



Bat Transect Surveys and Static Monitoring Cropredy, Oxfordshire

ISSUE RECORD

Client name	Obsidian Strategic Ltd	
Project name	Cropredy, Oxfordshire	
Project number	ObsSt09.1	
Report title	Bat Transect Surveys and Static Monitoring	
Issue number	1	2
Date	09/11/2022	23/03/2023
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ISO9001	QMF 32	Issue 1	Reviewed 04/03/2016
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1 **INTRODUCTION**

1.1 **Scope of Report**

This report has been prepared by Peak Ecology Ltd. on behalf of Obsidian Strategic Ltd. It provides the results of Bat Transect Surveys and Static Monitoring associated with the proposed development of land off Claydon Road, Cropredy, Oxfordshire. The purpose of this report is to:

- Identify key ecological constraints to the proposed development;
- Provide outline recommendations for mitigation and/or avoidance measures where appropriate;
- Identify any likely need for licensing by Natural England; and
- Highlight opportunities for ecological enhancement where appropriate.

In relation to planning and development, this report provides all relevant details to support a planning application; it should be read, however, in conjunction with any other ecological surveys that have been undertaken for the site, including the PEA report (Peak Ecology, 2021), Breeding Bird Survey report (Turnstone Ecology Ltd, 2022) and Biodiversity Net Gain Assessment (Peak Ecology Ltd, 2023).

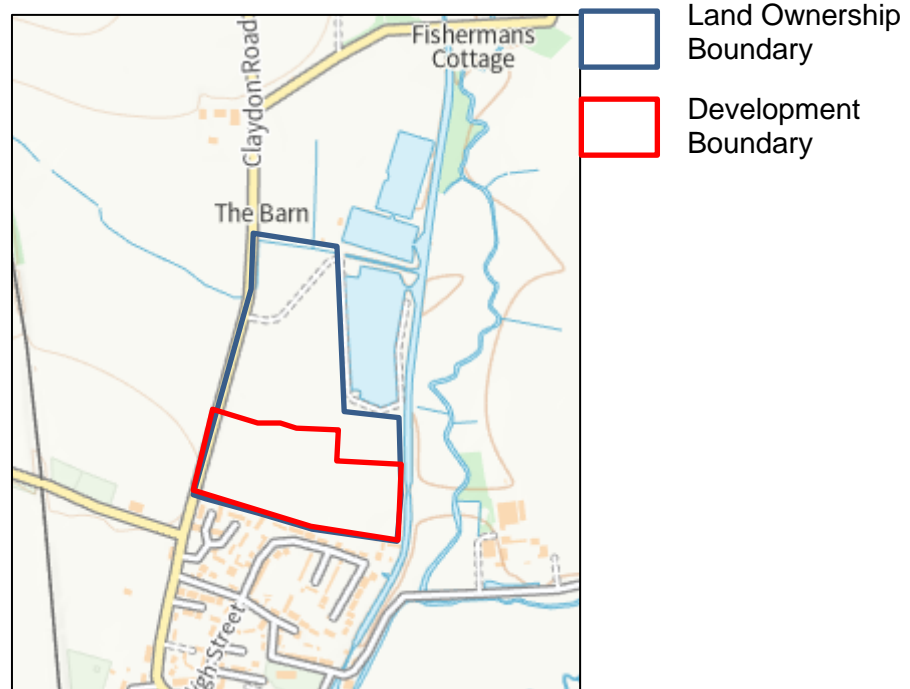
The approach to this assessment follows best practice published by the Chartered Institute of Ecology and Environmental Management (CIEEM, 2021 & 2015) and the British Standards Institution (BSI, 2013). Details of individual survey methods and associated supporting information are provided in Section 2.

1.2 **Site Background**

A Preliminary Ecological Appraisal (PEA) was conducted at the site in September 2021 by Peak Ecology Ltd which classified the foraging and commuting suitability of the site for bats as **high** as per good practice guidelines (Collins J. (ed), 2016).

The surveys conducted have considered the entire land ownership boundary (hereafter referred to as the Survey Area), however Peak Ecology understand that the development proposal redline boundary occupies only the southern and eastern areas (hereafter referred to as the Site). These boundaries are indicated in Figure 1.

Figure 1: Land ownership and development boundaries*



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1.3 Development Proposals

It is our understanding that the proposed development includes the construction of new residential housing with associated access, private gardens and shared recreational spaces as shown in concept drawing J0043785_006 (Carter Jonas, 2023). The existing boundary features on site, including mature native species hedgerows are to be largely retained and enhanced. A new access road is proposed which will result in the loss of a small section of the western boundary hedgerow (approximately 3m). A 75m section of the central hedgerow on site will be removed as part of the development.

