Bat Activity Surveys 2024

Rudgwick, Horsham

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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 snap shot 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 was commissioned by Welbeck Land to undertake updated bat activity surveys around land at Rudgwick, Horsham, West Sussex. In addition, remote detector Anabat surveys within site edge habitats were carried out to supplement the data collected during the transect surveys.

1.2 The Ecology Partnership have undertaken survey effort for bat activity on site previously in 2021 which identified low to moderate activity across all site boundary features as well as the central treeline. Transect surveys in June and September 2021 showed the site was dominated with common pipistrelles, with additional presence of soprano pipistrelles, brown long-eared, noctule, serotine and leisler. Anabat detectors deployed in June, July and September 2021 revealed further diversity of bat species, including barbastelle, myotis and a single nathusius pipistrelle.

1.3 This report presents the results of The Ecology Partnership's surveys in and around the site, which aims specifically to assess how bats are using the site over the course of the 2024 survey season.

Site Context and Status

1.4 The site is to the south-west of Rudgwick and to the north-west of Horsham (TQ07973305). The site covers approximately c. 5.5 ha and consisted of two cow-grazed grasslands with scrub, broadleaved treelines and hedgerows with trees along the field boundaries. The immediate surroundings comprised of arable fields, broadleaved woodland and low-density residential housing. The redline boundary is shown in figure 1.

1.5 The site is also located within the 7.8km wider conservation area for one of the Sussex Bats SACs, The Mens SAC/SSSI. Barbastelle bats are a secondary qualifying feature for The Mens SAC/SSSI.

Figure 1: Approximate location of the red line boundary.

Legislation

1.6 Under the Natural Environment and Rural Communities (NERC) Act 2006, it is now the duty of every Government department in carrying out its functions "*to have regard, so far as it is consistent with the proper exercise of those functions, to the purpose of conserving biological diversity in accordance with the Convention*". Seven species of bat (Barbastelle, Bechstein's, Noctule, Soprano pipistrelle, Brown long-eared, Greater horseshoe and Lesser horseshoe) are listed as Species of Principal Importance in England under Section 41 of the NERC Act.

1.7 All bats are covered by the following relevant legislation: the Wildlife and Countryside Act (WCA) 1981 (as amended); the Countryside and Rights of Way Act 2000; the Natural Environment and Rural Communities Act 2006; and by the Conservation of Habitats and Species Regulations (CHSR) 2010.

Under the WCA 1981 it is an offence to:

- intentionally, recklessly or deliberately disturb a roosting or hibernating bat i.e. disturbing it whilst it is occupying a structure or place used for shelter or protection)

- intentionally or recklessly obstruct access to a roost (i.e. a structure or place used for shelter or protection).

Under the CHSR 2010 it is an offence to:

- deliberately capture (or take), injure or kill a bat
- intentionally, recklessly or deliberately disturb a bat, in particular (i) any disturbance which is likely to impair their ability to survive, to breed or reproduce, or to rear or nurture their young; (ii) any disturbance which is likely to impair their ability in the case of hibernating or migratory species, to hibernate or migrate; or (iii) any disturbance which is likely to affect significantly the local distribution or abundance of the species to which they belong
- damage or destroy a breeding site or resting place (roost) of a bat.

2.0 Methodology

Bat activity surveys

2.1 Update night-time bat walkover (NBW) surveys were undertaken on site on the 21st May and 24th July 2024. Surveyors included Emer Hicks BSc (Hons) MSc, Joe Hopkins MBiol (Hons), Alice Bailey BSc (Hons) ACIEEM and Sophie Baker BSc (Hons) MSc. The surveys followed Bat Conservation Trust guidelines (Collins 2023). Prior to the activity surveys, the site was inspected in order to assess features of interest.

2.2 The transect surveys started at sunset, with fixed point observations made for the first 30 minutes in areas of interest, after which time the surveyors walked around the perimeter of the site and along the central treeline, and observations were maintained until two hours after sunset. Bats usually emerge about twenty minutes after sunset depending on the species, light level, weather conditions and time of year. Peak activity will normally last for about two hours after sunset, during times of peak insect activity.

2.3 Surveyors were equipped with either Batlogger M Elekon or Echometer Touch 2 Pro with iPad bat detectors.

2.4 Anabat express and songmeter remote detectors were also installed in three locations on site. These were set up for recording periods during each transect activity survey in June,

July, August and September 2024. They were left for at least 5 nights and then collected in for analysis. The stationary starting survey positions, transect walking route, and approximate Anabat/ songmeter remote detector locations are shown in Figure 2.

Figure 2: The path of the transect walking route (dashed yellow line) and anabat/ songmeter locations (white circles).

Limitations

2.5 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.

2.6 Unfortunately, the Western Anabat experienced an SD card error during the August recording period and no data were recorded. It is considered that the data collected during the June, July and September recording periods and during previous surveys in 2021 were sufficient to provide robust survey data for this location.

3.0 Results

Previous Surveys- June, July, September 2021

2021 Transect Activity Surveys

3.1 During the bat transect activity surveys key features used by bats were identified and a total of six bat species were recorded on site: common pipistrelle, soprano pipistrelle, noctule, serotine, brown long eared and leisler. The level of activity recorded on the walked transect varied from low during the June and July surveys, to moderate during the September survey.

3.2 Bat activity was dominated by common pipistrelles across all surveys, with only low numbers of the other species. Bats recorded on site were predominantly using the linear habitats, with occasional pipistrelle foraging activity over the open grassland. The boundary linear features have good connectivity to the broader landscape and were not artificially lit at night, providing optimal foraging and commuting habitat for UK bat species.

2021 Static Recording Surveys

3.3 Three Anabat Express static recorders were also deployed on site for a series of five consecutive nights between June to September 2021. These recorders revealed moderate to high levels of bat activity on site from common bat species already revealed from the transect surveys but with 3 additional bat species also recorded using the site: myotis species, barbastelle and nathusius' pipistrelle.

