Care should be taken to carefully lift tiles and other materials in a way that prevents the crushing of any animals located underneath.

Repointing, brickwork replacement and installation of integrated bat roosts

In advance of works to brickwork, an ECoW with a Natural England Level 2 Class Licence should undertake an endoscopic inspection of potential roosting features in gaps before they are blocked temporarily or permanently repaired.

The position of the bat roosting units should be agreed with the ECoW, and are ideally positioned on a south-east, south, or south-west elevation, at least 4m from the ground, away from windows, and can be placed under the eaves or high on the gable wall.

Selection of roofing materials

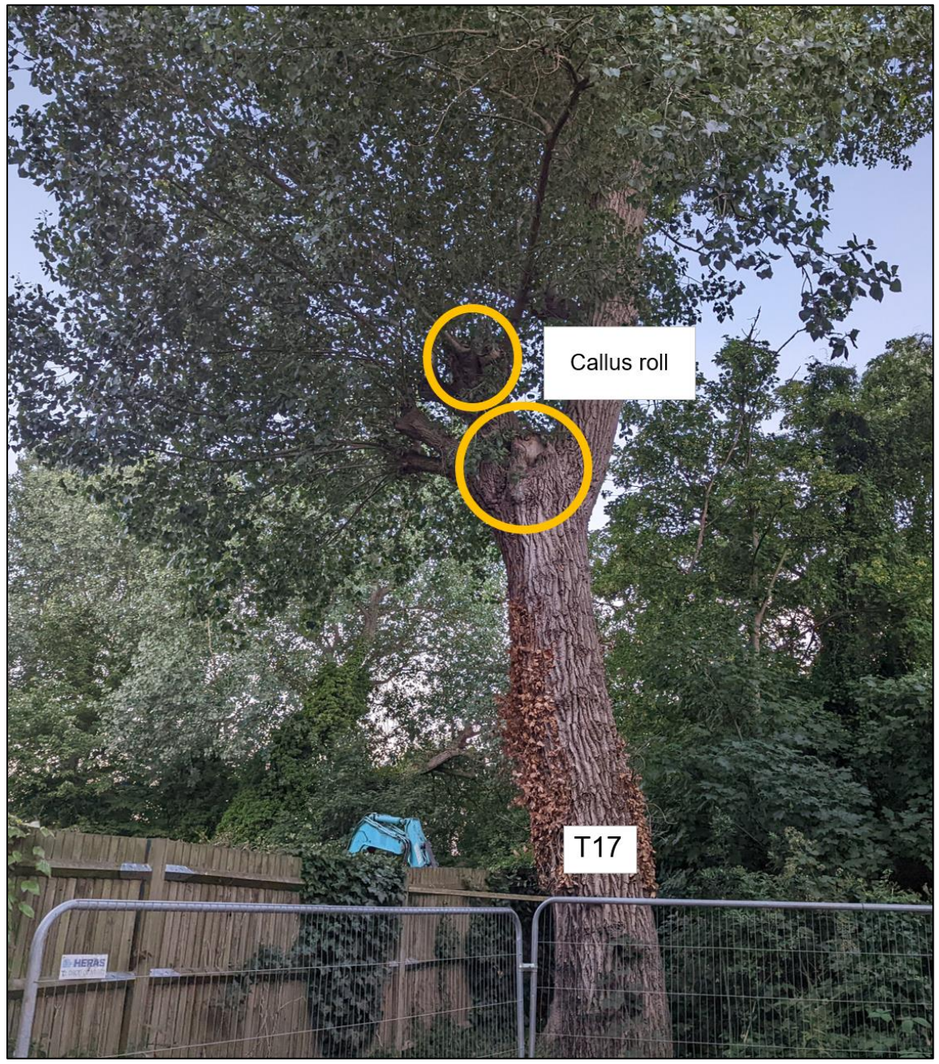
Where possible, breathable roofing membranes should be avoided. Instead, 1F bituminous membrane should be used. If this is not possible, bat-safe breathable roofing membrane may be used.

