

BAT SURVEY REPORT




FEBRUARY 2025

Stairfoot Quarry,
Sandy Gate Lane,
Ardsley,
Barnsley,
S71 5AW

U R B A N
G R E E N



QUALITY MANAGEMENT

Project No.:	UG1773			
Project:	Stairfoot Quarry			
Location:	Sandy Gate Lane, Ardsley, Barnsley, S71 5AW			
Title:	Bat Survey Report			
Document Type:	BSR	Issue No.:	01	
Date:	December 2023			
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Checked By:	Jake Healy	Signature:		
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02	10/02/2025	Amendment to report to reflect update to planning application boundary	Olivia Jones	Jake Healy

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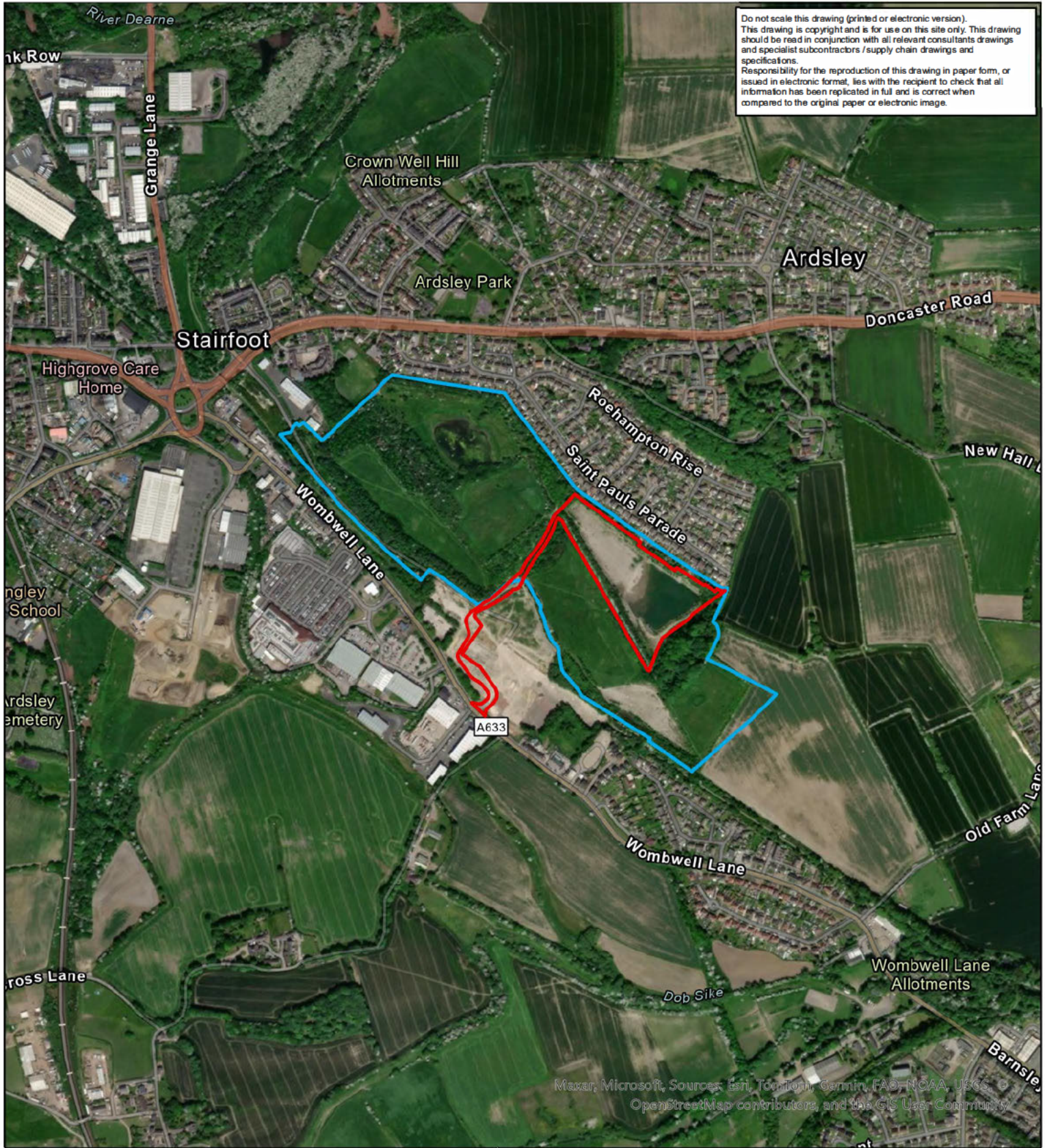
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1 Executive Summary

- 1.1.1.1 Green Earth Developments (Group) Ltd is proposing to develop land at Stairfoot Quarry in Ardsley, Barnsley (hereafter referred to as ‘the site’). The proposals include an ecological restoration scheme after an operation period as an inert waste landfill site.
- 1.1.1.2 Urban Green have been appointed to complete Bat Surveys and a Report of the site. A Preliminary Ecological Appraisal and a Preliminary Roost Assessment were conducted at the site in April 2023. Further surveys, in the form of bat activity and static surveys, were recommended for the site to assess the site’s commuting and foraging potential.
- 1.1.1.3 Bat transect surveys and static deployment surveys were conducted on all land within the clients ownership between May and September 2023, bat activity on site was found to be extensive and constant throughout the site, and the site is considered to provide high foraging value for bats. A range of species were identified, with common pipistrelle (*Pipistrellus pipistrellus*) and soprano pipistrelle (*Pipistrellus pygmaeus*) the most abundant species, with noctule (*Nyctalus noctule*) and *Myotis* species recorded occasionally, and rare occurrences of *Nyctalus* species, Leisler’s bat (*Nyctalus leisleri*), and brown long-eared bat (*Plecotus auritus*).
- 1.1.1.4 Species recorded around the planning application boundary included common pipistrelle, noctule, soprano pipistrelle, and *Myotis*. The highest level of activity was recorded within the bordering woodland, specifically within the eastern woodland, southern tree line and western woodland.
- 1.1.1.5 Due to the high levels of activity on site, it is recommended that the development follows a strict sensitive lighting scheme, as well as the creation of new mitigation ponds on site. Further recommendations regarding the ecological restoration scheme are also considered.



Legend:	
	Red Line Boundary
	Ownership
Client:	Green Earth Developments (Group) Ltd
Project:	Stairfoot Quarry
Title:	Site Context
Drawing Ref:	UG_1773_SITE_CONTEXT

0.85	
	
Kilometers	
Issue:	01
Figure:	01
Scale @ A4	1:10,000
Approved by:	CL
Checked by:	JH
Author:	CL
Date:	07/08/2024




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Legend

 Survey Area

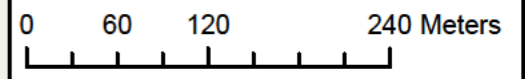
 Route

Bat Activity

 Sparse

 Dense

Species recorded:
Myotis sp.
Nyctalus sp.
 Noctule
 Common pipistrelle
 Soprano pipistrelle
 Unidentified bat



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Client:
Green Earth Developments (Group) Ltd.

Project:
Stairfoot Quarry

Title:
**Bat Transect Map
 May 2023**

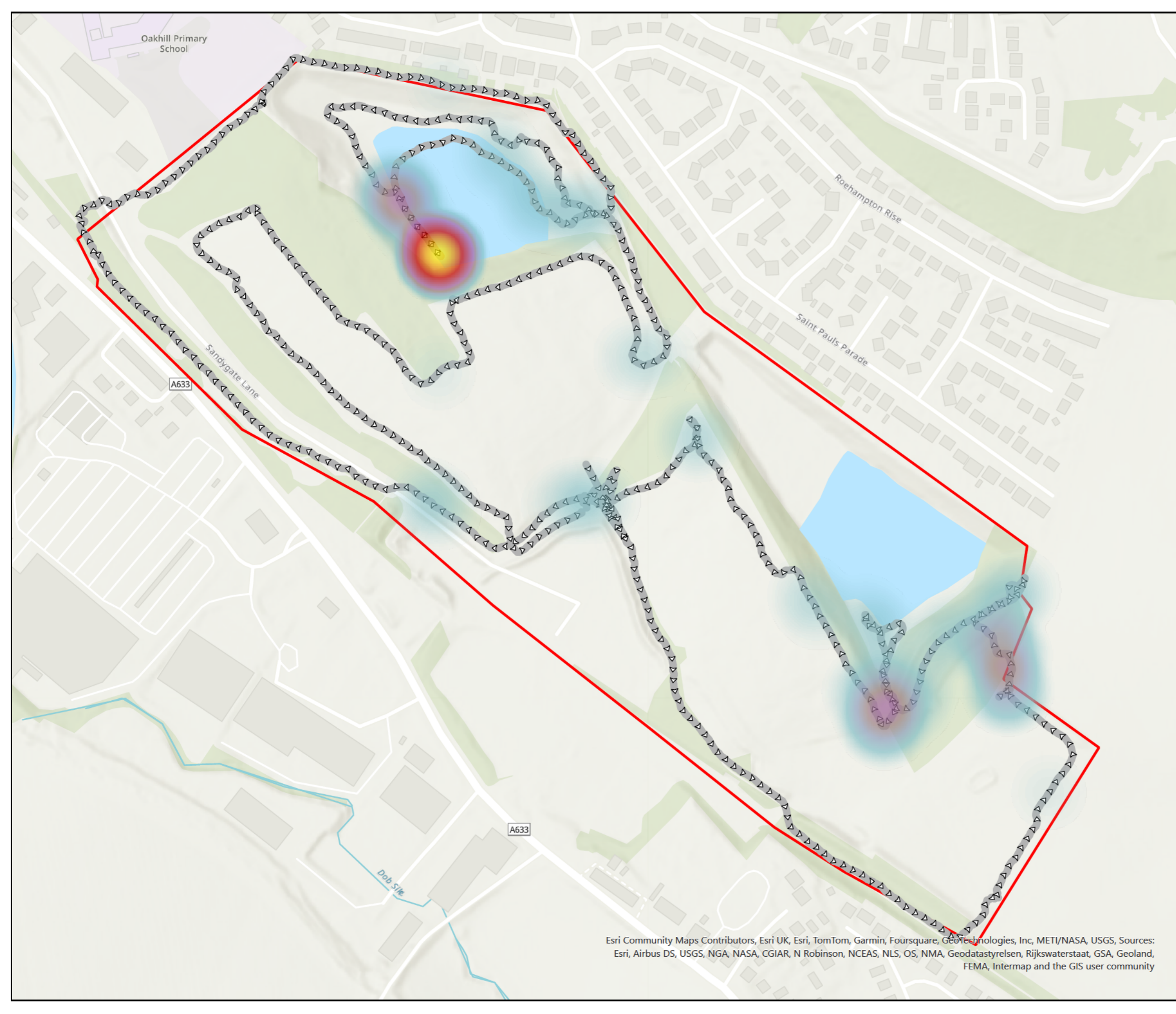
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Project: UG1773	Scale @ A3: 1:5000	Date: 20/12/2023
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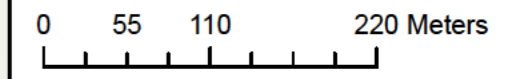
-  Route
-  Survey Area

Bat Activity



Species Recorded:

- Nyctalus* sp.
- Noctule
- Myotis* sp.
- Common pipistrelle
- Soprano pipistrelle