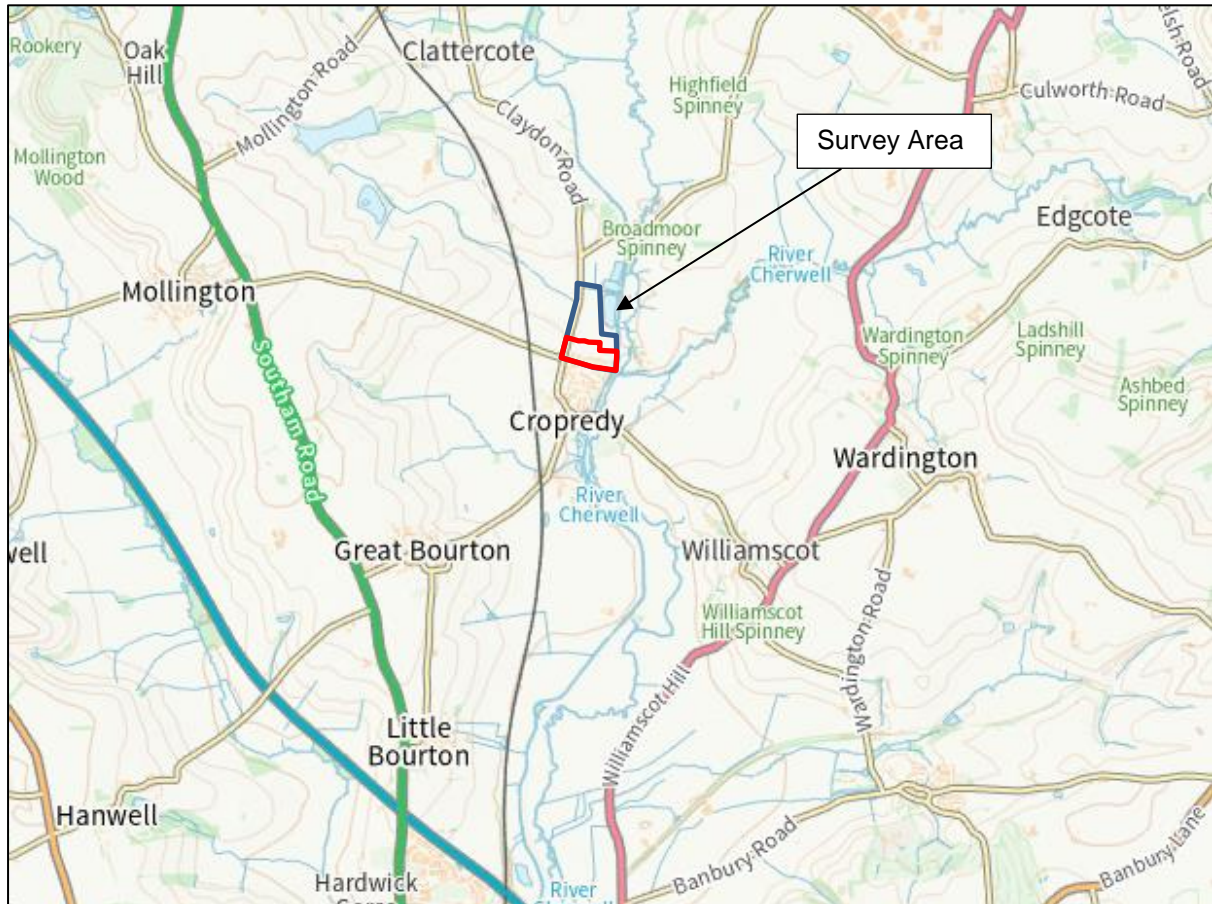
1.4 Site Description

The Survey Area comprised an area of land approximately 10.5ha in size, to the north of Cropredy, Banbury (central grid reference: SP 4691 4715). The area comprised two improved grassland fields, bordered by scrub, hedgerows and woodland. The fields were divided by a single mature hedgerow. The Site itself was approximately 4.9ha in size, located in the southern section of the Survey Area.

The surrounding land use was a mosaic of arable fields, hedgerows and small scattered woodland areas. Cropredy Marina is located adjacent to the site to the north-east, while Oxford Canal lies along the eastern border of the site. The village of Cropredy borders the site to the south, with other settlements including Great Bourton and Williamscot lying 1.9km south-west and 1.7km south-east of the site respectively. A trainline is located approximately 350m west of site.

The Survey Area location is illustrated by the combined blue and red line boundaries on Figure 2 below.

Figure 2: Location map*



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1.5 Zone of Influence

The geographical extent of the potential impact of a proposed development is known as the Zone of Influence. The Zone is determined by the nature of the development and also in relation to individual species, depending on their habitat requirements, mobility and distances indicated in any best practice guideline.

With regards to bats, the zone of influence is considered to be the site itself and any connecting habitat links suitable for use as commuting and foraging corridors.

1.6 Planning Context and Legislation

All British bat species are European Protected Species (EPS) under the Conservation of Habitats and Species Regulations 2017 (as amended). They are also listed on Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) and are protected by Parts 4(b), 4(c) and 5 of that Act.

In net effect, it is an offence to:

- Deliberately capture, injure or kill bats;
- Intentionally or recklessly disturb bats in a place of shelter (roost);
- Intentionally or recklessly damage, destroy or obscure access to a breeding site or resting place (roost); and/or
- Possess, control, transport, sell or exchange a bat or any part of a bat, unless acquired legally.

NB. Bats use roosts at different times of year and typically return to the same roosts annually; as such, it is a legal opinion that a roost is protected whether bats are in occupancy at the time or not.

Under the National Planning Policy Framework (NPPF) 2021 the presence of a European Protected Species is a material planning consideration. When assessing a planning application, to satisfy the three Habitats Directive tests, the Local Planning Authority (LPA) requires sufficient information about impacts on the species that are likely to result from the proposals, as well as any necessary mitigation or compensatory measures. The test relevant to this report is that which relates to the Favourable Conservation Status of the species.

In addition to this, county and borough/district councils typically have biodiversity policies within their Local Development Frameworks that they must also comply with.

2 **METHODOLOGY**

2.1 **Bat Transect Surveys**

2.1.1 ***Transect Surveys***

A suite of seven transect surveys were carried out from April through to October, as per good practice guidelines ((Table 8.3), Collins J. (ed), 2016). Each survey involved two surveyors walking a pre-determined route around the Survey Area, with a series of five-minute stopping points at regular intervals throughout. Surveyors were equipped with hand-held heterodyne bat detectors and an Anabat Swift detector to record and GPS-tag any detected bat calls. Recordings were subsequently analysed with Analook Insight software. Surveyors also recorded details of observations during the survey including bat flight lines, number of individual bats and their behaviour (see Table 3 and Appendix D).

2.1.2 ***Static Monitoring***

Two static monitoring devices (Anabat Express) were positioned in separate locations within the Survey Area during each survey and left for a period of at least 5 days. The position of these detectors remained the same across all surveys. The detectors were programmed to record any passing bat calls from approximately half an hour before sunset, throughout the night, until half an hour after sunrise. The detectors were then collected and any recordings analysed using AnalookW software.

2.2 **Surveyors**

Bat activity surveys were undertaken by members of the Peak Ecology team led by Niamh Gibson BSc (Hons). All surveyors were suitably experienced and appropriately qualified based on the CIEEM competency framework (CIEEM, 2021). Table 1 below provides details of all surveyors involved.

Table 1: Survey team

Surveyor name	Job title	Surveyor initials	Relevant licenses
Michelle Cullimore-Pike	Principal Ecologist	MCP	NE Class 1 bat licence (2017-28061-CLS-CLS)
Francis Marshall	Ecologist	FM	NE Class 1 bat licence (2020-44391-CLS-CLS)
Cass Stuttard	Ecologist	CS	-
Niamh Gibson	Assistant Ecologist	NG	-
Amy Wardle	Field Ecologist	AW	-
Eve Scott	Graduate Ecologist	ES	-
Rebekah Pipes	Graduate Ecologist	RP	-

2.3 Survey Timings and Conditions

The bat activity surveys were undertaken during the optimum activity season, as per best practice guidelines (Collins (ed), 2016) and during appropriate weather conditions. See Table 2 below for further details.