Procedure for unexpected discovery of bats

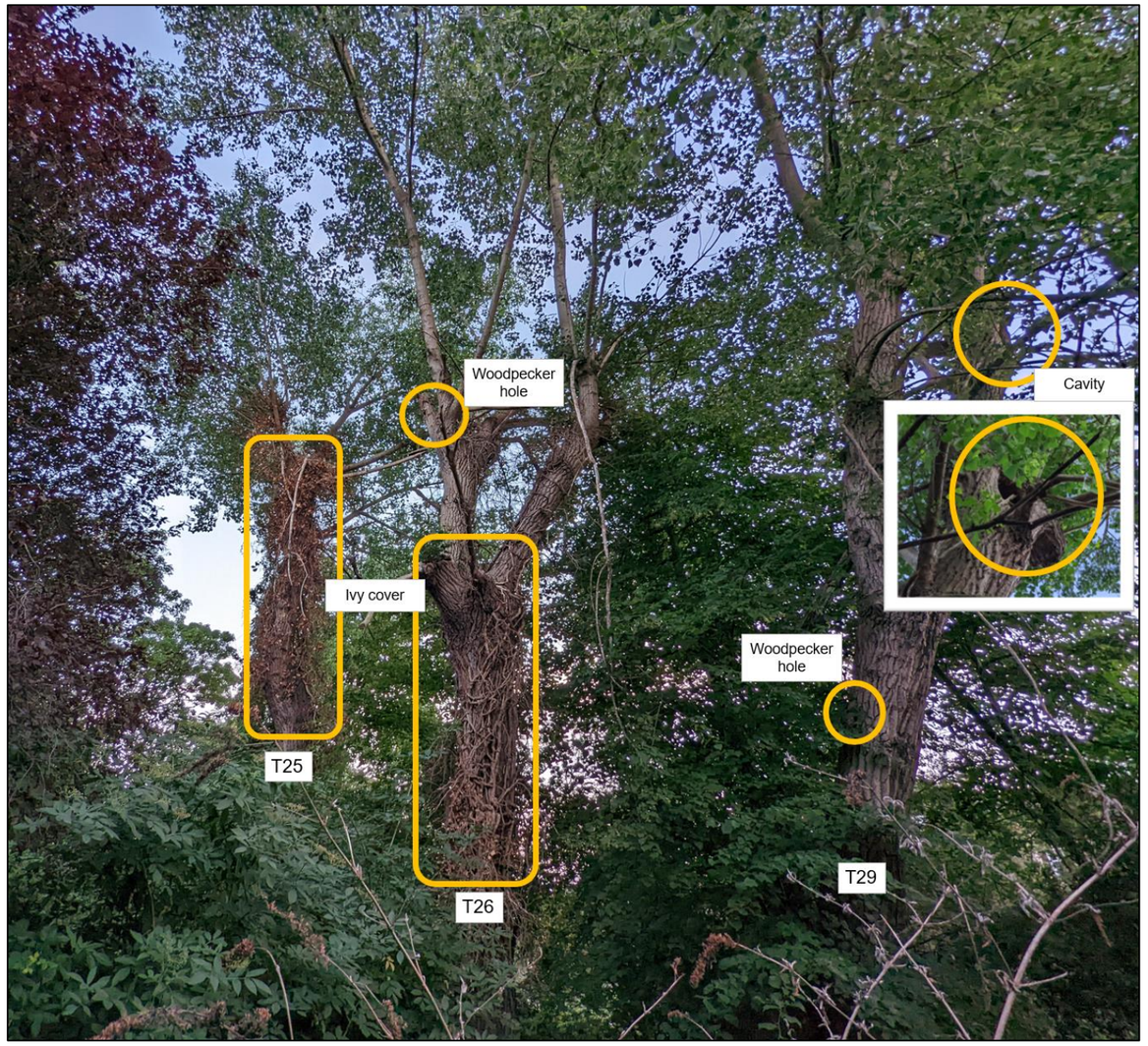
If bats are discovered at any stage, all works should be immediately suspended, and a licenced bat worker must be called to the site to assess the roost and liaise with Natural England. They will discuss the best course of action and determine any mitigation, or licence requirements.

The bat should be left in situ, if it is safe (for the bat) to remain, otherwise, it should be carefully picked up with a gloved hand and placed in a secure, but not air-tight box and placed out of harms way until the bat worker arrives. If the ECoW is in attendance when the bat is discovered, the bat will be assessed for injury and may be introduced to one of the bat roost units installed on trees.

A1: Potential Roosting Features – Trees



Tree 17



Tree 25, 26 and 29

A2: Bat Presence Absence Survey Analysed and Collated Results

Notes and interpretation – The results of night-time surveys are presented below. Data from each survey has been collated and where possible the flight activity of bats has been grouped together to indicate the likely flight by the same individual bat or group of bats. The tables are best interpreted alongside the associated bat flightline figure. Activity indicating roosting is shown in RED.