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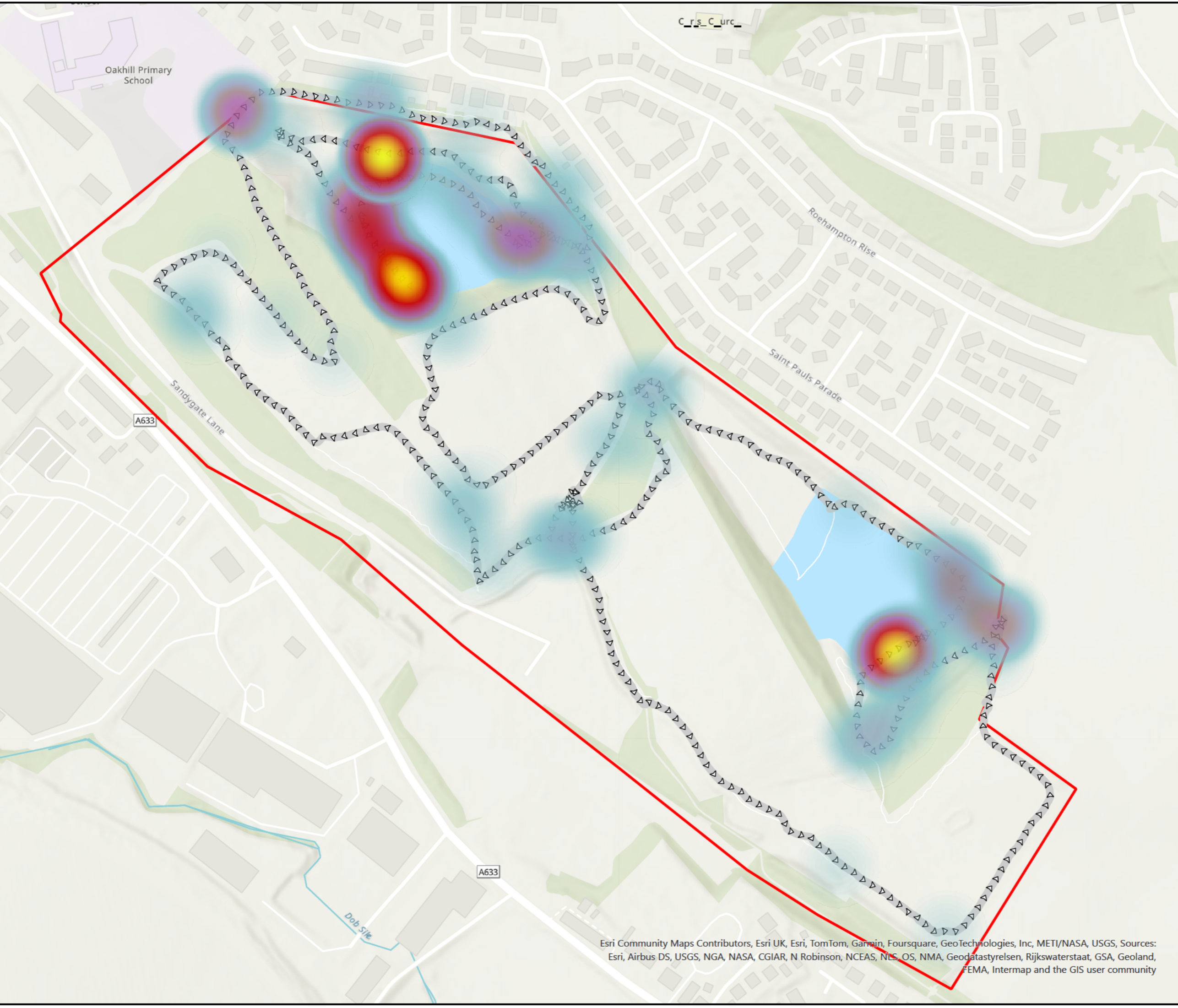
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 June 2023**

Issue:
01

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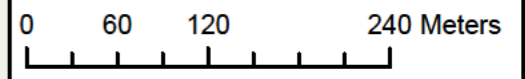
Legend

- ▶▶▶ Route
- Survey Area

Bat Activity

- █ Sparse
- █ Dense

Species recorded:
 Common pipistrelle
 Noctule
Nyctalus sp.
Myotis sp.
 Soprano pipistrelle



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**Bat Transect Map
 July 2023**

Issue:
01

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Project: UG1773	Scale @ A3: 1:5000	Date: 20/12/2023
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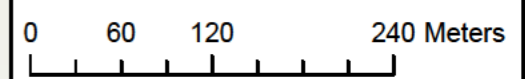
- ▶▶▶ Route
- Survey Area

Bat Activity



Species Recorded:

- Myotis* sp.
- Noctule
- Nyctalus* sp.
- Common pipistrelle
- Soprano pipistrelle
- Leisler's



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**Bat Transect Map
August 2023**

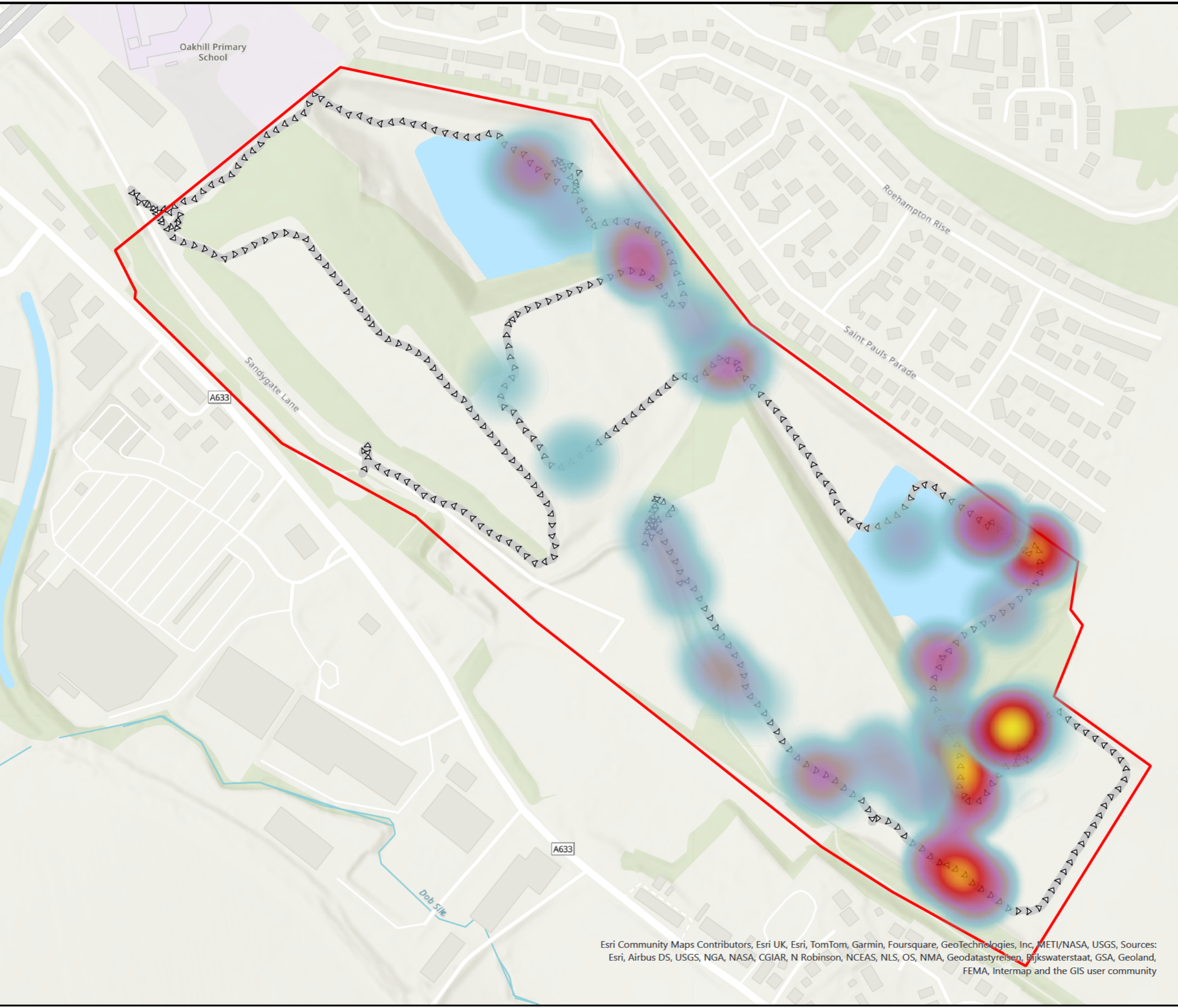
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Oakhill Primary School

A633

Sandygate Lane

Roehampton Rise

Saint Pauls Parade

A633

Dob Site

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Legend

- Survey Area
 - ▶▶ Route
- Bat Activity**
- Sparse
 - Dense



Species Recorded:

- Myotis* sp.
- Common pipistrelle
- Soprano pipistrelle
- Brown long-eared
- Nyctalus* sp.



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**Bat Transect Map
September 2023**

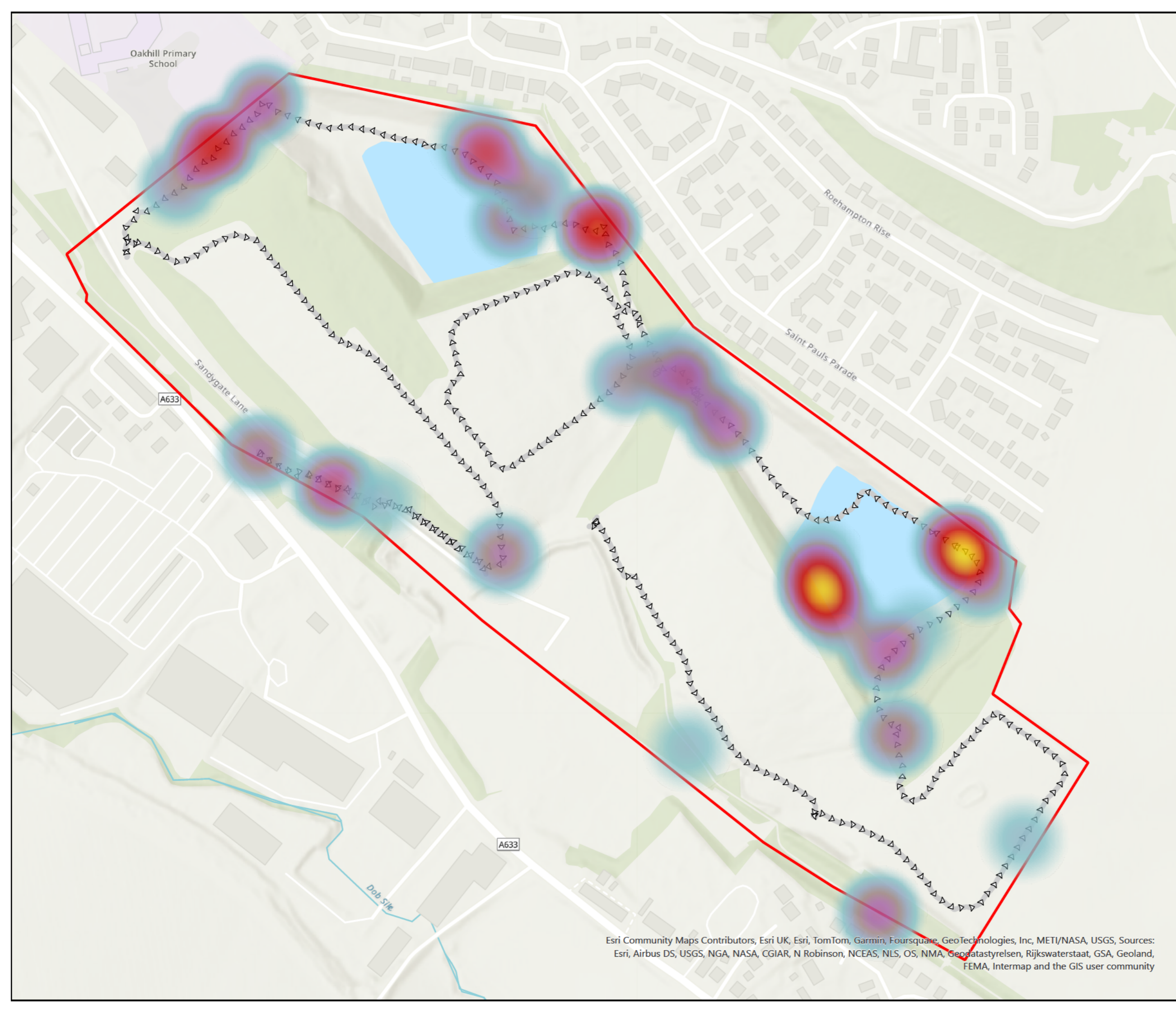
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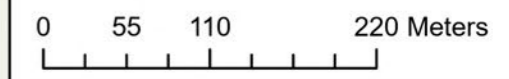
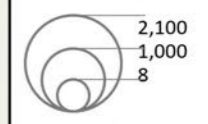
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Legend



-  Survey Area
- Statics**
- 
-  Common pipistrelle
-  Noctule
-  Soprano pipistrelle
-  *Nyctalus sp.*
-  *Myotis sp.*
-  Leisler's
-  Brown long-eared
-  Unidentified pipistrelle

Total



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Client:
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Project:
Stairfoot Quarry

