



Bat Activity Surveys

**Land West of Shoreham Road,
Small Dole, West Sussex**

The Ecology Partnership, Thorncroft Manor, Thorncroft Drive, Leatherhead, Surrey KT22 8JB

T +44 (0) 1372 364133

E info@ecologypartnership.com

W ecologypartnership.com

Contents

1.0	INTRODUCTION	3
	BACKGROUND	3
	SITE CONTEXT AND STATUS.....	3
	LEGISLATION	4
2.0	METHODOLOGY	5
	WALKED ACTIVITY TRANSECTS.....	5
	STATIC DETECTOR SURVEYS.....	6
	LIMITATIONS.....	7
3.0	RESULTS.....	7
	TRANSECT SURVEYS	7
	STATIC RECORDING SURVEYS	9
4.0	DISCUSSION.....	14
	IMPACTS FROM DEVELOPMENT.....	15
	ENHANCEMENTS	17
5.0	CONCLUSIONS	20
	APPENDIX 1: RAW DATA	23

LIABILITIES:

Whilst every effort has been made to guarantee the accuracy of this report, it should be noted that living animals and plants are capable of migration/establishing and whilst such species may not have been located during the survey duration, their presence may be found on a site at a later date.

This report provides a snapshot of the species that were present at the time of the survey only and does not consider seasonal variation. Furthermore, where access is limited, or the site supports habitats which are densely vegetated only dominant species maybe recorded.

The recommendations contained within this document are based on a reasonable timeframe between the completion of the survey and the commencement of any works. If there is any delay between the commencement of works that may conflict with timeframes laid out within this document or have the potential to allow the ingress of protected species, a suitably qualified ecologist should be consulted.

It is the duty of care of the landowner/developer to act responsibly and comply with current environmental legislation if protected species are suspected or found prior to or during works.

1.0 Introduction

Background

- 1.1 The Ecology Partnership Ltd was commissioned by Wates Development Ltd to undertake bat activity surveys on land west of Shoreham Road, Small Dole, West Sussex BN5 9YH.
- 1.2 This survey follows the March 2022 preliminary ecological appraisal (PEA) which identified a moderate habitat suitability for foraging and commuting bats. This habitat was largely restricted to the site boundaries, which had connectivity both on site and within the wider landscape. Further activity surveys were recommended, in accordance with Bat Conservation Trust guidelines, to determine which species are using the habitats on site and in what capacity.
- 1.3 This report presents the results of The Ecology Partnership's surveys on site, which aims specifically to assess the site's potential to support foraging and commuting bats that may be affected by the proposed development.
- 1.4 Section 2 of this report sets out the methodologies of The Ecology Partnership's surveys. In section 3 the results of the surveys are presented. Discussions, implications for development, and site enhancements are found in section 4. Section 5 presents the conclusions drawn from the report.

Site Context and Status

- 1.5 The site lies to the north of the village of Small Dole, West Sussex, BN5 9YH (TQ 21331 13112). The site covers approximately 5.45 ha and consists of an agricultural field with hedgerows and trees on the north, west and east boundaries, and deciduous woodland to the south.
- 1.6 The site, its immediate surroundings, and approximate red line boundary are shown in the Figure 1.



*Figure 1: Approximate red line boundary of the site and immediate surroundings.
Taken from Google Earth Pro, March 2022*

Description of Proposed Development

1.7 The proposals include a residential development with public open space provision.

Legislation

1.8 Bats are covered by the following relevant legislation:

- The Wildlife and Countryside Act (1981) (as amended)
- The Countryside and Rights of Way Act (2000)
- Habitat and Species Directive (1992) Annex 4
- The Natural Environment and Rural Communities Act (NERC, 2006)
- The Conservation of Habitats and Species Regulations (Amendment) (EU Exit) Regulations 2019

2.0 Methodology

2.1 The site was subject to activity transects and static detector surveys. The two methods complement each other to form a general picture of what species are present on-site and how they utilise the habitat. The walked transects provide qualitative data on how bats utilise the habitats on-site and the static detector surveys facilitate quantitative analysis of data.

Walked Activity Transects

2.2 Dusk transect surveys began with surveyors in position at the start of their set transect routes at sunset, transect routes were walked at a consistent pace with all bat activity being recorded and observations maintained for 2 hours after sunset. The transect routes are shown in Figure 2 and weather conditions and start and end times of the survey in Table 1. Surveyors were equipped with an Echo Meter Touch 2 with iPad and/or Elekon Batlogger M Bat Detectors. All surveys were conducted by ecologist Digby Hayden BSc (Hons).

