



BJ Collins
PROTECTED SPECIES SURVEYORS

PHASE II BAT EMERGENCE AND ACTIVITY SURVEYS
OF
65 CHURCH WALK
SHACKERSTONE

A report to:

David Granger Architectural Design Ltd

The Old Cottage Hospital
Leicester Road
Ashby de la Zouch
Leicestershire
LE65 1DB

By:

B J Collins – Protected Species Surveyors Ltd

Elvina Cottage
Wilson's Lane
Morton
Southwell
Nottinghamshire
NG25 0UF
www.bjcollins.co.uk

August 2023

Report to:	David Granger Architectural Design Ltd
Report Title:	Phase II Bat Emergence and Activity Surveys of 65 Church Walk, Shackerstone

Survey Site/Job:	65 Church Walk, Shackerstone, Nuneaton CV13 6NP
OS Grid Reference:	SK 37431 06784

Survey Date(s):	27 June and 18 July 2023
Surveyed by:	Mr N Clayton BSc (Hons) ACIEEM.

Architect/Agent:	David Granger Architectural Design Ltd
Planning Reference:	

Versioning and Quality Assurance

Report Status	Date	Author(s)	Reviewed by
Final version	23/08/2023	Mr N Clayton BSc (Hons) ACIEEM	B J Collins MSc MCIEEM

DISCLAIMER

This document has been prepared by B J Collins Protected Species Surveyors Limited. We accept no responsibility or liability for any use that is made of this document other than by the client for the purposes for which it was originally commissioned and prepared.

The evidence which we have prepared and provided is true and has been prepared and provided in accordance with the guidance of The Chartered Institute of Ecology and Environmental Management's Code of Professional Conduct.

RELIANCE - The report describes the conditions and ecological features on the site (and possibly its environs) at the time of survey and that this may (is likely to) change over time. Reliance upon the findings of this report should be determined in accordance with the Chartered Institute of Ecology and Environmental Management guidance on the longevity of ecological surveys, see Advice Note (April 2019) *On the Lifespan of Ecological Reports and Surveys* CIEEM.

Contents

SUMMARY	4
1. INTRODUCTION	5
1.1 Legislation applicable to bats	6
2. SITE DESCRIPTION	7
2.1 Location of Site	7
2.2 Description of the buildings.....	7
3. SURVEY METHODOLOGY	9
3.1 Emergence and Activity Surveys.....	9
3.2 Survey constraints	9
3.3 Weather Data.....	9
3.4 Personnel	9
4. SURVEY RESULTS	11
4.1 Emergence and Activity Survey Results.....	11
4.1.1 27 th of June 2023.	11
4.1.2 18 th of July 2023.....	12
4.2 DNA sample results.....	12
5. EVALUATIONS AND RECOMMENDATIONS	13
5.1 Bats in buildings.....	13
5.2 Breeding birds.....	13
5.3 Other species	13
5.3.1 Safeguarding of hedgehog during construction	13
6. BAT MITIGATION STRATEGY	14
6.1 Overview of Mitigation Strategy.....	14
6.2 Timing of commencement of redevelopment.....	14
6.3 Temporary roost provision	14
6.4 Safeguarding of individual bats from harm during demolition	14
6.5 Permanent roost provision	14
6.6 Breathable Roofing Membranes.....	16
6.7 Light Pollution Control	17
7. REFERENCES	17
8. Appendix 1 – PROCEDURE FOR IF A BAT IS DISCOVERED DURING WORKS	18
9. Appendix 2 – DNA Results	19
10. Appendix 3 – Screenshots of NVAs outputs at the end of surveys	22

SUMMARY

This report has been prepared by BJ Collins – Protected Species Surveyors Limited for David Granger Architectural Design Ltd on behalf of the owners, Ms E Hilton and Mr M Baller. The report provides the results of Phase II Bat Emergence and Activity Surveys of 65 Church Walk, Shackerstone.

This site was subject to a preliminary bat roost assessment by BJ Collins PSS (May 2023) which identified the presence of Whiskered bat droppings within the loft void of the residential dwelling (building 1) and features suitable for bats in the fabric of the buildings. This survey categorise the main house as being of moderate bat roost potential and the outbuilding as low bat roost potential.

The emergence and activity surveys confirmed the conclusions of the preliminary bat roost assessment, in that the building was found to support an individual day roosting Whiskered bat, emerging from the close to the eastern chimney stack of building 1.

The survey found no other bats or bat species roosting within the wide range of features in the building fabric.

The conclusion of the survey is therefore that the structure supports a day roost for an individual or a small number of Whiskered bat(s).

Therefore, for works to remain lawful the extension works that impact upon the roof covering and attic space over the house (building 1) must be covered by a European protected species derogation licence.

This roost status and number of bats qualifies for the Bat Low Impact Class Licence (CL21).

Chapter 6 of this document provides the details of the mitigation strategy necessary to receive registration to the Bat Low-Impact Class Licence.

Birds

The surveys alongside the survey undertaken in May 2023 identified that no nesting birds have previously used the buildings. No evidence of active nesting birds was found during the surveys, however there could be areas that may be used in the future. It is recommended that if works are undertaken during the nesting bird season, a pre-commencement check should be undertaken prior to works being undertaken. Please note that a bird's nest is protected by law from the commencement of the building of the nest until the young have fledged and left the nest.