Title:
**Static Bat Maps
 May - September 2023**

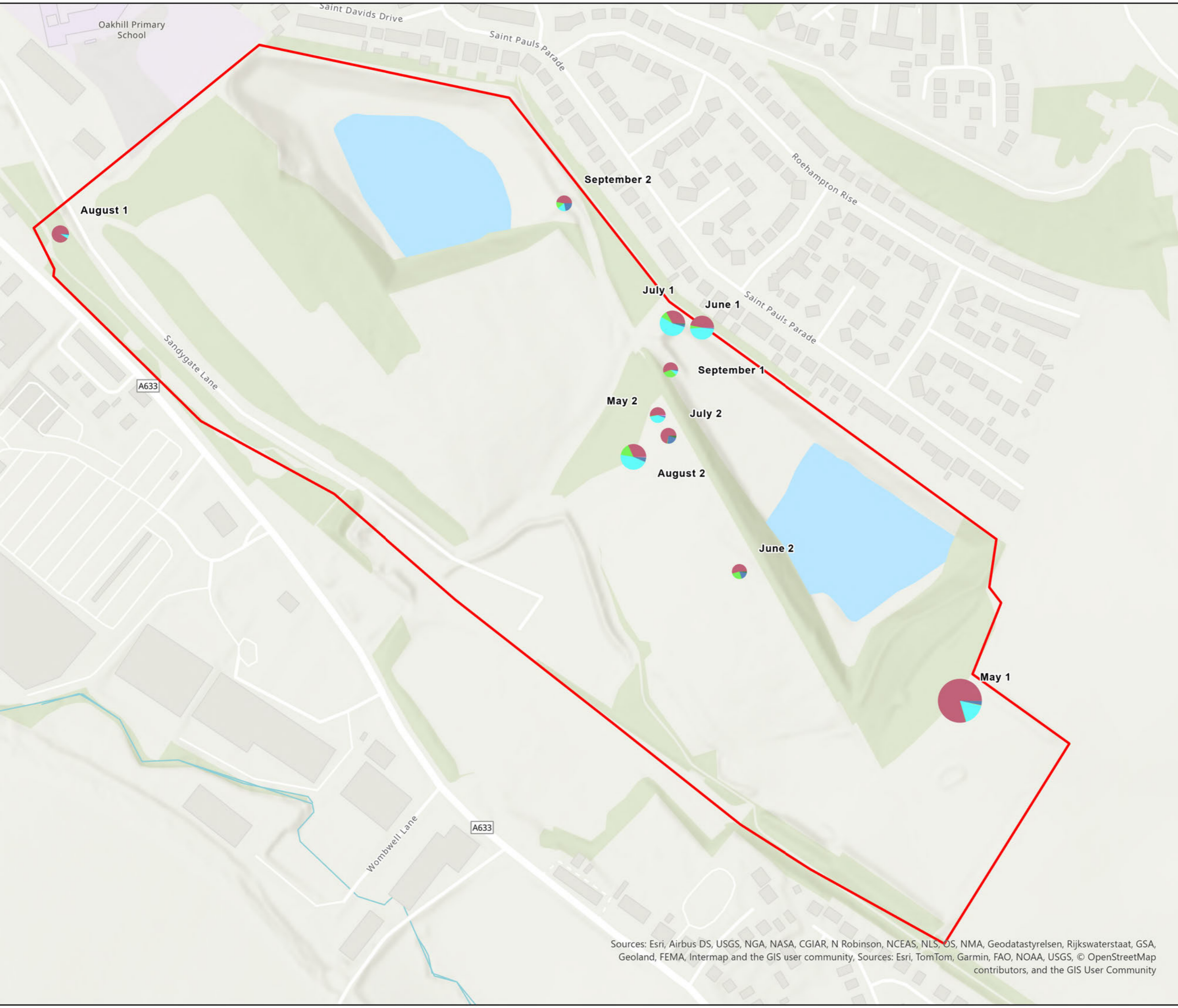
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2 Introduction

2.1 Scope

- 2.1.1.1 Urban Green has been instructed by Green Earth Developments (Group) Ltd to undertake further Nocturnal Bat Surveys following recommendations outlined within a Preliminary Ecological Appraisal (PEA) and Preliminary Roost Assessment (PRA), undertaken at the site by Urban Green in April 2023 at Stairfoot Quarry and produce our findings in a report.
- 2.1.1.2 The proposals include the restoration of Yew Tree Quarry, through the infill of non-hazardous excavated soil materials. It is understood that the operation phase of the development will last for approximately 111 weeks and will require the following activities:
- Vegetation removal, including areas of woodland,
 - Breaking of ground,
 - Use of heavy machinery, including ~80 HGV tippers per day,
 - Infill of the quarry, and other associated activities
- 2.1.1.3 Following the site's operational phase, it is understood that the quarry is to be capped, and an ecological restoration scheme is to be completed.

2.2 Site Context

- 2.2.1.1 The site is located at National Grid Reference SE 38138 05192 and comprises a total area of 4.3ha (see Figure 1), however the Survey Area includes all land within the client's ownership comprising 29.1 ha (see Figure 1).
- 2.2.1.2 The site is located in the rural-urban fringe of Barnsley, approximately 3km south-east of the town centre. The site is bound by residential properties to the north, arable land to the east, with industrial and commercial units to the south and west. Doncaster Road (A635) is present approximately 270m north of the site, with Wombwell Lane (A633) present immediately adjacent to the southwestern extent of the site. The wider landscape is dominated by urban development to the north and west while large expanses of open arable land are present to the east and south, including areas of woodland to the south. The River Dearne is located approximately 1.2km north of the site.

2.3 Purpose of this Report

- 2.3.1.1 This report has been produced to demonstrate the results of nocturnal bat surveys which were completed at the site. The surveys were conducted to confirm likely absence or presence of roosting bats. Appropriate mitigation and suitable roost replacement (compensation) are detailed (if required). The report has been produced in support of the proposed planning application.
- 2.3.1.2 Relevant UK legislation of the protection of all UK bats are detailed in Appendix 1.

3 Previous Surveys

3.1 Preliminary Ecological Appraisal and Preliminary Roost Assessment (Urban Green, 2023)

3.1.1.1 A PEA and PRA were completed within the Survey Area by Urban Green in April 2023. One building and two trees on site were assessed as having bat roosting potential.

Table 1. PRA Summary

Building Reference	Description and evidence	Category of Suitability
Building 1 (B1)	B1 had an area of breezeblock damaged and some blocks missing, exposing the brick wall behind.	Low
Tree 1 (T1)	Multiple cavities present on varying upper limbs of the tree which may provide suitable bat roosting potential.	Moderate
Tree 2 (T2)	Cavities present on multiple aspects of the stem of the tree	High

3.1.1.2 Surveys were recommended to be undertaken on B1, T1 and T2 in the form of nocturnal emergence/re-entry surveys on B1 and aerial tree inspections on T1 and T2; however, after further inspection of the plans for the site, these buildings and trees were not expected to be impacted significantly by development, and no further surveys were required.

3.1.1.3 Instead, bat activity surveys were recommended as the site was assessed as having **high** suitability for foraging and commuting bats, as the range of habitats on site were anticipated to attract invertebrate prey, such as woodland, scrub, and waterbodies, and an array of linear features, including hedgerows, lines of trees, and woodland edges. These habitats provide important foraging and commuting corridors which bats are known to utilise and connect the site to the wider landscape, particularly to the east.

4 Methods

4.1 Desk Study

4.1.1.1 Sources of information used in the desk study are presented in Table 2.

Table 2. Desk Study Sources of Information

Source	Date Consulted	Information Sought
Online aerial imagery	06/02/2025	Review of satellite imagery.
MAGIC website (www.magic.gov.uk)	06/02/2025	Locations of granted EPSL within 5km of the site.
Sheffield Biological Records Centre	24/03/2023	Records of bats within 1km of the site boundary.

4.2 Transect Surveys

- 4.2.1.1 Nine transect surveys were undertaken following guidance set out in Collins (2023), spanning from May to September 2023 (inclusive), with at least one survey completed each month. All surveys were conducted by two suitably qualified ecologists. The survey effort involved two surveyors walking a predetermined transect route, recording observations of bats, such as number of passes, peak count, species, and behaviour (e.g. commuting or foraging) using an Anabat Scout bat detector, which also recorded activity for further analysis. The routes also included Listening Points (LP), which involved stopping for a minimum of 5 minutes to record data at a specific point within the transect route.
- 4.2.1.2 The predetermined route ensured coverage of all habitat types and features along the viaduct, and the direction of the route was reversed on each occasion.
- 4.2.1.3 Summary of the survey details are provided in Table 3. Figures 2-6 provide a plan illustrating the transect route for the surveys conducted in each month. Surveyor results are available upon request.

Table 3. Transect survey details

Survey	Date	Start (Sunset) - End	Surveyors	Weather conditions at sunset
Survey 1 (May)	17/05/2023	21:01 – 22:54	Toby Mills Max Grindle	Temp: 14°C Cloud cover: 8/8 oktas Wind: 1 Beaufort Precipitation (Ppt): None
Survey 2 (June)	01/06/2023	21:23 – 23:12	Max Grindle Adam Ousby	Temp: 12°C Cloud cover: 8/8 oktas Wind: 4 Beaufort Precipitation (Ppt): None
Survey 3 (June)	12/06/2023	21:35 – 23:35	Max Grindle Adam Ousby	Temp: 22°C Cloud cover: 2/8 oktas Wind: 1 Beaufort Precipitation (Ppt): None
Survey 4 (June)	21/06/2023	21:38 – 23:37	Jake Healy Toby Mills	Temp: 19°C Cloud cover: 4/8 oktas Wind: 1 Beaufort Precipitation (Ppt): None
Survey 5 (July)	17/07/2023	21:25 – 23:30	Toby Mills Emily Grimwood	Temp: 15°C Cloud cover: 3/8 oktas Wind: 1 Beaufort Precipitation (Ppt): None
Survey 6 (August)	03/08/2023	21:00 – 23:20	Max Grindle Nathan Morton	Temp: 13°C Cloud cover: 8/8 oktas Wind: 1 Beaufort Precipitation (Ppt): Light rain showers during survey
Survey 7 (August)	21/08/2023	20:22 – 22:03	Barney Gardner Emily Grimwood	Temp: 20°C Cloud cover: 8/8 oktas Wind: 3 Beaufort Precipitation (Ppt): Rainfall from 21:20 onwards
Survey 8 (September)	04/09/2023	19:49 – 21:41	Toby Mills Adam Ousby	Temp: 23°C Cloud cover: 0/8 oktas Wind: 1 Beaufort Precipitation (Ppt): None
Survey 9 (September)	20/09/2023	19:10 – 21:00	Barney Gardner Adam Ousby	Temp: 15°C Cloud cover: 2/8 oktas Wind: 1 Beaufort Precipitation (Ppt): None

4.3 Static Deployment Surveys

- 4.3.1.1 Three static detectors were originally deployed during the first transect in May, however, one detector was missing during retrieval. Following this, two Anabat static detectors were deployed at the site for a maximum of five days across five deployment periods from May to September. Statics were placed in different positions each time, with the exception of June and July.
- 4.3.1.2 Dates of deployment and associated weather conditions are detailed within Table 4.

Table 4. Static deployment details

Deployment	Date	Sunset/sunrise time	Temperature		Precipitation
Deployment 1 (May)	17/05/2023	21:02 – 05:00	Hi: 15°C	Lo: 9°C	None
	18/05/2023	21:04 – 04:59	Hi: 15°C	Lo: 9°C	None
	19/05/2023	21:06 – 04:57	Hi: 14°C	Lo: 7°C	None
	20/05/2023	21:07 – 04:56	Hi: 16°C	Lo: 8°C	None
	21/05/2023	21:09 – 04:55	Hi: 18°C	Lo: 7°C	None
Deployment 2 (June)	21/06/2023	21:38 – 04:36	Hi: 21°C	Lo: 13°C	None
	22/06/2023	21:39 – 04:36	Hi: 23°C	Lo: 13°C	None
	23/06/2023	21:39 – 04:36	Hi: 19°C	Lo: 17°C	Some rainfall
	24/06/2023	21:39 – 04:37	Hi: 25°C	Lo: 17°C	None
	25/06/2023	21:39 – 04:37	Hi: 17°C	Lo: 12°C	None
Deployment 3 (July)	13/07/2023	21:29 – 04:53	Hi: 18°C	Lo: 11°C	None
	14/07/2023	21:28 – 04:55	Hi: 15°C	Lo: 13°C	Some rainfall
	15/07/2023	21:27 – 04:56	Hi: 16°C	Lo: 13°C	Light rainfall
	16/07/2023	21:26 – 04:57	Hi: 16°C	Lo: 12°C	None
	17/07/2023	21:25 – 04:59	Hi: 17°C	Lo: 11°C	None
Deployment 4 (August)	03/08/2023	20:58 – 05:25	Hi: 19°C	Lo: 13°C	Some rainfall
	04/08/2023	20:56 – 05:27	Hi: 17°C	Lo: 10°C	None
	05/08/2023	20:55 – 05:28	Hi: 12°C	Lo: 9°C	Light rainfall
	06/08/2023	20:53 – 05:30	Hi: 15°C	Lo: 11°C	None
	07/08/2023	20:51 – 05:32	Hi: 15°C	Lo: 11°C	None
Deployment 5 (September)	04/09/2023	19:49 – 06:21	Hi: 25°C	Lo: 14°C	None
	05/09/2023	19:46 – 06:22	Hi: 21°C	Lo: 14°C	None
	06/09/2023	19:44 – 06:24	Hi: 25°C	Lo: 16°C	None
	07/09/2023	19:41 – 06:26	Hi: 25°C	Lo: 14°C	None
	08/09/2023	19:39 – 06:28	Hi: 25°C	Lo: 19°C	None

4.4 Constraints to the Survey

- 4.4.1.1 The missing static from the first detector survey forced us to re-evaluate our approach, which meant changing to deploying two statics per month. This would have been a constraint to the survey, however, a large amount of records were returned through two static deployments throughout the survey suite.
- 4.4.1.2 Due to human error, nine transect surveys were completed rather than the ten recommended within the best practice guidelines. However, as 90% of the surveys were completed and a good volume data was collected, this is not expected to be a significant constraint.
- 4.4.1.3 During Activity Survey 6, extensive rainfall during the start of the survey required the survey to be delayed by approximately 1 hour to allow the rainfall to pass before beginning the survey. Additionally, Activity Survey 7 was ended prematurely, following rainfall that reduced bat activity and caused a malfunction in the bat detector.
- 4.4.1.4 Two transect surveys were planned to be completed throughout July; however, constraints regarding poor weather conditions forced one of the surveys to be delayed. Other factors, including time constraints, meant that the survey was delayed indefinitely, and eventually could not get completed. This should not have caused significant constraints to Transect survey results, although it may have fortified the result outcome.
- 4.4.1.5 *Myotis* species *alcaethoe* (*Myotis alcaethoe*), Brandt's (*Myotis brandtii*), Daubenton's (*Myotis daubentonii*) and whiskered (*Myotis mystacinus*) bat are often difficult to distinguish between by handheld detectors and sound analysis. As such, the species have been recorded as *Myotis* sp. throughout the report.
- 4.4.1.6 Both *Nyctalus* species native to the UK, noctule (*Nyctalus noctula*) and leisler's (*Nyctalus leisleri*), were identified through analysis on site. It was difficult, on occasion, to distinguish between these calls. As such, the species is sometimes referred to as *Nyctalus* sp. throughout the report.