Table 1. Dates of transect surveys and weather conditions

Date	Sunrise/sunset time	Surveyors	Survey start time	Survey end time	Start temp (°C)	End temp (°C)	Weather conditions
16/05/2022	20:46	DH	20:20	22:45	16	15	20% cloud cover, BFT-1
21/06/2022	21:20	DH	20:50	23:20	18	16	Clear, BFT 0
27/07/2022	20:58	DH	20:30	22:50	18	16	30% cloud cover, BFT 1
28/09/2022	18:48	DH	18:30	20:45	13	11	0% cloud cover, cold, BFT 0
24/10/2022	17:51	DH	17:30	19:50	12	10	70% cloud cover, damp, BFT 0



Figure 2: The walked transect route and static detector locations.

Static Detector Surveys

2.3 Titley Scientific Anabat Express Static bat detectors were deployed on site for a period of 5 consecutive nights per transect survey. Two Anabat Express static detectors were installed on site in pre-determined locations (as in Figure 2), deployment dates of the detectors are shown below in Table 2. The static detectors were configured to start recording half an hour before sunset and end recording half an hour after sunrise.

Table 2. Recording periods of static detectors

Month	First recording night	Last recording night
May	16/05/2022	20/05/2022
June	21/06/2022	25/06/2022
July	27/07/2022	31/07/2022
September	26/09/2022	30/09/2022
October	24/10/2022	28/10/2022

2.4 Calls were analysed within Anabat Insight Version 1.9.2-1-gee1731a and identified to species level where possible or genus if otherwise.

Limitations

2.5 Acoustic surveys are more effective at recording species that emit louder and less directional calls, in the UK this comprises *Nyctalus sp.*, *Pipistrellus sp.* and *Eptesicus* bats. Conversely, species that emit low amplitude and/or highly directional calls (*Rhinolophus sp.*, *Barbastelle*, *Myotis sp.*, & *Plecotus sp.*) are likely to be underrepresented.

2.6 It should be noted that whilst every effort has been made to provide a comprehensive description of the site, no single investigation could ensure the complete characterisation and prediction of the natural environment.

2.7 The data obtained by static detectors does not allow for differentiation between individual bats foraging near the detector or multiple bats commuting past, therefore the activity should be seen as indicative only.

2.8 Due to unforeseen circumstances the planned August survey date was not undertaken, this survey was undertaken into September and the survey period extended into October. With good conditions for bat activity extending into October in 2022, it is considered that a robust characterisation of bat activity across the activity season on site has been established.

3.0 Results

Transect Surveys

3.1 Bat activity surveys have been carried out in May, June, July, September, and October 2022. The following section summarises the results from these surveys per transect route.

3.2 Two bat surveyors followed the predetermined route illustrated in figure 2 above. Activity levels, foraging and commuting behaviour were recorded and species were identified using bat detectors. Surveyors began the surveys at sunset, and continued until 2 hours

after sunset. Anabat remote recording devices were placed around the site in the same locations each month as shown in figure 2, and, picked up at least five nights later.

May

3.3 During the May transect, moderate levels of bat activity were recorded on site. Serotine (*Eptesicus serotinus*) was the most frequently recorded species on site (8 individuals), followed by brown long-eared bats (*Plecotus auritus*) (5 individuals). A noctule (*Nyctalus noctula*) was initially observed foraging in the north-east corner of site 15 minutes after sunset and then numerous individuals of both species were seen across the length of the transect until the end of the survey. 2 myotis sp. were recorded, one at 21:44 foraging along the western boundary, and the other at 22:07 foraging over the scrub island boundary. Single occurrences of soprano pipistrelle (*Pipistrellus pygmaeus*) and Leisler (*Nyctalus leisleri*) were recorded at 21:15 and 21:55. The soprano pipistrelle was recorded commuting in the south-east corner of site, and the Leisler was recorded commuting in the north-west corner of site.

June

3.4 During the June transect, low levels of bat activity were recorded on site. Soprano pipistrelle was the most frequently recorded species on site (4 individuals). A soprano was initially observed foraging along the eastern boundary of the site 25 minutes after sunset. There were also 2 occurrences of noctules and common pipistrelles (*Pipistrellus pipistrellus*) on site. Both common pipistrelles recorded were foraging in the north-west corner of site at 21:15 and 22:43. The first noctule was recorded foraging in the southern centre of site at 21:15, the second was recorded in the north-west corner of site at 22:09.

July

3.5 During the July transect, low levels of bat activity were recorded on site. Common pipistrelle was the most frequently recorded species on site (2 individuals). A common pipistrelle was initially observed in the north-western corner of site 35 minutes after sunset. Single occurrences of noctule, Daubentons (*Myotis daubentonii*) and Leisler were recorded at 21:35, 22:03, and 22:21. The noctule was observed in the north-west corner of site, the daubentons pipistrelle was recorded on the eastern boundary of site, and the leisler was recorded commuting in the south-east corner of site.

September

3.6 The September survey was largely similar to the July survey with the most frequently recorded species being 2 common pipistrelles. The first bat recorded was a common pipistrelle which was commuting along the western boundary. Single occurrences of myotis and noctule bats were recorded at 19:42 and 20:01. The myotis was recorded commuting on the southern boundary, and the noctule was heard but not seen.

