

Report : Bat Survey:
House at Little Rock,
Rock Farm, Llanllwchaiarn SY16 3BH

Reference : GCR/2781/22.1

Date : 3 October 2022

Client : Mr. G. & Mrs. C. Rimmer
Little Rock
Rock Farm
Llanllwchaiarn
SY16 3BH

Purpose : To inform the proposed extension of the House

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The information, data, evidence, advice and opinions which I have prepared and provided is true, and has been prepared and provided in accordance with the Chartered Institute of Ecology and Environmental Management's Code of Professional Conduct. I confirm that the opinions expressed are my true and professional bona fide opinions.

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**Bat Survey:
House at Little Rock,
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1. Introduction

In July 2022 Star Ecology was commissioned by Mr. G. & Mrs. C. Rimmer to carry out a Bat Survey to inform a proposal to construct a first-floor extension onto part of an existing single-storey area of the House within the Little Rock property.

The development proposal will require the removal of the existing single-storey roof structure, the construction of the new first-floor extension and the cutting-in / joining of the new extension roof structure into an existing two-storey roof structure.

Full details of the proposed development may be obtained from Mr. G. & Mrs. C. Rimmer.

The House is a single- and two-storey detached structure within the southwest area of the small village of Llanllwchaiarn and stands at approximate National Grid Reference (NGR) 312325, 292395.

The Bat Survey comprised an Initial Bat Survey and two Dusk Bat Emergence and Activity Surveys.

The Initial Bat Survey was carried out on 29 July 2022.

The Dusk Bat Emergence and Activity Surveys were carried out on 19 August 2022 and 5 September 2022.

The Initial Bat Survey was carried out by Dr. R. M. Jones, experienced field biologist, surveyor and Natural Wales Licensed bat worker (Licence number S088947/1).

The Dusk Bat Emergence and Activity Surveys were carried out by Dr. R. M. Jones with the assistance of Mr. A. Edwards, surveyor and recorder.

The survey/assessment has been carried out with regard to the following published guidance:

- 'Bat surveys for Professional Ecologists – Good Practice Guidelines'⁽¹⁾
- the gov.uk website⁽²⁾
- BS42020:2013 'Biodiversity – Code of practice for planning and development'⁽³⁾

A photographic record of the House at Little Rock is contained in Appendix 1.

2. Legislation and Policy

2.1 Bat

All bat species (*Rhinolophidae* and *Vespertilionidae*) are protected under the Wildlife and Countryside Act 1981, the Countryside and Rights of Way Act 2000 and the Conservation of Habitats and Species Regulations 2017 (as amended).

Under the Conservation of Habitats and Species Regulations 2017 legislation it is illegal to:

- deliberately capture, injure or kill a bat;
- deliberately disturb bats. This includes in particular, disturbance in a way any such which is likely to (i) impair their ability to survive, breed or reproduce, or to rear or nurture their young; (ii) impair their ability to hibernate or migrate; or (iii) to affect significantly the local distribution or abundance of the species to which they belong;
- damage or destroy a breeding site or resting place of a bat;
- to be in possession or control, to keep, transport, to sell or exchange, or to offer for sale or exchange, any live or dead bat, or any part of, or anything derived from such a wild animal.

Under the Wildlife and Countryside Act 1981, it is illegal to:

- intentionally or recklessly disturb a bat while it is occupying a structure or place which it uses for shelter or protection.
- intentionally or recklessly obstruct access to any structure or place which a bat uses for shelter or protection.

A bat resting place may be a structure a bat uses for breeding, resting, shelter or protection. Resting place sites are protected whether or not bats are in occupation, as they may be re-used by bats.

Eight species of bat are listed as 'priority species' under Schedule 7 of the Environment (Wales) Act 2016.

A European Protected Species (EPS) Development Licence from Natural Resources Wales may be required for development works triggering Conservation of Habitats and Species Regulations 2017 offences against bats.

2.2 Bird

Nesting birds are protected by the Wildlife and Countryside Act 1981.

Under the Wildlife and Countryside Act 1981, all birds are protected while breeding. It is an offence, with certain exceptions to:

- intentionally kill, injure or take any wild bird;
- intentionally take, damage or destroy the nest of any wild bird while it is in use or being built;
- intentionally take or destroy the egg of any wild bird.