4.5 Lifespan of Reports

- 4.5.1.1 In accordance with the BCT guidance (Collins, 2023), the details of this report will remain valid for a period of **18 months** (i.e. until 8th March 2025). After this date, this assessment should be reviewed to determine whether any update surveys are required.

5 Results

5.1 Desk Study

5.1.1 Data Records

- 5.1.1.1 Twenty-two records of bats were returned during the data search, including records of pipistrelle species (*Pipistrellus* sp.), unidentified *Myotis* sp., common pipistrelle, soprano pipistrelle and noctule. Four records related to roosts, whilst the remaining eighteen records concerned field observations. All records were located within 1km of the site, with the most recent dated to 2016.
- 5.1.1.2 All species of bat are listed as European Protected Species (EPS) through the Conservation of Habitats and Species Regulations (2017) and are furthermore listed on the Wildlife and Countryside Act 1981. Common pipistrelle, soprano pipistrelle and noctule are also listed on the Barnsley LBAP, whilst soprano pipistrelle and noctule are further listed on Section 41 of the Natural Environment and Rural Communities Act 2006.

5.1.2 Granted EPSLs within 5km

- 5.1.2.1 MAGIC detailed the presence of two granted EPSL within 1km of the site. Both licences (Ref: 2016-26581-EPS-MIT-1 and 2016-26581-EPS-MIT) were located approximately 200m north of the site and concerned soprano pipistrelle (*Pipistrellus pygmaeus*). Both licences allowed the impact and destruction of a breeding site in 2016 and between 2017 and 2021, respectively.
- 5.1.2.2 A further three more granted ESPL are located within 5km of the site (Ref: EPSM2009-532, 201-41299-EPS-MIT and EPSM2013-6477), all of which were granted for the destruction of a known resting place for common pipistrelle (*Pipistrellus pipistrellus*).

5.2 Nocturnal Bat Activity Surveys

5.2.1 Activity Survey 1 – 17/05/2023

- 5.2.1.1 Starting at 21:03, the first activity was recorded at 21:13, approximately 10 minutes after sunset, attributed to a *Nyctalus* pass. Bat activity was relatively steady throughout LP1 and 2, along the southern border, with foraging and commuting common and soprano pipistrelle calls dominant as well as one noctule, one *Nyctalus* and several *Myotis* calls.
- 5.2.1.2 Bat activity became less frequent between 21:36 and 22:15, before a hotspot of activity between LP6 and 8, with a peak count of 16 calls during LP7, recorded above the western quarry, attributed mostly to *Myotis*, common pipistrelle and soprano pipistrelle calls. This activity was mostly attributed to foraging and was recorded around the westernmost pond on site, from this point until the end of the activity survey.
- 5.2.1.3 Common pipistrelle comprised the majority of activity, equalling 60% of all calls recorded, followed by soprano pipistrelle (24%) and *myotis* (12%). Soprano pipistrelle calls were more sporadic throughout the survey whilst common pipistrelle were constant. 156 calls were recorded in total, with an average of 1.4 calls per second.

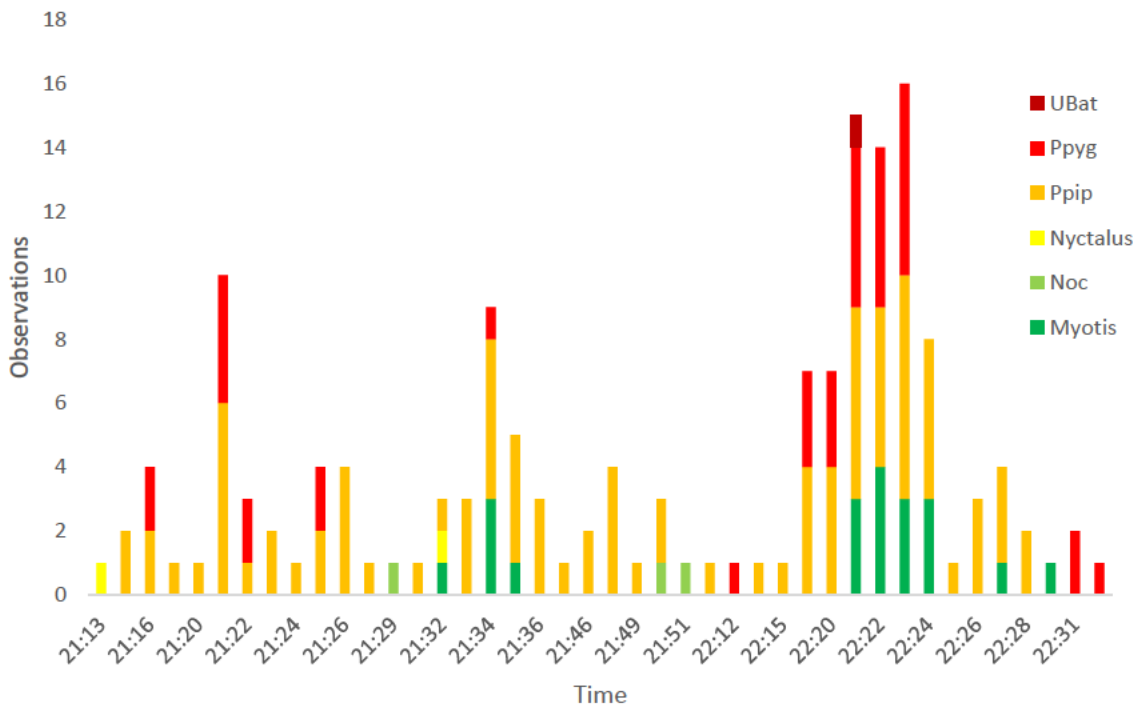


Figure 8. Observations per minute by species during Activity Survey 1

5.2.2 Activity Survey 2 – 01/06/2023

- 5.2.2.1 Activity recorded during survey 2 was similar to that recorded during survey 1. The first pass, attributed to common pipistrelle, was recorded during LP2, and further records of common and soprano pipistrelle were identified throughout the next few Listening Points. Activity during this period was mostly attributed to foraging, and activity levels were moderate to low, with an average of 1.1 calls per minute between LP2 and LP6, and a peak count of 7 calls.
- 5.2.2.2 Bat activity spiked during LP7, attributed to extensive foraging by common and soprano pipistrelle, along with the first presence of Myotis during the survey. High levels of activity were recorded between LP7 and LP8, around the easternmost pond, with an average of 7.6 calls per minute during this period and a peak count of 10 calls per minute. Following this, activity became much less frequent until the final call of the survey, identified as a soprano pipistrelle at 23:06.
- 5.2.2.3 Activity during this survey was predominantly attributed to common pipistrelle (72%), with soprano pipistrelle (18%) and Myotis (10%) comprising the remainder of calls. A total of 166 calls were recorded during the survey; similar to the number of calls recorded during survey 1.

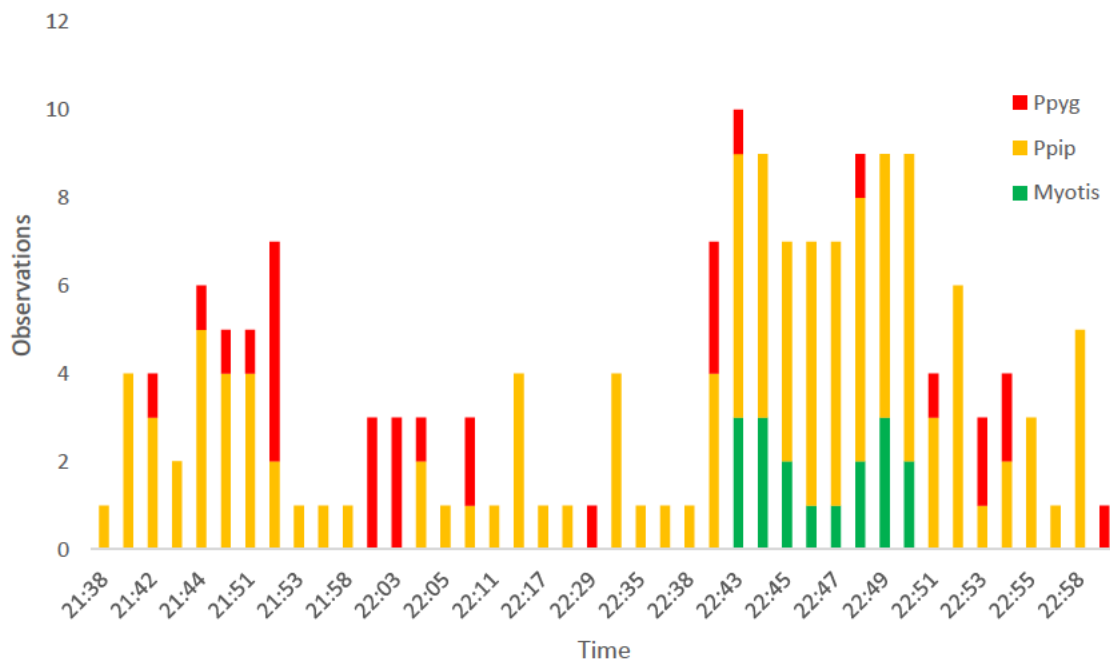


Figure 9. Observations per minute by species during Activity Survey 2

5.2.3 Activity Survey 3 – 12/06/2023

- 5.2.3.1 Activity Survey 3 provided similar amounts of calls compared to the first two surveys but featured a markedly different species composition. The first activity recorded on site was attributed to *Nyctalus* sp., with several *Nyctalus* calls recorded throughout the beginning of the survey, along with noctule, myotis and common pipistrelle.
- 5.2.3.2 Activity was highest during LP2 and LP3, with the majority of calls attributed to noctule. An average of 1.7 calls per minute were recorded, with a peak count of 8 calls per minute. This activity was located around the northern border of the westernmost pond.
- 5.2.3.3 Soprano pipistrelle were recorded foraging before a drop in activity through LP4 to LP6, through the centre of the site- a total of 8 calls recorded between 22:23 and 23:01. Activity levels fluctuated through the final section of the survey, with 16 calls recorded during LP7, followed by no calls recorded during Lp8 or LP9. The final recorded activity occurred at 23:21, approximately 15 minutes before the end, attributed to a soprano pipistrelle call.
- 5.2.3.4 Unlike the previous surveys, the majority of calls during this survey were attributed to noctule and *Nyctalus* calls, comprising over half of all calls recorded (52% and 13%, respectively). Common pipistrelle (17%) and soprano pipistrelle (15%) were less prevalent than usual, and Myotis (3%) featured rarely. A total of 90 calls were recorded during the survey; less than previous surveys.