October

3.7 During the October transect, only low levels of bat activity were recorded on site, with only three soprano pipistrelles, two common pipistrelles and one noctule. The three soprano pipistrelles were recorded foraging along the eastern boundary of the site at 19:01. The two common pipistrelles were recorded along the western boundary of the site at 18:21. The noctule bat was recorded in the north-west corner at 18:43.

Table 3: Summary of results from the transect surveys

Date	Common Pipistrelle	Soprano Pipistrelle	Myotis	Serotine	Noctule	Leisler	BLE	Daubentons
May	2	1	2	9	1	1	5	-
June	2	4	-	-	2	-	-	-
July	2	-	-	-	1	1	-	1
September	3	-	1	-	1	-	-	-
October	2	3	-	-	1	-	-	-

Static Recording Surveys

3.8 Anabat Express static recording devices were deployed on the site, for recording periods (Table 2) in May, June, July, September and October 2022, the locations are detailed in Figure 2. A summary of the results for each Anabat location are shown in Table 4 below.

Table 4: Summary of results from static detectors in the east (AB1) and south (AB2) of the site

	Total Count		Percentage of total (%)		Peak count on a single night		Mean ¹ number of passes/night	
Species	AB1	AB2	AB1	AB2	AB1	AB2	AB1	AB2
Common Pipistrelle	175	288	31.64%	22.80%	23 <i>16th May</i>	62 <i>24th Oct</i>	7	11
Soprano Pipistrelle	85	860	15.37%	68.09%	14 <i>28th July</i>	204 <i>23rd June</i>	3	34
Myotis spp.	107	53	19.34%	4.19%	12 <i>29th July</i>	10 <i>Multiple Dates</i>	4	2
Serotine	110	57	19.89%	4.51%	15 <i>25th June</i>	18 <i>17th May</i>	4	2
Noctule	37	4	6.69%	0.31%	4 <i>Multiple Dates</i>	3 <i>27th Oct</i>	1	0
Leisler's	36	1	6.50%	0.07%	3 <i>17th May</i>	1 <i>22nd June</i>	1	0
Barbastelle	3	0	0.54%	0%	1 <i>Multiple Dates</i>	0	0	0
Total	553	1263						
Grand Total	1816							

3.9 Consistent with the activity surveys, bat passes were generally more frequent along the southern boundary than along the eastern hedgerow. This was most distinct in May, June and October, when there were approximately three times more bat passes recorded on the southern boundary than on the eastern boundary. However, in July the eastern boundary recorded 136 more bat passes than the southern boundary. Common pipistrelles were most frequently recorded in the transect surveys, but soprano pipistrelles were the most frequently recorded on the static detectors.

3.10 Barbastelles were identified in the static surveys as well as the other species that were previously identified in the transects surveys. The barbastelles were identified only by anabat 1 (AB1).

¹ The mean number of bats has been rounded down to the nearest whole number.

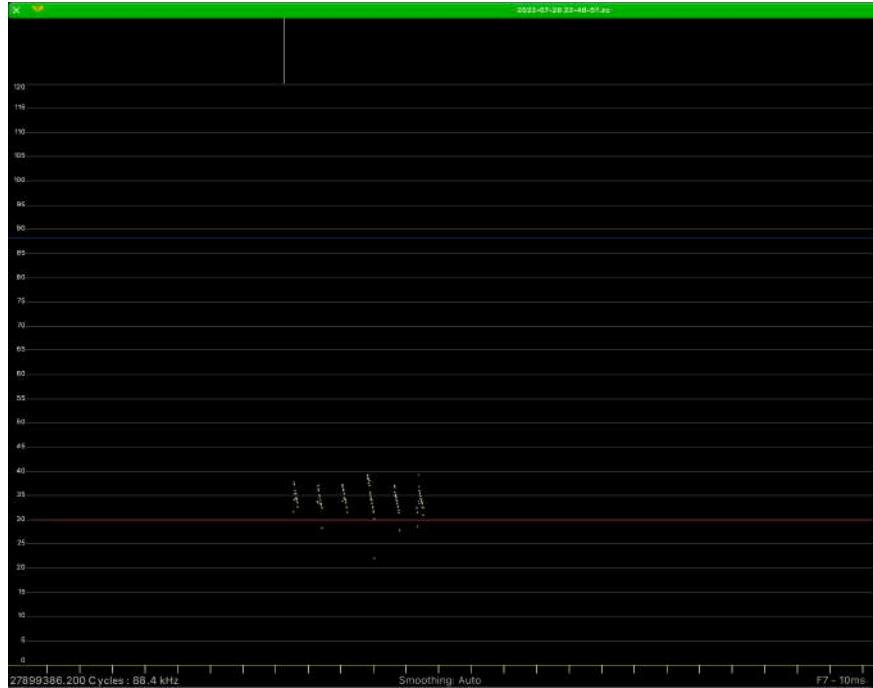


Figure 3: Barbastelle bat call recorded at 22:48 on 28/07/22 on the eastern boundary.

