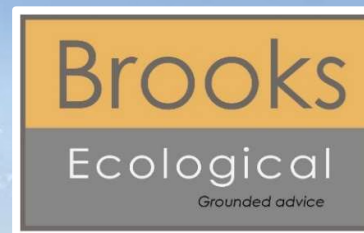


01-24



Bat Activity Survey

## Horn Crag Quarry, Silsden

AD Calvert Architectural Stone Supplies

Report Reference: ER-5064-05

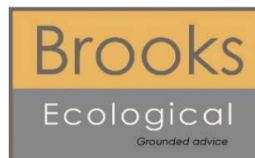
13/10/2021

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Report Title:	Bat Activity Survey Horn Crag Quarry, Silsden
Report Reference:	ER-5064-05
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Date:	13/10/2021

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## **Summary Statement**

Seasonal Activity Surveys have demonstrated that the Site is used by up to six species of bat, although this is heavily dominated by common and soprano pipistrelle, and noctule. Activity was moderate during the spring period, with marked decreases seen in summer and again in autumn.

Patterns of activity suggest that proposals to re-open the quarry face will have minimal impact on local bat populations, provided the habitats across the Site's western sector are largely avoided.

This will be ensured by incorporating standard mitigation and enhancement measures, which must include a sensitive lighting design to reduce light spill from the quarry face and access road as much as possible.

## Introduction

1. Brooks Ecological was commissioned by AD Calvert Architectural Stone Supplies to carry out detailed Bat Activity Survey at the proposed development Site at Horn Crag Quarry, Silsden.
2. These surveys are required to provide evidence of the baseline use of the Site by the local bat population, which in turn will enable mitigation and enhancement strategies to be devised to support a planning application.
3. The scope of the survey has been devised based on an assessment of the habitats present, the results of previous activity surveys, and in accordance with current best practice guidelines (Bat Conservation Trust, 2016).

**Figure 1** The Site boundary (red line).



## Method

4. The objective of the survey was to collect up-to-date information on the Site's use by local bat populations, so that an accurate assessment of the potential impacts of development could be made. A transect and remote monitoring survey was carried out to collect the following data (Bat Conservation Trust, 2016):
  - The assemblage of bat species using the Site;
  - The relative frequency with which the Site is used by different species;
  - The nature of activity for different bat species, for example, foraging, commuting, and roosting.

### Survey Conditions

5. Walked transects were undertaken in April, July, and October, during optimal survey conditions. Survey conditions are summarised below:

**Table 1** Survey conditions.

Survey	Date	Sunset	Weather	Invertebrate Activity
Spring	22.04.21	20:21	Clear, mild, 15-14°, no precipitation, light breeze B2.	Moderate-high
Summer	14.07.21	21:30	Clear, humid, 16°, light breeze B2.	High
Autumn	07.10.21	18:28	90% cloud cover, mild 18°C light breeze B2.	Moderate

Transects

6. Transects began around sunset and continued up to two hours after when all bats were thought to have emerged, and thus were actively foraging and commuting.
7. The transects were walked by a team of two surveyors, equipped with a heterodyne detector as well as a Titley Scientific Anabat Express, used to track the transect route and aid species identification. Notes taken during the survey were then used to produce the activity 'heat map' seen in the below figures.
8. Blue shades on the heat map correspond with low activity defined by up to 2 individuals intermittently recorded, yellow tones indicate more prolonged spells of activity by 2 -5 individuals whilst red tones indicate higher and consistent activity levels of 5 or more bats.

Remote Monitoring

9. To supplement data collected during the walked transect, a static monitoring device (Wildlife Acoustic SM4) were deployed in a strategic location on-site prior to the start of the walked transect.
10. Data collected during the period of remote monitoring has been run through Kaleidoscope Pro software, which can identify bat calls down to species level (except for *Myotis* species). Identification is generally correct when using this software; however, results are double-checked to ensure accurate data analysis.
11. Every effort is made to split up myotid calls down to species level. This is done by analysing calls on Anabook software and looking at parameters such as inter-pulse interval, call duration, slope, and maximum/minimum/peak call frequency. However, this can often be difficult when registrations are short in duration, faint, or distorted by cluttered environments.