3. Desk Study

3.1 Designated Wildlife Sites

A search for designated wildlife sites within 1km of the House was carried out using the Multi-Agency Geographic Information Centre (MAGIC) (<http://magic.gov.uk>).

There are no designated wildlife site within 1km of the House.

3.2 Records of Bat

A formal search of historical records of bats (or other wildlife) within the vicinity of the House was not commissioned. Considering the nature, scale and location of the proposed development; the constraint of not carrying out an historical biodiversity record search is considered negligible.

The owner(s) of the House is/are not aware of protected wildlife being present within the House.

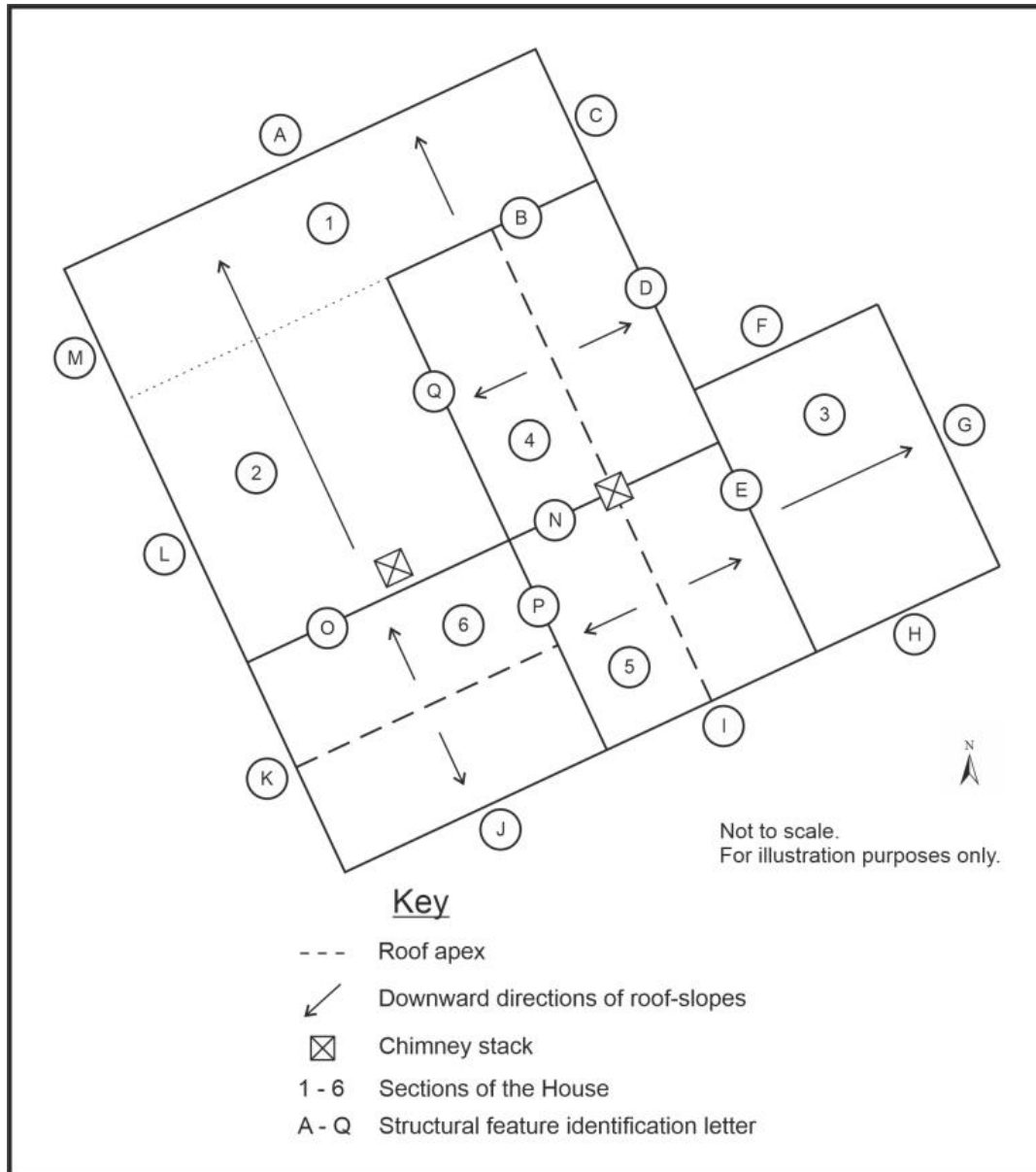
4. Building Description

A brief description of the House is provided here.