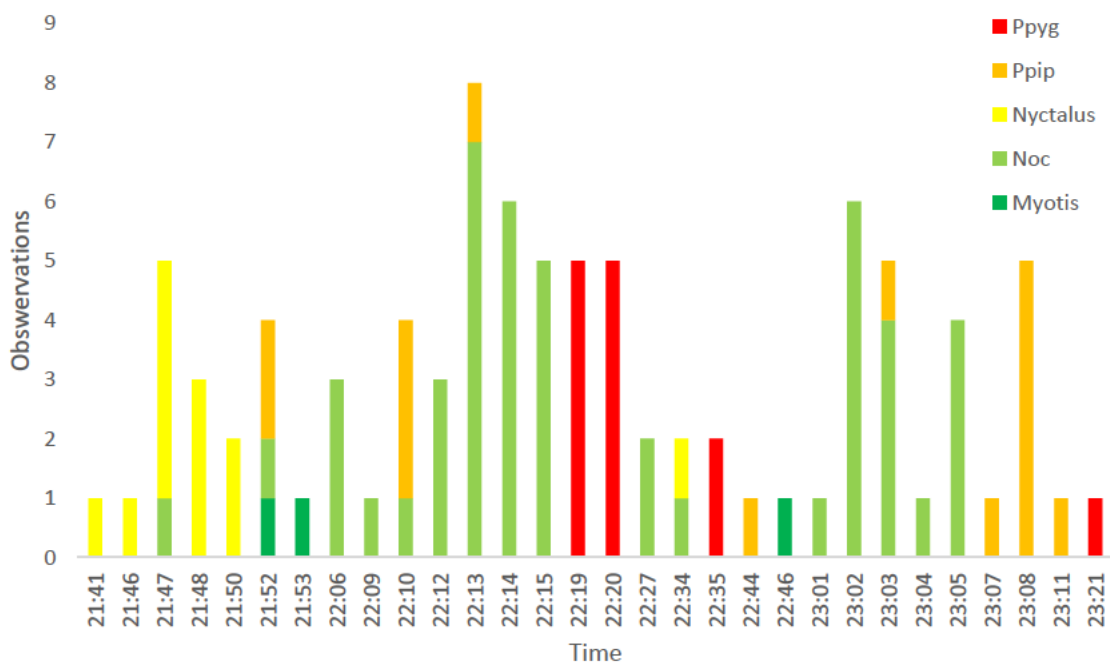


Figure 10. Observations per minute by species during Activity Survey 3

5.2.4 Activity Survey 4 – 21/06/2023

- 5.2.4.1 Levels of activity were high during Activity Survey 4. The first recorded activity on site was attributed to noctule foraging at 21:50, with this being one of two times noctule were identified; the other recorded in between LP7 and LP8, at 23:15. All other activity recorded was attributed to common and soprano pipistrelle.
- 5.2.4.2 Activity was consistent between LP2 and LP4, through the corridor that runs through the middle of the site, with activity recorded between and at each point. Activity was at its highest during the survey at LP2, with 26 calls recorded, as well as 14 calls recorded during LP4. Activity was semi-frequent during this period.
- 5.2.4.3 Constant calling occurred between 21:57-22:05, with an average of 4.25 and a peak of 7 per minute, and 22:19-22:33, with an average of 5.14 and a peak of 8 per minute. After LP4, activity became much less consistent, with fewer calls per minute. No activity was recorded during LP5, and only 1-4 calls were recorded during LP6-9.
- 5.2.4.4 A total of 136 calls were recorded during the survey: the majority were attributed to common pipistrelle (68%), soprano pipistrelle were abundant (27%) and rare occurrences of noctule (4%).

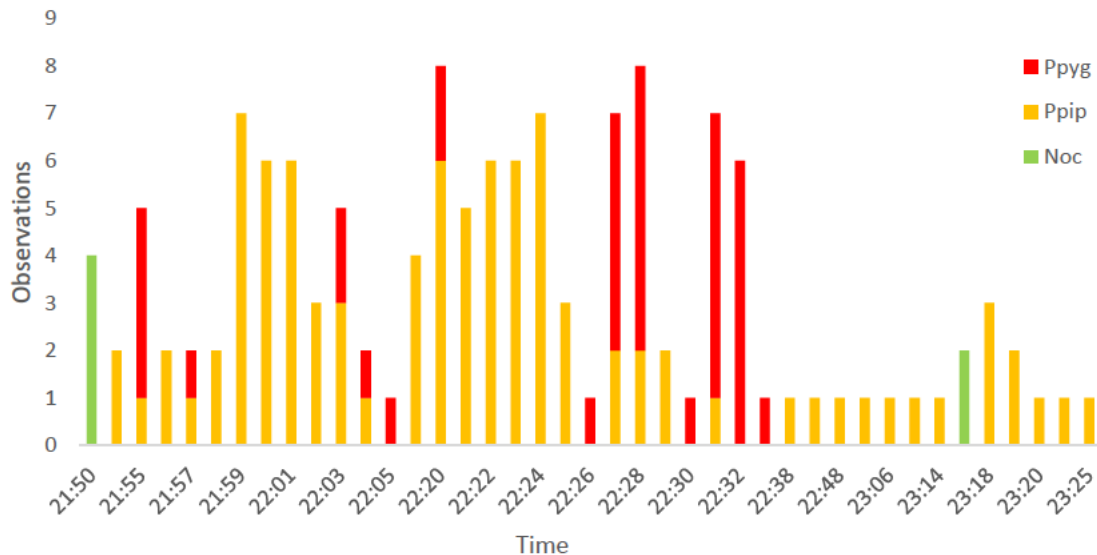


Figure 11. Observations per minute by species during Activity Survey 4

5.2.5 Activity Survey 5 – 17/07/2023

- 5.2.5.1 The first activity recorded during the survey was attributed to a common pipistrelle pass at 21:35, identified during LP2. Following this, noctule commuting activity was observed, with no activity observed at LP3. Activity was inconsistent during the start of the survey, 10-minute intervals in between call records until 22:00 at LP4.
- 5.2.5.2 Activity from LP4 onwards became more consistent, and levels of activity rose, with a peak of 7 calls recorded per minute within LP5. Much of the activity recorded between LP4 and LP6, to the north of the westernmost pond, is attributed to foraging by multiple different species, including common pipistrelle, soprano pipistrelle and Myotis.
- 5.2.5.3 Activity was most concentrated around LP8, located to the east of the eastern woodland on site, with an average of 2.6 bat calls per minute. Following this, bat activity became less frequent, with the final call being recorded at 23:30, attributed to a common pipistrelle pass.
- 5.2.5.4 A total of 103 bat calls were recorded, for an average of 0.8 calls per minute overall. Common pipistrelle attributed to the majority of calls (73%), with occasional Myotis (12%) and soprano pipistrelle (7%) and Nyctalus (8%).

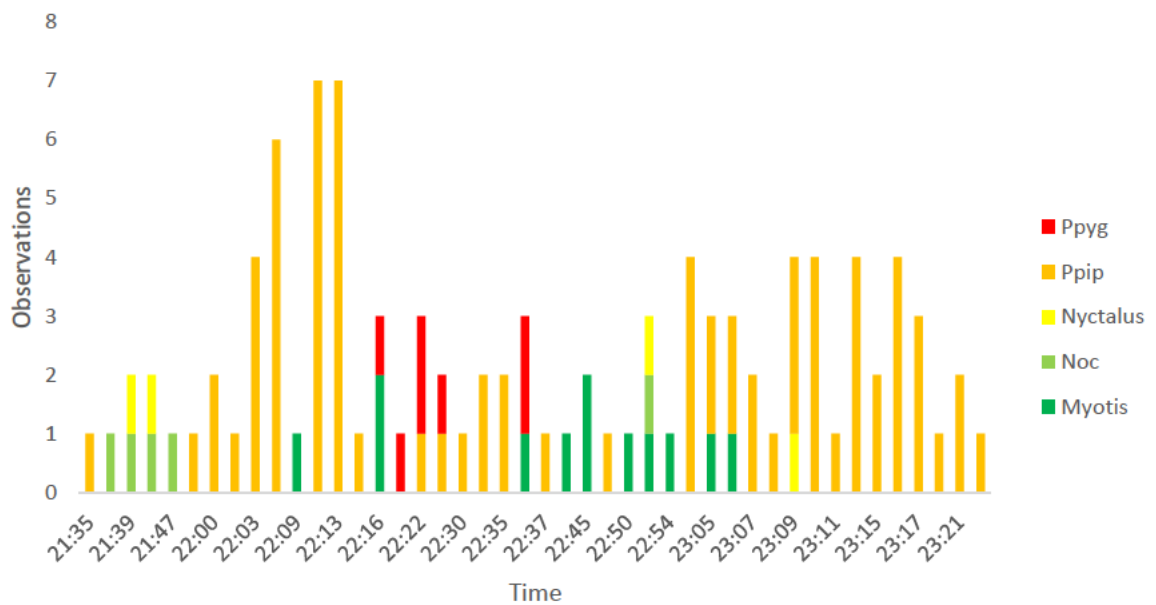


Figure 12. Observations per minute by species during Activity Survey 5

5.2.6 Activity Survey 6 – 03/08/2023

- 5.2.6.1 Activity was overall lower compared to previous surveys, likely due to interruptions from rain showers during the survey. The first activity was recorded after a break in the survey to allow the rain to pass, at 22:06, attributed to a common pipistrelle pass.
- 5.2.6.2 Activity was low but varied throughout the first half of the survey. An average of 0.7 calls per minute were recorded through LP2 to LP4, around the western pond and accompanying field to the east, with a peak count of 3 calls per minute, recorded during LP3. Common pipistrelle, soprano pipistrelle and noctule were all identified during this period. Activity increased slightly after LP5, with 5 noctule passes recorded during 22:41.
- 5.2.6.3 Activity was busiest between LP6 and LP7, located to the east of the eastern pond and within the surrounding woodland, with a survey-high peak of 7 calls, attributed to soprano pipistrelle and Myotis foraging. Little activity was recorded at any other listening point during the survey, but commuting behaviour for common pipistrelle was identified in between each point. One record of Leisler’s bat was identified near the end of the survey, and the final activity was attributed to commuting common pipistrelle, at 23:20.
- 5.2.6.4 Only 53 calls were recorded during the survey, giving an average of 0.51 calls per minute over the survey. The majority of calls were attributed to common pipistrelle (47%), followed by occasional soprano pipistrelle (25%), Myotis and noctule (both 13%), followed by a single Leisler’s call (2%).

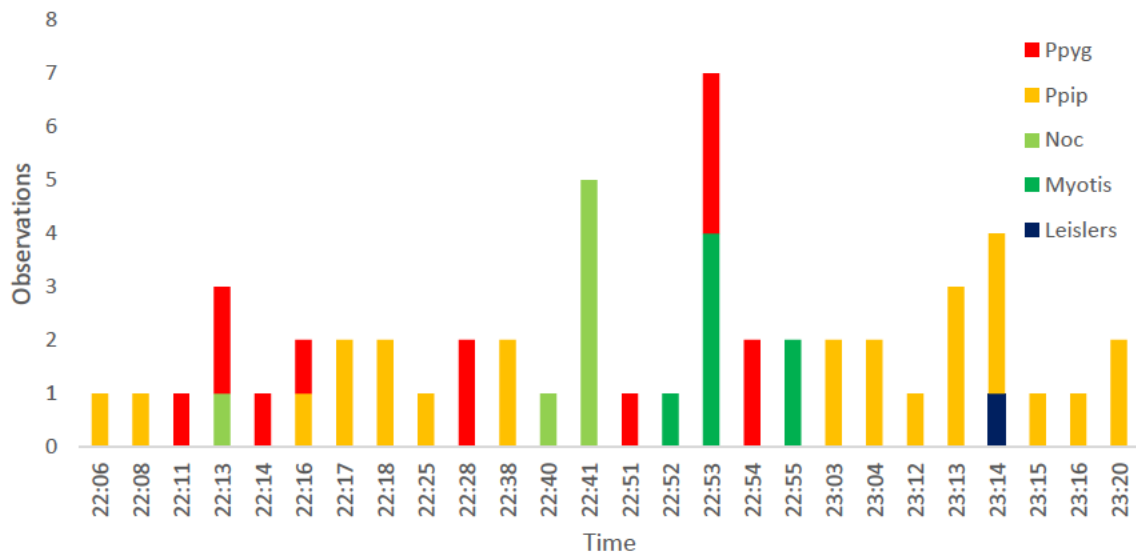


Figure 13. Observations per minute by species during Activity Survey 6

5.2.7 Activity Survey 7 – 21/08/2023

- 5.2.7.1 Like survey 6, activity was also considerably lower during Activity Survey 7. The first activity recorded was attributed to *Nyctalus* commuting, following the several more instances of *Nyctalus* and soprano pipistrelle activity before LP2 at 20:44. Soprano pipistrelle activity was dominant from LP2 for ten minutes, with a peak count of 3 soprano pipistrelle calls during LP3.
- 5.2.7.2 After 21:00, activity became scarcer. The first recorded activity of *Myotis* species were identified at 21:07, but despite this, only an average of 0.5 calls per minute between 21:00 and the final recorded call, a common pipistrelle pass, at 21:12. During this survey, rainfall began after 21:12, which limited the ability to record bat calls, as well as activity in general. Subsequently, the survey was ended prematurely at 22:03, after not being able to record any activity for 51 minutes.
- 5.2.7.3 A total of 42 calls were recorded during the survey, for an average of 1 call per minute between 20:30 and 21:12. The majority of calls were attributed to soprano pipistrelle (52%), with occasional common pipistrelle and *Nyctalus* (both 17%), and rare occurrences of *Myotis* and noctule (both 7%).