Limitations

12. Static monitoring can only reliably provide information on what species of bat are regularly making use of a site. More detailed information on bat activity, such as frequency of bats, nature of activity (foraging, commuting, flight path), etc., can only be gleaned through walked transects.
13. The frequency of calls recorded can, to some extent, suggest whether activity on site is low, moderate, or high, by comparing data collected with that of similar sites that have been surveyed.
14. A single registration can account for up to 15 seconds of continuous bat call. Large batches of registrations can be interpreted in several different ways, i.e., a single bat foraging continuously for only an hour can result in many hundreds of registrations being logged; similarly, many hundreds of bats commuting quickly past the detector can result in the same number of registrations.

## Spring Results

### Walkover Transect

15. The transect started south of the Site and headed northwards along the track leading into the Site before heading east. The transect cut through the moorland vegetation to the south, then centre of the Site before looping round to take in the grassland to the east.
16. The transect continued in an anticlockwise direction around the boundaries, along the western banking before heading back up to the centre of the Site near the quarry face. The uneven nature of the Site and presence of quarry face meant the transect was only walked once as conditions became too dark to continue safely.
17. Activity was low, with only individual pipistrelle noted to the south-west corner of the Site, either foraging briefly or commuting eastwards across the Site, with the first bat being seen at 20:49, some 28 minutes after sunset.

**Figure 2** Summary of bat activity observed during walked transect.



## Spring Results

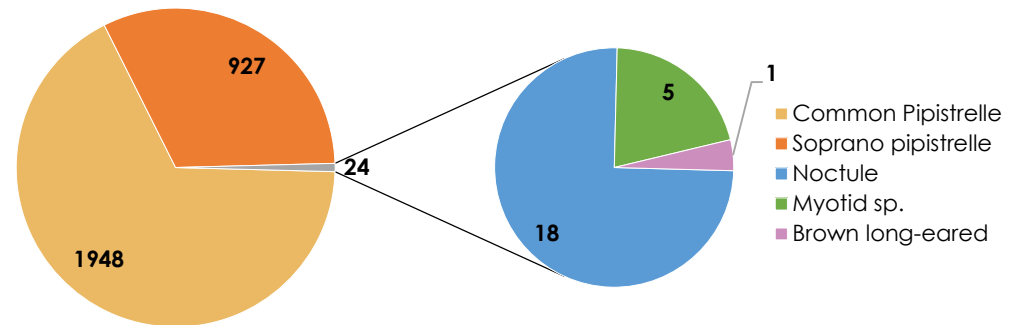
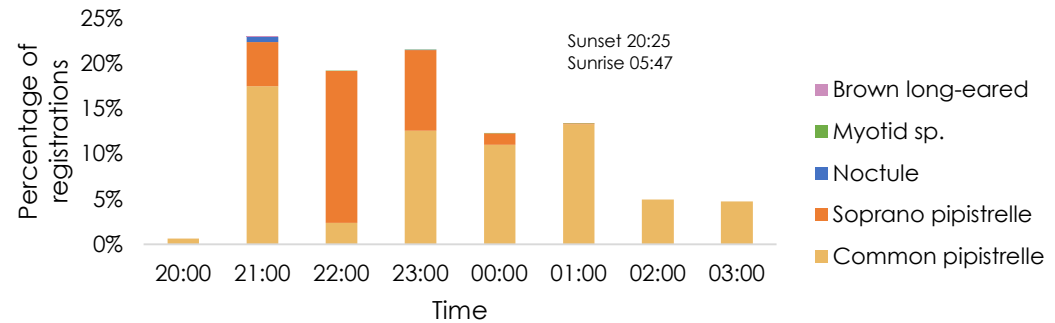
### Remote Monitoring

18. A single remote detector (Song Meter SM4BAT FS) was deployed in a strategic location, as shown in Figure 2. This was left to run for 5 consecutive nights, from the 22<sup>nd</sup> to the 26<sup>th</sup> April 2021.
19. With an average of 580 registrations per night, bat activity within this area of the Site can be assessed as moderate, particularly within spring when generally activity can be lower. Recordings vary across evenings with 1252 registrations on the 23<sup>rd</sup> to only 2 on the 25<sup>th</sup>. There is no indication that any adverse weather was present across this period of monitoring which may have affected results.
20. Registrations are dominated by common pipistrelle, with a smaller proportion of soprano pipistrelle, and irregular registrations of noctule, brown long-eared bat, and myotis, likely owed to individuals passing through the Site on an occasional basis.
21. Activity levels peak in the hours after sunset, falling off towards dawn. Although common pipistrelle activity varies through the night, recordings are spread across all hours suggesting the Site is used as a foraging resource throughout the night for this species.
22. Soprano pipistrelle activity peaks from 10-11pm, suggesting this species are using the Site earlier in the evening when passing through, possibly along a commuting line. Soprano and common pipistrelle account for over 99% of registrations with no particular patterns noted for any other species.