Table 2: Survey details

Date	Sunrise/ sunset	Start time	End time	Weather conditions	Surveyors
19.04.2022	20:10	20:25	22:34	Temp: 12°C at start, dropping to 9°C. Cloud cover: 7/8 at start, increasing to 8/8 Rain: Dry, light drizzle at the end of the survey Wind: 14km/h dropping to 12km/h	MCP, NG
09.05.2022	20:44	20:40	22:10	Temp: 17°C at start, dropping to 16°C. Cloud cover: 8/8 throughout Rain: Dry throughout Wind: 16km/h rising to 17km/h	MCP, NG
13.06.2022	21:26	21:20	23:33	Temp: 17°C dropping to 13°C Cloud cover: 3/8 clearing to 1/8 Rain: Dry throughout Wind: 8km/h increasing to 16km/h	NG, ES
11.07.2022	21:33	21:20	23:27	Temp: 25°C dropping to 23°C Cloud cover: 2/8 increasing to 6/8 Rain: Dry throughout Wind: 5km/h throughout	NG, RP
12.07.2022	04:59	02:50	04:55	Temp: 19°C dropping to 17°C Cloud cover: 7/8 throughout Rain: Dry throughout Wind: 4km/h throughout	NG, RP
17.08.2022	20:36	20:36	22:19	Temp: 16°C throughout Cloud cover: 3/8 clearing to 2/8 by the end of survey Rain: Dry throughout Wind: No wind	CS, RP
12.09.2022	19:28	19:25	21:10	Temp: 21°C dropping to 19°C Cloud cover: 7/8 throughout Rain: Dry throughout Wind: No wind	AW, RP
10.10.2022	18:22	18:35	20:35	Temp: 10°C dropping to 8°C Cloud cover: 0/8 Rain: Dry throughout Wind: No wind	FM, RP

2.4 Limitations

2.4.1 *Survey Methods*

All species-specific surveys are undertaken following recognised guidance within suitable seasons and weather parameters. It should be noted, however, that survey visits are snapshots of the site conditions; therefore, particular conditions of each season, or year, may impact upon the survey results.

Some bat species, such as brown long-eared bats *Plecotus auritus*, echolocate very quietly and can therefore be difficult to detect. This species also typically emerges after dark when it is less likely to be seen by surveyors.

Good practice guidelines (Collins (ed) 2016) recommend that three static monitoring devices are used at sites with **high** suitability for foraging and commuting bats. Two static devices were used throughout this survey effort, as the linear features of interest were considered to be adequately covered by these detectors.

The good practice guidelines also recommend up to two transect survey visits per month (April to October inclusive). Only one transect survey per month was conducted due to the small size of the Site and low habitat diversity within the Survey Area, which was appropriately surveyed by a single visit each month over the seven-month period.

2.4.2 *Lifespan of Data*

The results and recommendations contained within this report are considered to be valid for up to two years from the date of survey – assuming that there are no significant changes to the Site condition or management within this period. After this period, or should the Site conditions change, an update may be required in order to inform ecological constraints to development proposals and/or accompany a planning submission.

3 **RESULTS**

3.1 **Desk Study**

A desk study was undertaken by Peak Ecology Ltd within the 2021 PEA report (Peak Ecology, 2021). The search returned records of common pipistrelle *Pipistrellus pipistrellus* and brown long-eared bat *Plecotus auritus* within 2km of the Survey Area.

A search of the online Multi-Agency Geographical Information Centre (MAGIC) tool returned one European Protected Species (EPS) mitigation licence for bats within 2km of the Site. This was granted as follows:

1. 2016-23796-EPS-MIT-: Approx. 320m south. License to destroy a resting place and a breeding site of common pipistrelle and brown long-eared bat (01/06/2016 - 31/05/2021)

3.2 **Bat Activity Surveys**

3.2.1 **Transect Surveys**

Bat transect surveys highlighted the features within the Survey Area and on the Site used most frequently by bats, and which are, therefore, the most ecologically valuable for foraging and commuting bats.

Throughout the surveys, the vast majority of recorded bat calls were attributed to common pipistrelle bats, accounting for 78% of all calls recorded across all survey visits. Other species recorded included soprano pipistrelle *Pipistrellus pygmaeus* (12%), Daubenton's bat *Myotis daubentonii* (0.5%), noctule *Nyctalus noctule* (8%), Leisler's bat *Nyctalus leisleri* (1%), and an un-confirmed species of myotis bat *Myotis sp.* (0.5%).

The table below provides the breakdown of species recorded, number of counts of each species and the percentage of the count per species (Table 3).

Table 3: Bat calls by species recorded per transect

Date	Visit Number	Species	Count	% Count
19/04/2022	1 (dusk)	Common pipistrelle	46	86.7
		Soprano pipistrelle	2	3.8
		Noctule	3	5.7
		Myotis Sp.	2	3.8
09/05/2022	2 (dusk)	Common pipistrelle	53	79.1
		Soprano pipistrelle	9	13.4
		Noctule	3	4.5
		Leisler's bat	1	1.5
		Myotis sp.	1	1.5
14/06/2022	3 (dusk)	Common pipistrelle	71	61.7
		Soprano pipistrelle	16	13.9

Date	Visit Number	Species	Count	% Count
		Noctule	24	20.9
		Leisler's	4	3.5
11/07/2022	4 (dusk)	Common pipistrelle	96	82.8
		Soprano pipistrelle	9	7.7
		Noctule	8	6.9
		Leisler's bat	1	0.9
		Myotis sp.	2	1.7
12/07/2022	4 (dawn)	Common pipistrelle	68	80.9
		Soprano pipistrelle	14	16.7
		Noctule	2	2.4
17/08/2022	5 (dusk)	Common pipistrelle	63	77.8
		Soprano pipistrelle	17	21.0
		Daubenton's bat	1	1.2
12/09/2022	6 (dusk)	Common pipistrelle	48	64.8
		Soprano pipistrelle	9	12.2
		Daubenton's bat	1	1.3
		Noctule	16	21.6
10/10/2022	7 (dusk)	Common pipistrelle	57	100.0

The activity levels across the season (April to October inclusive) were variable, with the highest activity levels recorded in the summer months of June, July and August with around 110 calls recorded per night. Bats were recorded commuting or foraging on site during all survey visits.