June

3.4 The anabats were deployed between 15-19th June 2021. The anabat located on the western hedgerow (AB1) of site recorded a total of 137 registrations over 5 nights. A total of 8 species were recorded, including pipistrelles, big bats and myotis species. Common and soprano pipistrelles were the most dominant species on site and a single barbastelle pass was recorded. AB2 and AB3 failed during this month and no recordings were made.

July

3.5 The anabats were deployed between 21st-25th July 2021. Across the 5 nights and 3 anabats, a total of 928 passes were recorded, with total of 9 species identified. Common pipistrelle was the most dominant species, with soprano pipistrelle the second most recorded species. Low numbers of other species were recorded, but notably 7 barbastelle passes and 1 nathusius pipistrelle were recorded during this month.

September

3.6 The anabats were deployed between 2nd-6th September 2021 and all anabats recorded a total of 8 species during this month. Across the 5 nights and 3 anabats, a total of 3066 passes were recorded. Again, common pipistrelle and soprano pipistrelle were the most dominant species on site, but a large number of noctule was also recorded this month, at least double that of any other month. Lower numbers of other bats were recorded but notably 21 barbastelle passes this month, the highest number recorded during the 2021 activity surveys.

Overview

3.7 In total 4126 bat passes were recorded over the 2021 survey period comprising at least nine bat species. The calls by bats of the Myotis genus have been grouped together owing to difficulties in identifying calls to species level.

3.8 Throughout the survey period, common pipistrelles were most frequently recorded, accounting for approximately 63.1% of the total recordings. Soprano pipistrelles were the second most recorded species group on site, with their calls accounting for 26.9% of the total passes, followed by noctules which accounted for 4.1% of the total passes. The remaining species, which included myotis species, brown long eared, serotine, leisler and barbastelle accounted for approximately 10% of the total calls.

2024 Bat Activity Surveys

NBW Survey 1- 21st May 2024

3.9 Sunset was at 20:55, with a temperature of 14°C. Conditions included no wind, no rain and light scattered cloud (10% cover).

3.10 Activity recorded during this survey was low. The first recorded activity occurred at 21:10 and was a soprano pipistrelle commuting along the central treeline. Several other common pipistrelles and soprano pipistrelles were identified commuting along this feature throughout the night. Two common pipistrelles were identified along the southern treeline at 21:20 and 22:04. One common pipistrelle also used the western treeline as a foraging feature later in the evening at 22:25.

NBW Survey 2 – 24th July 2024

3.11 Sunset was at 20:59, with temperatures starting at 17°C and falling to 16°C by the end of the survey. Conditions were dry, overcast (100% cloud cover), and calm (Beaufort 0).

3.12 Activity recorded during this survey was considered to be moderate across all site linear features, with the activity dominated by common pipistrelles and soprano pipistrelles. The first recorded activity was at 21:10, a soprano pipistrelle commuting along the central treeline. Other activity included several noctule passes throughout the night on all linear features. One brown long-ear was recorded commuting along the western treeline and one myotis species was recorded commuting along the central treeline.

NBW Survey 3- 24th September 2024

3.13 Sunset was at 18:54, with a temperature of 14°C, low wind (Beaufort 1), dry and mostly cloudy (80% cover).

3.14 The first recorded activity occurred at 19:16, a soprano pipistrelle foraging over the central tree line. Activity throughout the night was considered to be moderate, dominated by common pipistrelles and soprano pipistrelles. Additionally, two noctules were identified as well as one leisler. Most of the foraging activity was concentrated along the central tree line and western boundary.

Automated/static bat detector surveys

3.33 Two anabats and one songmeter was deployed on site in June, July, August, and September 2024 for at least five consecutive nights to record bat species using the site and levels of activity on site. The anabats were situated within boundary hedgerows to the east,

centre and west of the site (Figure 2). The raw data are given in Tables 5-8, with summary graphs (Figure 4-6) and tables (Table 1-3) given within this section of the report.

June

3.34 In June the most recorded species was common and soprano pipistrelles with a total of 657 and 315 recordings respectively. Soprano pipistrelles dominated the eastern and western site anabats while common pipistrelles were the most recorded species on the central treeline songmeter. The eastern anabat also recorded low numbers of passes from brown long-eared, myotis, noctule and serotines, while the western anabat only picked up the aforementioned pipistrelles.

3.35 The central treeline songmeter picked up significantly more calls than the eastern and western anabats. In addition to the numerous pipistrelle passes, the songmeter recorded low numbers of myotis bats, which were considered to be whiskered bat and natterers bats, with additional species recorded including noctules and serotines, along with single passes from barbastelles, brown long-eared and nathusius' pipistrelle. No other species were identified during the June surveys.