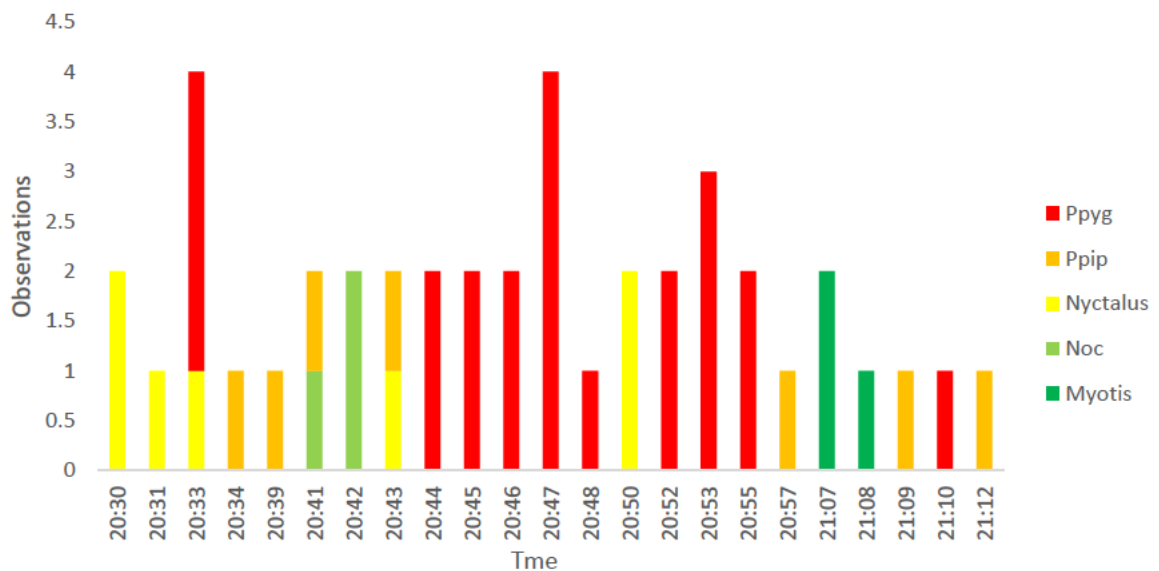


Figure 14. Observations per minute by species during Activity Survey 7

5.2.8 Activity Survey 8 – 05/09/2023

- 5.2.8.1 Activity was lower than average during Activity Survey 8, similar to the previous two. No activity was identified during LP1, and the first activity, attributed to a noctule pass, was recorded at 19:58, and was the only activity until 20:13. Common pipistrelle activity was dominant throughout the survey, and activity overall was sporadic.
- 5.2.8.2 Species assemblage was diverse throughout the survey, with Myotis recorded throughout multiple points during the survey, as well as noctule and Nyctalus, and a rare occurrence of brown long-eared (*Plecotus auritus*). Activity was confined to small pockets of a few minutes every ten minutes or so, with several gaps within the survey with no activity.
- 5.2.8.3 The highest level of activity was recorded in between LP6 and LP7, located through the basin of the eastern pond, attributed to Myotis, noctule and common pipistrelle, with a survey-high peak count of 5 calls per minute and an average of 1.5 calls per minute between 20:57 and 21:11. Activity slowed down following this period, with an average of 0.25 calls per minute from 21:19 to 21:43. The final call recorded was attributed to a commuting Myotis call at 21:43, recorded during LP9, near the southernmost corner of the site.
- 5.2.8.4 Overall, a total of 54 calls were recorded during the survey. The majority of calls were attributed to common pipistrelle (61%), with frequent soprano pipistrelle (16%), occasional Myotis (9%), Nyctalus and noctule (both 6%), and one occurrence of brown long-eared (2%).

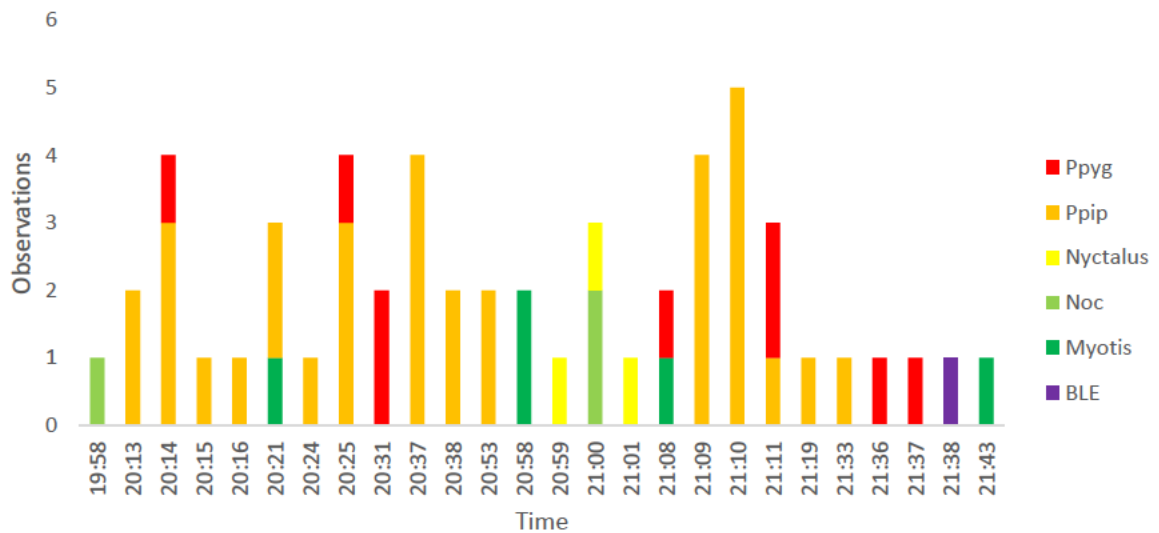


Figure 15. Observations per minute by species during Activity Survey 8

5.2.9 Activity Survey 9 – 20/09/2023

- 5.2.9.1 Activity during this survey was the lowest recorded out of all Activity Surveys completed on site during the season. Activity was very sporadic, with the first activity identified at 19:28, approximately 18 minutes after sunset, relating to foraging noctule calls. From this point onwards, there are large pauses in data between calls, and little activity recorded during LPs- the only point that recorded data was LP4, which identified soprano pipistrelle activity at 19:49.
- 5.2.9.2 Species assemblage is similar to what has previously been identified earlier within the report, including common pipistrelle, soprano pipistrelle, noctule, Myotis and brown long-eared. There were no specific periods with larger levels of activity, with the survey-high peak count of 3 calls per minute.
- 5.2.9.3 Myotis activity was largely confined to near the end of the survey, around the southernmost corner of the site, where activity was more concentrated- with 0.6 calls per minute recorded, attributed to Myotis, common and soprano pipistrelle, and noctule. The final recorded activity is attributed to two noctule calls, recorded at 21:05, at the end of the survey.
- 5.2.9.4 There were 24 calls recorded overall throughout the survey, with an average of 0.2 calls recorded per minute. No dominant species were recorded. Common pipistrelle (29%), noctule and Myotis (both 21%) were frequent, and there were occasional records of soprano pipistrelle (17%) and brown long-eared (12%).

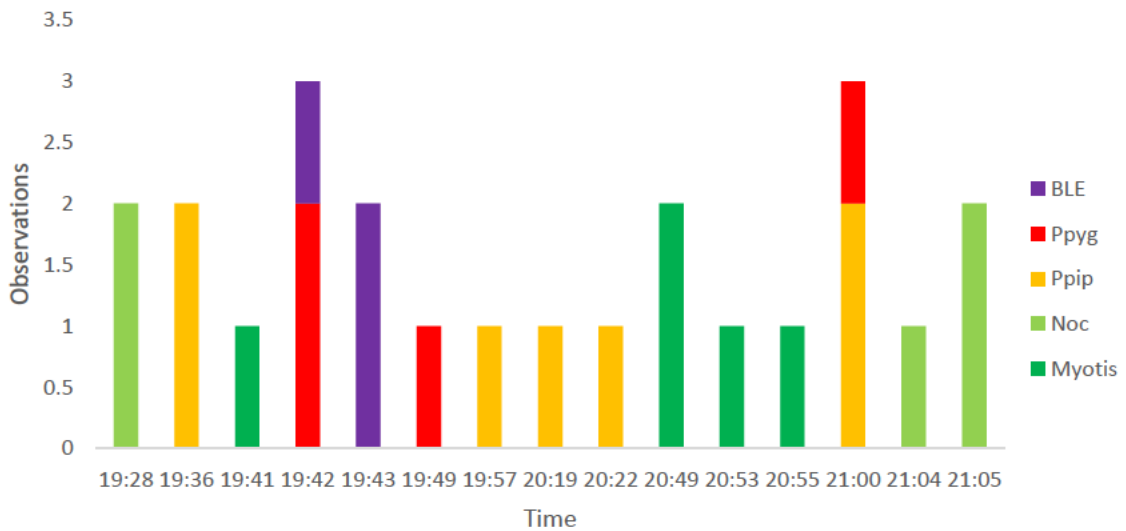


Figure 16. Observations per minute by species during Activity Survey 9

5.2.10 Activity Survey Summary

- 5.2.10.1 Throughout the suite of transect surveys, bat foraging and commuting activity was common throughout the duration of all surveys except for survey 7, which was interrupted by the weather. Common pipistrelle was the dominant species on most surveys, usually followed by soprano pipistrelle and noctule, although there were surveys which did not follow this trend, such as survey 3, which noctule were the most abundant, and survey 9, in which there was no clear dominant species. Nyctalus and Myotis were often found occasionally on site, and Leisler's and brown long-eared were often rare occurrences.
- 5.2.10.2 Bat activity was predominantly confined to around the ponds on site, especially foraging by noctule and pipistrelle. The centre of the site, including the corridor that dissects the site, was also of importance for bats, mostly common pipistrelle, as a foraging and commuting route.

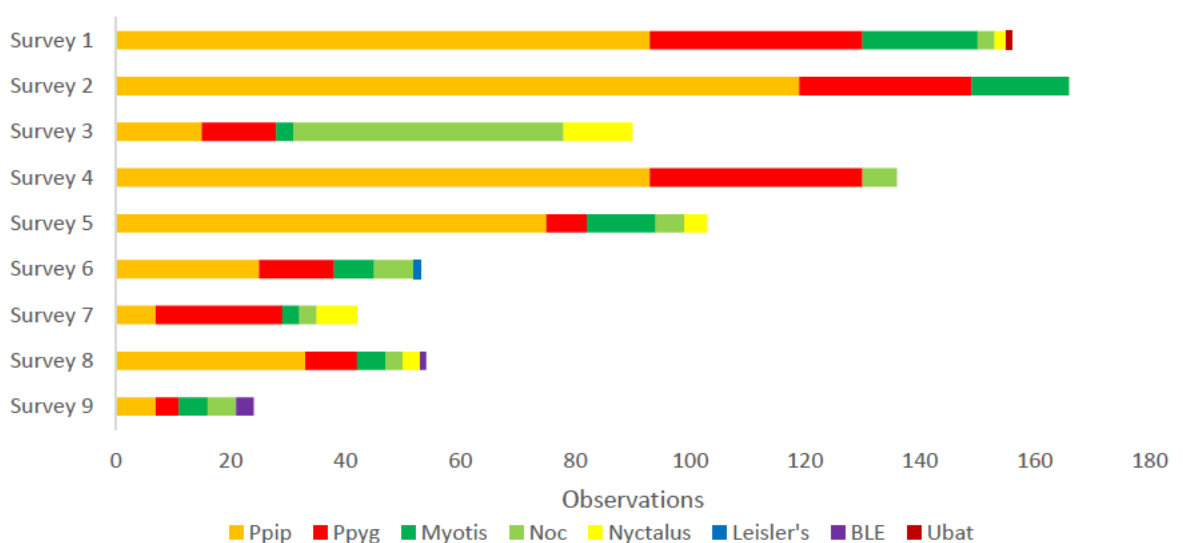


Figure 17. Graph of bat calls by species across all transect surveys

5.3 Static Detectors

5.3.1 May Deployment

- 5.3.1.1 High levels of bat activity were recorded during the five-day static recording period in May, relating to a wide range of species. Static 1 (S1) was deployed to the southeast of the eastern woodland, and Static 2 (S2) was deployed around the centre of Survey Area, located within the hedgerows beside the footpath that dissects the Survey Area.
- 5.3.1.2 The abundance of calls per night was varied, with 143 calls on the first night, compared to 806 on the fourth night. There was a large discrepancy between number of calls between each static as well; S2 only recorded 88 calls throughout the deployment period, whereas S1 recorded 1,980 calls. Both statics recorded similar species diversity, with the same species recorded at either location, barring Leisler's, which was only recorded on S1.
- 5.3.1.3 Common pipistrelle were the most abundant species by a large margin, comprising 79% of all calls throughout May Static Deployment- with 97% of common pipistrelle calls attributed to S1. Soprano pipistrelle calls were occasionally observed, with 17% of total calls over the deployment period. Other species include Myotis sp. (2.7%), Nyctalus sp. (0.4%), Leisler's, noctule and brown long-eared (each 0.2%), with the rest consisting of unidentified bat species.