The House is a single- and two-storey structure, part rendered brick and concrete-block with six distinct structural roof structures; Sections 1 – 6.

For ease of reference the relevant structural features of the House have been labelled A – Q and are described separately.

A diagram of the structural outlay of the House showing the locations of Sections 1 – 6 and features A - Q is shown below:



- Section 1: Single-storey.
Slate covered mono-pitch roof with stainless steel slate hooks/clips.
Vaulted ceiling and no roof-space is present.
- Section 2: Single-storey.
Roofing-felt covered mono-pitch roof with shallow/narrow-height (approximately 1.2m maximum) roof-space. Roofing felt covers slates with no underlining, but some lime torching/parching is present. The roof is situated between the two-storey walls of Section 4 and 6, a parapet wall at the southwest and adjoins the Section 1 roof apex at the northwest. Roofing felt and/or lead flashings are present at abutments.
- Section 3: Single-storey.
Slate covered mono-pitch roof.
Vaulted ceiling and no roof-space is present.
- Section 4: Two-storey.
Slate covered apex roof with inter-locking ridge tiles.
The roof structure is lower in height than Section 5.
Vaulted ceiling and no roof-space is present.

- Section 5: Two-storey.
Slate covered apex roof with inter-locking ridge tiles.
The roof structure is higher than the Section 4 roof structure.
No roof-space is present.
- Section 6: Two-storey.
Slate covered apex roof with inter-locking ridge tiles.
A narrow-height (approximately 0.4m) surveyor inaccessible roof-space is present beneath the roof apex.
- Feature A: Single-storey eave. Timber fascia board direct.
- Feature B: Part of the Section 1 single-storey roof apex; lead flashing to the Section 4 two-storey height northwest elevation exterior wall.
Two-storey height gable. Timber barge boards attached direct with oversailing (by roughly 30mm) mortared roof slate verges supported by composite-board under-cloaking.
- Feature C: Section 1 single-storey gable.
Exterior common rafter direct to wall with a timber barge board and top architrave. Roof-slate verge oversails by roughly 30mm.
- Feature D: Section 4 two-storey eave. Timber fascia board direct.
- Feature E: Section 3 single-storey roof apex. Lead flashing to the Section 5 two-storey height northeast elevation wall.
Section 5 two-storey eave. Timber fascia board direct.
- Feature F: Single-storey gable. Horizontal overlapping waney-edge timber-board cladding. Timber barge board and top architrave direct with oversailing (by roughly 30mm) roof-slate verge.
- Feature G: Single-storey eave. Overhanging and enclosed with an intact timber-board soffit box.
- Feature H: Single-storey gable. Horizontal overlapping waney-edge timber-board cladding. Timber barge board and top architrave direct with oversailing (by roughly 30mm) roof-slate verge.
- Feature I: Two-storey gable. Timber barge direct with flush and oversailing (50% intact) mortared roof-slate verge.
- Feature J: Two-storey eave. Timber fascia board direct.
- Feature K: Two-storey gable. Timber barge direct with flush and oversailing (100% intact) mortared roof-slate verge.
- Feature L: Section 2 single-storey gable enclosed by a (brick) rendered parapet wall with concrete slab copings.
- Feature M: Section 1 single-storey gable. Timber barge board direct with top architrave and oversailing (by roughly 30mm) mortared roof slate verge.
- Feature N: Section 4 two-storey roof abutment to the Section 5 northwest elevation exterior wall of lead flashings and soakers.
Section 5 two-storey gable. Timber barge boards attached direct with oversailing (by roughly 30mm) mortared roof slate verges supported by composite-board under-cloaking.

Feature O: Section 6 two-storey eave. Timber fascia board direct.

Feature P: Lead gutter between the Section 5 southwest elevation roof-slope and the Section 6 northeast elevation gable.
The Section 6 two-storey gable has a timber barge board attached roughly 20mm out/away from the gable wall exterior surface. Mortared roof slate verges supported by composite-board under-cloaking oversail the barge boards by roughly 30mm.

Feature Q: Section 4 two-storey eave. Timber fascia board direct.