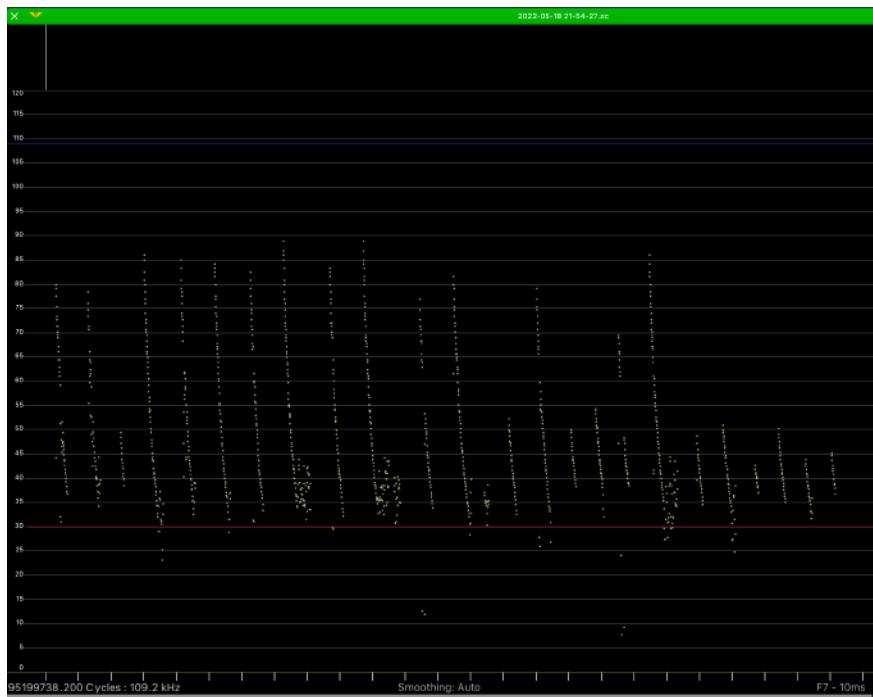


Figure 4: Myotis bat call recorded at 21:54 on 18/05/22 on the eastern boundary.



Figure 5: Leisler's bat call recorded at 00:40 on 23/06/22 on the eastern boundary.



Figure 6: Noctule bat recorded at 21:09 on 27/07/22 on the eastern boundary.

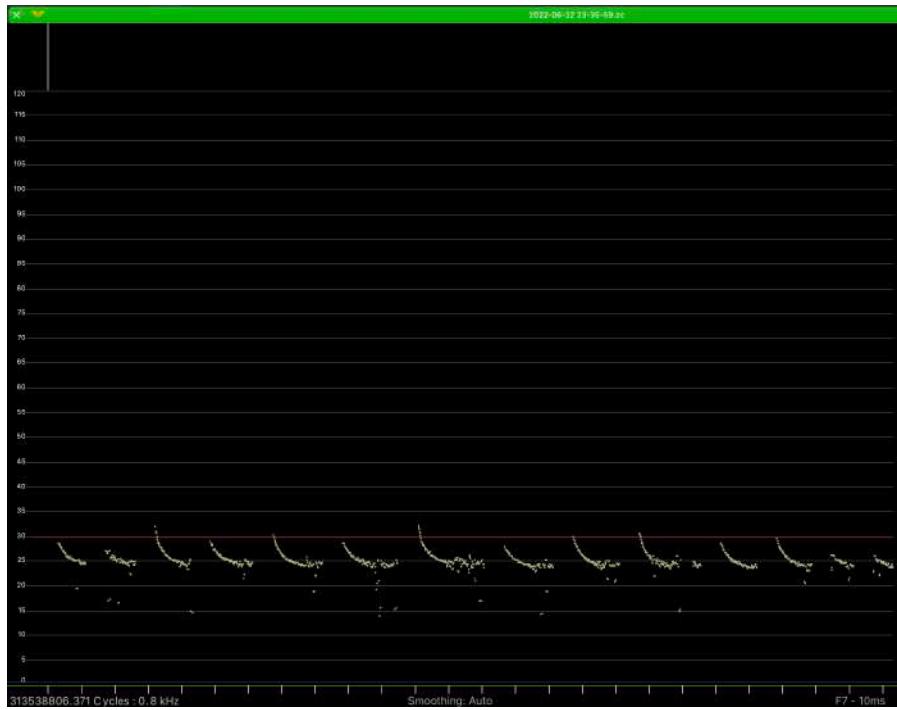


Figure 7: Serotine bat recorded at 23:35 on 22/06/22 on the eastern boundary.