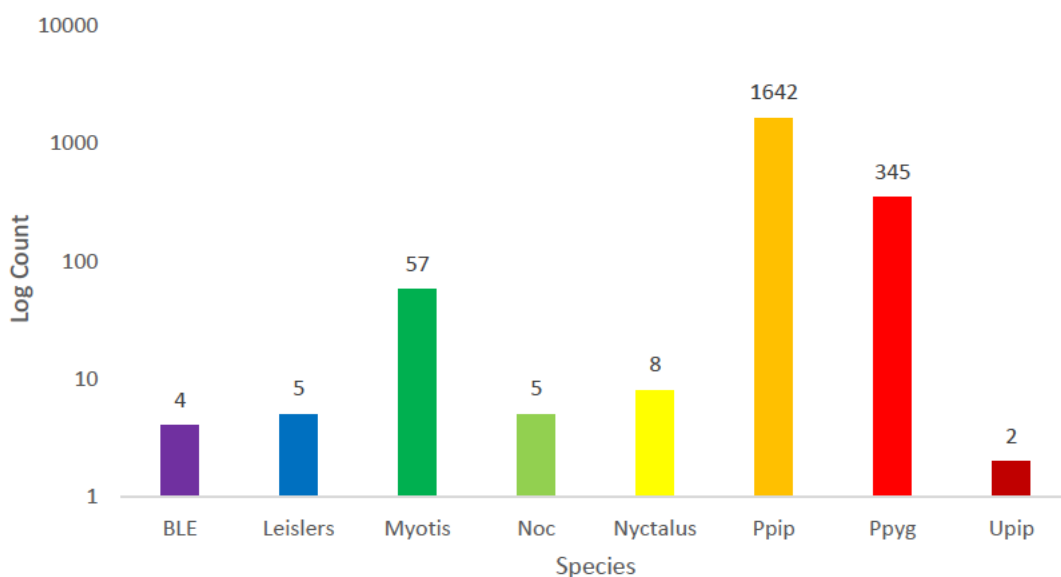


Figure 18. Graph of bat calls by species during the May static deployment

5.3.2 June Deployment

- 5.3.2.1 Static locations were moved to different locations for deployment during June- Static 3 (S3) was placed within the oak plantation in the centre of the Survey Area, whereas Static 4 (S4) was located around the centre of the Survey Area, within the hedgerow along the footpath.
- 5.3.2.2 The overall number of calls recorded reduced significantly from the May deployment, with a total of only 658 calls recorded during the five-day period. Calls per night were not as varied, however, with a low of 54 calls recorded on the fourth night between both statics, compared to 191 calls recorded on the third night. The majority of activity was attributed to S3, however, with 623 calls recorded; equating to 94% of all calls recorded during June deployment. Species assemblage varied between statics; the only occurrences of brown long-eared and soprano pipistrelle are attributed to S3, whereas Leisler's and Myotis sp. were only identified through S4.
- 5.3.2.3 Common pipistrelle and soprano pipistrelle contributed the most calls recorded during June deployment, with both species comprising 47% each, equalling 94% of species recorded in total. Noctule were recorded occasionally (4%), and the remainder comprised of rare occurrences of Myotis, brown long-eared and Leisler's.

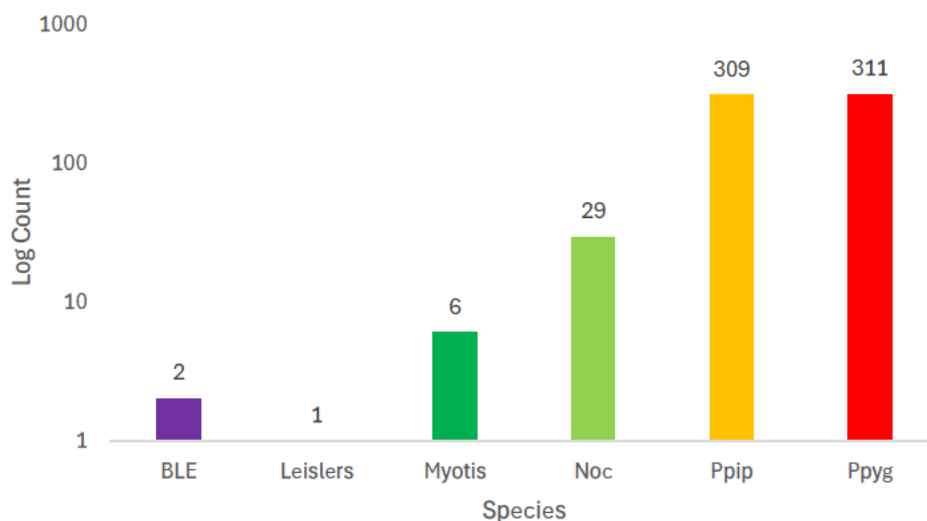


Figure 19. Graph of bat calls by species during the June static deployment

5.3.3 July Deployment

- 5.3.3.1 Statics were deployed in the same location as the June deployment for July. Subsequently, the results of the July deployment follow similar trends identified within the June deployment.
- 5.3.3.2 Overall, a total of 762 calls were recorded over the five day monitoring period in July. Calls per night were also not as varied, with calls per night ranging from 48-169, apart from night 1, which is an outlier, with 320 calls recorded. This is most likely due to high levels of pipistrelle activity; with 58% of common pipistrelle and 34% of soprano pipistrelle activity recorded during this night.

5.3.3.3 Activity between the two statics was similar as within the June deployment, with S3 providing a significantly higher number of calls over S4. S3 recorded 669 bat calls throughout the recording period, contributing to 87% of all recorded calls. Unlike June, species richness was also higher within S3, with brown long-eared and soprano pipistrelle calls only recorded through S3.

5.3.3.4 Soprano pipistrelle calls attributed the most bat calls throughout July deployment, consisting of 53% of all calls. Social calling by soprano pipistrelle was also quite frequent during this period. Common pipistrelle activity was abundant (33%), with noctule activity occasional (9%) and the remainder of activity relating to rare calls regarding Myotis, Leisler's and brown long-eared.

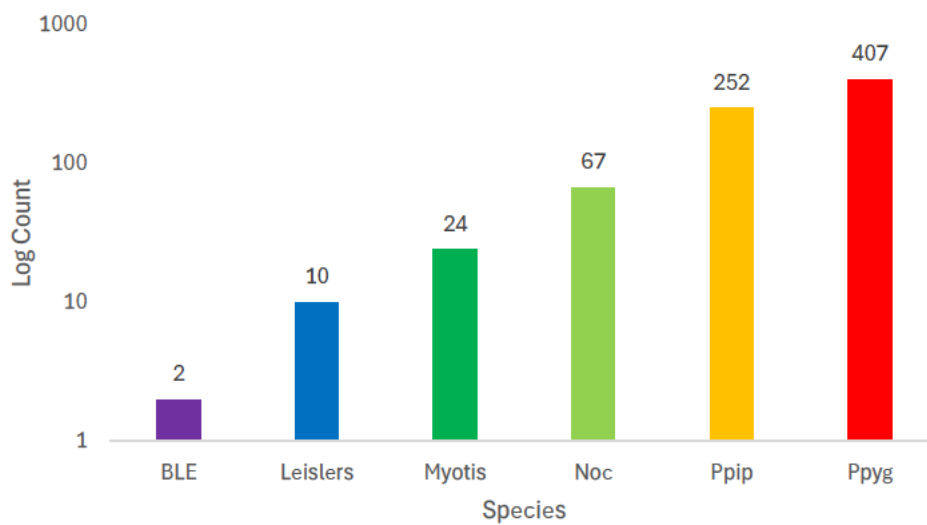


Figure 20. Graph of bat calls by species during the July static deployment

5.3.4 August Deployment

5.3.4.1 The placement of statics for the August deployment were changed from the June and July deployments. Static 5 (S5) was moved into the western corner of the Survey Area into the bordering woodland parcel, whereas Static 6 (S6) was placed nearby the oak plantation woodland and the eastern quarry around the centre of the Survey Area.

5.3.4.2 Overall number of calls recorded during the August deployment was higher than those recorded during the previous two surveys, with a total of 972 bat calls. Calls per night were also much more varied than usual; with the lowest being 40 per night on the 3rd night, and the highest being 288 on the 2nd night. Lower activity during the second night is likely due to rainfall during optimal foraging periods.

5.3.4.3 Activity recorded during this period is mostly contributed to S6, with 782 calls recorded; equivalent to 80% of all calls recorded. Species richness was also higher at S6, with brown long-eared and both Nyctalus species being recorded exclusively by S6. This is most likely due to the positioning of S5, which was located within an area of the Survey Area with suboptimal foraging habitats.

5.3.4.4 Pipistrelle species attributed to the majority of calls throughout the monitoring period. Common pipistrelle were the most abundant, contributing to 43% of all calls, with soprano pipistrelle (38%) closely following behind. Noctule were observed frequently (12%), along with rare occurrences of Leisler’s and Nyctalus calls, all of which were identified by S6. Myotis were observed occasionally (5%) at both Statics, and brown long-eared were identified rarely.

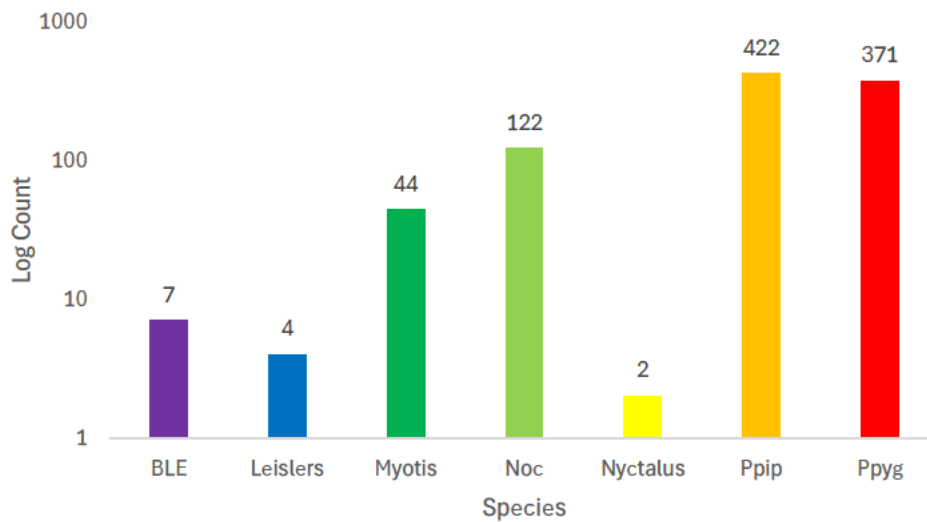


Figure 21. Graph of bat calls by species during the August static deployment

5.3.5 September Deployment

5.3.5.1 During September deployment, two statics were deployed. Static 7 (S7) was located within the woodland near the footpath at the eastern quarry, whilst Static 8 (S8) was located within the woodland near to where the footpath meets the western pond.

5.3.5.2 This deployment period witnessed the lowest overall number of calls out of all static surveys completed; 116 total calls were recorded over the five-day recording period. It is unclear what may have been the cause of this reduction in activity, as weather conditions were optimal, although September is at the end of the bat survey season. Calls per night were low and unvarying, between 15 and 40 between each night.

5.3.5.3 S7 recorded a total of 34 calls, equal to 29% of total calls, and S8 recorded the highest number of calls, with 82. The majority of calls were attributed to common pipistrelle, with similar levels of noctule, Myotis and soprano pipistrelle calls identified.

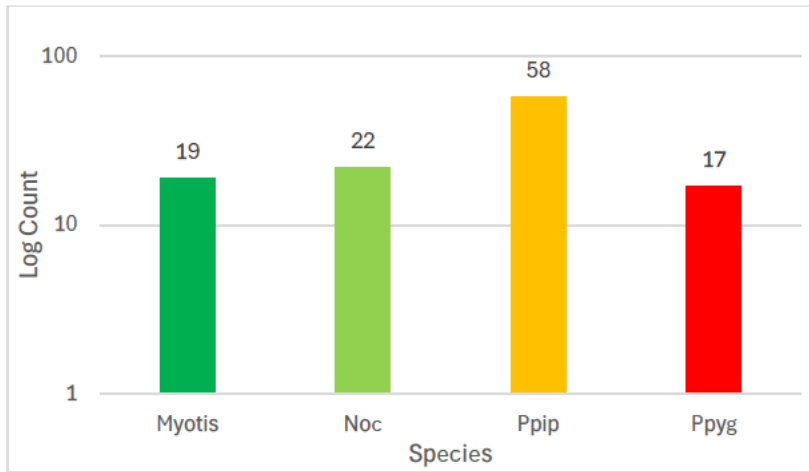


Figure 22. Graph of bat calls by species during the September static deployment

5.3.6 Static Detector Summary

- 5.3.6.1 Throughout the entire static survey suite, bat activity was recorded throughout the Survey Area and throughout the entire survey season, although distribution of bat activity is heavily skewed by location and time. Location hotspots were identified throughout static placement, including the eastern quarry, the yew plantation to the east of Survey Area, and the woodland and line of trees incorporating the pathway that dissects the Survey Area. Areas close to the woodland that covers the southern border and neutral grasslands around the centre of Survey Area are of the least value to foraging and commuting bats.
- 5.3.6.2 Common pipistrelle were generally the species with the most recorded calls per month, and were the most abundant species, comprising 58% of all recordings during the static survey. Soprano pipistrelle, which were more frequent than common pipistrelle on occasion, accounted for 32% of all calls. The remainder of species were a lot less common and would appear sporadically throughout the season: noctule and Myotis were recorded semi-frequently during most of the season, attributing for 5.4% and 3.3%, respectively. The remaining 1.4% is attributed to the rare occurrence of Nyctalus, including Leisler's, as well as brown long-eared bat and unidentified bat.