5. Initial Bat Survey

The Initial Bat Survey was carried out on 29 July 2022.

5.1 Method

5.1.1 Bat roosting potential

The House was assessed for its potential to support bats and the type and number of bat roosts.

This involves consideration of a number of abiotic factors including:

- Access to the interiors of the House
- Age
- Construction fabric
- Habitat context
- Light levels
- Previous use of, and activity within, the House
- Temperature regime and protection from weather

5.1.2 Physical evidence of bat occupation

The House was searched for the presence of bats and their roosts.

Search methods included the use of mirrors, torches (including a Fenix RC40 3800 lumen torch and a DeWalt DCL043 1000 lumen torch), binoculars (Zeiss 10x42), borescope (Visual Optics VO18 5.8mm Fibre Optic), fibrescope (Provision PV2636-21 5.8mm), video-scope (Draper 05163 Recording Flexi Inspection Camera), thermal imaging binoculars (Pulsar Accolade 2 LRF XP50 Pro Thermal Binocular (50Hz)), thermal imaging monocular (Zeiss DTI 3/25 Thermal Monocular), a night vision scope (Sytong HT-66 with infrared illuminator), a 3.8m Telescopic ladder, 4.1m Telescopic ladder, 8.15m Combination ladder; and combinations of these.

A search was also made for notable signs of past and/or present bat roost activity, including bat urine stains, fur oil stains, scratch marks and faeces. These may be found around a bat roost entrance, within a roost, and within flight/foraging areas.

The following list explains how the survey equipment was used to inspect the House:

- torches are portable battery powered (artificial) light emitting devices that were used to illuminate areas/features to aid the surveyor's inspection for physical evidence of bat.

- mirrors are portable reflective pieces of equipment that can aid the visual perception of features that may otherwise be inaccessible.
- binoculars are portable pieces of equipment that consist of two magnification telescopes, mounted side-by-side, and were used to aid the visual perception of distant and/or small objects.
- borescopes, fibrescopes and video-scopes are portable battery powered optical devices with flexible (light emitting) tubes that were used to aid the internal visual inspection - for physical evidence of bat - of small (structural) features and crevices that would otherwise be inaccessible.
- thermal imaging binoculars and monoculars are handheld electronic devices with an integrated visual display, designed for detecting heat energy, that were used to aid the external and internal visual inspection for bat presence.
- night vision binoculars, monoculars and (spotting) scopes are electro-optical devices that are used to detect visible and infrared energy and provide a visible image. The night vision scope was used to aid internal inspection for bat presence.
- a rigid ladder is a portable piece of equipment used for climbing up and/or down, which consists of two vertical stiles (bars) that are joined together by a series of horizontal rungs. Rigid ladders are self-supporting and may be leaned against (vertical) structures (such as walls) and/or on gradients (such as roof-slopes). The ladder was used to aid access to otherwise inaccessible spaces/features and therefore allow the close inspection of spaces/features for physical evidence of bat.

Combinations of survey equipment were used throughout the survey to enable the survey of spaces/features and inspections for physical evidence of bat.

For example; a surveyor used unaided visual perception from the ground to establish that there may be gaps between the lower edges of (roof apex) ridge tiles. The surveyor may then use binoculars and a torch to confirm or not, from the ground, if gaps are present and if these gaps are likely to provide bats with potential access to voids beneath the ridge tiles (i.e. within ridge tile voids - above the roof apex and beneath the undersides of ridge tiles).

5.1.3 Limitations

Physical evidence of bats that may have been created within the previous bat-active season may have deteriorated or have been removed (for example by wind and/or rain) prior to the Initial Bat Survey being carried out.

Considering the:

- structural fabric of the House;
 - results of the Bat Survey (evidence of bat found);
- the constraints of the above limitation are negligible.

5.2 Results

5.2.1 Weather conditions

The survey was carried out in dry (and bright) conditions with little or no breeze.

5.2.2 Potential for Bats

Habitat connectivity

The House is situated amongst a small group of houses with domestic gardens and small fields/paddocks. The treed route of a former canal is present approximately 50m northeast of the House and the River Severn flows roughly west-to-east approximately 100m south and 70m west. These landscape features provide good habitat connectivity and foraging resources for bats.

Structural fabric

In general, the House is in a good and maintained structural condition and most of the roof structures and features do not provide bat roost habitat.