Table 7: Total bat passes recorded by species

Bat Species	Total Passes
Common Pipistrelle	463
Soprano Pipistrelle	945
Myotis sp.	160
Leisler's	37
Noctule	41
Serotine	167
Barbastelle	3

Table 8: Number of calls made at each Anabat location

Anabat	Total Calls Recorded
Anabat 1 (Eastern Boundary)	553
Anabat 2 (Southern Boundary)	1263

Table 9: Number and percentage of calls made by each species at each Anabat location

Bat Species	Anabat 1 (East) Total	% of Anabat 1 calls	Anabat 2 (South) Total	% of Anabat 2 calls
Common Pipistrelle	175	31.65%	288	22.8%
Soprano Pipistrelle	85	15.37%	860	68.09%
Myotis sp.	107	19.35%	53	4.20%
Leisler's	36	6.51%	1	0.08%
Noctule	37	6.69%	4	0.32%
Serotine	110	19.89%	57	4.51%
Barbastelle	3	0.54%	0	0.00%

4.0 Discussion

4.1 The site comprises largely sub-optimal habitat for foraging and commuting bats with the site largely supporting managed grassland. However, the site supported good connectivity within the wider landscape, notably the edges of the site where the woodland and hedgerow extends to the wider landscape. The Ecology Partnership PEA (March 2022) concluded that the site had a low suitability for foraging and commuting bats. Five bat activity surveys were therefore conducted on site, recommended in accordance with Bat Conservation Trust Good Practice Guidelines.

4.2 The walked transects identified eight bat species using the site for foraging and commuting purposes: common pipistrelle, soprano pipistrelle, serotine, myotis, leisler, daubenton, noctule and brown long-eared bat. This was dominated by foraging common pipistrelles, with greatest frequency of passes recorded along the northern and western boundaries of the site.

4.3 The static detector surveys indicated the presence of an additional four species, noctule, *Myotis spp.*, barbastelle, and brown long-eared bat.

4.4 Barbastelle is a notable find, as a rare species in the UK. The Annex II species barbastelle was only recorded in low numbers on the static detectors. The timing of the calls recorded across all survey months were at least 40 minutes after sunset, and with the mean average emergence time for the species as 24 minutes (Zeale *et al*, 2012), it is considered unlikely that a roost is present within the immediate vicinity.

4.5 Barbastelle were recorded on one occasion in May, July and October surveys, and only on the eastern Anabat. There were a total of 3 recordings across three different nights. This suggests that the site does not form a key foraging or commuting habitat for the species and the site falls outside the wider conservation area for Sussex bats SACs.

Impacts from Development

4.6 Impacts to bats from development can occur either directly, through direct habitat loss and fragmentation, or indirectly, mostly through light pollution. Where possible, development should seek to retain the existing important linear features across the site from both direct loss as well as buffer these habitats from any proposed lighting schemes.

4.7 The proposals are currently at outline stage, however, it is understood that development will involve the retention of all linear features on site. The southern and eastern boundaries have the potential to be impacted, and as such consideration of a green corridor along these edges should be made. An enhanced edge will maintain landscape connectivity and support green infrastructural ambitions under the forthcoming Environment Bill.

4.8 It is understood that the footprint of the development scheme will be contained within the grassland habitat. This was considered sub-optimal for foraging and commuting bats and not seen to be in active use by bats during any of the activity surveys. As such, no direct impacts to bat foraging and commuting habitat are anticipated. However, a further assessment will need to be made once the development scheme is finalised.

4.9 In order to prevent indirect impacts to the linear features on site, a sensitive lighting scheme should be adopted. At present the northern boundary of the site is currently subject to low levels of artificial lighting at night, and this is thought to be the cause of limited bat activity within these areas. While UK bat species are generally light averse, artificial lighting can affect bats in different ways, eliciting species specific responses. Slower flying bats such as, barbastelle, brown long-eared, and *Myotis*, all recorded on-site, are more light-averse whereas pipistrelle bats are more tolerant of artificial lighting. This can hand competitive advantages to the more light-tolerant species of bat.

4.10 It is recommended that existing and proposed habitat suitable for bats, namely the hedgerows and treelines, notably the eastern and southern edges, be buffered from direct lighting. The proposals have potential for increased light spillage onto the linear features from the proposed residential blocks directly adjacent to them to the north. Increased lighting during the hours of bat activity, may impact significantly upon the local commuting and foraging bat community. It is recommended that baffles or physical light barriers are put in place to limit the amount of light spilling onto the site as well as additional planting to screen light.

4.11 Any proposed lighting scheme as part of the development should consider bats in the surrounding area as well as the site. All bat species are nocturnal, resting in dark conditions in the day and emerging at night to feed. Bats are known to be affected by light levels, which can affect both their roosting and foraging behaviour. This needs to be considered with a sympathetic lighting scheme for the development. Recommendations include:

- Installing lighting only if there is a significant need;
- LED luminaires should be used where possible due to their sharp cut-off, lower intensity, good colour rendition and dimming capability;
- A warm white spectrum (ideally <2700 Kelvin) should be adopted to reduce blue light component;
- Directing light to where it is needed and avoiding light spillage;
- Using baffled lighting where light is directed towards the ground;
- Avoid putting lighting near tree lines or hedgerows and angling light away from these linear features which are used by commuting and foraging bats;
- Planting a barrier or using man-made features required within the scheme to form a barrier.