**Table 2** Total number of registrations logged for each bat species, per day across the spring period.

Species	22 <sup>nd</sup>	23 <sup>rd</sup>	24 <sup>th</sup>	25 <sup>th</sup>	26 <sup>th</sup>
Common pipistrelle	335	927	6	0	680
Soprano pipistrelle	522	325	0	1	79
Noctule	1	0	0	0	17
Brandt's bat	2	0	0	1	0
Daubenton's bat	0	0	0	0	2
Brown long-eared bat	0	0	0	0	1

**Figure 3** Cumulative total of registrations logged for each hour across the spring monitoring period.

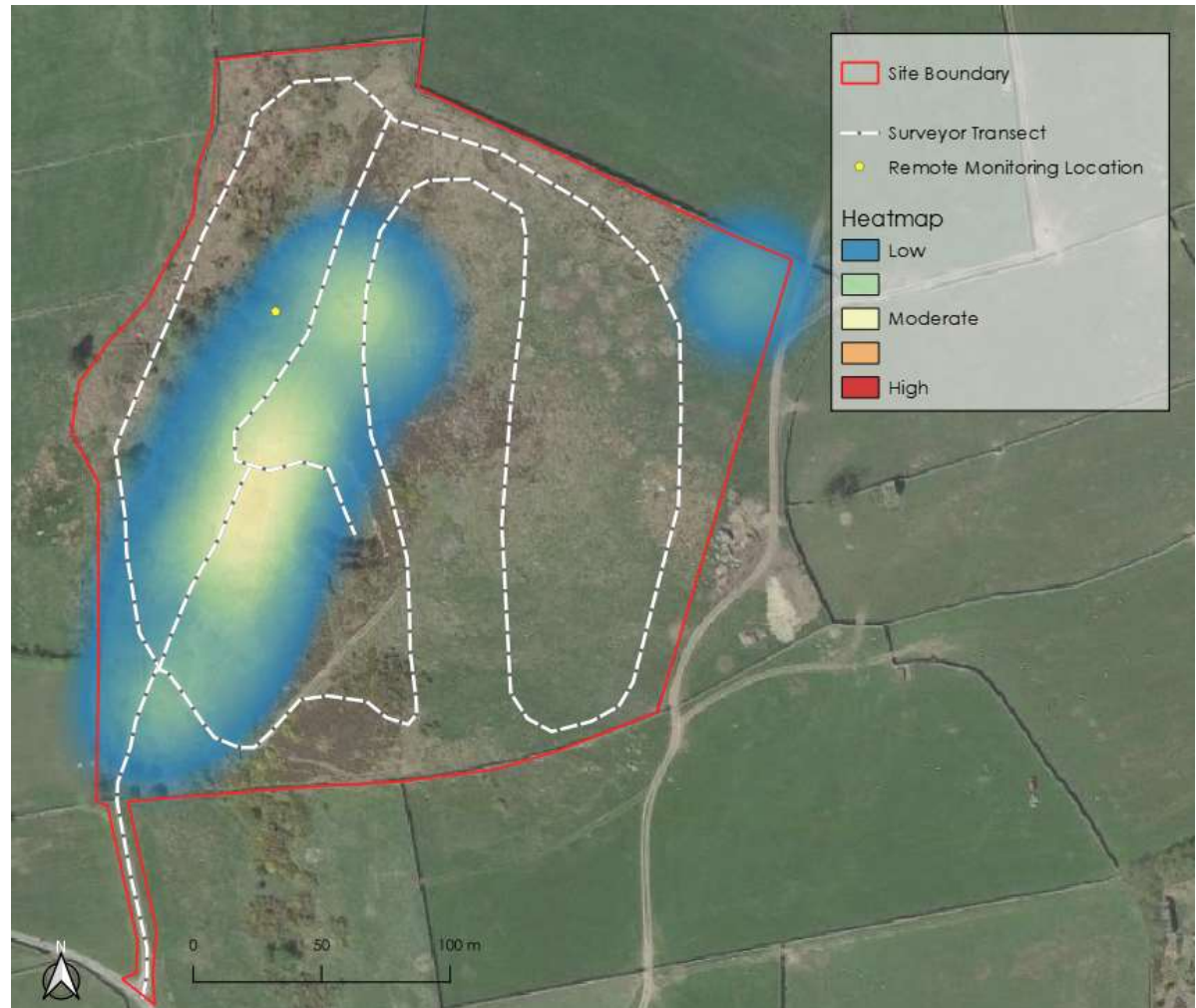


## Summer Results

### Walkover Transect

23. The summer transect commenced in the same location as that of the spring survey and followed roughly the same transect route.