Mammals - hedgehog

Safeguards for hedgehogs should be undertaken during the works phase of the project. If any trenches or holes are left open overnight some provision must be made to enable an animal to escape. This can include leaving a slope at one end of an open trench or installing a ramp.

1. INTRODUCTION

This report has been prepared by BJ Collins – Protected Species Surveyors Limited for David Granger Architectural Design Ltd on behalf of the building owners, Ms E Hilton and Mr M Baller. It provides the results of Phase II Bat Emergence and Activity Surveys of 65 Church Walk, Shackerstone, Nuneaton CV13 6NP. The site is centred upon the OS grid reference SK 37431 06784.

The objectives of these surveys were to determine the current status of bat roosting within the buildings to ensure that all works on the site remain lawful.

The development proposal includes an extension to the north side of the dwelling breaking into the existing attic space, as indicated by the drawing in figure 1 below.

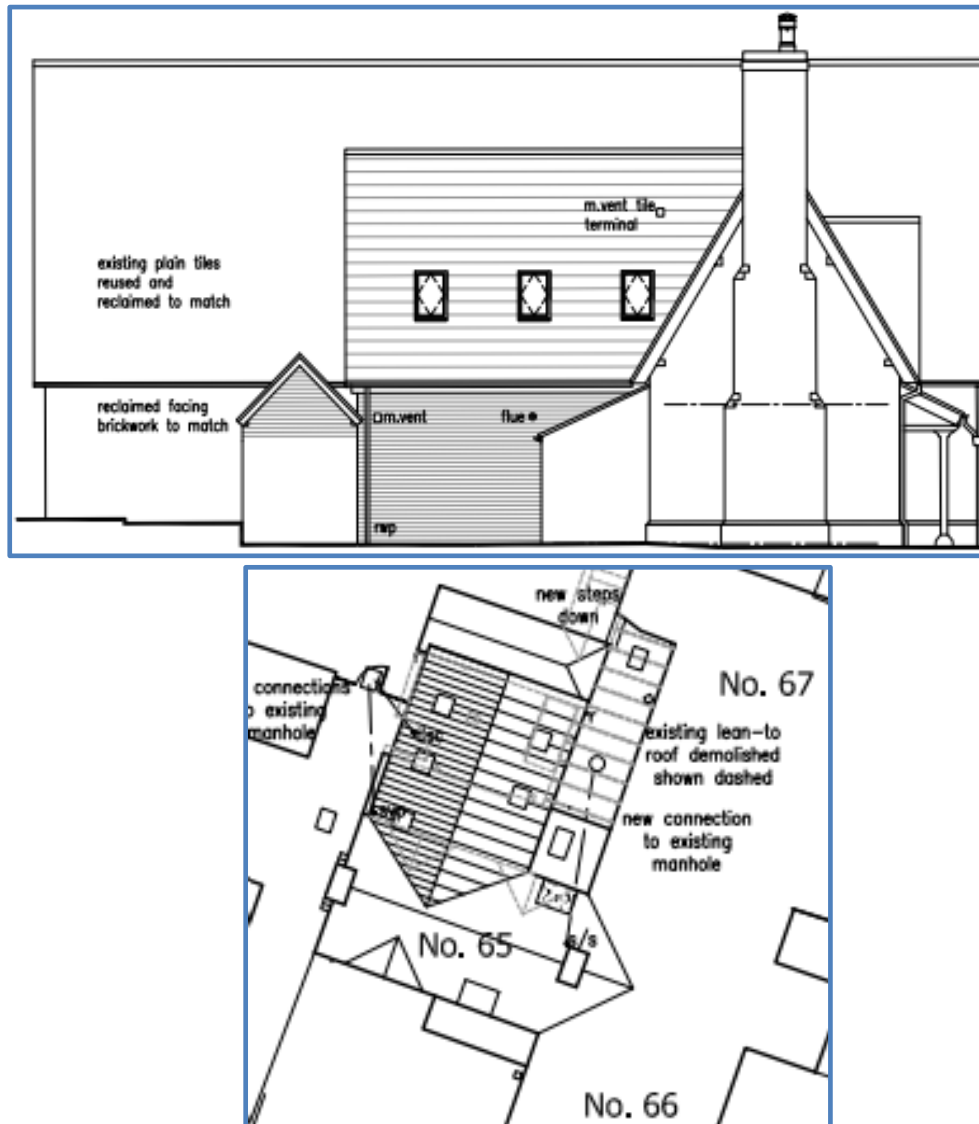


Figure 1 - extract from the proposed extension plans for the dwelling

This site was subject to a protected species survey by BJ Collins PSS (May 2023) which identified the presence of Whiskered bat droppings within the loft void of the dwelling (building 1) and features suitable for bats in the rear outhouse (building 2) the buildings were determined as of Moderate and Low potential respectively, triggering a requirement for further surveys to determine the presence/absence of roosting bats.

The follow-up protected species surveys described within this report consisted of two bat emergence and activity surveys of building 1 and one bat emergence and activity survey of building 2.

The legislation with regard to bats (*Chiroptera*) is listed below.