Flightline Figure Key –

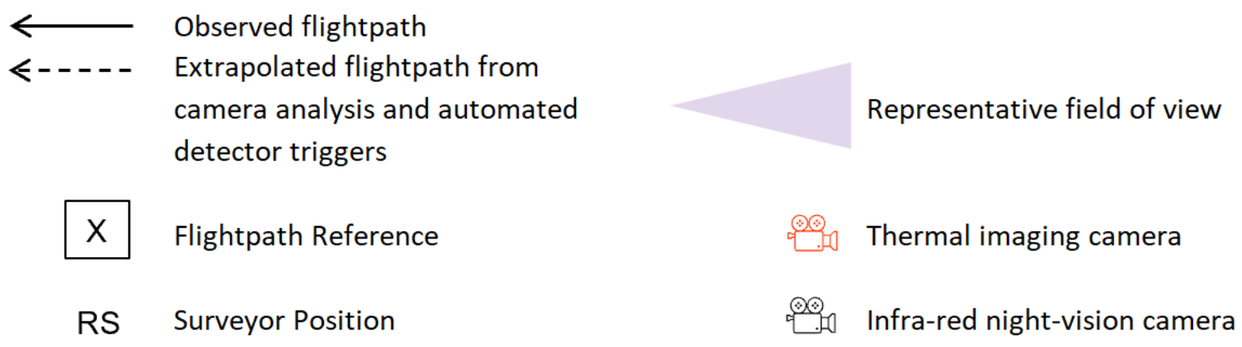


Table A2.1 Dusk Survey – 27.05.2022 Results

Precipitation	Nil	Survey Start time	20:47	Other Observations
Cloud Cover (oktas)	1/8	Sunset / Sunrise time	21:02	Tawny owl pair heard in distance.
Start Temperature	19 ºC	Survey Finish Time	22:32	
End Temperature	11 ºC	Weather Observations		
Wind speed Beaufort	.f3	Light breeze, cool at end of survey		
Wind direction	NW			

Surveyor	Time	Species	Flightpath	Comment	Video Analysis Result
BB	21:13	Common pipistrelle	A	Foraging briefly	
AL	21:13	Common pipistrelle	Unseen	Unseen did not emerge from trees	
GW	21:13	Common pipistrelle	A	Foraging and then commuting towards RS	
Therm-Cam (tree)	22:13	Common pipistrelle	Unseen	Ultrasonic trigger, no bat observed	Did not emerge from roost
RS	21:13	Common pipistrelle	A, then B, occasionally C	Commuting and foraging for 9 minutes	
AD	21:13	Common pipistrelle	Unseen	Frequent foraging in distance	
IR-Cam (tiles)	21:13	Common pipistrelle	Unseen	Ultrasonic trigger, no bat observed	Did not emerge from roost
BB	21:20	Common pipistrelle	C	Foraging	
AL	21:20	Common pipistrelle	Unseen	Unseen did not emerge from trees	
GW	21:20	Common pipistrelle	C	Foraging over BB and AL then commuting towards RS	
Therm-Cam (tree)	21:20	Common pipistrelle	Unseen	Ultrasonic trigger, no bat observed	Did not emerge from roost
RS	21:23	Common pipistrelle	B	Foraging close to the south side of the building	
IR-Cam (tiles)	21:23	Common pipistrelle	D	Three ultrasonic triggers, bat observed flying south-west past camera	Did not emerge from roost
AD	21:23	Common pipistrelle	D	Foraging at south side and east side of the building	
AL	21:24	Common pipistrelle	Unseen	Unseen did not emerge from trees	
BB	21:24	Common pipistrelle	E	Foraging then commuting over house	
GW	21:24	Common pipistrelle	E	Foraging and then flew upwards out of view, over the house towards AD	
AD	21:24	Common pipistrelle	E	Commuting overhead towards road	
BB	21:26	Soprano pipistrelle	C	Foraging briefly over GW	
GW	21:26	Soprano pipistrelle	C	Foraging overhead for a few moments, social calling	
AL	21:26	Soprano pipistrelle	Unseen	Unseen did not emerge from trees	
Therm-Cam (tree)	21:26	Soprano pipistrelle	Unseen	Ultrasonic trigger, no bat observed	Did not emerge from roost
Therm-Cam (tree)	21:26	Common pipistrelle	Unseen	Ultrasonic trigger, no bat observed	Did not emerge from roost
RS	21:26	2 x Common pipistrelle	B	Flew from the west and then foraged for 7 minutes, foraging and chasing	
AD	21:26	Common pipistrelle	B	Occasionally 2 bats foraging between me and RS for several minutes	
IR-Cam (tiles)	21:26	Common pipistrelle	B	Frequent ultrasonic triggers, bat observed flying past camera 10 times in 6 minutes	Did not emerge from roost
RS	21:46	Common pipistrelle	F	Foraging over garden at 11 Netherhall Gardens	
Therm-Cam (tree)	21:46	Common pipistrelle	Unseen	Only a brief heat signature at edge of frame	Did not emerge from roost
RS	21:49	Myotis sp. (wab)	Unseen	Only identifiable to genus, perhaps flying in neighbours garden	Did not emerge from roost

RS	21:50	Soprano pipistrelle	B	Foraging at south of building	
AD	21:50	Soprano pipistrelle	D	Foraging at south and east of building	
IR-Cam (tiles)	21:50	Soprano pipistrelle	B and D	Frequent ultrasonic triggers, bat observed flying past camera twice	Did not emerge from roost
RS	21:58	Unidentified bat	B	Seen foraging, inaudible	
IR-Cam (tiles)	21:58	Soprano pipistrelle	Unseen	Single brief ultrasonic trigger, no bat observed	Did not emerge from roost
AL	22:19	Common pipistrelle	Unseen	Unseen did not emerge from trees	
BB	22:19	Common pipistrelle	E	Foraging then commuting over house	
GW	22:19	Common pipistrelle	E	Foraging then commuting over house	
AD	22:20	Common pipistrelle	E	Commuting over house towards road	