24. Activity was found to be higher than that of the spring walkover, with up to 4 bats noted foraging at any time.
25. Unlike previous survey walkover and monitoring, noctule were the most frequently recorded species, with around 3-4 foraging above the Site from 21:38, 6 minutes after sunset. Foraging by this species continued for approximately 20 minutes.
26. Up to 3 common pipistrelles were also noted foraging within the quarry bottom, and along the main path through the Site from the south-west corner. Foraging activity by pipistrelle continued until the survey end.

**Figure 4** Summary of bat activity observed during walked transect.





## Summer Results

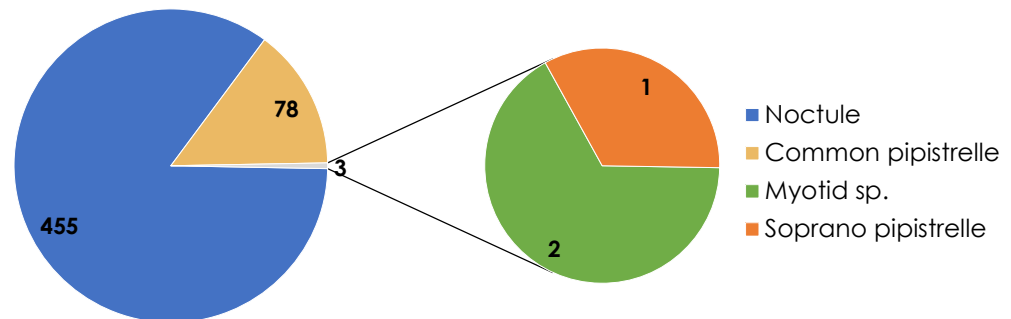
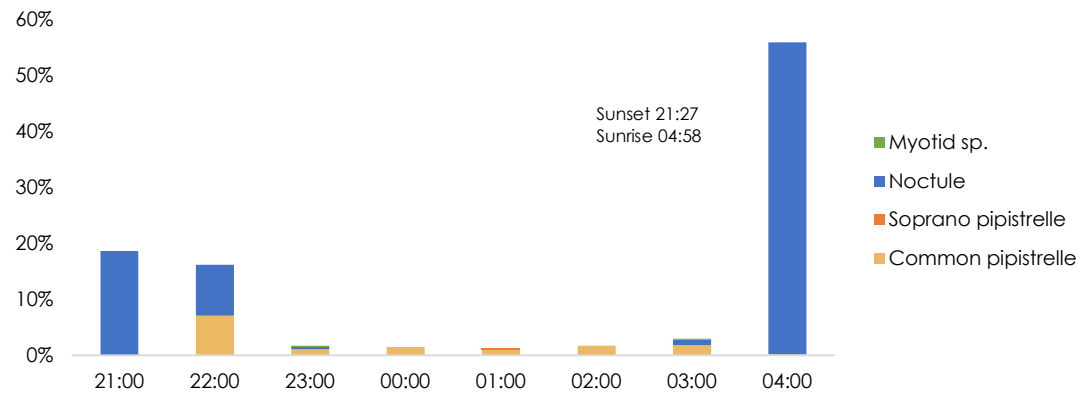
### Remote Monitoring