1.1 Legislation applicable to bats

All species of British bat and their roosts are protected under British law by the Wildlife and Countryside Act 1981 (as amended), and bats are classified as European Protected Species under the Conservation of Habitats and Species Regulations 2017 ('the 2017 Regulations'). This has recently been amended by the Conservation of Habitats and Species Regulations (Amendment) (EU Exit) Regulations (2019) which continue the same provision for European protected species, licensing requirements, and protected areas after Brexit.

The legislation makes it an offence to kill, injure or disturb a bat and/or to damage or destroy a breeding site or resting place for a bat. It is also an offence to disturb the animals such that it impairs their ability to survive, to reproduce, to nurture their young, or such that it impairs their ability to hibernate or migrate. Under this legislation development work that could affect a bat or bat roost can only be permitted under a licence from Natural England.

Licences in respect of European Protected Species affected by development can be granted under Section 55(2) (e) of The Conservation of Habitats and Species Regulations (Amendment) (EU Exit) Regulations (2019), for the purpose of preserving public health or public safety or other imperative reasons of overriding public interest including those of social or economic nature and beneficial consequences of primary importance for the environment.

Under section 55(9) of the Regulations licences can only be issued if Natural England is satisfied that:

- there is no satisfactory alternative to the work specification
- and the action authorised will not be detrimental to the maintenance of the population of the species at a favourable conservation status in their natural range.

Natural England aim to process EPS licence applications within 35 working days of receipt and Low Impact Class licenses are typically registered within 14 working days of receipt.

2. SITE DESCRIPTION

2.1 Location of Site



Figure 1: The situation of the site, encircled in red, in relation to the surrounding landscape, courtesy of Google Earth.

The description of the habitats surrounding the site is provided within the preliminary bat roost assessment. 65 Church Walk is a residential property located in the village of Shackerstone.

2.2 Description of the buildings

Building 1 is a two-storey T-shaped dwelling constructed from solid brick, with brick-built chimneys and a plain clay tiled roof underlined with mortar torching. The building is fitted with uPVC windows and doors, with timber-built fascia boards located on all aspects of the property. The internal roof structure of the property consists of an open couple roof, with no trusses or collar beams present. Thick fibre-glass insulation is also present on the floor of this internal roof space.

Building 2 is a small brick-built outbuilding attached to the rear of this two-storey dwelling and located within the small yard area. This outbuilding contains timber-built windows and doors, with a plain clay tiled roof which is underlined with Tyvek. This outbuilding is attached to the main building by a small brick-built extension, covered by a polycarbonate sheet roof. An internal dividing wall is present within this outbuilding, in addition to a vaulted chipboard ceiling.

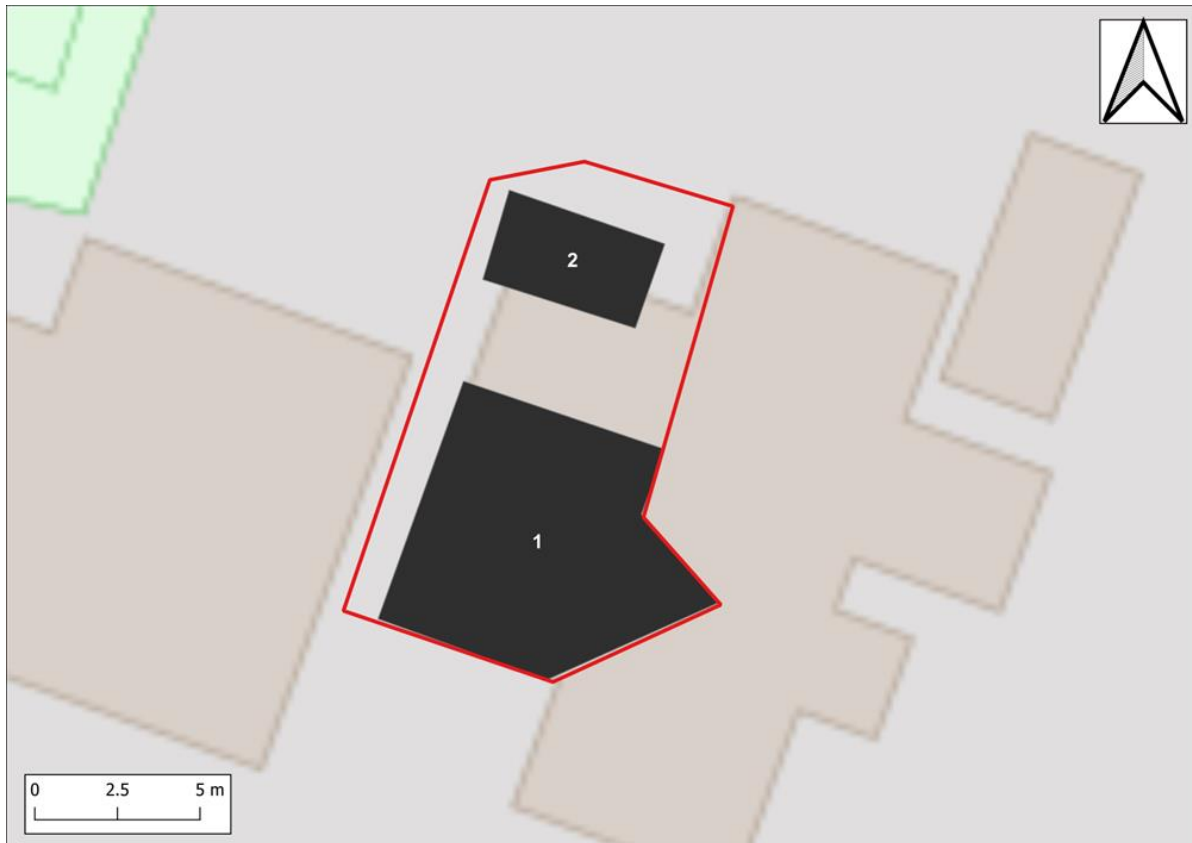


Figure 2: Red line boundary of the site and Buildings (black) surveyed numbered.