Foraging activity was concentrated in four main areas in the Survey Area. The canal and adjoining scrub was a particular hot-spot for activity, with high levels of activity also noted along the hedgerow which bisects the two fields on site, the western hedgerow which borders Claydon Road, and the southern boundary adjacent to the residential gardens. A mature oak *Quercus robur* tree on the northern site boundary was also noted to support foraging bats on several occasions.

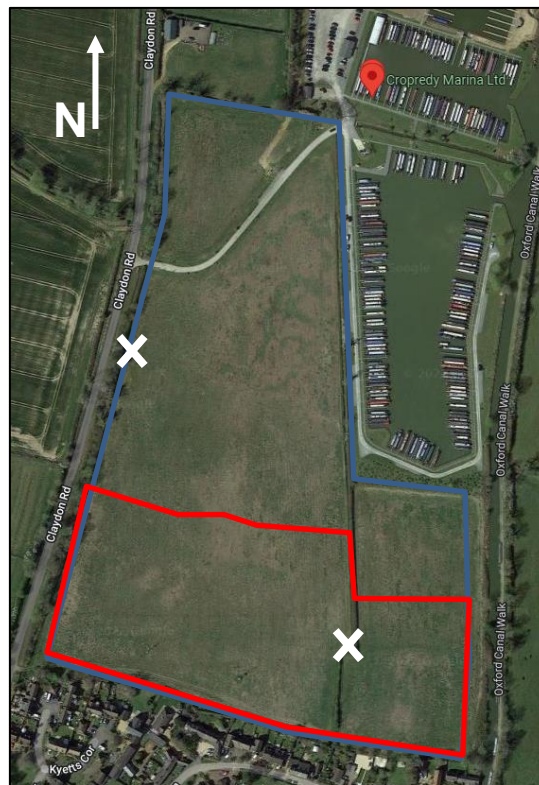
Bats were recorded commuting across the Survey Area from the canal and marina towards the western boundary. Noctule social calls were recorded on the July transect close to the canal, which could indicate the presence of a roost in one of the trees along the canal's edge off site.

Appendix D shows the flight paths observed and recorded by the surveyors.

3.2.2 **Static monitoring**

Static monitoring across the Survey Area returned a large number of recordings. A total of two static detectors were deployed on each monitoring occasion. Figure 3 shows the locations of the static monitoring devices, indicated by white crosses.

Figure 3: Static monitoring device locations*



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The static device located within the western boundary hedgerow recorded a higher number of calls, with an average of 74 bat passes recorded per night of monitoring across the survey season. This is in comparison with an average of 52 passes per night recorded by the device placed in the central hedgerow. This supports the observations made by surveyors during the bat activity transects, who recorded foraging activity at both locations.

Species broadly mirrored those identified during the bat activity transects, with common pipistrelle forming the largest percentage of the recorded calls – 80% along the western boundary hedgerow and 82% along the central hedgerow. An additional species which was not recorded during the bat activity transects, brown long-eared bat *Plecotus auritus*, was also recorded to pass the Survey Area. Table 4 shows the average percentage of bat passes by species for each of the static device locations (see Appendix E for full details of recordings per species per monitoring period).

Table 4: Summary of all bat passes recorded by static monitoring devices at each location.

Species	Western Hedgerow		Central Hedgerow	
	Passes	%	Passes	%
Common Pipistrelle	1537	80.4	1063	81.8
Soprano Pipistrelle	193	10.1	127	9.8
Daubenton's Bat	61	3.2	10	0.8
Noctule	35	1.8	73	5.6
Brown Long-Eared Bat	2	0.1	4	0.3
Leisler's Bat	3	0.2	9	0.7
Myotis Species	49	2.6	7	0.5
Pipistrelle Species	31	1.6	6	0.5
Total passes by all species	1911		1299	

Calls recorded indicated both foraging and commuting behaviour during the monitoring periods. At times more than one bat and also more than one species was identified within the same file recording, however, the majority of calls were indicative of a single bat in flight.

4 EVALUATION

4.1 Proposed Impacts

The proposed development will impact upon the majority of the Site including the existing habitats; however, the majority of boundary features such as trees and hedgerows are not expected to be impacted under current proposals.

A 75m section of the central hedgerow will be removed as part of the development. The loss of this length of hedgerow will result in this linear commuting feature for bats becoming defunct, and therefore may impact on the bats in the area passing across the site to roosting or feeding areas elsewhere. In order to retain this linear feature, additional tree planting must be implemented as part of the development proposal. This has been illustrated within the Biodiversity Net Gain Statement (Peak Ecology, 2023). The planting of semi-mature or mature trees to form a linear block between the end of the central hedgerow and the southern boundary hedgerow will allow bats to continue using existing commuting and foraging lines on the site.

A short section (approximately 3m) of the western boundary hedgerow will also be lost due to the construction of a new access road to the Site. The removal of this section would not impact on the functionality of the hedgerow as a linear commuting feature, particularly as the adjacent road is lined by hedgerows on both sides which maintains a suitable corridor for foraging and commuting bats.

However, it is expected that additional lighting will be present at the access point to the site, and light spill onto this and adjacent features would negatively impact the suitability of the hedgerows for foraging and commuting bats, as it may increase the risk of predation or create a barrier in the normal flight path of commuting bats. As part of the linear feature will be lost, even such a small amount, it is important this section is subject to no light spill so that bats will continue to use the linear feature. An appropriate lighting scheme is required across the Site to minimise the impact of the development on the favourable conservation status of bats utilising the Site.