27. The Song Meter SM4BAT FS was deployed in the same location as before, as shown in Figure 4. This was left to run for 6 consecutive nights, from the 14<sup>th</sup> to the 19<sup>th</sup> July 2020.
28. Averaging just 89 registrations per night, this area of the Site displays very low bat activity particularly for summer. There is high variation in activity levels between nights, with the 16<sup>th</sup> and 18<sup>th</sup> being significantly above average, and the 19<sup>th</sup> significantly below.
29. Registrations are dominated by noctule with a smaller proportion of common pipistrelle which reflects the results of the summer transect. There are very irregular registrations of myotis and soprano pipistrelle, indicating likely occasional use of the Site by few individual bats, which are unlikely to rely on the Site for foraging and/or commuting.
30. Activity levels peak immediately after sunset, between 21:00 and 23:00, with a second, much larger peak in the hour before dawn, which could indicate the presence of a roost site nearby – in which case, registrations would be concentrated in the post-dusk and pre-dawn periods, when bats are exiting and re-entering the roost, or foraging across the Site immediately prior to roost re-entry nearby.
31. Noctule activity accounts for almost the entirety of the early and late-night peaks; common pipistrelle activity peaks at 22:00 but continues through the evening suggesting the Site is used for foraging by single/small numbers throughout the night. These two species account for over 99% of registrations.

**Table 3** Total number of registrations logged for each bat species, per day across the summer period.

Species	14 <sup>th</sup>	15 <sup>th</sup>	16 <sup>th</sup>	17 <sup>th</sup>	18 <sup>th</sup>	19 <sup>th</sup>
Common pipistrelle	3	6	22	6	35	6
Soprano pipistrelle	0	0	1	0	0	0
Noctule	73	70	120	80	88	24
Brandt's bat	0	0	0	0	0	1
Daubenton's bat	0	0	0	0	1	0