Example of illuminance limit zonation

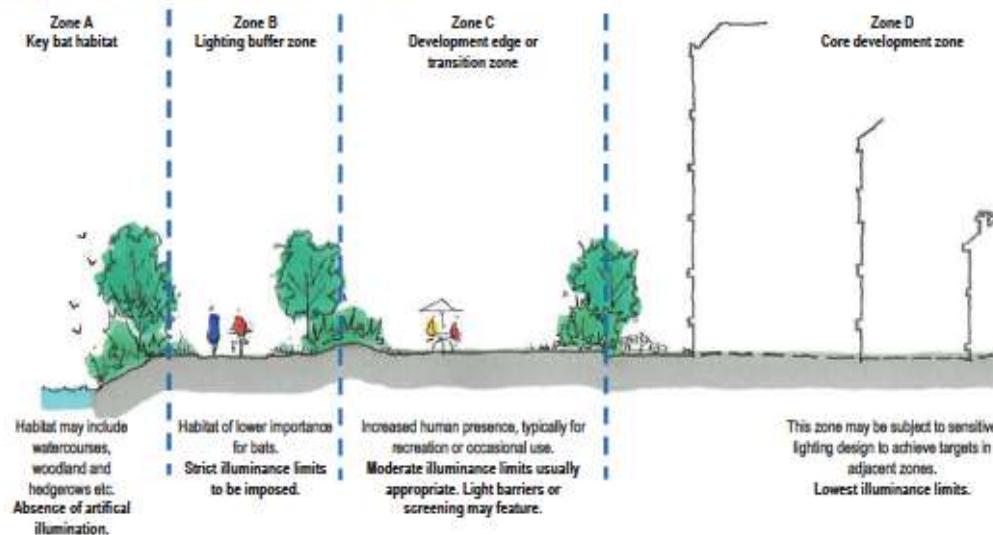


Figure 8: Example of planting scheme to limit impacts of lighting on bats from nearby developments.

Enhancements

4.12 Enhancements detailed below include sensitive management of existing habitats on-site, creation of new habitats and green linkages, provision of bat boxes and planting of night flowering plant species.

4.13 Enhancing existing linear features by planting up gaps with native woody species, particularly on the northern and western boundaries, would greatly improve their connectivity and ecological value. Creating new tree lines and hedgerow links within the red line boundary would also be considered an appropriate strategy to ensure that bats would not be adversely affected by the proposals. Native species recommended include:

- Oak (*Quercus robur*)
- Rowan (*Sorbus aucuparia*)
- Hawthorn (*Crataegus monogyna*)
- Dogrose (*Rosa canina*)
- Beech (*Fagus sylvatica*)
- Wild privet (*Ligustrum vulgare*)
- Elder (*Sambucus nigra*)
- Hazel (*Corylus avellana*)
- Hornbeam (*Carpinus betulus*)

4.14 In terms of habitat edge planting, fruit bearing species are recommended, which may attract insect prey and support foraging bats. Recommended fruit bearing species include: apple (*Malus domestica*), pear (*Pyrus pyraster*), wild cherry (*Prunus avium*), plum (*Prunus domestica ssp domestica*), and crab apple (*Malus sylvestris*). Street tree planting is recommended throughout the site with species such as: alder (*Alnus glutinosa*), hazel (*Corylus avellana*), hornbeam (*Carpinus betulus*) and field maple (*Acer campestre*).

4.15 Planting of open greenspace/amenity grasslands on the site can provide suitable foraging habitat for bats, in particular for pipistrelle species. This would also contribute to biodiversity net gain on site, as optimal foraging habitat does not currently exist in the field centres and is restricted largely to the treelines. It is recommended that suitable areas are planted with wildflower species. Of particular benefit to bats are night-flowering species that attract night-flying invertebrate prey. The following native species are considered suitable:

- Nottingham catchfly (*Silene nutans*)
- Night-flowering catchfly (*Silene noctiflora*)
- Bladder campion (*Silene vulgaris*)
- Soapwort (*Saponaria officinalis*)
- Wild marjoram (*Orignaum vulgare*)
- Borage (*Borago officinalis*)
- Yarrow (*Achillea millefolium*)
- Primrose (*Primula vulgaris*)
- Corn marigold (*Glebionis segetum*)
- Perforate St John's-wort (*Hypericum perforatum*)
- Wood forget-me-not (*Myosotis sylvatica*)
- Ox-eye daisy (*Leucanthemum vulgare*)
- Corncockle (*Agrostemma githago*)
- Cornflower (*Centaurea cyanus*)

4.16 To enhance the local bat population and provide roosting opportunities, it is recommended that boxes should be hung on retained mature trees and have clear flight paths. Bat boxes

should be erected on the trees prior to works starting on site. Recommended boxes are made of a hardwearing woodcrete material, or similar. Examples include:

- Vivara Pro Woodstone Bat Box (Figure 7) – general purpose hard-wearing bat box suitable for a number of bat species.
- Miramare Bat Box – a larger bat box suitable for a number of different bats, particularly crevice dwelling species such as pipistrelles.