However, the following features may be used by bats for roosting and/or to gain access to roosting space:

- gaps between and behind the Section 3 southeast elevation gable timber-board cladding (Feature H).
- several gaps between the undersides of ridge tiles and the upper courses of slates on the Section 4 and Section 5 apex roofs.
- several roof slate-to-slate crevices on the Section 4 and Section 5 roof-slopes.
- gaps between the Section 6 northeast elevation gable barge boards and exterior wall surface (Feature P).

No potential bat roost habitat was found on or within any other part of the House.

Considering the structural fabric of the House and its location it is reasonably unlikely that the House is used by bats for hibernation purposes.

5.2.3 Physical evidence of Bats

A group of 12 fresh, year 2022, bat droppings was found on a lead gutter between the northeast gable of the northeast-to-southwest apex roof structure (Section 6) and the southwest roof-slope of the southeast, southeast-to-northwest roof structure (Section 5) (see Feature P).

Two fresh, year 2022, bat droppings were found on the northeast gable wall of the northeast-to-southwest apex roof structure; one within a gap between the northwest roof-slope barge board and the exterior wall surface.

A sample of the droppings was collected and sent to EcoWarwicker ecological Forensics for DNA Analysis. The bat species identified as depositing the droppings is Soprano pipistrelle (*Pipistrellus pygmaeus*). A copy of the result sheet from EcoWarwicker ecological Forensics is contained in Appendix 2, sample labelled 'W12'.

It was considered likely that the gap between the northwest roof-slope barge board and the exterior wall surface of the northeast-to-southwest apex roof structure (Section 6) is used as a bat roost. However, no holes that bats may potentially use to gain access to/from the barge board gaps and the (Section 6) roof-slope batten voids were found.

6. Dusk Bat Emergence and Activity Surveys

6.1 Method

Two Dusk Bat Emergence and Activity Surveys were carried out.

Between 20:15hrs and 22:00hrs on 19 August 2022 a Dusk Bat Emergence and Activity Survey was carried out on the House. Sunset for 19 August 2022 was noted as being 20:30hrs.

Between 19:30hrs and 21:15hrs on 5 September 2022 a Dusk Bat Emergence and Activity Survey was carried out on the House. Sunset for 5 September 2022 was noted as being 19:51hrs.

Air temperature (°c), relative air humidity (%), wind speed (Beaufort Force scale) and cloud cover (Oktas) was recorded at the start and at the end of each survey.

Immediately prior to the Dusk Bat Emergence and Activity Surveys:

- the exterior of the House was inspected for physical evidence of bat.
- Anabat SD 1 bat echolocation detectors were positioned to record bat echolocation at the immediate northeast, southeast, southwest and northwest of the House.

Immediately after the Dusk Bat Emergence and Activity Surveys:

- the Anabat SD 1 bat echolocation detectors were retrieved.

During the Dusk Bat Emergence and Activity Survey:

- surveyors used a Magenta Bat5 heterodyne bat detector, an Elekon Batscanner automatic tuning heterodyne bat detector, an Anabat Walkabout bat detector and night vision binoculars, monoculars and scopes (Pulsar Accolade 2 LRF XP50 Pro Thermal Binocular (50Hz), Zeiss DTI 3/25 Thermal Monocular and Sytong HT-66 with infrared illuminator).
- the House was carefully and continuously observed.
- surveyors kept in contact via private mobile radios.

The House was carefully and continuously observed.

Search methods for physical evidence of bat included the use of mirrors, torches (including a Fenix RC40 3800 lumen torch and a DeWalt DCL043 1000 lumen torch), binoculars (Zeiss 10x42), borescope (Visual Optics VO18 5.8mm Fibre Optic), fibrescope (Provision PV2636-21 5.8mm), video-scope (Draper 05163 Recording Flexi Inspection Camera), thermal imaging binoculars (Pulsar Accolade 2 LRF XP50 Pro Thermal Binocular (50Hz)), thermal imaging monocular (Zeiss DTI 3/25 Thermal Monocular), a night vision scope (Sytong HT-66 with infrared illuminator), a 3.8m Telescopic ladder, 4.1m Telescopic ladder, 8.15m Combination ladder; and combinations of these.

Please note: all stated times are approximate.