**Figure 5** Cumulative total of registrations logged for each hour across the summer monitoring period.

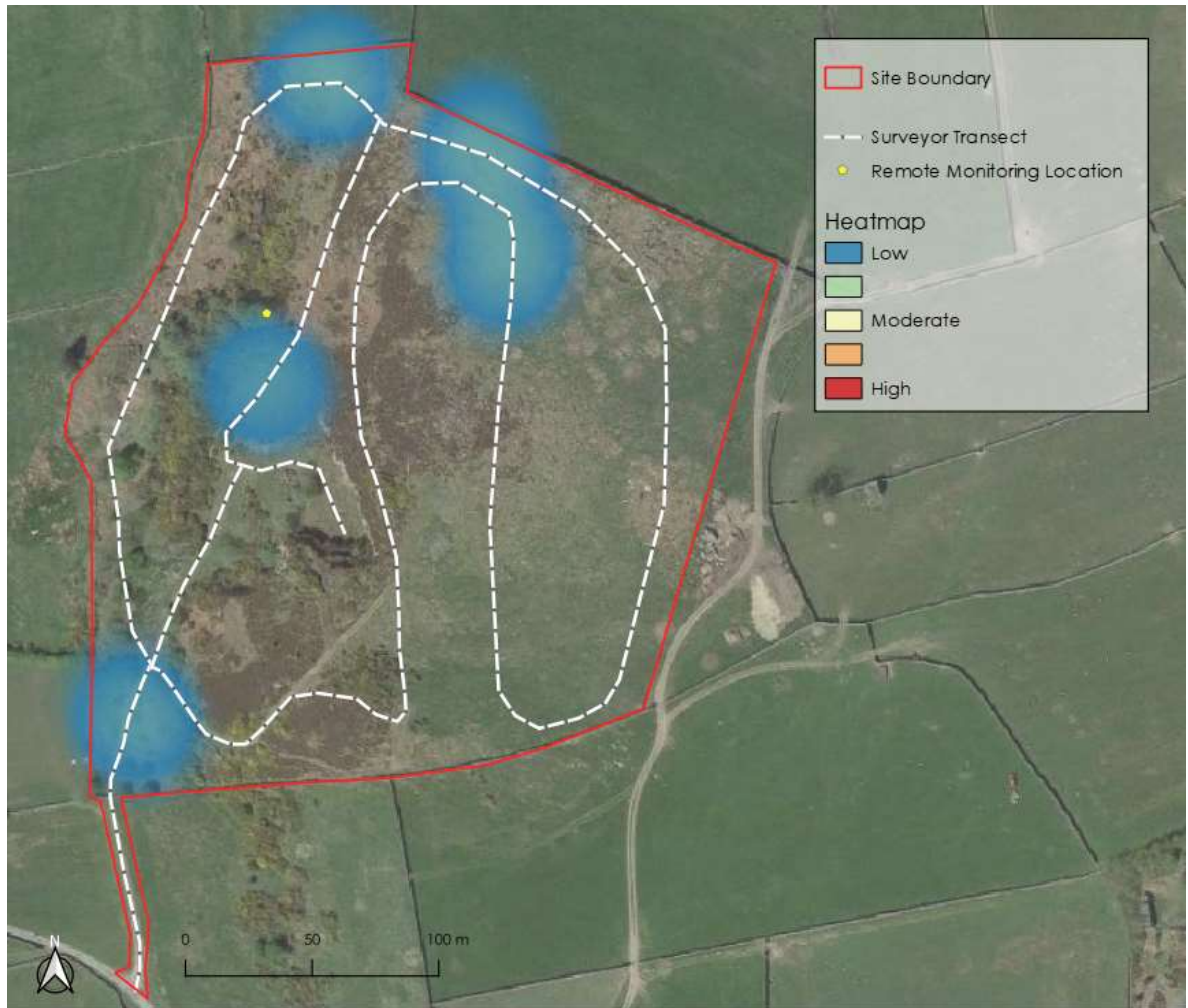


## Autumn Results

### Walkover Transect

32. The autumn transect commenced in the same location as that of the spring and summer surveys and followed roughly the same transect route. Again, the transect was limited to only one lap given health and safety concerns of the Site in darkness.
33. Noctule activity was recorded early on, at the same time as sunset (18:31) where a pass was noted to the south-western corner near the start of the transect.
34. Noctule activity was noted briefly for the next 20 minutes, before activity by common pipistrelle was observed.
35. Single passes by pipistrelle foraging and commuting were observed, some passing through the Site south-east to north-west. A number of recordings were made in which registrations were briefly picked up with no bats seen. Given the sound of these, registrations can be likely owed to bats commuting and/or briefly foraging within close proximity of the surveyor but out of direct eyeline.

**Figure 6** Summary of bat activity observed during walked transect.



## Autumn Results

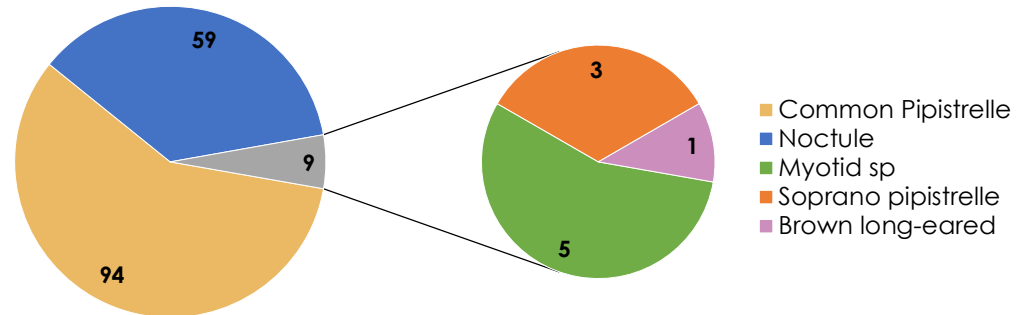
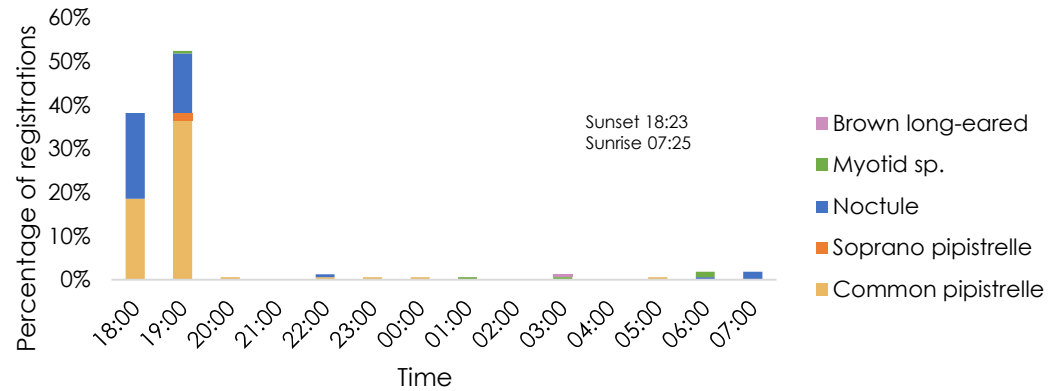
### Remote Monitoring