4.17 Bat roosting space can also be incorporated into the design of any new dwellings or brick garages to be erected on site. These should be installed beneath the apex of the roof, between 3m – 6m from the ground. Bat bricks should be installed onto the south or west face of the buildings where possible. The bat brick (Figure 9) is targeted towards crevice dwelling species including common pipistrelle bats which were the dominant species recorded using the site for foraging and commuting.



Figure 9: Integrated bat bricks recommended for installation within proposed buildings on site (left) and an example of a recommended bat box – Vivara Pro Woodstone box (right)

4.18 It is recommended that any new residents moving into the properties with these wildlife bricks are provided with an information leaflet to explain the purpose of the bricks. This will prevent the new residents from mistaking the gaps as damage to the brickwork and filling them in.

4.19 It is considered that the above recommendations will not only maintain but improve the favourable conservation status of bats within the local area.

5.0 Conclusions

5.1 During the transect surveys a low level of bat activity was recorded. This comprised largely of the common and widespread common pipistrelle and soprano pipistrelle bats commuting and foraging across the site along linear features and site boundaries only. In particular, the southern site boundary was most frequently used by these bats, with periods of continuous foraging during the monitoring surveys. The eastern reaches of the site were deemed to be less frequently used by bats partly due to light pollution from the adjacent town residential dwellings. Despite this, myotis, leisler, noctule, serotine, daubenton and brown long-eared bats were recorded using the site.

5.2 Two static detectors were set up on the eastern and southern site boundaries and left to record for five consecutive nights in May, June, July, September, and October. The static detectors revealed one more species of bats to be using the site sporadically, likely for commuting purposes. This extra species was a barbastelle bat. The static detector data was not very consistent with the activity survey results, as soprano pipistrelles were recorded most frequently and generally higher levels of activity recorded along the southern boundary.

5.3 It is understood that the areas of value to bats (all hedgerows and boundary features) are to be largely retained as they are within the scheme, with development restricted to the sub-optimal arable pasture habitat. As a result, no direct impact on suitable bat habitat is anticipated, although this will need to be re-assessed once the development plans are finalised. To avoid indirect impact to these habitats, a sensitive lighting scheme is recommended to be implemented across the site, particularly in proximity to the areas where bat activity was significant, notably the southern edge.

5.4 Further recommendations for mitigation and enhancements have been made within this report, aimed at improving the ecological value of the site for bats post development. This includes the installation of bat boxes, hedgerow enhancement and new habitat creation. It is considered that if the recommendations and enhancements are implemented that the favourable conservation status of bats in the local area will not be impacted upon by the development.

5.5 The results of this report are valid for two years from the date of the first activity survey. After this time the surveys will need to be updated in order to accurately inform any further works.

6.0 References

Bat Conservation Trust, 2019. The National Bat Monitoring Programme Annual Report 2018. Bat Conservation Trust, London. Available at http://www.bats.org.uk/pages/nbmp_annual_report.html

CIRIA C567 (2005) *Working with wildlife – site guide*. CIRIA, London.

Collins, J. (ed.) (2016) *Bat surveys for Professional Ecologists: Good Practice Guidelines (3rd edition)*. The Bat Conservation Trust, London.

English Nature (1994) *Species Conservation Handbook*. English Nature, Peterborough

Lintott, P.R., Davison, S., van Breda, J., Kubasiewicz, L., Dowse, D., Daisley, J., Haddy, E. and Mathews, F., 2018. Ecobat: An online resource to facilitate transparent, evidence-based interpretation of bat activity data. *Ecology and evolution*, 8(2), pp.935-941.

Lintott, P.R. and Mathews, F., 2018. Basic mathematical errors may make ecological assessments unreliable. *Biodiversity and conservation*, 27(1), pp.265-267

Mathews F, Kubasiewicz LM, Gurnell J, Harrower CA, McDonald RA, Shore RF. (2018) *A Review of the Population and Conservation Status of British Mammals: Technical Summary*. A report by the Mammal Society under contract to Natural England, Natural Resources Wales and Scottish Natural Heritage. Natural England, Peterborough.

Mitchell-Jones, A.J. (2004) *Bat Mitigation Guidelines*. English Nature, Peterborough.