3. SURVEY METHODOLOGY

3.1 Emergence and Activity Surveys

In accordance with the Good Practice Guidelines (Collins 2016), and the updated guidance Bat Conservation Trust (2022). Building 1 was subject to two emergence and activity surveys, Building 2 was subject to one emergence and activity survey. The surveys were carried out on the 27th of June and the 18th of July 2023.

The surveys were completed by deploying ecologists at prominent positions to cover the buildings in their entirety (where possible). All bat workers were experienced bat surveyors alongside two licenced bat ecologists. The surveyors used a range of equipment including Anabat Scout, Echometer Touch 2 and Pro full spectrum detector and recording units.

Night vision aids (NVA) were utilised covering all aspects of the survey area/building in support of the surveyors. These included the InfiRay Xinfrared T3 Thermal Imager with a Samsung A7, a Canon XA30 and a Sony FDR AX53 (both with infrared ability) paired with infrared floodlights.

Ambient temperature was measured with an ETI Hygro-Therm hygrometer.

The emergence surveys began just prior to sunset and lasted for 105 minutes each.

All bat activity was documented by the surveyors.

3.2 Survey constraints

The surveyors did not encounter any significant constraints upon the survey effort. They were able to access all areas of the survey site.

3.3 Weather Data

Date	Sunset	Temperature (°C)		Cloud Cover (%)		Wind (Beaufort)	
		Start	End	Start	End	Start	End
27/06/2023	21:33	20.2	17.3	75	100	1	3
18/07/2023	21:19	17.3	14.7	100	100	1	0

Table 1: Weather data for the emergence and activity surveys.

3.4 Personnel

The emergence survey on the 27th of June was led by Mr N Clayton BSc (Hons) ACIEEM (Natural England Class Licence: 2020-49905-CLS-CLS) at position 1, assisted by Ms H Spencer MSc (Natural England Class Licence: 2022-10160-CL17-BAT at position 2 and Mr J Edinborough BSc (Hons) at position 3.

The emergence survey on the 18th of July was led by Mr N Clayton at position 2, assisted by Ms C Ward at position 1.