6.2 Results – Dusk Survey 1

Weather conditions throughout the survey were fine and dry with a Beaufort wind scale of 0-1. At the start of the survey the air temperature was 19° Celsius, the air humidity was 65% and cloud cover was 4 Oktas. At the end of the survey the air temperature was 15° Celsius, air humidity was 77% and cloud cover was 4 Oktas.

At 21:05hrs one Soprano pipistrelle bat emerged from the roof area at which evidence of roosting by Soprano pipistrelle was previously identified. Upon emerging the bat flew immediately southeast, away from the House.

Between 20:45hrs and 21:20hrs foraging by four, or-so, Common pipistrelle (*Pipistrellus pipistrellus*) was heard and seen within the vicinity of the House. These bats appeared to originate from the southwest and did not emerge from the House.

At 20:35hrs, 20:40hrs and 20:45hrs and between 21:20 – 21:30hrs two Noctule bat flew over and in the vicinity of the House. These bats did not emerge from the House.

6.3 Results – Dusk Survey 2

Weather conditions at the start of the survey were fine and dry with a Beaufort wind scale of 1-3. However, light rainfall commenced at 20:58hrs and the survey was stopped at 21:15hrs due to heavy rainfall.

At the start of the survey the air temperature was 18^o Celsius, the air humidity was 78% and cloud cover was 3 Oktas. At the end of the survey the air temperature was 16^o Celsius, air humidity was 86% and cloud cover was 7 Oktas.

At 20:05hrs one Soprano pipistrelle bat emerged from the roof at which evidence of roosting by Soprano pipistrelle was previously identified. Upon emerging the bat flew immediately southeast, away from the House.

At 19:55hrs one Noctule bat flew over the House in a northwest-to-southeast direction. Between 19:28hrs and 20:15hrs foraging by no more than two Noctule was heard and seen over and in the vicinity of the House. These bats did not emerge from the House.

Between 20:10hrs and 20:45hrs foraging by four, or-so, Common pipistrelle (*Pipistrellus pipistrellus*) was occasionally heard and seen within the vicinity of the House. These bats appeared to originate from the southwest and did not emerge from the House.

7. Small Breeding Bird Survey

7.1 Method

On 29 July 2022, 19 August 2022 and 5 September 2022, the presence of bird nests, active (in current use) and inactive (not in current use), on and within the House, were noted.

7.2 Results

Evidence of a probable old and unused House sparrow (*Passer domesticus*) nest was found behind timber board cladding attached to the southeast elevation of Section 3 (Feature H).