3.36 Graphs showing the bat registrations recorded at each location in June are shown in Figure 4.

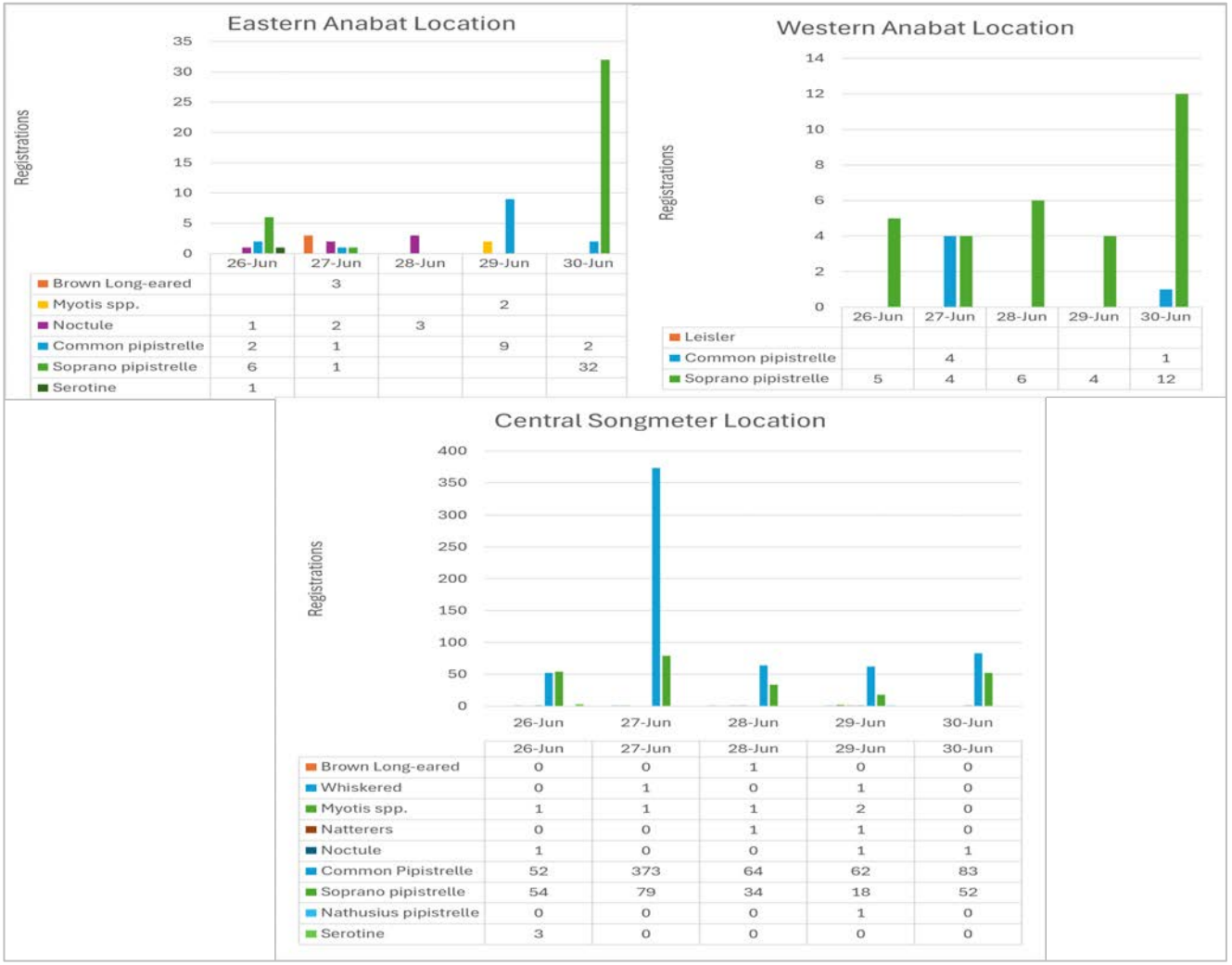


Figure 4: Summary graphs of the June anabat/ songmeter data at each of the three locations

July

3.37 In July, by far the most frequently recorded species was common pipistrelles, with a total of 744 calls across the three locations, of which 79% were recorded in the central treeline songmeter. The second most frequently recorded species was soprano pipistrelles with a total of 173 calls across the three locations over five nights. Other species recorded on the eastern and western anabats included low numbers of noctule and unidentified myotis species.

3.38 The central treeline songmeter recorded a higher diversity of species, including brown long-eared, and myotis species which were considered to be daubentons, whiskered, brandts, with leislers, natterers and serotines, in addition to the four species previously mentioned. Some species, however, had very few passes, such as a total of two leislers and one brandts pass on the central songmeter. No other species were identified during the July surveys.

3.39 Graphs showing the bat registrations recorded at each location in July are shown in Figure 5.

	25/07/2024	26/07/2024	27/07/2024	28/07/2024	29/07/2024
Myotis			2	3	2
Noctule			1	2	4
Common pipistrelle	6	23	47	9	35
Soprano pipistrelle		1	2	4	5

	25/07/2024	26/07/2024	27/07/2024	28/07/2024	29/07/2024
Myotis			1	2	1
Noctule				1	
Common pipistrelle	2	5	3	9	15
Soprano pipistrelle	4	5	8	5	7

	25/07/2024	26/07/2024	27/07/2024	28/07/2024	29/07/2024
Brown long-eared	1	1	2	7	5
Daubentons	0	3	2	1	1
Whiskered	0	0	1	1	1
Brandts	0	0	0	1	0
Myotis spp.	0	4	3	3	3
Noctule	5	0	3	3	1
Leislers	0	0	0	1	1
Common pipistrelle	173	73	114	84	146
Soprano pipistrelle	12	2	14	55	49
Natterers	0	4	1	0	0
Serotine	0	0	0	2	5