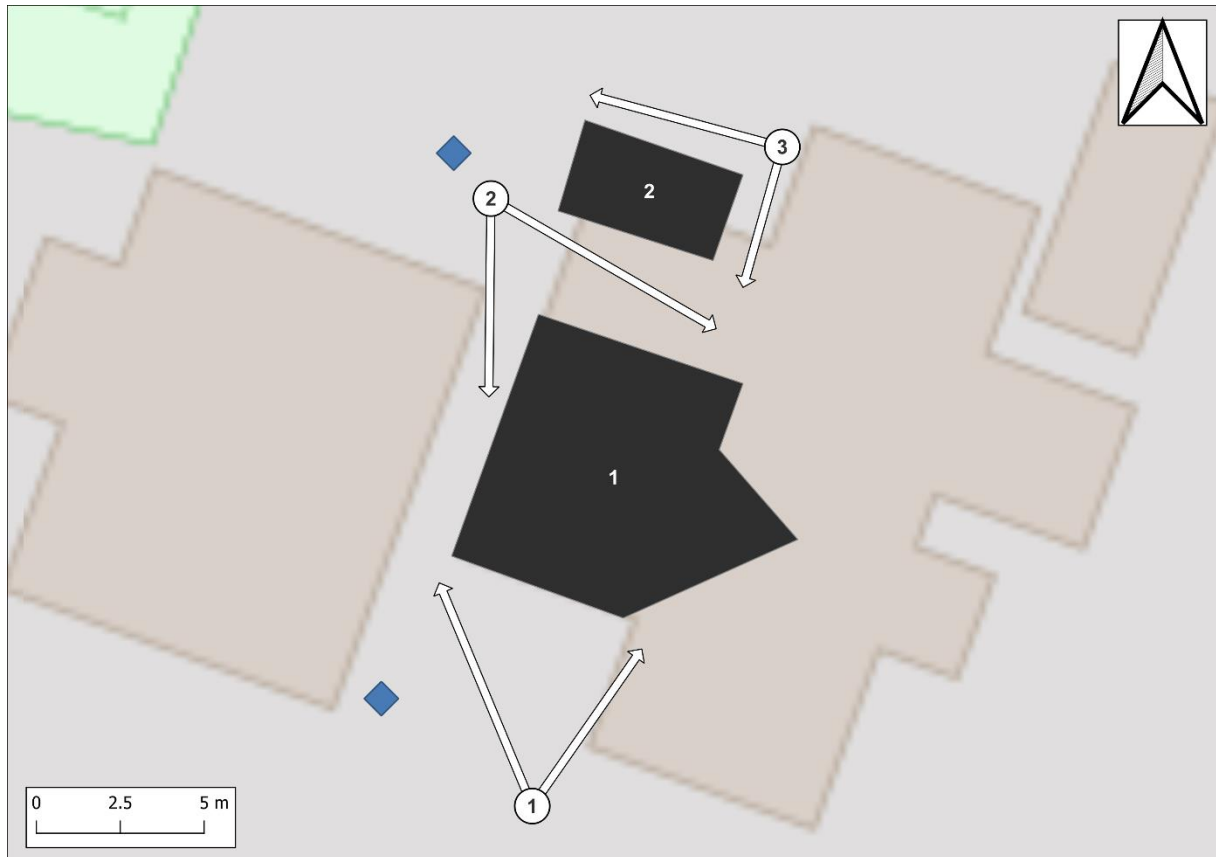


Figure 3: Buildings surveyed in black, surveyor (white circles) and NVA positions (blue diamonds), and field of view (white arrows) during the surveys.

4. SURVEY RESULTS

4.1 Emergence and Activity Survey Results

4.1.1 27th of June 2023.

For the first emergence and activity survey, ecologists were deployed positioned around the buildings identified as building 1 and 2 (see Figure 3) to ensure all elevations were under observation simultaneously, as well as identifying bats that approach from outside the survey area.

The first bat was recorded at 21:48 hours when a Common pipistrelle (*Pipistrellus pipistrellus*) flew alongside the west elevation of building 1 arriving from the south.

A total of 19 passes of bat activity were documented by surveyor at position 1, the vast majority of these were Common pipistrelle passes flying near building 1 and the attached building (Town Hall) at the east. Only one other bat species was heard during the survey period a Leisler's bat (*Nyctalus leisleri*) at 22:51 unseen.

The surveyor at position 2 recorded a total of 16 individual observations of bats during the survey period, twelve of these were foraging Common pipistrelles starting at 21:58 and with the last bat heard at 22:36. Soprano pipistrelles (*Pipistrellus pygmaeus*) was heard but not seen at 22:26 and 22:27, and a single Leisler's pass at 22:51. Other bats seen during the survey period, included a small *Myotis* emergence close to the chimney stack and lead flashing at 22:05.

The surveyor at position 3 recorded a total of 17 observations of bats during the survey period, these were all Common pipistrelles foraging around the immediate area, apart from the single Leisler's bat pass at 22:51.

1x *Myotis* species was recorded emerging from the close to the chimney stack from building 1.



Photograph 1 – showing the emergence point of the *Myotis* bat.

4.1.2 18th of July 2023.

For the second emergence and activity survey, positions 1, and 2 were deployed positioned around the survey buildings identified as building 1 (see Figure 3) to ensure all elevations were under observation simultaneously, as well as identifying bats that approach from outside the survey area.

The first bat was recorded at 21:43 hours when 2 x Common pipistrelles came from a northerly direction and passed alongside the rear of building 1.

The surveyor at position 1 recorded a total of 18 individual observations of bats during the survey period. Thirteen of these observations were Common pipistrelles with a maximum of two bats being seen at any one time, one of these bats was seen to emerge from the bay window of the Town Hall (**outside of the scope of works**). Other bats heard included Noctule at 21:43 and 22:23 and Soprano pipistrelles foraging in the area.

A total of 11 observations of bat activity were documented by surveyor at position 2, this included the first bats at 21:43. Most of the other activity was by Common pipistrelles foraging along the roof and attached Town Hall from 21:57 until 22:02. Other bats included a Soprano pipistrelle pass at 21:51, and a single unseen *Myotis* bat species pass at 22:10.

No bats were seen to emerge from any of the buildings (within the scope of works) by any of the surveyors during the survey period.

4.2 DNA sample results

Samples of bat faecal matter were collected within the loft void of building 1 during the PBRA in May 2023. These have since been analysed and have determined that the samples were of a probability of 98.43 % Whiskered bat (*Myotis mystacinus*).

5. EVALUATIONS AND RECOMMENDATIONS

5.1 Bats in buildings

The full suite of follow-up surveys was completed (spread across two months of the active season) are and found:

- 1x *Myotis* species emerging from close to the eastern chimney stack of building 1.
- Analysis of the DNA samples collected determined that the loft void of building 1 was being used as a roost by low levels of Whiskered bats.

The determination of the survey is therefore that the building supports a day roost for an individual or small number of Whiskered bat(s).

Therefore, for works to remain lawful the extension works that impact upon the roof covering and attic space over the house (building 1) must be covered by a European protected species derogation licence.

The bat roosts present are classified under The Bat Mitigation Guidelines (Mitchell-Jones 2004) as of low conservation status with regard to proportionate mitigation.

As a result, the renovation of the building qualifies for registration under the Bat Low Impact Class License (CL21). This is as the number of species and the number of roost features fits within the threshold of this licence, which cannot be used when a site supports more than 3 roost features or 3 bat species, or indeed bat species of special conservation concern.

Low-impact class licences can only be used for a 3-month period following the registration of the site. The application must be supported by bat emergence and activity surveys from the most recent active season, which runs from May to September. Therefore, if the application for a licence extends beyond May 2024, then further emergence and activity survey(s) will be required.

Before an application for registration to this licence can be submitted; planning permission must be obtained and all conditions relating to wildlife species must be discharged.