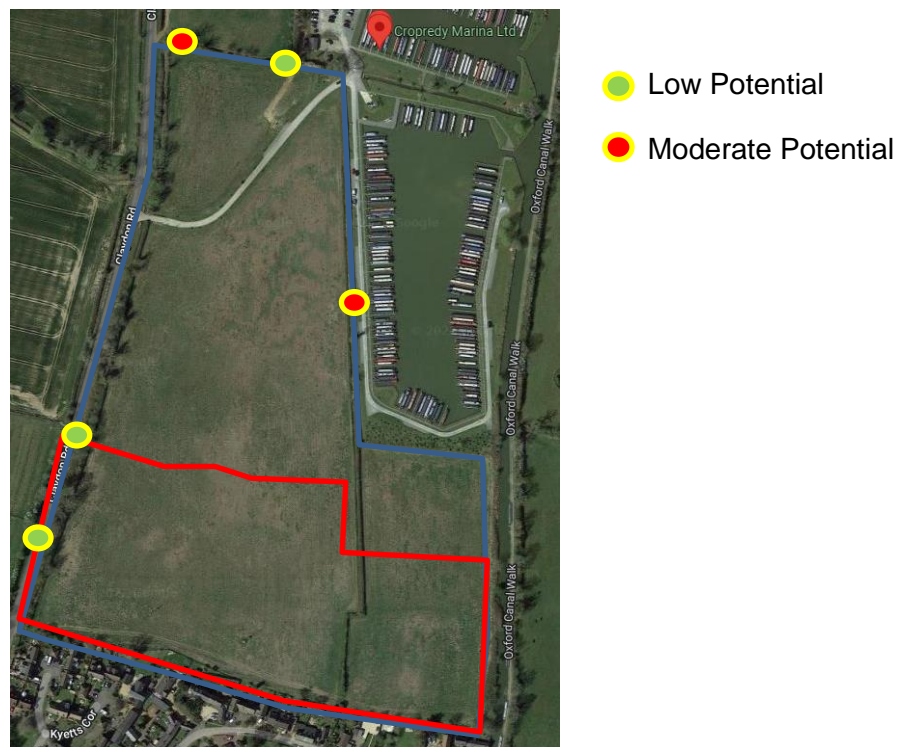
4.2 Bats

Bat species and their roosts are fully protected under the Conservation of Habitats and Species Regulations 2017 and under the Wildlife and Countryside Act 1981 (as amended) through inclusion in Section 1 (Schedule 5). Bats are also a UK Post-2010 Biodiversity Framework species. Cherwell District Council do not identify any specific bat species as additionally noteworthy within their adopted Local Plan 2011-2031.

4.2.1 *Trees with Potential Roost Features*

The Preliminary Ecological Appraisal (Peak Ecology, 2021) highlighted five trees in the Survey Area which had potential to support roosting bats. Three of these trees had low roosting potential and two had moderate roosting potential, as shown in Figure 4. Only one of these trees is within the Site boundary. It is our understanding that these trees will not be affected by the proposed works, and therefore no further survey effort has been undertaken.

Figure 4: Trees with potential bat roosting features*



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An arboricultural survey conducted by Tree:fabrik Ltd. (Tree:fabrik Ltd, 2022) categorised a number of trees on site as 'R Category trees' which are defined as 'trees in such a condition that any existing value would be lost within 10 years', and are therefore the most likely to be removed as part of the development. None of the trees identified as having bat roost potential fall under this category.

If trees identified as having bat roosting potential are to be impacted by the proposed works, further surveys of trees with moderate potential should be undertaken via nocturnal bat activity surveys or further inspection by tree climbing, if possible. Sectional soft felling of trees with low potential can be undertaken under a precautionary method statement.

4.2.2 **Foraging and Commuting Habitat**

The habitats on the Site, in particular the linear features including hedgerows, provide suitable foraging and commuting habitats for bats. The canal and marina which lie immediately adjacent to the eastern Site boundary, and the unlit, hedgerow-lined Claydon road to the west of the Site provide suitable dark corridors for commuting bats and provide excellent connectivity between the site and the wider environment, including to areas of Priority Habitat deciduous woodland to the North of the site. The mixture of grassland, hedgerow, tree lines, scrub and watercourse allow for a diverse range of insect prey availability throughout the year and therefore activity appears to be continuous throughout the active bat season.

Seven species of bat were recorded passing over the Survey Area across the nocturnal activity transects and static monitoring undertaken. The highest concentration of bat activity on the Site was recorded along the western and southern boundary hedgerows, as well as along the central hedgerow and the canal. Activity was also recorded to a lesser extent to the north of the Survey Area.

It is likely that bats are commuting and foraging along Claydon road itself, which provides a dark vegetated corridor, and could explain the higher number of recorded calls on the static monitoring device at this location. The central hedgerow is used less frequently for foraging, and for commuting between the site and the wider landscape.

Overall, the linear boundary features within the Site and those immediately adjacent off site, i.e roads and canal, are the most valuable to foraging and commuting bats.

5 **RECOMMENDATIONS**

5.1 **Mitigation, Compensation and Enhancement Measures**

5.1.1 ***Linear Features***

Where possible, trees should be retained throughout the works. Any trees and hedgerows that are being retained within the site and impact zones should be adequately protected during the works in line with BS5837:2012 *Trees in relation to design, demolition and construction - Recommendations*. Furthermore, no materials should be stored under the canopy of retained trees during construction works and all Root Protection Areas (RPAs) marked out prior to commencement of work.

Should trees and sections of hedgerows be removed (subject to permission from the Local Planning Authority), replacement planting must be included to maintain the functionality of the overall feature for commuting and foraging bats. Under the current development proposals, a small section of hedgerow on the western boundary will be removed to create an access road onto the Site. No more hedgerow than necessary should be removed. Planting of native species could be done right up to the access, once it is completed to further minimise the gap in the hedgerow. It is our understanding that the southern boundary is to be enhanced by planting a new hedgerow with trees to act as a visual barrier between the proposed development and the existing residential houses. This should comprise a native species-rich hedgerow to provide increased foraging opportunities for bird species.

There is an opportunity to enhance the site by infilling existing hedgerows, where defunct, with native species. Further enhancement can be provided throughout the site by planting seasonal, native wildflowers at the base of the hedgerows. Providing species that flower at different times within the year can benefit a range of different species for longer.

5.1.2 ***Bats***

5.1.2.1 ***Lighting***

The Site is used by a number of bat species which utilise the un-lit linear boundary features surrounding the Site for foraging, and for commuting to other suitable habitats within the immediate wider environment. The hedgerows, canal and dark tree-lined roads are all important features and should be retained and remain in darkness.

Foraging behaviours can be significantly impacted from light spill, primarily by reducing the periods when bats are out foraging, creating barriers to existing foraging/commuting routes and increasing the predation risk from nocturnal hunters, such as tawny owl *Strix aluco*, around roost entrances. In some circumstances, light spill can cause bats to abandon their roosts (Bat Conservation Trust, 2018; Rowse *et al.*, 2015).

It is therefore recommended that a sympathetic lighting scheme is adopted across the site to ensure that dark corridors are maintained.