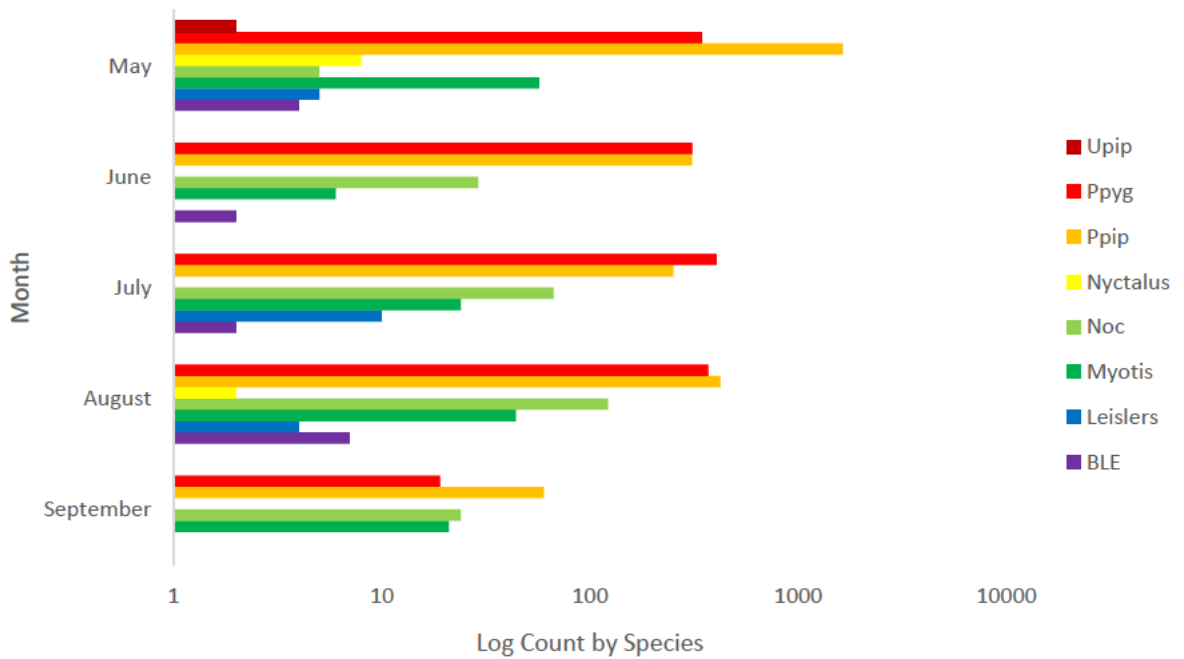


Figure 23. Graph of bat calls by species per month during static deployment

- 5.3.6.3 Common species were typically recorded site wide, with rarer species preferring specific habitats. Soprano pipistrelle activity, for example, was recorded in much higher quantities during June and July, and specifically around the oak plantation and eastern quarry. The aquatic habitats within the Survey Area also seem to be of the most value to foraging bats, with noctule and *Myotis* recorded more frequently around the ponds.
- 5.3.6.4 Soprano pipistrelle activity involved high levels of social calling, especially during June and July. This indicates that soprano pipistrelle within the Survey Area were actively searching for a mate, which, in turn, suggests the presence of a maternity roost within the immediate vicinity.
- 5.3.6.5 The activity recorded in May relating to high levels of common pipistrelle was an outlier, with an outstanding number of common pipistrelle calls; attributing to approximately 61% of all common pipistrelle calls in one month.

5.4 Assessment

- 5.4.1.1 Compiling the results from activity and static surveys, there is significant evidence that the habitats within the Survey Area provide significant value to local populations of common and widespread foraging and commuting bat species and suggests that the wider environment supports a wide range of species.
- 5.4.1.2 Bat activity was recorded across a range of habitats within the Survey Area, although activity was more condensed within preferred habitats, with the woodlands, priority hedgerows, quarries and open water in the Survey Area providing high quality foraging conditions for bats. The ponds provided higher quality foraging habitat for species that preferred that habitat, such as *Nyctalus* and *Myotis* species identified.

Table 5. Total bat calls recorded throughout the entire survey suite

Species	Total Observations	Percentage Observations
Common pipistrelle	3150	58.3
Soprano pipistrelle	1623	30
Noctule	324	6
<i>Myotis</i>	222	4.1
<i>Nyctalus</i>	38	0.7
Leisler's	21	0.4
Brown long-eared	19	0.4
Unidentified Bat	3	0.1
Grand Total	5400	

- 5.4.1.3 Overall, common pipistrelle were the most abundant species, comprising over half of all calls observed (58.3%). Soprano pipistrelle were also abundant, attributing 30% of all calls recorded. Noctule and *Myotis* species were occasionally recorded (6% and 4.1%, respectively), and the rest comprised rare occurrences of *Nyctalus*, Leisler's, brown long-eared and unidentified bat.
- 5.4.1.4 There were no roosts identified in the Survey Area during this survey suite, although this is not to say they are not present. The extensive activity by multiple different species, as well as condensed social calls, recorded attributed to soprano pipistrelle, all suggest that roosts are likely to be present and extensive within the surrounding habitat. The Survey Area provides multiple foraging resources for a range of bat species, and this should be considered within the development proposals. Given the rare presence of Leisler's, a species classed as Near Threatened by the IUCN within Great Britain, mitigation efforts within the site for bats should be strictly adhered to. Recommendations for further development of suitable habitats on site and in the wider Survey Area are also considered further in this report

6 Mitigation Recommendations

6.1 Impact Assessment

- 6.1.1.1 During all of the surveys undertaken in 2023, bat activity was regularly recorded, with mostly widespread species, occasionally identifying rarer species, including brown long-eared and Leisler's bat. Foraging and commuting activity recorded in the Survey Area was associated with the woodlands, priority hedgerows and open standing waters.
- 6.1.1.2 *Nyctalus* and *Myotis* species, which were both recorded utilising the Survey Area in various capacities, often foraging above open water bodies- this activity was observed during the survey suite, with noctule identified foraging above the eastern pond during activity surveys, and Leisler's identified through static surveys placed near the eastern quarry and incorporated pond.

Direct Impacts

- 6.1.1.3 Vegetation removal and draining of the large area of standing water within the quarry basin is required as part of the proposed works.
- 6.1.1.4 As a result, high value commuting and foraging habitats that have been confirmed as supporting high levels of bat activity are to be removed, namely the waterbody within Yew Tree Quarry and an area of woodland spanning north to south through centre of the Survey Area. These habitats were recorded as supporting a varied species composition and regular foraging/commuting activity during the survey effort.

Indirect Impacts

- 6.1.1.5 In addition to this, increased noise levels from landfill activities and regular movement of heavy vehicles will provide an indirect impact on retained habitats within the wider Survey Area.
- 6.1.1.6 Such habitats include the woodland located directly east of Yew Tree Quarry, which was found to support consistently high levels of bat activity, and the public footpath that runs through the site adjacent the south of Yew Tree Quarry, that similarly recorded regular bat activity.

Summary

- 6.1.1.7 The proposed scheme will result in the direct loss of foraging and commuting habitat and will introduce an extra level of indirect impacts on retained habitats both onsite and in the wider Survey Area. However, it is understood that impacts will be over a temporary period of approximately 2.5 years after which the site will be subject to an ecological restoration scheme.
- 6.1.1.8 With suitable mitigation measures, detailed below, and the level of suitable foraging and commuting habitat being retained within the wider Survey Area it is believed that impacts on commuting and foraging bats will be minimal in the medium term and beneficial in the long-term.

6.2 Mitigation

6.2.1 Habitat Mitigation

- 6.2.1.1 The post operational design of the site should seek to provide new areas of habitat, that will be beneficial for local bat populations.
- 6.2.1.2 Mitigation ponds should be included within the finalised landscaping plans for the site, where possible, compensating for the loss of the water body on site and maintaining habitat diversity and foraging behaviour of bat species present on site. Where possible, mitigation ponds should consider:
- A mosaic pond of variable nature, with permanent, semi-permanent, and temporary subsections of variable depth, to promote a diversity of riparian, shallow, marginal, and submerged vegetation, and a diversity of fauna between them.
 - A range of pond sizes where possible to boost structural and functional habitat complexity.
 - Commission of a long-term management plan to cut back and avoid excessive pond-side succession and overshadowing by riparian vegetation.
 - Effort should be made to ensure habitat connectivity between ponds and other suitable habitat features retained or created on site.
- 6.2.1.3 In addition to this, the plans should seek to include new linear features such as hedgerows, lines of trees/linear blocks of woodland that increase the connectivity within the site and the wider Survey Area.

6.2.2 Lighting Mitigation

- 6.2.2.1 As part of the proposed works, it is understood that sources of artificial light will be introduced to the site extent.
- 6.2.2.2 Artificial lighting can disproportionately impact slow-flying species such as *Myotis* sp., which have been identified to utilise the site.
- 6.2.2.3 As such, it is recommended that an External Lighting scheme is produced that follows the guidance outlined in the Institute for Lighting Engineers document “Guidance for the Reduction of Obtrusive Lighting” (2005) and BCT’s “Bats and Artificial Lighting at Night” (2023).
- 6.2.2.4 Construction lighting should not be directed towards retained and surrounding habitats including the broadleaved woodland and grassland. Directional lighting will be achieved by angle and orientation of beam, use of a cowl, louvre or other light shield, or a combination of these.
- 6.2.2.5 It is understood that the main landfill works will be conducted during daylight operating hours and as such, where possible artificial lighting should be switched off while the site is closed during nocturnal hours.

7 References

Bat Conservation Trust (2016). Bat Surveys for Professional Ecologists: Good Practice Guidelines (Third Edition). The Bat Conservation Trust, London.

CIEEM (2019). Advice Note on the Lifespan of Ecological Reports and Surveys. CIEEM.

English Nature (2004). Bat Mitigation Guidelines. English Nature, Peterborough.

Hutson A. M. (1993). Action Plan for Conservation of Bats in the United Kingdom. The Bat Conservation Trust, London.

Joint Nature Conservation Committee (2004). Bat Workers Manual. JNCC, Peterborough.

Urban Green (2023). Preliminary Ecological Appraisal of Stairfoot Quarry. Ref: UG_1773_ECO_PEA_01




Appendix 1 - Relevant Legislation

Legislation relating to European Protected Species (e.g. bats)

European Protected Species and their resting places (e.g. bat roosts) are protected under the Wildlife and Countryside Act 1981 (as amended), the Countryside and Rights of Way (CRoW) Act 2000, and the Conservation of Habitats and Species Regulations 2017.

The Conservation of Habitats and Species Regulations 2017 transpose the European Union's 'Habitats Directive' (Council Directive 92/43/EEC) on the Conservation of Natural Habitats and of Wild Fauna and Flora (EC Habitats Directive) into UK law. The Regulations provide for the designation and protection of 'European Sites', the protection of 'European Protected Species' (EPS), and the adaptation of planning and other controls for the protection of European Sites. EPS are listed on Schedule 2 of the Conservation of Habitats and Species Regulations 2017.

Appendix 2 - Full Preliminary Roost Assessment

Building Reference	Description	Evidence	Category of Suitability
B1	<p>A small outhouse building is present on site within the north-western extent. It's a single-storey structure comprised of brick and breezeblock with a flat roof. The building is open to the elements on the southern aspect and the internal aspects are similarly comprised. An area of breezeblock is damaged on the internal northern wall with some blocks missing and exposing the brick wall behind. A cavity is present between the remaining blocks and the external brick wall which would provide suitable roosting potential.</p> <p>No evidence of a bat roost was identified, and the internal void had evidence of antisocial behaviour present with smashed glasses and beer cans present.</p> <p>No other features were present within the building that could support a bat roost, and the building was assessed as not providing hibernation potential.</p>		Low
T1	<p>T1 is a mature ash tree located within the broadleaved woodland (block 1) on site. Multiple cavities are present on varying upper limbs of the tree which may provide suitable bat roosting potential.</p>		Moderate
T2	<p>T2 was a large mature ash tree within the broadleaved woodland (Block 1) on site. A cavity within the stem was present on the north-western, south, and south-eastern aspects and may provide suitable bat roosting potential.</p>		High