A mitigation plan which reflects the mandatory compensatory requirements for a low impact class licence is included in chapter 6 of this report.

5.2 Breeding birds

The surveys alongside the survey undertaken in May 2023 identified that no nesting birds have previously used the buildings.

No evidence of active nesting birds was found during the surveys, however there could be areas that may be used in the future. It is recommended that if works are undertaken during the nesting bird season, a pre-commencement check should be undertaken prior to works being undertaken.

Please note that a bird's nest is protected by law from the commencement of the building of the nest until the young have fledged and left the nest.

5.3 Other species

5.3.1 Safeguarding of hedgehog during construction

Safeguards for terrestrial mammals, specifically hedgehog, should be undertaken during the works phase of the project. If any trenches or holes are left open overnight some provision must be made to enable an animal to escape. This can include leaving a slope at one end of an open trench or installing a ramp.

6. BAT MITIGATION STRATEGY

6.1 Overview of Mitigation Strategy

In order for the site to address the requirements of a mitigation strategy sufficient to acquire a European Protected Species Derogation Licence, the following actions will be required:

- Works must be timed to avoid the sensitive period for individual adult bats, ideally work should avoid the hibernation season as the low-impact class licence cannot be used if a hibernation roost is discovered during the pre-commencement survey. If this occurs, there would be an approximate two-month delay while an individual mitigation licence is acquired.
- Alternative replacement habitat is required suitable for the species and in permanent form and on a like-for-like basis.

6.2 Timing of commencement of redevelopment

The results from the survey show that the roost sites are being used by single numbers of Whiskered bats; no maternity colony was present. Consequently, works can proceed in the active season when adult bats are physiologically able to tolerate disturbance. If the roost status was to change and a maternity colony was identified, then works would be restricted to either spring or autumn to avoid the sensitive maternity period.

6.3 Temporary roost provision

Prior to the works commencing on site and following the award of the EPS licence, one timber bat boxes are to be installed upon a mature tree or upon an erected pole/post of at least 3 metres in height at a site nominated by the ecologist. The purpose of the timber bat boxes is to provide temporary roosting habitat for any bats discovered during the redevelopment of the buildings, and to provide an alternative roost location whilst the permanent roost features are installed within the building.

6.4 Safeguarding of individual bats from harm during demolition

Prior to the commencement of the development works on any buildings a toolbox talk is to be given to contractors on site to advise of the potential roost features and how to protect roosting bats from harm. A copy of the license and suitable precautionary procedure should be kept in the site office and adhered to if bats are encountered when the ecologist is not present see Appendix 1.

The requirements of the license necessitate that roosting bats are safeguarded from harm and therefore the lintels, bargeboards, around the windows, along the verge, and roofing material as applicable and cavities utilised by roosting bats must be removed or dismantled with care utilising best practice methods and under the direct supervision of the bat consultant.

Any bats found during this process will need to be transferred by hand by the ecologist only, and placed in one of the timber bat boxes.

6.5 Permanent roost provision

The first element of the permanent roost provision within this mitigation strategy is a single bat tube located within the gable of the new extension, see figure 4 overleaf. The objective of the new permanent roost provision is to provide an alternative crevice feature suitable for use by day roosting bats. Being on the northern gable this feature would not be suitable for a maternity colony.

The enclosed bat tube should be placed into the gable wall offset from the window to avoid any risk of droppings and urine splashings landing on the window itself. With the building being used by such a small number of bats it is unlikely that these will be visible on the normal external wall surface.

The proposal is to install a Chillon Woodstone bat tube or similar proprietary brand.



Figure 4 - example of the integrated bat boxes

The locations for the integrated bat box shown in figure 5 below.

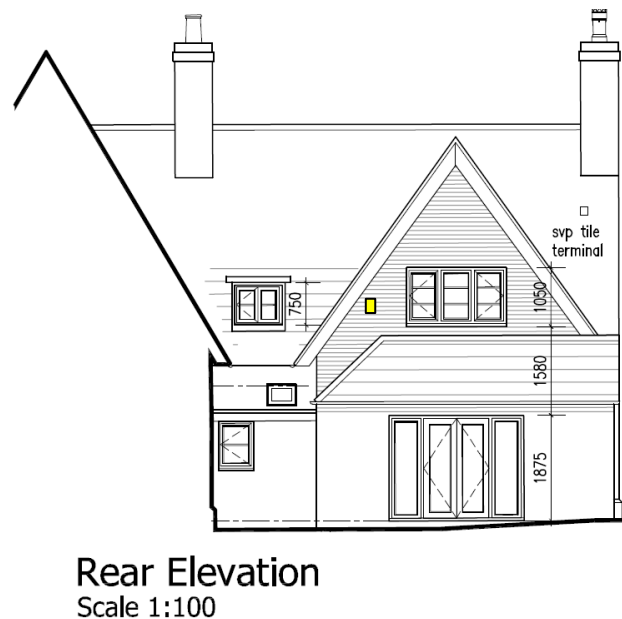


Figure 5 - proposed locations for bat tube

The second element of mitigation is providing continued access for the whiskered back to the attic space of the dwelling. To achieve this it is recommended that a lead bat tile is installed allowing access to the roof covering into the original dwelling attic, ensuring this habitat is available in the long-term.