Figure 5: Summary graphs of the July Anabat data at each of the three locations

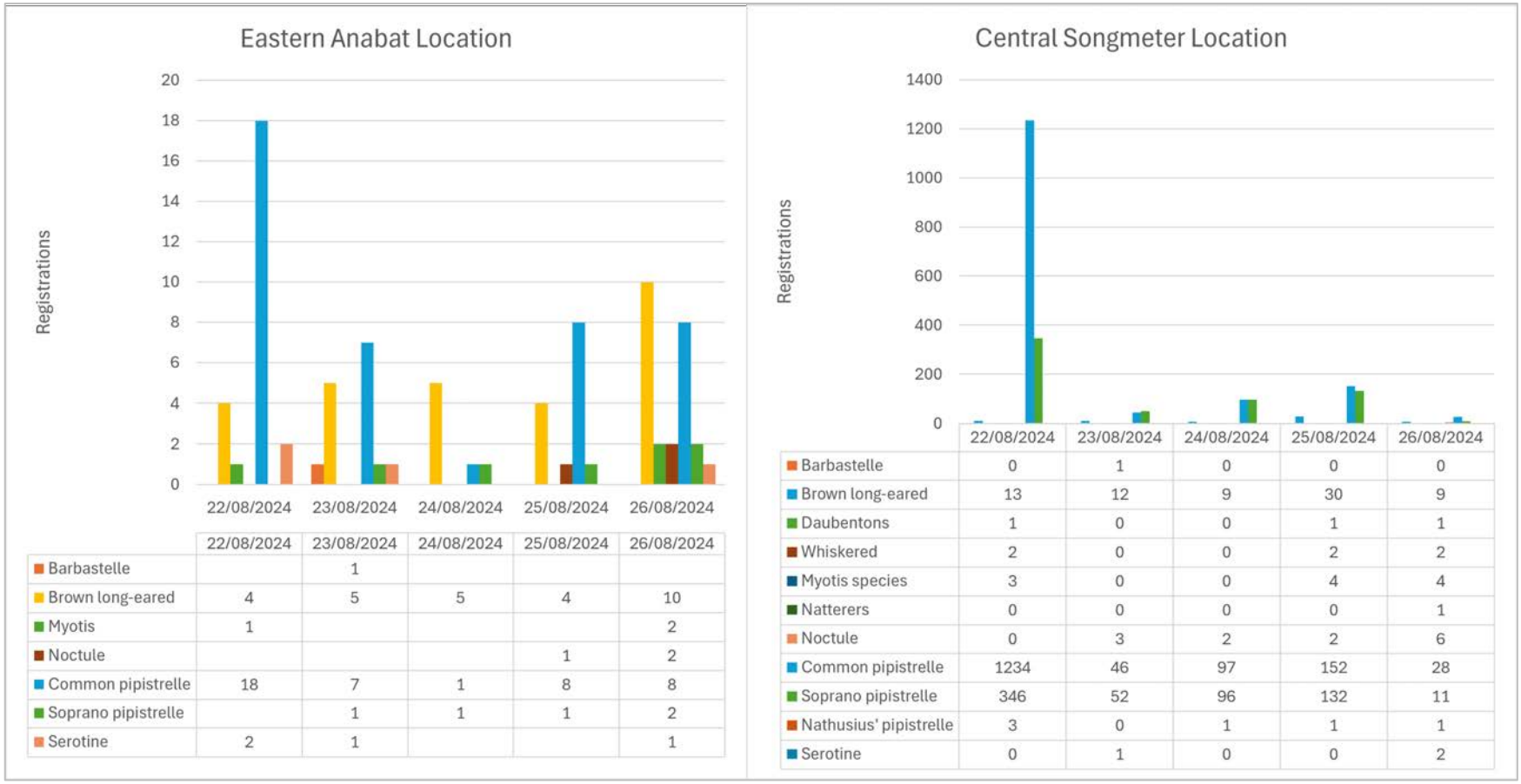
August

3.40 In August, an error occurred on the western anabat and so no data was recorded during the month of August. Data from the other two locations, three other months in 2024 and previous year's survey data is considered sufficient to determine site bat activity.

3.41 The eastern anabat was dominated with common pipistrelle recordings, a total of 42 passes, making up half of all recordings for this location/ month. Second to this was brown long-eared, where 28 passes were recorded in the month of August. Low numbers of myotis, noctule, soprano pipistrelle and serotine passes were recorded as well as a single barbastelle.

3.42 The central treeline songmeter picked up far more passes, a total of 2311 recordings over the 5 nights. Of these, 1557 (67%) were common pipistrelles, 637 (28%) were soprano pipistrelles and 73 were brown long-eared (3%). The remaining recordings comprised of low numbers of myotis bats including daubenton's, and whiskered, with additional species including noctule, nathusius' and serotine, along with one pass each from a barbastelle and natterer's. No other species were recorded during the August survey period.

3.43 Graphs showing the bat registrations recorded at each location in August are shown in Figure 6.



	22/08/2024	23/08/2024	24/08/2024	25/08/2024	26/08/2024
Barbastelle		1			
Brown long-eared	4	5	5	4	10
Myotis	1				2
Noctule				1	2
Common pipistrelle	18	7	1	8	8
Soprano pipistrelle		1	1	1	2
Serotine	2	1			1

	22/08/2024	23/08/2024	24/08/2024	25/08/2024	26/08/2024
Barbastelle	0	1	0	0	0
Brown long-eared	13	12	9	30	9
Daubentons	1	0	0	1	1
Whiskered	2	0	0	2	2
Myotis species	3	0	0	4	4
Natterers	0	0	0	0	1
Noctule	0	3	2	2	6
Common pipistrelle	1234	46	97	152	28
Soprano pipistrelle	346	52	96	132	11
Nathusius' pipistrelle	3	0	1	1	1
Serotine	0	1	0	0	2

Figure 6: Summary graphs of the August Anabat/ Songmeter data at each of the two locations.
Note: Due to an SD card error no data were collected at the Western location in August 2024

September

3.44 The activity on the eastern anabat was dominated by common pipistrelles with a total of 89 passes over the 5 nights, 82% of the 109 total passes. Other species included soprano pipistrelles, brown long-eared, myotis and a single noctule. The western anabat had less recordings but showed a similar species composition, with the only addition being a single serotine pass.

3.45 The central treeline songmeter recorded significantly more passes than the anabats, a total of 3094 passes over the 5 nights. The most frequent species recorded by far was common pipistrelles, with 2385 passes, making up 77% of September songmeter recordings. Other species included frequent soprano pipistrelle and myotis species passes including from daubenton's, whiskered, natterer's, along with rare passes of barbastelle, brown long-eared, and noctule. September also recorded a single nathusius' pipistrelle pass along the central treeline.