36. The Song Meter SM4BAT FS) was deployed in the same location as before, as shown in Figure 6. This was left to run for 5 consecutive nights, from the 7<sup>th</sup> to the 11<sup>th</sup> October 2020.
37. With an average of 32 registrations per night, this location shows very low bat activity during the autumn period. Activity levels are typically much lower, averaging 6 nightly registrations across the 7<sup>th</sup> and 9<sup>th</sup>-11<sup>th</sup>, with an unusually high peak in activity on the 8<sup>th</sup> raising the overall average.
38. Registrations are dominated by common pipistrelle and noctule, accounting for 58% and 36% of registrations respectively.
39. The remaining 6% of data are composed of very irregular registrations of myotids, soprano pipistrelle, and brown long-eared bat similar to summer results, again indicating low use of, and reliance upon, this Site for these species.
40. Activity levels again peak immediately after sunset, although much more sharply than in spring, with very few registrations logged after 8pm. Noctule and common pipistrelle account for the majority of this activity, with no significant difference in proportions of these species between the two hours.

**Table 4** Total number of registrations logged for each bat species, per day across the autumn period.

Species	7 <sup>th</sup>	8 <sup>th</sup>	9 <sup>th</sup>	10 <sup>th</sup>	11 <sup>th</sup>
Common pipistrelle	0	79	10	5	0
Soprano pipistrelle	0	2	1	0	0
Noctule	0	55	3	0	1
Brandt's bat	0	3	0	0	2
Brown long-eared bat	0	0	0	0	1

**Figure 7** Cumulative total of registrations logged for each hour across the autumn monitoring period.



## Evaluation

41. Evaluation of foraging and commuting habitat is made with reference to Wray *et al* (2010). This uses a scoring system to assess the Site's importance to bats against a geographic frame of reference.

**Table 5** Scoring system for valuing commuting and foraging habitat.

Geographic Frame of Reference	Score
International	>50
National	41-50
Regional	31-40
County	21-30
District, Local or Parish	11-20
Not Important	1-10

42. Using the above methodology, the Site is assessed as follows:

### Foraging

43. Small numbers (10) of rarer species of bat (5). No roosts identified nearby (1). Less intensive arable land (3).
44. Total of **19 points**.
45. The Site is of local value to bat populations for foraging.

### Commuting

46. Individuals (5) of common species of bat (2). No roosts identified nearby (1) with an absence of linear features (1).
47. Total of **9 points**.
48. The Site is of no importance to bat populations for commuting.

## Conclusions

49. Seasonal bat activity surveys have been carried out during spring, summer, and autumn 2021, in optimal weather conditions. This has highlighted distinct seasonal variation in levels of bat activity on-Site, with activity starting higher in spring and becoming considerably lower throughout summer and autumn. Overall activity at the Site can be assessed as low.
50. Walked transects have recorded low-level irregular foraging, primarily by common pipistrelle and noctule, with activity focused in the Site's western sector, where the majority of scattered trees and scrub is located.
51. Remote monitoring supports these findings, with the majority of registrations attributed to common pipistrelle and noctule, and significantly higher activity in spring dropping off as the year progresses.
52. Six species of bat have been recorded making use of the Site, with soprano pipistrelle activity being relatively common but peaking several hours after sunset, explaining this species' absence from transects. Sparce numbers of Brandt's, Daubenton's, and brown long-eared bat were also recorded, indicating sporadic use of the Site by these species likely passing through on a very occasional basis.
53. The data collected show that the western portion of the Site is of highest value to bats, especially for foraging and commuting during the spring, with much lower levels of use across summer and autumn. However, activity levels seen can still be considered to be low when compared with other sites.
54. Habitat favoured during the activity surveys should be retained where possible, particularly scattered trees and scrub within the western side of the Site, to maintain the Site's current value to local bat populations. Any loss of these habitats should be suitably mitigated for.
55. Lighting should be a consideration in these areas, as light spill from the quarry face and access road will reduce the suitability of retained habitats for foraging bats; a sensitive lighting plan should be produced to limit light spill into the retained area.

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