Figure A2.1 Dusk Survey – 27.05.2022 Schematic

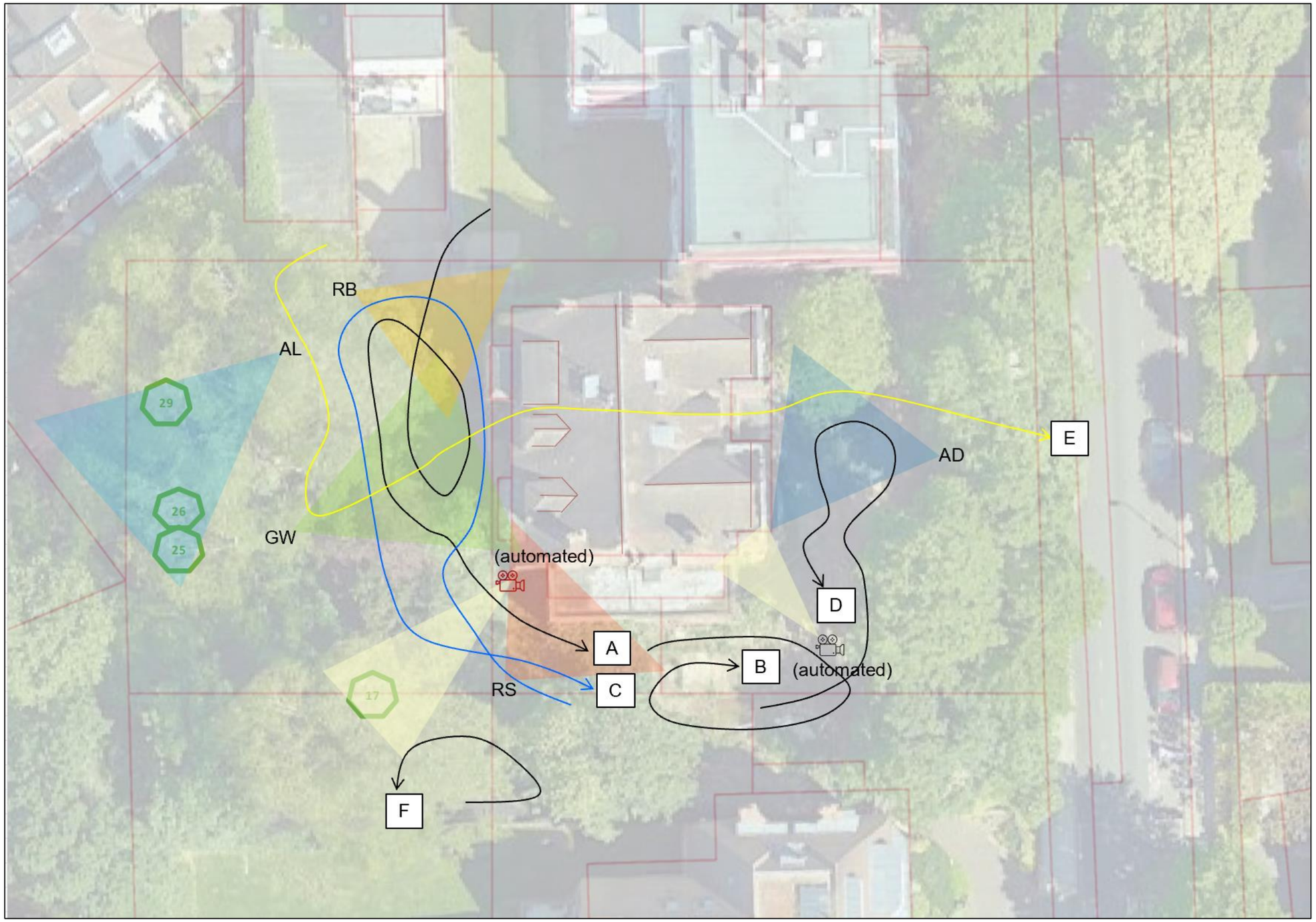


Table A2.2 Dawn Survey – 28.06.2022 Results

Precipitation	Nil	**Survey Start time**	02:30	**Other Observations**
Cloud Cover (oktas)	3/8	**Sunset / Sunrise time**	04:45	A vixen and two cubs climbing over bins.
Start Temperature	12 ºC	**Survey Finish Time**	05:05	
End Temperature	11 ºC	**Weather Observations**		
Wind speed Beaufort	.f1	Calm, light cloud at start, clearing towards the end of the survey		
Wind direction	Var.			