3.46 Graphs showing the bat registrations recorded at each location in September are shown in Figure 7.

Eastern Anabat Location	26/09/2024	27/09/2024	28/09/2024	29/09/2024	30/09/2024
Brown long-eared			2		
Myotis	1	1			1
Noctule				1	
Common pipistrelles	38		2	32	17
Soprano pipistrelles	6			1	7

Western Anabat Location	26/09/2024	27/09/2024	28/09/2024	29/09/2024	30/09/2024
Brown long-eared		1			
Myotis	3	1			1
Noctule					
Common pipistrelle	2		2	1	6
Soprano pipistrelle	3	2			1
Serotine	1				

Central Songmeter Location	26/09/2024	27/09/2024	28/09/2024	29/09/2024	30/09/2024
Barbastelle	3	0	0	0	1
Brown long-eared	15	2	1	0	1
Daubentons	17	0	1	0	5
Whiskered	62	1	2	0	4
Myotis	157	1	3	0	16
Natterers	20	0	0	0	0
Noctule	3	0	0	3	1
Common pipistrelle	870	13	15	41	1446
Soprano pipistrelle	274	25	18	16	56
Nathusius' pipistrelle	0	0	0	1	0

Figure 7: Summary graphs of the September anabat/ songmeter data at each of the three locations.

3.47 A total of 7616 bat registrations were recorded over the survey period by the Anabat and Songmeter static detectors, and these comprised of at least 13 separate species (Table 1).

3.48 Throughout the survey period, common pipistrelles were most frequently recorded, accounting for nearly than three-quarters of the total recordings (Table 1), followed by soprano pipistrelles making up around 20% of recordings. Myotis species and brown long-eared combined accounted for around 5% of passes, whilst the remaining species combined accounted for approximately 3% of the total calls (Table 1).

Table 1: Total number of bat recordings by species

Species	Number of calls	% of total
Common pipistrelle	5481	71.97
Soprano pipistrelle	1531	20.10
Myotis sp.	230	3.02
Brown long-eared	143	1.88
Whiskered	80	1.05
Noctule	53	0.70
Daubenton's	33	0.43
Natterer's	28	0.37
Serotine	19	0.25
Nathusius'	8	0.17
Barbastelle	7	0.08
Leisler's	2	0.03
Brandt's	1	0.01
Total	**7616**	

3.49 By far the highest level of activity was recorded by the central songmeter along the central treeline, with nearly 93% of the total registrations being recorded here (Table 2). The eastern and western anabats recorded a relatively low proportion of the total registrations, however it should be noted that the August West anabat data was missing due to a SD card error, which may contribute to the lower proportion of passes.

Table 2: Total number of bat passes by Anabat location

Anabat location	Total number of passes	% of total passes
East	406	5.33%
West	128	1.68%
Central	7082	92.99%

3.50 Activity levels increased each month, with the quietest month being June and the greatest activity levels in September (Table 3).

Table 3: Number of passes recorded per month over the survey period

Month (2024)	Total number of passes	% of total passes
June	990	12.9
July	1002	13.2
August	2397	31.5
September	3227	42.4

4.0 Discussion

4.1 Surveys of the site were undertaken in 2021, which included NBW transect surveys where a total of six bat species were recorded on site: common pipistrelle, soprano pipistrelle, noctule, serotine, brown long eared and leisler. The level of activity recorded on the walked transect varied from low during the June and July surveys, to moderate during the September survey.

4.2 Bat activity was dominated by common pipistrelles across all surveys, with only low numbers of the other species. Bats recorded on site were predominantly using the linear habitats, with occasional pipistrelle foraging activity over the open grassland.

4.3 Three Anabat Express static recorders were also deployed on site for a series of five consecutive nights between June to September 2021. These recorders revealed moderate to high levels of bat activity on site from common bat species already revealed from the transect surveys but with 3 additional bat species also recorded using the site: myotis species, barbastelle and nathusius' pipistrelle.

4.4 Updated NBW surveys in 2024 identified widespread bat species within West Sussex, with the activity around the site dominated by common pipistrelle, the most common and widespread bat species in Britain. During the NBW transect surveys the only other species identified were soprano pipistrelles, noctules, brown-long eared and leisler's. These species were heard very infrequently and so bat diversity and activity was considered to be low.

4.5 Bats were almost exclusively recorded utilising the linear boundary features for commuting, with the central treeline being by far the most frequently used commuting and foraging feature.

4.6 Three static recorders (two Anabat Express and one Songmeter) were deployed for five consecutive nights from June-September 2024. A total of 7616 passes were recorded over the 2024 survey period, comprising of 13 species. By far the most recorded species was common pipistrelles comprising 71.97% of total passes, followed by soprano pipistrelles (20.1%), myotis species (3.02%), brown long-eared (1.88%) and whiskered bats (1.05%). Note that some myotis calls could not be confidently identified to species and have been grouped in the general 'myotis species' category.

4.7 The other recorded species during the 2024 survey period each comprised of less than 1% of the total recordings: noctule (0.70%), daubenton's (0.43%), natterer's (0.37%), serotine (0.25%), nathusius' (0.17%), barbastelle (0.08%), leisler's (0.03%) and a single brandt's pass (0.01%).

4.8 Foraging bats make repeated passes within a small area whilst hunting for invertebrates. This means that a high number of passes is likely to be generated by a relatively small number of bats throughout the night as opposed to a large number of bats making individual passes. Therefore, the registrations recorded during the various surveys are likely to have been made by a relatively small number of individuals who use the site frequently to forage. This is confirmed by the NBW surveys which showed only low to moderate bat activity. As such it is thought that the less frequently recorded species such as noctules, serotine, and Myotis spp. are more likely to be using the site for commuting purposes only.

4.9 June was the quietest month, encompassing 12.9% of the total recordings, with activity increasing each subsequent month, up to September which contained 42.4% of total recordings.

4.10 The central treeline songmeter recorded the greatest number passes (92%), however it is critical to note that Songmeters are more sensitive contributing to the higher proportion of

calls recorded along the central treeline. They are also more reliable in deciphering similar bat calls from one another, such as myotis species with very similar calls, hence the greater species diversity identified along the central treeline.

4.11 The eastern and western anabats recorded significantly fewer passes, with the eastern feature recording the greatest of the two (5.33% and 1.68% respectively).