The proposed lighting scheme should take into account of the following:

- Avoiding direct lighting of sensitive habitats including any trees, hedgerows, watercourses and grassland, both on Site and immediately adjacent, in particular the southern and western boundary hedgerows, the canal and Claydon road;
- Use of reflectors to direct light away from linear features and the new access point where the hedge section will be removed.
- Install lamps of the shortest permissible column height and at the lowest permissible density;
- Use of low intensity bulbs (sodium lamps) to minimise light intensity;
- Lamps should be fitted with spill accessories avoiding upward spill and spill onto site boundaries, and
- Domestic amenity and security lighting should be set on motion-sensors and short (1min) timers to reduce the amount of time the Site is illuminated.

Particular attention should be paid to ensure that the canal itself remains a dark corridor, as this supports foraging and commuting of a number of different bat species, and also may support an off-Site noctule roost. It is our current understating that a minimum 5m standoff from the water's edge will be implemented as part of the development, which, in conjunction with an appropriate lighting scheme, would adequately maintain this dark corridor.

5.2 Ecological Enhancement

The National Planning Policy Framework (NPPF) 2021 guidelines recommends that all developments incorporate ecological enhancements where possible. Recommendations for enhancements which should be considered during the planning process can be found in the PEA report prepared by Peak Ecology in 2021 (Section 5).

Some specific recommendations to enhance the sites for use by bats are included below:

- Bat boxes can be positioned on new buildings to provide suitable roosting habitat. Several bat boxes can be positioned on one building, where appropriate, south-east and south-west facing. General guidelines for the positioning of bat roosting features include ensuring a clear flight line into the box, ideally positioned in line with a linear feature such as tree line or hedgerow known to be utilised by bats for foraging and commuting, and positioning boxes 3-5m above ground and away from features where predators, such as domestic cats, could sit. Suitable bat boxes are available at <https://www.nhbs.com/equipment> which also provides further information on the correct positioning of specific bat boxes.
- Use a native species within soft landscaped and open areas, ideally with a range of species with different flowering times, will encourage foraging by increasing the insect population. Many native plants are suitable for inclusion in planting areas, including herbaceous perennials, annual plants, trees and shrubs. Suitable species are listed on the RHS website: www.rhs.org.uk/plantsforpollinators

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APPENDIX A : Protected and Priority Species

Legal protection is afforded to particular habitats and species (as well as designated sites), see Appendix B. The legislation, and the habitats and species listed, vary between the different jurisdictions. Certain habitats and species are also considered to have some level of nature conservation importance, due to factors such as their rarity, vulnerability or declining population/status. This document uses the term 'priority habitats' and 'priority species', as they are those which should be considered as priorities for conservation (it should not be confused with priority habitats and species as listed in the EU Habitats Directive). Priority habitats and species are defined as those which are:

- 1) listed as a national priority for conservation (such as those listed as habitats and species of principal importance for the conservation of biodiversity);
- 2) listed as a local priority for conservation, for example in the relevant local Biodiversity Action Plan (BAP);
- 3) Red Listed using International Union for the Conservation of Nature (IUCN) criteria (e.g. in an all-Ireland Red List, in one of the UK Species Status Project reviews, in the Species of Conservation Concern Red List, Birds of Conservation Concern in Wales, or BWI/ RSPB Red List for Ireland and Northern Ireland (Birds of Conservation Concern in Ireland 2014 to 2019) or, where a more recent assessment of the taxonomic group has not yet been undertaken, listed in a Red Data Book);
- 4) listed as Near Threatened or Amber Listed e.g. in an all-Ireland Red List, in one of the UK Species Status Project reviews, in Birds of Conservation Concern in Wales, in the Species of Conservation Concern Amber List or BirdWatch Ireland (BWI)/RSPB Amber List for Ireland and Northern Ireland (Birds of Conservation Concern in Ireland 2014 to 2019);
- 5) listed as a Nationally Rare or Nationally Scarce species (e.g. in one of the Species Status Project reviews) or listed as a Nationally Notable species where a more recent assessment of the taxonomic group has not yet been undertaken; and/or
- 6) endemic to a country or geographic location (it is appropriate to recognise endemic sub-species, phenotypes, or cultural behaviours of a population that are unique to a particular place).

Most protected species are also considered to be priority species, although there are some exceptions. There are numerous priority habitats and species which do not receive any legal protection.

Note that the terms 'priority habitat' and 'priority species' used in this document differ from the following uses of the same terms:

- a) These terms were previously used to denote those habitats and species afforded the highest level of priority for conservation under the UK BAP; this has been superseded by the lists of habitats and species of principal importance for the conservation of biodiversity in England under Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006, Section 7 of the Environment (Wales) Act 2016, or their equivalents in Scotland

(Nature Conservation (Scotland) Act 2004, Scotland's Biodiversity Strategy and the Scottish Biodiversity List¹⁵) and Ireland (Actions for Biodiversity – Ireland's National Biodiversity Plan 2017 -2021¹⁶; and Valuing Nature – A Biodiversity Strategy for Northern Ireland to 2020).

- b) The terms 'Priority Natural Habitat Type' and 'Priority Species' are used to denote specific lists of habitats and species under The Conservation of Habitats and Species Regulations 2017; these are defined in Articles 1(d) and 1(h) respectively of the Habitats Directive.

APPENDIX B : Relevant Legislation

The following text provides information on the key legislation, which is applicable to this survey.

The main wildlife legislation in the UK is as follows:

European Legislation

The relevant sections of the EC Directives and international conventions are summarised below:

- EC Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (Habitat Directive 1992) as amended (92/43/EEC)

The Directive requires Member States to introduce a range of measures including the protection of species listed in the Annexes. The 189 habitats listed in Annex I of the Directive and the 788 species listed in Annex II, are to be protected by means of a network of sites. Once adopted, these are designated by Member States as Special Areas of Conservation (SACs), and along with Special Protection Areas (SPAs) classified under the EC Birds Directive. The Habitats Directive introduces the precautionary principle; that disturbance to the designated sites can only be permitted having ascertained no adverse effect on the integrity of the site.

- EC Directive on the Conservation of Wild Birds (Birds Directive 1979) as amended (79/409/EEC)

The main provisions of the Directive includes; the maintenance of the favourable conservation status of all wild bird species across their distributional range.

- Bern Convention on the Conservation of European Wildlife and Natural Habitats (1979)

The Convention imposes legal obligations on contracting parties, protecting over 500 wild plant species and more than 1000 wild animal species.