Surveyor	Time	Species	Flightpath	Comment	Video Analysis Result
RS	03:34	Common pipistrelle	A then B	Foraging	Did not return to roost
Therm-Cam (Tree)	03:34	Common pipistrelle	B	Ultrasonic trigger, no bat observed	Did not return to roost
IR-Cam (Tiles)	03:34	Common pipistrelle	B	Ultrasonic trigger, no bat observed	Did not return to roost
Therm-Cam (Tree)	03:34	Common pipistrelle	B	Ultrasonic trigger, bat seen flying north	Did not return to roost
RS	03:35	Common pipistrelle	C	Foraging and commuting	Did not return to roost
RS	04:03	Soprano pipistrelle	B	Foraging and commuting	Did not return to roost
Therm-Cam (Tree)	04:03	Soprano pipistrelle	B	Ultrasonic trigger, no bat observed	Did not return to roost
Therm-Cam (Tree)	04:05	Soprano pipistrelle	B	Ultrasonic trigger, bat seen flying north	Did not return to roost
RS	04:05	Soprano pipistrelle	B then C	Foraging and commuting	Did not return to roost
RS	04:10	Soprano pipistrelle	A then D	Foraging and commuting	Did not return to roost
Therm-Cam (Tree)	04:10	Soprano pipistrelle	D	Ultrasonic trigger, no bat observed	Did not return to roost
IR-Cam (Tiles)	04:11	Soprano pipistrelle	E	Ultrasonic trigger, bat seen flying north-east towards road	Did not return to roost