4.12 At 7.8km from The Mens SAC, the site falls outside the 6.5km key conservation area of the Sussex bats SACs but lies within the wider conservation area which extends to 12km. Within this area, impacts must be considered as habitats within the zone. Following the Sussex SAC guidance, avoidance, mitigation, and compensation must be considered in relation to bats associated with the SAC.

4.13 Bats are mobile species that are qualifying features of the SACs, which can forage or roost on land outside of the SAC boundaries. Occasionally impacts to such habitats can have a significant effect upon the special interest of a European site, through an impact on conservation objective 4 (effect on the population) and 5 (the distribution of the species). Habitats used by significant numbers of qualifying features of the SAC are defined as ***functionally linked*** to the site and so require assessment under the Habitats Directive and Regulations, as if they were within the SAC boundary (Chapman and Tyldesley, 2016).

4.14 The results of the surveys identify low levels of barbastelle use across the survey area. Considering the limited use of the site, a total of 7 barbastelle passes, the site is not considered to be functionally linked to the SAC. However, consideration of the wider use of the site by bats should be considered.

4.15 The proposals are only to impact only small sections of linear features to allow for access, however, as the site falls within the 12m wider conservation area of the Sussex bats SACs, all impacts must be considered, as habitats within the zone are considered critical for sustaining the population of bats within the SACs. Following the Sussex SAC guidance, avoidance, mitigation, and compensation must be considered in relation to bats associated with the SACs.

4.16 Advice laid out within Sussex Bat Special Area of Conservation, Planning and Landscape Scale Enhancement Protocol states that all proposals within this zone should take:

'reasonable steps to avoid impacts to the SACs and biodiversity in general and where this cannot be achieved, 'mitigation' measures should be implemented and if there are still residual impacts then compensatory measures will need to be provided'.

4.17 The definitions of avoidance, mitigation and compensation are shown below in Table 4.

Table 4: Definitions of avoidance, mitigation and compensation measures in relation to bats associated with the Sussex SACs.

Measure	Definition
Avoidance	This normally means redesigning the scheme to avoid all direct and indirect impacts
Mitigation	This normally involves measures that reduce and/or minimise impacts such as altering the timing of works or using a different technique
Compensation	This generally involves the creation of new habitat, either on or off site and should only be considered as a last resort.

4.18 Using these definitions, it is considered that the proposals are already avoiding most impacts on commuting, foraging and roosting bats, by retaining the majority of the linear habitat features. The exception to this, is the small sections of the central and southern treelines which are to be removed to create a new access roads.

4.19 It must be noted that access would be limited to a small sections of tree lines, and mature trees are recommended to be maintained in situ, with any loss of habitat restricted to less mature features within the linear habitat. Furthermore, avoidance of severance of habitats, is found within the site choice itself. The modified grassland habitat is not considered to be significant in terms of bats foraging and commuting, and thus this loss is not considered to be significant. The grassland is considered to be of lower botanical interest, and as such enhancements to the site's biodiversity value, through careful design and planting, can be achieved.

4.20 Mitigation has been recommended in the form of a sensitive lighting scheme, which can be conditioned. Furthermore, a buffer zone around the retained linear features, where additional planting should take place to further protect the existing linear features and to make a more robust ecological network. Finally, incorporation of surveys prior to any works on any roosting bat potential trees, if any are to be removed. It is however, recommended that all mature trees are retained where possible.

4.21 Compensation in the form of tree and shrub planting on the northern boundary of site is recommended, where the development boundary ends and open space begins. This would provide a link to tree line to the north of the site. Where the access road into the site and across the central treeline is proposed, newly planted trees, providing 'hop over' points should be made ensuring the bats can still fly within the sites linear features (Figure 6).

Figure 6: 'Hop-overs' created using trees to guide bats over roads (Limpens et al. 2005)

4.22 Enhancements to the site have also been recommended within the relevant section below, to create more opportunities for foraging, commuting and roosting bats within the site. This includes the creation of new native hedgerows/ treelines, mixed scrub planting and SUDS, to attract a greater variety of invertebrates.

4.23 Overall, with the site avoiding impacting the majority of the potential habitat, and if these mitigation and compensation measures are followed it is considered that no likely significant effects on roosting and foraging bats, including barbastelles and Bechstein,

would occur as a result of the proposals. Therefore, the proposals would not have any significant impact on the qualifying features for which The Mens Nature Reserve is designated for.

Recommendations and Enhancements

4.24 It is recommended that all linear features in and around the site are retained and protected during works and enhanced post-development.

4.25 Dark corridors must be maintained along the boundary features. Lighting can alter bat behaviour significantly in terms of light avoidance with some species unable to cross lit areas even at low light levels. In addition, lighting can affect the availability of insect prey with some groups attracted to lights, creating a 'vacuum effect' in adjacent habitats. Some of the species such as brown long-ears and Myotis species, which have been recorded on site, are known to avoid all streetlights (Stone *et al* 2009, 2012, 2015), meaning that development could seriously impact the abundance of these species on site post-development without careful design and mitigation.

4.26 Where lighting is required on site, a sensitive lighting scheme must be implemented. Again collaboration between a lighting professional and ecologist may be required in order to help design this scheme but measures should include:

- Inclusion of important habitat features within unlit open spaces such as parks;
- Careful siting and orientation of built structures away from important features e.g. taller buildings within the centre of a built area rather than the edges;
- The use of screening with fencing (with concrete or metal posts) to be softened with tree, hedgerow and climber planting;
- LED luminaires due to their lower intensity, sharp cut-off and good colour rendition – any lights with UV elements or metal halide lights should not be used;
- Lights with peak wavelengths higher than 550nm to avoid the component of light most disturbing to bats (Stone 2012);
- Lights with an upward light ratio of 0% and good optical control;
- Careful consideration of column height to avoid light spill;
- Any external security lights should use motion-sensors and short (1 minute) timers;

- Accessories such as baffles and hoods should be used as a last resort to reduce light spill and direct light only to where needed.