UK Legislation

The sections of UK legislation considered to be of relevance include:

- The Conservation (Natural Habitats, and c.) Regulations 2017 (as amended)

This transposes the Habitats Directive into national law. The Regulations provide for the designation and protection of 'European sites', and the protection of 'European protected species.

- The Wildlife and Countryside Act 1981 (as amended) (WCA)

This consolidates and amends existing national legislation to implement the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) and Council Directive 79/409/EEC on the Conservation of Wild Birds (Birds Directive) in Great Britain.

- The Countryside and Rights of Way Act 2000 (CRoW)

This act strengthens wildlife enforcement legislation.

- The Protection of Badgers Act 1992

Species-Specific Legislation

Species specific legislation is provided in the Table below:

Species-Specific Wildlife Legislation

Feature/Species	Legislation	It is an offence to:
Hedgerows	Hedgerow Regulations 1997.	<p>Outlines a number of criteria for designation of 'important' hedgerows.</p> <p>'Important' hedgerows cannot be removed without notifying the relevant body.</p>
Breeding birds	Wildlife and Countryside Act 1981 (as amended). Countryside and Rights of Way Act 2000.	<ul style="list-style-type: none"> • Kill; • Injure; • Take; <p>any wild bird, their eggs or nest (with the exception of those on Sch. 2).</p>
Bats	Sch. 5 Wildlife and Countryside Act 1981 (as amended). Conservation of Habitats and Species Regulations 2010 (as amended).	<ul style="list-style-type: none"> • Intentionally or deliberately kill, injure or capture (or take) bats; • Deliberately disturb bats (whether in a roost or not); • Recklessly disturb roosting bats or obstruct access to their roosts; • Damage or destroy bat roosts.
Otter	Sch. 5 Wildlife and Countryside Act 1981 (as amended). Conservation of Habitats and Species Regulations 2017 (as amended).	<ul style="list-style-type: none"> • Deliberately capture, injure or kill an otter; • Disturb an otter in its breeding or resting place; • Damage, destroy or obstruct an otter's breeding or resting place.

Feature/Species	Legislation	It is an offence to:
Water vole	Sch. 5 Wildlife and Countryside Act 1981 (as amended).	<ul style="list-style-type: none"> Deliberately capture, injure or kill; Disturb a water vole whilst it is in its breeding or resting place; Damage, destroy or obstruct a water vole's breeding or resting place.

In addition, species and habitats listed on the UK Post-2010 Biodiversity Framework (formally the UK BAP) are also considered. Details on these species and habitats can be found at: <http://jncc.defra.gov.uk/page-5705>.

Protected Sites

A network of protected sites, at varying levels, have been put in place across the UK. Further details are provided below;

International importance

- Natura 2000

Natura 2000 is the name of the European Union-wide network of nature conservation sites established under the EC Habitats and Birds Directives. This network will comprise Special Areas of Conservation (SACs) and Special Protection Areas (SPAs).

- Special Areas of Conservation (SAC)

SACs are designated under the EC Habitats Directive. The Directive applies to the UK and the overseas territory of Gibraltar. SACs are areas which have been identified as best representing the range and variety within the European Union of habitats and (non-bird) species listed on Annexes I and II to the Directive. SACs in terrestrial areas and territorial marine waters out to 12 nautical miles are designated under the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended). New and/or amended Habitats Regulations are shortly to be introduced to provide a mechanism for the designation of SACs and SPAs in UK offshore waters (from 12-200 nm).

National importance

- Sites of Special Scientific Interest (SSSI)

The SSSI series has developed since 1949 as the national suite of sites providing statutory protection for the best examples of the UK's flora, fauna, or geological or physiographical features. Most SSSIs are privately-owned or managed; others are owned or managed by public bodies or non-government organisations. The SSSIs designation may extend into intertidal areas out to the jurisdictional limit of local authorities, generally Mean Low Water in England and Northern Ireland; Mean Low Water of Spring tides in Scotland. In Wales, the

limit is Mean Low Water for SSSIs notified before 2002, and, for more recent notifications, the limit of Lowest Astronomical Tides, where the features of interest extend down to LAT. There is no provision for marine SSSIs beyond low water mark. Originally notified under the National Parks and Access to the Countryside Act 1949, SSSIs have been renotified under the Wildlife and Countryside Act 1981. Improved provisions for the protection and management of SSSIs were introduced by the Countryside and Rights of Way Act 2000 (in England and Wales) and the Nature Conservation (Scotland) Act 2004.

Regional/local importance

- Wildlife Sites

Local authorities for any given area may designate certain areas as being of local conservation interest. The criteria for inclusion, and the level of protection provided, if any, may vary between areas. Most individual counties have a similar scheme, although they do vary. These sites, which may be given various titles such as 'Listed Wildlife Sites' (LWS), 'County Wildlife Sites' (CWS), 'Local Nature Conservation Sites' (LNCS), 'Sites of Importance for Nature Conservation' (SINCs), or 'Sites of Nature Conservation Importance' (SNCIs), together with statutory designations, are defined in local and structure plans under the Town and Country Planning system and are a material consideration when planning applications are being determined.

APPENDIX C : Methodologies

Assessment Method for Bats

Following current good practice guidelines (Collins (ed) 2016), the assessment comprised a visual inspection of each of the trees and built structures, for the latter including any internal areas such as roof voids or cellars. For ease of reference, each structure was numbered B1, B2, B3 etc and trees were numbered T1, T2, T3 etc.

The location and description of any features such as holes, crevices or internal voids that could potentially be used by roosting bats was recorded and a search was made for any evidence of bat presence such as droppings or feeding remains. Binoculars, ladders, high powered torches and endoscopes were used where necessary to facilitate more detailed inspection of individual features.


Based on the number, location and type of any potential roost features, structures and trees were categorised as having negligible, low, moderate or high potential for roosting bats, or confirmed roost where direct evidence of bat presence was encountered. Evaluation of roost potential is necessarily subjective and relies on the professional judgment of the surveyor; however, the table below provides a useful guide to how this is informed.