Figure A2.2 Dawn Survey – 28.06.2022 Schematic

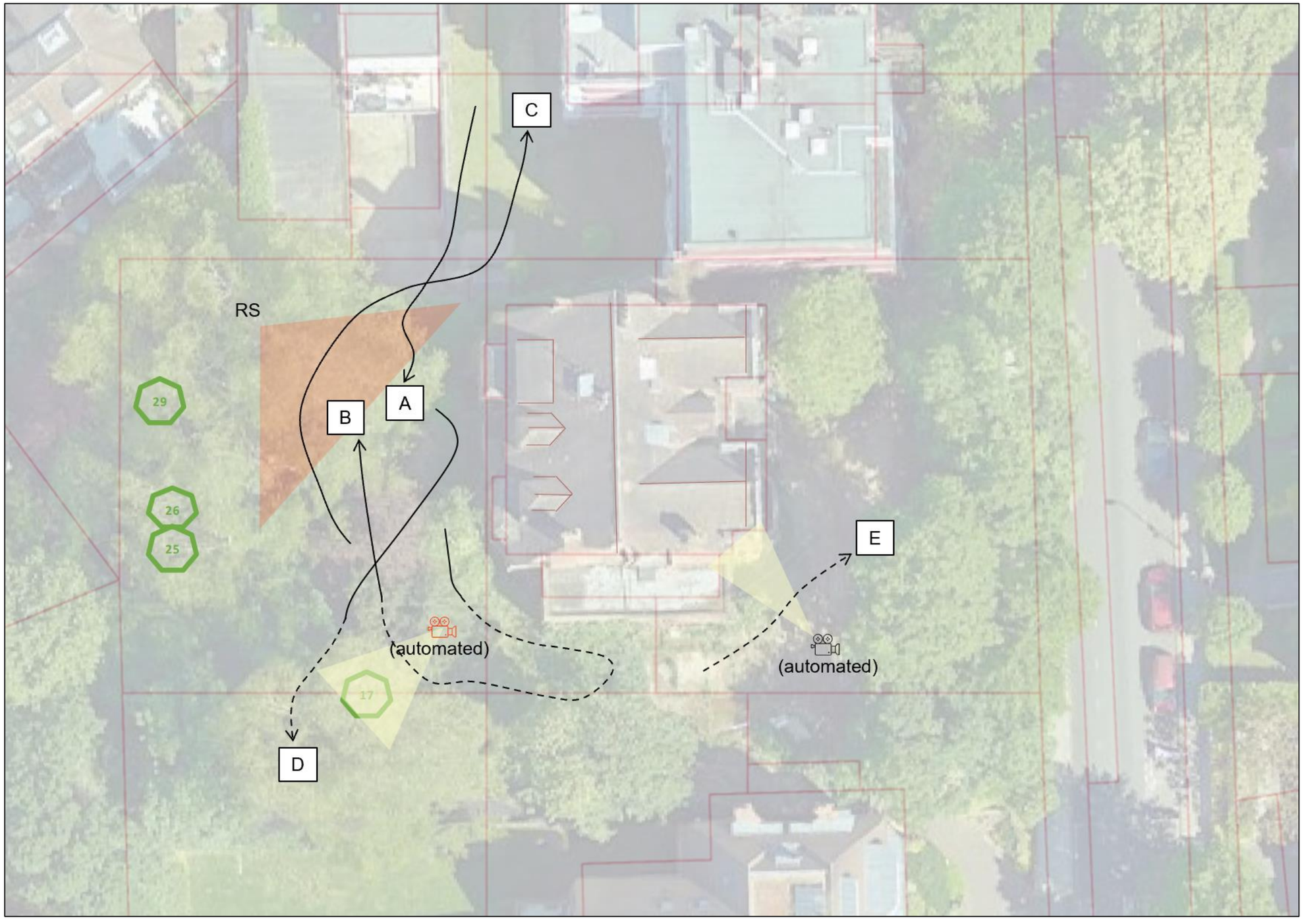


Table A2.3 Dawn Survey – 02.07.2022 Results

Precipitation	Nil	**Survey Start time**	02:45	**Other Observations**
Cloud Cover (oktas)	6/8	**Sunset / Sunrise time**	04:48	None
Start Temperature	13 ºC	**Survey Finish Time**	05:05	
End Temperature	12 ºC	**Weather Observations**		
Wind speed Beaufort	.f2	Humid, overcast to start, clearing at dawn.		
Wind direction	SW			

Surveyor	Time	Species	Flightpath	Comment	Video Analysis Result
RS	04:00	Common pipistrelle	Unseen	Likely foraging	Did not return to roost
IR-Cam (east)	04:00	Common pipistrelle	Unseen	Ultrasonic trigger, no bat observed	Did not return to roost
Therm-Cam (trees)	04:02	Soprano pipistrelle	Unseen	Ultrasonic trigger, no bat observed	Did not return to roost
RS	04:03	Soprano pipistrelle	A	Foraging, then commuting	Did not return to roost
IR-Cam (east)	04:03	Soprano pipistrelle	A	Ultrasonic trigger, bat flew north across frame	Did not return to roost
IR-Cam (east)	04:06	Soprano pipistrelle	B	Ultrasonic trigger, bat flew south across frame	Did not return to roost
RS	04:06	Soprano pipistrelle	B	Foraging then commuting	Did not return to roost
RS	04:10	Common pipistrelle	A	Commuting north away from property	Did not return to roost
IR-Cam (east)	04:10	Common pipistrelle	A	Ultrasonic trigger, bat flew north across frame very close to the camera	Did not return to roost