Parsons, S. and Jones, G. (2000) Acoustic identification of 12 species of echolocating bats by discriminating function analysis and artificial neural networks. *Journal of Experimental Biology*, 203: 2641-2656.

Richardson, S.M., Lintott, P.R., Hosken, D.J. and Mathews, F., 2019. An evidence-based approach to specifying survey effort in ecological assessments of bat activity. *Biological Conservation*, 231, pp.98-102.

Russ, J. (2012) *British Bat Calls – A guide to species identification*. Pelagic Publishing

Stone, E.L., Jones, G., Harris, S. (2009) Street lighting disturbs commuting bats. *Current Biology*, **19**: 1123-1127.

Stone, E.L., Jones, G., Harris, S. (2012) Conserving energy at a cost to biodiversity? Impacts on LED lighting on bats. *Global Change Biology*, **18**: 2458-2465.

Stone, E.L., Harris, S., Jones, G. (2015) Impacts of artificial lighting on bats: A review of challenges and solutions. *Mammalian Biology*, **80**: 213-219.

Internet resources:

Magic Interactive Map: www.magic.gov.uk

Google Earth: www.earth.google.co.uk

Appendix 1: Raw Data

Table 1: Anabat data from the eastern anabat (AB1)

Date	Common Pipistrelle	Soprano Pipistrelle	Myotis	Leisler	Noctule	Serotine	Barbastelle
16/05/2022	23	5	6	0	1	5	0
17/05/2022	5	6	3	3	2	5	0
18/05/2022	3	4	4	2	0	2	1
19/05/2022	14	3	11	0	2	2	0
20/05/2022	0	0	2	0	2	0	0
Total	45	18	26	5	7	14	1
21/06/2022	12	5	9	9	2	8	0
22/06/2022	19	5	5	6	0	12	0
23/06/2022	7	3	6	4	1	6	0
24/06/2022	8	3	4	1	2	4	0
25/06/2022	16	4	4	3	1	15	0
Total	62	20	28	23	6	45	0
27/07/2022	7	6	6	1	2	3	0
28/07/2022	9	14	6	2		8	1
29/07/2022	5	5	12	2	4	7	0
30/07/2022	9	2	6	2	1	11	0
31/07/2022	2	8	5	0	3	7	0
Total	32	35	35	7	10	36	1
26/09/2022	0	0	3	0	0	1	0
27/09/2022	0	0	1	0	0	2	0
28/09/2022	0	0	1	0	1	4	0
29/09/2022	0	0	2	1	2	1	0
30/09/2022	0	0	0	0	2	1	0
Total	0	0	7	1	5	9	0
24/10/2022	0	1	0	0	1	0	0
25/10/2022	9	1	2	0	0	1	1
26/10/2022	10	0	4	0	1	1	0
27/10/2022	16	6	3	0	4	3	0
28/10/2022	1	4	2	0	3	1	0
Total	36	12	11	0	9	6	1

Table 2: Anabat data from the southern anabata (AB2)

Date	Common Pipistrelle	Soprano Pipistrelle	Myotis	Leisler	Noctule	Serotine	Barbastelle
16/05/2022	1	5	0	0	0	3	0
17/05/2022	16	29	0	0	0	18	0
18/05/2022	0	29	0	0	0	0	0
19/05/2022	33	38	1	0	0	2	0
20/05/2022	36	132	3	0	0	2	0
Total	86	233	4	0	0	25	0
21/06/2022	0	2	0	0	0	1	0
22/06/2022	0	5	0	1	0	0	0
23/06/2022	24	204	1	0	0	1	0
24/06/2022	12	196	4	0	0	0	0
25/06/2022	1	5	0	0	0	0	0
Total	37	412	5	1	0	2	0
27/07/2022	0	0	0	0	0	0	0
28/07/2022	0	0	0	0	0	0	0
29/07/2022	0	0	0	0	0	0	0
30/07/2022	11	4	0	0	0	3	0
31/07/2022	2	0	0	0	0	0	0
Total	13	4	0	0	0	3	0
26/09/2022	1	8	3	0	0	2	0
27/09/2022	0	0	5	0	0	0	0
28/09/2022	0	0	0	0	1	0	0
29/09/2022	0	0	10	0	0	0	0
30/09/2022	31	5	8	0	0	0	0
Total	32	13	26	0	1	2	0
24/10/2022	62	3	10	0	0	5	0
25/10/2022	26	123	4	0	0	6	0
26/10/2022	3	39	2	0	0	9	0
27/10/2022	25	27	1	0	3	5	0
28/10/2022	4	6	1	0	0	0	0
Total	120	198	18	0	3	25	0

The Ecology Partnership

Thorncroft Manor

Thorncroft Drive

Leatherhead

KT22 8JB

Tel: 01372364133

www.ecologypartnership.com

Approved by: Alexia Tamblyn MA (Oxon) MSc CEcol CEnv MCIEEM FRGS

Date: 10/01/2023