Examples of characteristics that inform assessment of roost potential

Status	Typical characteristics
Negligible potential	<ul style="list-style-type: none">• Modern construction / immature trees• Lack of access points for bats• Situated within very poor quality foraging habitat• High levels of external lighting
Low potential	<ul style="list-style-type: none">• Small number of minor hole / crevice features suitable for opportunistic roosting• Lack of roof voids or small cluttered roof spaces• Features obscured by dense cobwebs• Unlikely to support breeding or hibernating bats• Situated within poor quality foraging habitat
Moderate potential	<ul style="list-style-type: none">• One or more hole / crevice features suitable for roosting, e.g. damaged soffits, uneven roof tiles• Access into large, dark internal spaces such as roof voids• Trees with small fissures and crevices in dead wood suitable for day roosting• Situated within or near to moderate/good quality foraging habitat

Status	Typical characteristics
High potential	<ul style="list-style-type: none"> • Old buildings / mature or veteran trees • Trees with woodpecker holes or deep fissures and crevices in dead wood • Structures with large, uncluttered roof voids • Traditional brick, stone or timber framed barns • Features suitable for large numbers of bats and/or several different species • Types of structure suitable for hibernation, e.g. caves, tunnels, ice houses etc • Low level of disturbance by humans • Little / no external lighting • Situated within good quality foraging habitat
Confirmed Roost	Bats seen or heard within the roost feature during the survey Bat droppings, particularly if piled rather than scattered Feeding remains such as moth wings Existing record of roost at that location

Guidance for assessing the overall value of potential development sites for bats (Collins (ed), 2016)

Site Status	Description
 <p style="writing-mode: vertical-rl; transform: rotate(180deg);">Increasing site value for bats</p>	<ul style="list-style-type: none"> • No features likely to be used by bats • Small number of potential roost sites but unlikely to be suitable for maternity roosts or hibernacula • Isolated habitat that could be used by foraging bats • Isolated site not connected by prominent linear features to suitable other/adjacent foraging habitats • Several potential roost sites in buildings, trees or other structures • Habitat suitable for foraging bats (e.g. trees, water, scrub, grassland present) • Site is connected with the wider landscape by features that could be used by foraging/commuting bats (e.g. gardens backed by scrub or line of trees) • Buildings, trees or other structures (e.g. caves or underground structures) of particular significance for roosting bats • Site includes high quality foraging habitat (e.g. broadleaved woodland, tree-lined watercourses, parkland with mature trees and rough grass) • Site is connected with the wider landscape by strong linear features that could be used by commuting bats (e.g. hedgerows, river valleys) • Site is close to known roosts • Bats recorded or observed using an area for foraging or commuting close to a potential roost

APPENDIX D : Bat Activity Map



APPENDIX E : Bat Static Monitoring Summary

Note: Static detectors create a number of files that can be the result of non-bat related recordings such as wind, birds, small mammals and insects. A total count of files/recordings is included for each static location per recording period.

Monitoring Period	Species	Static Number			
		Western Boundary		Central Hedgerow	
		Count	% Count	Count	% Count
19-23 April 2022	Common pipistrelle	96	91.4	47	75.8
	Soprano pipistrelle	1	1.0	6	9.6
	Daubenton's bat				
	Noctule	4	3.8		
	Leisler's bat			4	6.5
	Brown long-eared				
	Pipistrelle sp.				
	Myotis sp.	4	3.8	5	8.1
	Total count of bat calls	105		62	
	Total count of files	408		345	

Monitoring Period	Species	Static Number			
		Western Boundary		Central Hedgerow	
		Count	% Count	Count	% Count
09-15 May 2022*	Common pipistrelle	141	80.6	149	94.4
	Soprano pipistrelle	23	13.1	2	1.3
	Daubenton's bat	8	4.6	1	0.6
	Noctule			3	1.9
	Leisler's bat			1	0.6
	Brown long-eared			1	0.6
	Pipistrelle sp.				
	Myotis sp.	3	1.7	1	0.6
	Total count of bat calls	175		158	
	Total count of files	180		517	

*Due to technical error, only one night of recording occurred on the device located in the western boundary.

Monitoring Period	Species	Static Number			
		Western Boundary		Central Hedgerow	
		Count	% Count	Count	% Count
13-17 June 2022	Common pipistrelle	209	68.5	323	81.1
	Soprano pipistrelle	55	18.0	22	5.5
	Daubenton's bat	39	12.8	1	0.3
	Noctule	2	0.7	51	12.8
	Leisler's bat				
	Brown long-eared			1	0.3
	Pipistrelle sp.				
	Myotis sp.				
	Total count of bat calls	305		398	
	Total count of files	370		1034	

Monitoring Period	Species	Static Number			
		Western Boundary		Central Hedgerow	
		Count	% Count	Count	% Count
12-16 July 2022	Common pipistrelle	232	77.3	404	81.0
	Soprano pipistrelle	23	7.7	85	17.0
	Daubenton's bat				
	Noctule	8	2.7	2	0.4
	Leisler's bat				
	Brown long-eared			2	0.4
	Pipistrelle sp.	31	10.3	6	1.2
	Myotis sp.	6	2.0		
	Total count of bat calls	300		499	
	Total count of files	595		827	

Monitoring Period	Species	Static Number			
		Western Boundary		Central Hedgerow	
		Count	% Count	Count	% Count
17-22 August 2022	Common pipistrelle	226	82.6	77	70.6
	Soprano pipistrelle	13	4.7	4	3.7
	Daubenton's bat	13	4.7	8	7.3
	Noctule	16	5.8	16	14.7
	Leisler's bat	3	1.1	4	3.7
	Brown long-eared				
	Pipistrelle sp.				
	Myotis sp.	3	1.1		
	Total count of bat calls	274		109	
	Total count of files	4354		3390	

Monitoring Period	Species	Static Number			
		Western Boundary		Central Hedgerow	
		Count	% Count	Count	% Count
12–16 September 2022	Common pipistrelle	619	84.3	61	87.2
	Soprano pipistrelle	78	10.6	8	11.4
	Daubenton's bat	1	0.1		
	Noctule	5	0.7	1	1.4
	Leisler's bat				
	Brown long-eared	2	0.3		
	Pipistrelle sp.				
	Myotis sp.	29	4.0		
	Total count of bat calls	734		70	
	Total count of files	6454		456	

Monitoring Period	Species	Static Number			
		Western Boundary		Central Hedgerow	
		Count	% Count	Count	% Count
10-14 October 2022	Common pipistrelle	14	77.8	2	66.7
	Soprano pipistrelle				
	Daubenton's bat				
	Noctule				
	Leisler's bat				
	Brown long-eared				
	Pipistrelle sp.				
	Myotis sp.	4	22.2	1	33.3
	Total count of bat calls	18		3	
	Total count of files	277		4914	