8. Conclusion

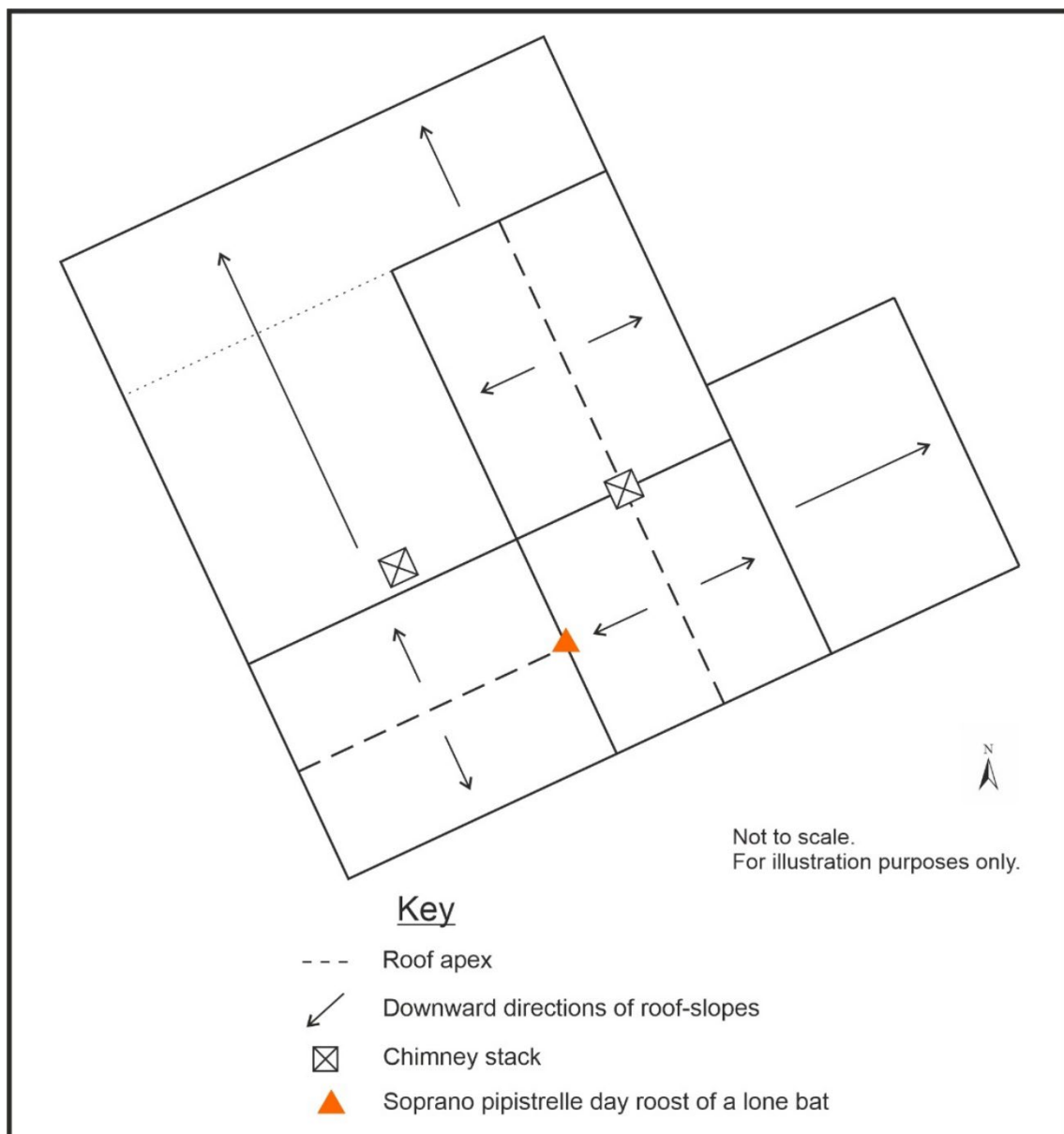
8.1 Bat

8.1.1 Survey results

The House provides a moderate summer bat roost potential.
It is not considered that the House provides bat hibernation habitat.

The results of the Bat Survey indicate that a gap between the northwest roof-slope barge board and the exterior wall surface of the northeast gable of the northeast-to-southwest apex roof structure (Section 6) is used by a lone adult Soprano pipistrelle bat for (non-maternity) day roosting. The roost is possibly used on an occasional basis.

The location of the bat roost is indicated on the plan below:



8.1.2 Species Conservation Significance

Soprano pipistrelle are frequently encountered in Powys and surrounding counties and nationally are regarded as being "common"⁽⁴⁾ and "abundant and widespread"⁽⁵⁾.

In accordance with the Bat Mitigation Guidelines⁽⁶⁾ the Soprano pipistrelle bat roost within the House is of low conservation significance.

The Soprano pipistrelle bat roost within the House is of site importance. However, the Soprano pipistrelle bat roost is not of regional or national importance.

8.1.3 Development Impact

Roost retention

The proposed development will not result in the destruction of the identified bat roost and (the) bat(s) may continue to use the roost in the future.

However, in the absence of mitigation, the proposed development may lead to the killing and/or injury of (a) Soprano pipistrelle bat(s) (that may be present in the roost at the time development work is carried out).

It will be imperative that the identified roost continues to be present in its current form to allow it to continue to be used by bats in the future.

Loss of the roost

Should development work require work that leads to the destruction of the identified bat roost; in the absence of mitigation the loss of the roost may result in the killing or injury of (the) bat(s).

8.1.4 Licence

Scenario 1 – Non-licenced mitigation

The development may be carried out using timing constraints and work-method constraints and the identified bat roost retained. Therefore, it is not considered that the development will require a EPS Development Licence to be issued by Natural Resources Wales.

Scenario 2 – EPS Licence

Should development work require the removal of the identified bat roost and/or work whilst bat are likely to be present within the roost; the extension of the House may only be carried out on receipt of a EPS Development Licence issued by Natural Resources Wales.

Should the identified bat roost be destroyed; compensation bat habitat will need to be provided.