The design of the laid-back tile is provided in figure 6 overleaf, along with its proposed location.

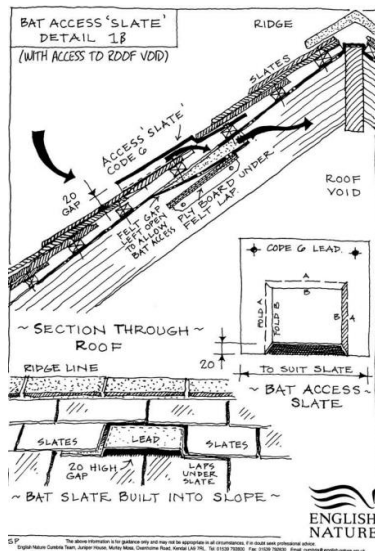


Figure 6 - example of the integrated lead access tile and its proposed location on the building.

6.6 Breathable Roofing Membranes

Scientific investigations (Waring et al., 2013) into bats roosting against breathable roofing membranes have found that bats become entangled in the loose fibres of the membrane resulting in a death. The species most commonly affected are the pipistrelle bats which often gain access to the space underneath roof tiles and above the non-bitumen membranes. ALL non bitumen roofing membranes represent a threat to roosting bats in this way.

To this end no building which contains a bat roost can have the roof underlined with modern breathable roofing membranes. The licence currently only permits the use of traditional type I bitumen and hessian based linings.

Natural England advise that if a manufacturer of membranes can provide a certificate of safety via snagging propensity tests, which complies with their own test requirements, then it will be possible to use that material but only with the express approval on each individual licensed case.

6.7 Light Pollution Control

Exterior lighting has been shown to negatively impact upon emergence times and foraging opportunities for bats thereby reducing their fitness and ability to survive (Stone, Jones & Harris, 2009). It is therefore important that the areas of the buildings where the bat tubes are to be placed must remain unlit in the hours of darkness to enable bats to safely access and use these features.

The following recommendations for mitigation of artificial lighting have been extracted from the Guidance note 08/18: Bats and Artificial Lighting in the UK produced by the Bat Conservation Trust and Institution of Lighting Professionals (2018).

- Lighting units should use LED which emit a warm white light (less than 2700K) to reduce the blue light component known to attract insects.
- Lighting units should feature peak wavelengths 550nm to avoid the component of light that is most disturbing to bats
- Lighting units should be mounted horizontally as such there is no upward tilt
- External security lighting should be motion sensitive on a short timer (1 min)

7. REFERENCES

- Bat Conservation Trust (May 2022) **Interim Guidance Note: Use of night vision aids for bat emergence surveys and further comment on dawn surveys**. Available at https://media.nhbs.com/book_pdfs/Interim-guidance-note-on-NVAs-May-2022-FINAL.pdf
- Collins, J. (ed) (2016) **Bat Surveys for Professional Ecologists: Good Practice Guidelines**, 3rd Edition, Bat Conservation Trust, London.
- Gunnell, K. Williams, C. Murphy, B. (2013) **Design for Biodiversity: A Technical Guide for New and Existing Buildings**, RIBA Publishing, 15 Bonhill Street, London EC2P 2EA (2nd Edition) Kindle Edition.
- Mitchell-Jones, A.J. (2004) **Bat Mitigation Guidelines**, English Nature, Peterborough.
- Stone, Jones & Harris, (2009) **Street Lighting Disturbs Commuting Bats**, Current Biology, doi:10.1016/j.cub.2009.05.058 .
- Stone E, Zeale MRK, Newson SE, Browne WJ, Harris S, et al. (2015) **Managing Conflict between Bats and Humans: The Response of Soprano Pipistrelles (*Pipistrellus pygmaeus*) to Exclusion from Roosts in Houses**. PLOS ONE 10(8): e0131825. <https://doi.org/10.1371/journal.pone.0131825>
- Institution of Lighting Professionals & Bat Conservation Trust (2018) **Guidance note 08/18: Bats and Artificial Lighting in the UK**, Institution of Lighting Professionals, Rugby.
- Waring S.D., Essah E.A, Gunnell K., and Bonser R.H.C., (2013) **Double Jeopardy: The Potential for Problems when Bats Interact with Breathable Roofing Membranes in the United Kingdom**. Architecture & Environment, 1 (1): 1-13.

8. APPENDIX 1 – PROCEDURE FOR IF A BAT IS DISCOVERED DURING WORKS

- If at any point in the building works bats are discovered then contractors must stop work immediately and telephone BJ Collins Protected Species Surveyors on 01636 830058 or 07957 122217.
- B J Collins PSS will either provide an appropriately licensed bat worker to the site or provide a member of staff who will liaise directly with the contractor. Actions will then be taken following advice given. This may include removal of bats, but only where the bat ecologist considers this to be a viable and safe option.
- Bats are a protected species and there should be no attempt to handle a bat if discovered. The bat should be covered with a light material (cloth) and the bat worker called out to carry out the rescue.
- Only when the bat ecologist is satisfied that the risk to bats is ceased will works recommence.
- Should it transpire that the operation being carried out is of more risk to bats than was originally thought, then works will be stopped until they can be supervised by an appropriately licensed bat worker.
- If a bat is found under a tile or within any other niche to the building fabric, works will stop immediately (as above). If the bat does not voluntarily fly out, then the aperture will be carefully covered over to protect the bat(s) from the elements, leaving a small gap for the bat to escape voluntarily. Any covering should be free from grease or other contaminants and should not be a fibreglass-based material.