Figure A2.3 Dawn Survey – 02.07.2022 Schematic

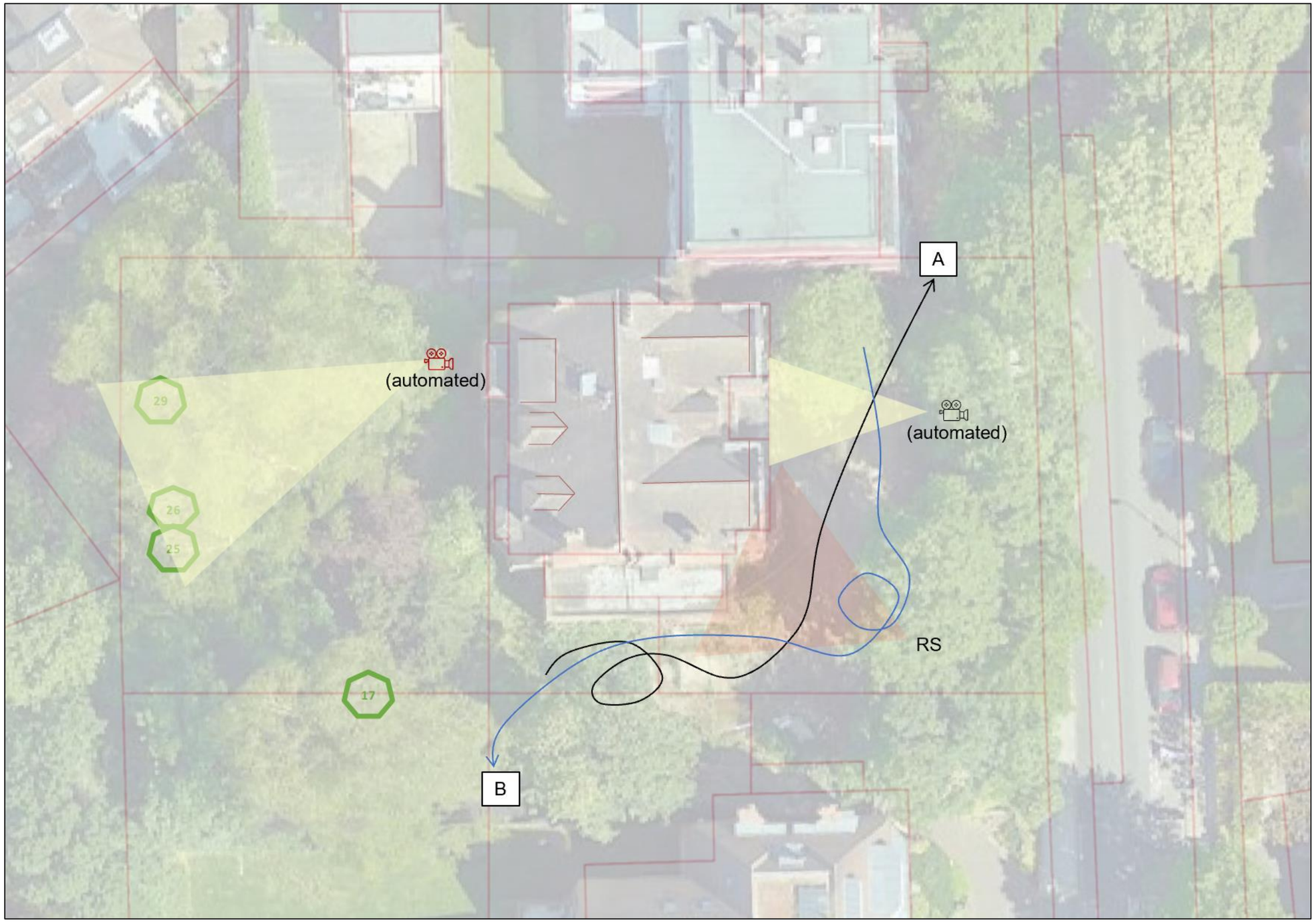


Table A2.4 Dusk Survey – 01.08.2022 Results

Precipitation	Nil	**Survey Start time**	20:30	**Other Observations**
Cloud Cover (oktas)	6/8 clearing	**Sunset / Sunrise time**	20:49	High levels of bat activity. First emergence unusually early.
Start Temperature	23 ºC	**Survey Finish Time**	22:30	
End Temperature	21 ºC	**Weather Observations**		
Wind speed Beaufort	.f3	Very warm, humid evening. Overcast at the beginning of the survey, clearing to a haze by the end.		
Wind direction	SW			

Surveyor	Time	Species	Flightpath	Comment	Video Analysis Result
AD	20:51	Common pipistrelle	A	Commuting over RS heading west	
Therm-Cam (tiles)	20:51	Common pipistrelle	Unseen	Ultrasonic trigger, no bats seen	Did not emerge from roost
RS	20:51	Common pipistrelle	A	Commuting from east towards AL	
AL	20:51	Common pipistrelle	Unseen	Brief, commuting	
AL	20:52	Soprano pipistrelle	B	Commuting	
GW	20:52	Soprano pipistrelle	C	Commuting then foraging	
RB	20:52	Soprano pipistrelle	C	Foraging in garden and around trees	
GW	20:54	Common pipistrelle	C	Foraging	
AD	20:56	Common pipistrelle	Unseen	Did not emerge	
RS	20:56	Common pipistrelle	A	Commuting from south towards AL	
Therm-Cam (tiles)	20:56	Common pipistrelle	Unseen	Ultrasonic trigger, no bats seen	Did not emerge from roost
AL	20:56	Common pipistrelle	B	Commuting	
GW	20:56	Common pipistrelle	C	Foraging	
RB	20:56	Common pipistrelle	Unseen	Foraging behind me according to GW	
AL	20:57	Common pipistrelle	D	Foraging	
RS	20:57	Common pipistrelle	D	Commuting and foraging from west towards AD	
Therm-Cam (tiles)	20:57	Common pipistrelle	D	Ultrasonic trigger, bat flying north east	Did not emerge from roost
AD	20:57	Common pipistrelle	D, then E	Commuting then foraging for several minutes back and forth in sheltered area in front of me	
RB	20:58	Common pipistrelle	Unseen	Foraging and social calling	
IR-Cam (north elevation)	20:58	2 x Common pipistrelle	F	Ultrasonic trigger, two bats flew south	Did not emerge from roost
GW	20:58	2 x Common pipistrelle	F, then C	Foraging, chasing and social calling.	
AD	20:59	Common pipistrelle	E, then G	Briefly foraging over front of building then commuting west over building	
AL	20:59	Common pipistrelle	G	Commuting over roof, same bat was seen by AD flying west towards GW	
GW	20:59	3 x Common pipistrelle	B	Now three bats foraging, chasing and social calling, additional bat appeared to fly over roof. Bats continued to forage for several minutes before flying north	
RS	20:59	Common pipistrelle	A and D	Commuting over head from east and then foraging back and forth for several minutes	
Therm-Cam (tiles)	21:00	Common pipistrelle	D	Ultrasonic trigger, bat flying north east, then south west	Did not emerge from roost
RS	21:03	Common pipistrelle	A and D	Foraging	
AL	21:03	Common pipistrelle	A and D	Foraging	