4.27 The retained boundary features should be enhanced. Oak is an important species as it supports more organisms than any other tree in the UK, including a range of invertebrates. Oak trees (*Quercus robur*) are currently present throughout the site, in the ecologically valuable line of trees in the centre and the native hedgerow with trees to the west. Large numbers of moth larvae feed on oak trees including micro moths. Beetles and weevils are also associated with the oak, boring into the wood or using acorns as nurseries.

4.28 Therefore, it is recommended that existing oak trees are retained and that oak trees are utilised as part of any planting schemes on site, especially along the boundaries of the site. Other recommended native species for enhancement planting along tree lines and hedgerows includes ash, hazel, beech, cherry, hornbeam, rowan, field maple, privet, spindle, hawthorn, blackthorn, dog rose and dogwood. This will provide habitat for numerous invertebrates within the site boundaries and thus provide foraging habitat for bats.

4.29 Shade-tolerant wildflower seeds can be sown along the base of hedgerows and areas of new tree and scrub planting. Thick hedges with tussocks and an accumulation of leaf litter are preferred by invertebrates as well as herbaceous plants which are characteristically associated with hedgerows, including species such as cow parsley, common hogweed, wild parsnip and hedge parsley. These can form a wide protective green buffer between the boundary features and the urban footprint.

4.30 Hedgerow management is important to ensure that the hedges remain suitable for foraging and commuting bats. Ideally, a hedge for bats should include mature trees, a diverse shrub layer and a wide margin. Mature trees are important for roosting as well as route markers for bats. The shrub layer should be both species and structurally diverse to support a range of different invertebrates. A wide margin at the base either side of the hedge creates a buffer in which a succession from grassland to hedge with a range of species to further provide opportunities for invertebrate prey. An enhancement and management plan for hedgerows and tree lines on site can be conditioned as part of the planning permission.

4.31 To enhance the local bat population and provide roosting opportunities, it is recommended that boxes should be hung on retained mature trees within the hedgerows and have clear flight paths. Recommended boxes include:

- NHBS general purpose bat box – A general purpose bat box that supports a range of species (Figure 8). These can be hung on trees in a variety of heights and aspects in order to provide a variety of micro-climates.
- Large Multi Chamber WoodStone Bat Box – This is a multipurpose box designed for larger colonies and a range of bat species including pipistrelles, noctules and brown long-eared bats. These should be hung on mature trees around the site (Figure 8).

Figure 8: NHBS general purpose bat box (left) and Large Multi Chamber WoodStone Bat Box (right)

4.32 Incorporating specially designed bat boxes onto mature trees along the boundaries can enhance the habitat on site for bats. Bat boxes should be erected on the trees prior to any works starting on site.

4.33 Incorporating bat tubes into some buildings within the scheme is recommended. An example of a recommended bat tube would include Schwegler 2FR Bat Tubes and Habibat 001 bat boxes unfaced (Figure 9). Both require no maintenance as droppings fall out of the entrance ramp. The added benefit of the Schwegler 2FR tubes is that connecting holes allow several tubes to be placed next to each other to create a large roost space. These should be placed where they will receive sunlight for most of the day as temperature is an important factor in the success of artificial bat roosts. They should also be placed as close to the eaves or gable apex as possible and not above windows to reduce the risk of cat predation.

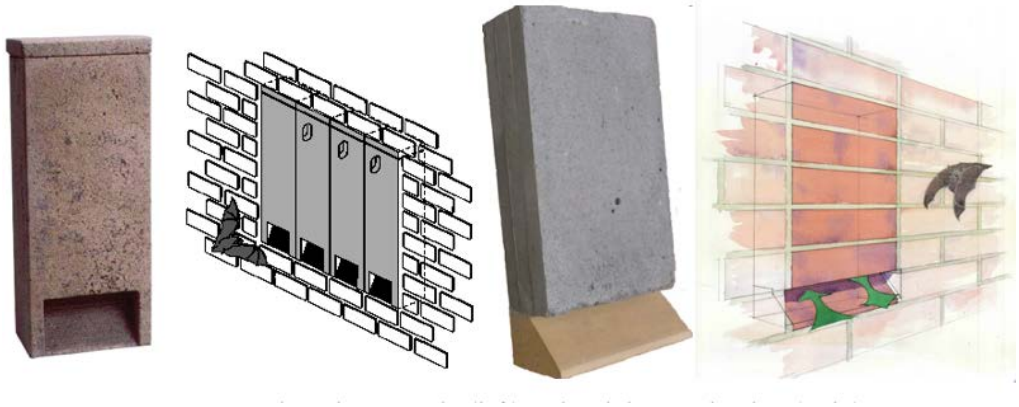


Figure 9: Schwegler 2FR tube (left) and Habitat 001 bat box (right)

5.0 Conclusions

5.1 The site is predominantly comprised of poor and moderate condition modified grassland which is common and widespread. The boundary features of scrub, ecologically valuable line of trees and native hedgerow were considered to provide opportunities for foraging and commuting bats.

5.2 Previous surveys undertaken by The Ecology Partnership in 2021 identified low/ moderate numbers of foraging and commuting bats across nine species, mostly common and widespread. Just under 1% of the calls were barbastelles, a total of 7 calls, an Annex II species associated with The Mens SAC located c. 7.8km away.

5.3 The results of all surveys suggest the site is predominantly used by common bat species. The main areas for foraging were the boundary features and linear mature central treeline.

5.4 Updated surveys were carried out in June-September 2024 which confirmed that the site's linear features were utilised by bats for commuting and foraging. A total of 13 species were identified as using the site during the surveys, with most of the recorded passes comprising of common and soprano pipistrelle (over 92% of total calls, when combined).