9. APPENDIX 2 – DNA RESULTS



Folio No: E18337
 Report No: 1
 Purchase Order: Rudd and Berks
 Client: BJ COLLINS
 Contact: Barry Collins

TECHNICAL REPORT

ANALYSIS OF BAT DROPPINGS FOR SPECIES OF ORIGIN IDENTIFICATION

SUMMARY

The droppings of bats contain small amounts of DNA belonging to the organism from which they originated. By analysing droppings collected from a bat roost or colony for the presence of DNA, a robust identification of the species present can be made. Recent advancements in molecular methods including PCR (polymerase chain reaction) and DNA sequencing mean that 92% of bat species worldwide can be identified including all 17 UK resident bat species.

RESULTS

Date sample received at Laboratory: 27/06/2023
 Date Reported: 04/07/2023
 Matters Affecting Results: None

Lab Sample ID.	Site Name	O/S Reference	Genetic Sequence	Common Name	Result	Sequence Similarity
B1970	Shackerstone, 65 Church Walk	SP2702 7756	TTATKCGGAGGCTTTGGGA TTGACTAGTGGCCCTGATGA TTGGGGCTCTCGATATAGCC TTGCCCCGGATAAATATAT AAGTTTCTGACTACTTCCOC CATCTTCTTATTACTACTGG CCTGCTCTATAGTGAAGCA GGGGCAGGAACCTGTTGAC AGTTTATCCTCCCTAGCAG GAAACCTTGACATGACGGA GAG	Whiskered bat	Myotis mystacinus	98.43%



Forensic Scientists and Consultant Engineers
 SureScreen Scientifics Ltd, Morley Retreat, Church Lane, Morley, Derbyshire, DE7 6DE
 UK Tel: +44 (0)1332 292003 Email: scientific@suresscreen.com
 Company Registration No. 08950940

Page 1 of 3



```

TCTTTTCTACTACTTTTAGCT
TCGTCTGTCAGTAGAGGCTGG
AGCAGGTACCGGTTGACAG
TCTATCTCTCTTAGCGGA
AAGCTAGCACATGC

```

If you have any questions regarding results, please contact us: ForensicEcology@surescreen.com

Reported by: Chelsea Warner

Approved by: Chris Troth

METHODOLOGY

Once samples have arrived in the laboratory, a single bat dropping is selected for its suitability (freshness and size). The DNA is then isolated using a commercial DNA extraction kit. Using PCR, bat DNA (if present within the sample) is amplified using bat DNA-specific molecular markers designed to amplify a short fragment of the mitochondrial gene. If amplification is successful, the resulting DNA sequence is revealed using a process known as Sanger Sequencing in order to obtain the genetic sequence. The sequence results are aligned against a library of known bat reference sequences using bioinformatics software, which enables us to determine which species the extracted DNA matches with, informing the species identity and sequence similarity (%).

If the initial analysis is unsuccessful, the entire process is repeated up to two additional times with fresh reserve droppings. If no DNA is detected after three attempts, we can be confident that any further analysis of the sample will likely also fail to result in species identification.

INTERPRETATION

Genetic Sequence:	The unique DNA sequence obtained from the sample.
Sequence Similarity:	How closely matched the DNA sequence from your sample is to the sequences within our reference database. This can be interpreted as a score of result accuracy, with the maximum score of 100% indicating an exact match of dropping to the indicated species' reference sequence. Lower scores (80-99%) indicate some variation between the sample and reference sequence, likely due to natural variation between individual genetic sequences and/or systematic variations generated through the sequencing process. Scores below 80% similarity should be interpreted with care and can indicate part degraded or part contaminated samples.
Inconclusive Result:	Degraded sample: DNA degraded, unable to determine species identification due to degradation of sample DNA. This can happen either before sample collection (old droppings, exposure to UV etc.) or after sample collection if stored for long periods before analysis or not handled correctly. Inhibited/contaminated sample: Unable to determine species identity due to contamination or the suspected presence of large quantities of PCR inhibitors. Contamination sources can come from other species which come into contact with droppings, human contamination during sample collection.
Alternative Result:	Sometimes, other mammalian species such as rodents are detected. We find this to be a common occurrence as some bat droppings can be similar in appearance to rodent



Forensic Scientists and Consultant Engineers
 SureScreen Scientifics Ltd, Morley Retreat, Church Lane, Morley, Derbyshire, DE7 6DE
 UK Tel: +44 (0)1332 292003 Email: scientifics@surescreen.com
 Company Registration No. 08950940

Page 2 of 3



droppings. Although sometimes unexpected, repeat analyses in these cases would likely return the same results.



Forensic Scientists and Consultant Engineers
SureScreen Scientifics Ltd, Morley Retreat, Church Lane, Morley, Derbyshire, DE7 6DE
UK Tel: +44 (0)1332 292003 Email: scientifics@suresscreen.com
Company Registration No. 08950940

Page 3 of 3

10. APPENDIX 3 – SCREENSHOTS OF NVAS OUTPUTS AT THE END OF SURVEYS