Therm-Cam (tiles)	21:04	Common pipistrelle	D	Ultrasonic trigger, bat flying north east	Did not emerge from roost
AL	21:06	Soprano pipistrelle	B, then reverse B	Foraging and feeding overhead for several minutes in canopy of poplar tree	
RS	21:09	Noctule	H	Commuting high above site	
AD	21:09	Noctule	Unseen	Did not emerge	
Therm-Cam (tiles)	21:09	Noctule	Unseen	Ultrasonic trigger only	Did not emerge from roost
RB	21:09	Noctule	H	Flying high above the house	
RS	21:11	Common pipistrelle	D	No sound during survey, but analysis shows common pipistrelle	
RS	21:12	Common pipistrelle	D and E	Chasing, foraging and social calling	
Therm-Cam (tiles)	21:12	2 x Common pipistrelle	D	Ultrasonic trigger, two bats flying north east	Did not emerge from roost
AD	21:12	2 x Common pipistrelle	E	Foraging back and forth for servral minutes, social calling	
GW	21:13	Common pipistrelle	B, reverse F	Commuting north	
IR-Cam (north elevation)	21:13	Common pipistrelle	F	Ultrasonic trigger, bat flying north, rapid flight 3 frames only	Did not emerge from roost
RB	21:13	Common pipistrelle	Unseen	Brief chatter, did not emerge from trees	
AD	21:14	Soprano pipistrelle	G	Foraging over front of building then commuting west	
RS	21:14	Soprano pipistrelle	G	Foraging and commuting	
AL	21:15	Soprano pipistrelle	G	Commuting over roof, same bat was seen by AD flying west towards AL	
GW	21:15	Soprano pipistrelle	G, then C	Foraging	
RB	21:15	Soprano pipistrelle	Unseen	Social Calls, did not emerge from trees	
RB	21:16	2 x Soprano pipistrelles	J	Foraging and social calling	
GW	21:17	3 x Soprano pipistrelle	C	Now three bats foraging and social calling for 2 minutes before flying north	
AL	21:21	Soprano pipistrelle	Unseen	Consistent foraging activity for several minutes	Did not emerge from roost
RS	21:22	Soprano pipistrelle	Unseen	Feeding buzzes, perhaps from 11 Netherhall Gardens	Did not emerge from roost
AD	21:22	Soprano pipistrelle	K	Foraging over front of building then commuting west	
AL	21:22	Soprano pipistrelle	K	Commuting over roof, same bat was seen by AD flying west towards AL	
RS	21:25	Soprano pipistrelle	E	Foraging	
AD	21:25	Soprano pipistrelle	E	Foraging	
Therm-Cam (tiles)	21:25	Soprano pipistrelle	Reverse D	Ultrasonic trigger, bats flying south west	Did not emerge from roost
RS	21:26	Soprano pipistrelle	Reverse D	Foraging	
AD	21:26	Soprano pipistrelle	Reverse D	Foraging	
RS	21:28	Common pipistrelle	A and D	Foraging	
AL	21:28	Common pipistrelle	A and D	Foraging	
Therm-Cam (tiles)	21:28	Soprano pipistrelle	D	Ultrasonic trigger, bats flying north east	Did not emerge from roost
AD	21:28	Common pipistrelle	D, then E	Foraging	
IR-Cam (north elevation)	21:30	Common pipistrelle	F	Ultrasonic trigger, one bat flying south	

GW	21:31	Common pipistrelle	F, then Reverse G	Commuting over roof	
AD	21:31	Common pipistrelle	Reverse G, then E	Foraging	
RS	21:31	Common pipistrelle	E, then reverse D	Commuting then foraging back and forth for several minutes	
AD	21:32	Common pipistrelle	E, then K	Foraging over front of building then commuting west	
AL	21:32	Common pipistrelle	K	Commuting over roof, same bat was seen by AD flying west towards AL	
RB	21:33	Soprano pipistrelle	Unseen	Brief quiet chatter in distance	
AL	21:33	Soprano pipistrelle	D	2x Soprano pipistrelles chasing and foraging	
Therm-Cam (tiles)	21:33	Soprano pipistrelle	D	Ultrasonic trigger, bats flying north east	Did not emerge from roost
RS	21:33	Soprano pipistrelle	D and E	2x Soprano pipistrelles chasing and foraging	
AD	21:34	Soprano pipistrelle	D and E	2x Soprano pipistrelles chasing and foraging	
AL	21:36	Soprano pipistrelle	Unseen	Brief chatter in distance	
RB	21:36	Soprano pipistrelle	Unseen	Brief quiet chatter in distance	
IR-Cam (north elevation)	21:59	Common pipistrelle	F	Ultrasonic trigger, one bat flying south	Did not emerge from roost
GW	21:59	Common pipistrelle	F, reverse F	Briefly foraged in the garden before commuting north	
IR-Cam (north elevation)	22:00	Common pipistrelle	reverse F	Ultrasonic trigger, one bat flying north	Did not emerge from roost
AD	22:11	Common pipistrelle	D and E	Foraging back and forth between me and RS for 5 minutes, occasionally unseen	
RB	22:11	Common pipistrelle	Unseen	Did not emerge	
AL	22:11	Common pipistrelle	Unseen	Foraging and feeding buzzes, did not emerge	
RS	22:11	Common pipistrelle	D and E	Foraging back and forth between AD and me for several minutes	
Therm-Cam (tiles)	22:11	Common pipistrelle	D	Ultrasonic trigger, bats flying north east then south west several times	Did not emerge from roost

Figure A2.4 Dusk Survey – 01.08.2022 Schematic