5.5 Annex II species barbastelle was additionally recorded on site during the 2024 surveys (7 total passes, 0.08% of calls), most frequently along the central treeline. The site falls within the wider conservation area of The Mens SAC which is located 7.8km away and is designated for populations of Annex II protected species such as barbastelle bats. It is

considered that the site is not functionally linked to The Mens SAC due to the limited nature of the use of the site by barbastelles and the lack of regular use of the site.

5.6 The majority of boundary habitats utilised by bats are to be retained and enhanced as part of the development. The creation of new linear features and urban trees planted on-site will help to maintain and improve the site's suitability for foraging bats. A sensitive lighting scheme is also recommended, including the enforcement of dark corridors along the existing boundary linear features.

5.7 If the above recommendations are adhered to, it is considered that the development would not impact upon the favourable conservation status of bats in the local area.

6.0 References

Bat Conservation Trust & Institution of Lighting Professionals (2023) *Guidance Note GN08/23 Bats and Artificial Lighting At Night.* Institution of Lighting Professionals, Regent House, Warwickshire.

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

Collins, J. (ed.) (2023)., *Bat Surveys for Professional Ecologists: Good Practice Guidelines* (4th edition). The Bat Conservation Trust, London. ISBN-978-1-7395126-0-6.

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

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

Internet resources:

Magic Interactive Map: www.magic.gov.uk

Google Maps: www.google.co.uk/maps

Previous reports:

The Ecology Partnership (2021) *Bat Activity Surveys Report; Land Near the Junction of Lynwick Street and Guildford Road*

Table 5: Anabat data for June 2024

		Common Pipistrelle	Soprano pipistrelle	Noctule	Serotine	Nathusius'	Natterers	Myotis spp.	Whiskered	Brown Long-eared	Barbastelle	**Total**
Central Songmeter	26-Jun	52	54	1	3			1			1	**112**
	27-Jun	373	79					1	1			**454**
	28-Jun	64	34				1	1		1		**101**
	29-Jun	62	18	1		1	1	2	1			**86**
	30-Jun	83	52	1								**136**
East Anabat	26-Jun	2	6	1	1							**10**
	27-Jun	1	1	2						3		**7**
	28-Jun			3								**3**
	29-Jun	9										**11**
	30-Jun	2	32									**34**
West Anabat	26-Jun		5									**5**
	27-Jun	4	4									**8**
	28-Jun		6									**6**
	29-Jun		4									**4**
	30-Jun	1	12									**13**
Total		**653**	**307**	**9**	**4**	**1**	**2**	**5**	**2**	**4**	**1**	**990**

Table 6: Anabat data for July 2024

		Common Pipistrelle	Soprano pipistrelle	Noctule	Serotine	Natterers	Myotis spp.	Whiskered	Brown Long-eared	Leislers	Daubenton's	Brandts	**Total**
Central Songmeter	25-Jun	173	12	5					1				**191**
	26-Jun	73	2			4	4		1		3		**87**
	27-Jun	114	14	3		1	3	1	2		2	1	**141**
	28-Jun	84	55	3	2		3	1	7	1	1		**157**
	29-Jun	146	49	1	5		3	1	5	1	1		**212**
East Anabat	25-Jun	6											**6**
	26-Jun	23	1										**24**
	27-Jun	47	2	1			2						**52**
	28-Jun	9	4	2			3						**18**
	29-Jun	35	5	4			2						**46**
West Anabat	25-Jun	2	4										**6**
	26-Jun	5	5										**10**
	27-Jun	3	8				1						**12**
	28-Jun	9	5	1			2						**17**
	29-Jun	15	7				1						**23**
Total		**744**	**173**	**20**	**7**	**5**	**24**	**3**	**16**	**2**	**7**	**1**	**1002**

Table 7: Anabat data for August 2024

		Common Pipistrelle	Soprano pipistrelle	Noctule	Serotine	Nathusius'	Natterers	Myotis spp.	Whiskered	Brown Long-eared	Leislers	Daubenton's	Brandts	Barbastelle	**Total**
Central Songmeter	22-Jun	1234	346	0	0	3	0	3	2	13		1		0	**1602**
	23-Jun	46	52	3	1	0	0	0	0	12		0		1	**115**
	24-Jun	97	96	2	0	1	0	0	0	9		0		0	**205**
	25-Jun	152	132	2	0	1	0	4	2	30		1		0	**324**
	26-Jun	28	11	6	2	1	1	4	2	9		1		0	**65**
East Anabat	22-Jun	18			2			1		4					**25**
	23-Jun	7	1		1					5				1	**15**
	24-Jun	1	1							5					**7**
	25-Jun	8	1	1						4					**14**
	26-Jun	8	2	2	1			2		10					**25**
Total		**1599**	**642**	**16**	**7**	**6**	**1**	**14**	**6**	**101**	**0**	**3**	**0**	**2**	**2397**

Note: Due to an SD card error, west anabat recorded no data during the month of August

Table 8: Anabat Data for September 2024

		Common Pipistrelle	Soprano pipistrelle	Noctule	Serotine	Nathusius'	Natterers	Myotis spp.	Whiskered	Brown Long-eared	Barbastelle	Daubentons	**Total**
Central Songmeter	26-Jun	870	274	3			20	157	62	15	3	17	**1421**
	27-Jun	13	25					1	1	2			**42**
	28-Jun	15	18					3	2	1		1	**40**
	29-Jun	41	16	3		1							**61**
	30-Jun	1446	56	1				16	4	1	1	5	**1530**
East Anabat	26-Jun	38	6					1					**45**
	27-Jun							1					**1**
	28-Jun	2								2			**4**
	29-Jun	32	1	1									**34**
	30-Jun	17	7					1					**25**
West Anabat	26-Jun	2	3		1			3					**9**
	27-Jun		2					1		1			**4**
	28-Jun	2											**2**
	29-Jun	1											**1**
	30-Jun	6	1					1					**8**
Total		**2485**	**409**	**8**	**1**	**1**	**20**	**185**	**69**	**22**	**4**	**23**	**3227**

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