8.1.5 Recommendations

It is recommended that:

- the identified bat roost is retained and not modified in any manner, to allow bats to continued future use of the roost.
- the construction of the new extension is carried out between 15 September and 15 April, when bats are unlikely to be present within the Section 6 roof structure (or elsewhere within the House roof structure).

Non-structural work, such as the internal decoration of the new extension may be carried out at any time of year.

Although the identified bat roost will be retained; the development will need to provide new and alternative bat roosting features for bats.

Habitat in the vicinity of the House provides bat commuting and foraging habitat. It is imperative that external lighting that may be installed as part of the development should be sensitive to bats.

Suggested enhancement measures for bats are contained in Appendix 3.

8.2 Small Breeding Bird

8.2.1 Survey results

Historic evidence of nesting by House Sparrow was found within the external fabric of the House and it is possible that small breeding bird may nest on/within other parts of the House in the future.

Proposed development work will need to be carried out when there are no nesting birds present. Suggested mitigation for nesting birds is contained in Section 8.2.2.

Bird nesting habitat may be created on-site, post-development, to encourage birds to nest within the Little Rock property in the future. Suggested compensation and enhancement measures for nesting birds are contained in Section 8.2.3.

8.2.2 Mitigation

Ideally, development work should not be started between 1 March and 1 October (inclusive).

Should it not be possible to time development work to avoid disturbance to nesting birds, potential access points to bird nesting locations should be closed off with mesh or fabric barriers, in order to prevent birds from nesting.

Should it be required that development works commence between March and September, the House should be inspected by a suitably qualified ecologist for evidence of nesting birds.

No works may commence if birds have started to build, or if they already occupy, nests. If birds start nesting on/within the House - prior to or during development work - delays will be inevitable up to the moment when the young birds leave the nest.

8.2.3 Compensation and enhancement

In order to encourage small nesting birds to nest within the Little Rock property: it is recommended that woodcrete (or similar) purpose-made bird nest boxes be installed.

Ideally nest box placement and construction of nesting features should be undertaken outside the bird breeding season (March-September inclusive).

Nest boxes may be placed under the gables and eaves of the House, on other nearby buildings and/or on nearby trees. Ideally nest boxes should be positioned in areas of low future disturbance.

It is recommended that a minimum of:

- a) two Swift nest boxes (e.g. Schwegler No. 16 Swift box)
- b) two House Sparrow nest boxes (e.g. Schwegler 1SP Sparrow Terraces)
- c) two House Martin nest boxes (e.g. Schwegler House martin Nest 9A)
- d) one Tit nest box (e.g. Schwegler 2M woodcrete bird box)

be installed within the Little Rock property post-development. Alternatively, the bird nest boxes may be installed at other, suitable, areas in the vicinity of the Little Rock property.

9. Relevant publications

- 1: Collins, J. (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines, 3rd ed., Bat Conservation Trust.
- 2: 'Bats: surveys and mitigation for development projects' (28 February 2022). United Kingdom Government Website:
<https://www.gov.uk/guidance/bats-surveys-and-mitigation-for-development-projects>
- 3: BS42020:2013 'Biodiversity – Code of practice for planning and development.' British Standards Limited.
- 4: UK Mammals: Species Status and Population Trends. JNCC/Tracking Mammals Partnership. 2005.
- 5: Mathews F., Kubasiewicz L.M., Gurnell J., Harrower C.A., McDonald R.A., Shore R.F. (2018). A Review of the Population and Conservation Status of British Mammals. A report by the Mammal Society under contract to Natural England, Natural Resources Wales and Scottish Natural Heritage. Natural England, Peterborough. Natural England Access to Evidence Catalogue Code JP025.
- 6: Natural England (2004). Bat Mitigation Guidelines. English Nature, Peterborough, England.

Appendix 1. Survey Photographs



Photograph 1. Exterior.

Left: part of the Northwest elevation.
Right: part of the Southwest elevation.



Photograph 2. Exterior.

Part of the Northwest elevation.



Photograph 3. Exterior.
Far left: part of the Southeast elevation.
Centre and right: Northeast elevation.



Photograph 4. Exterior.
Lower left: part of the Section 4 Southwest elevation roof-slope.
Upper left: part of the Section 5 Northwest elevation gable.
Lower centre and right: part of the Section 2 roof structure.
Upper centre and right: Northwest elevation of Section 6.



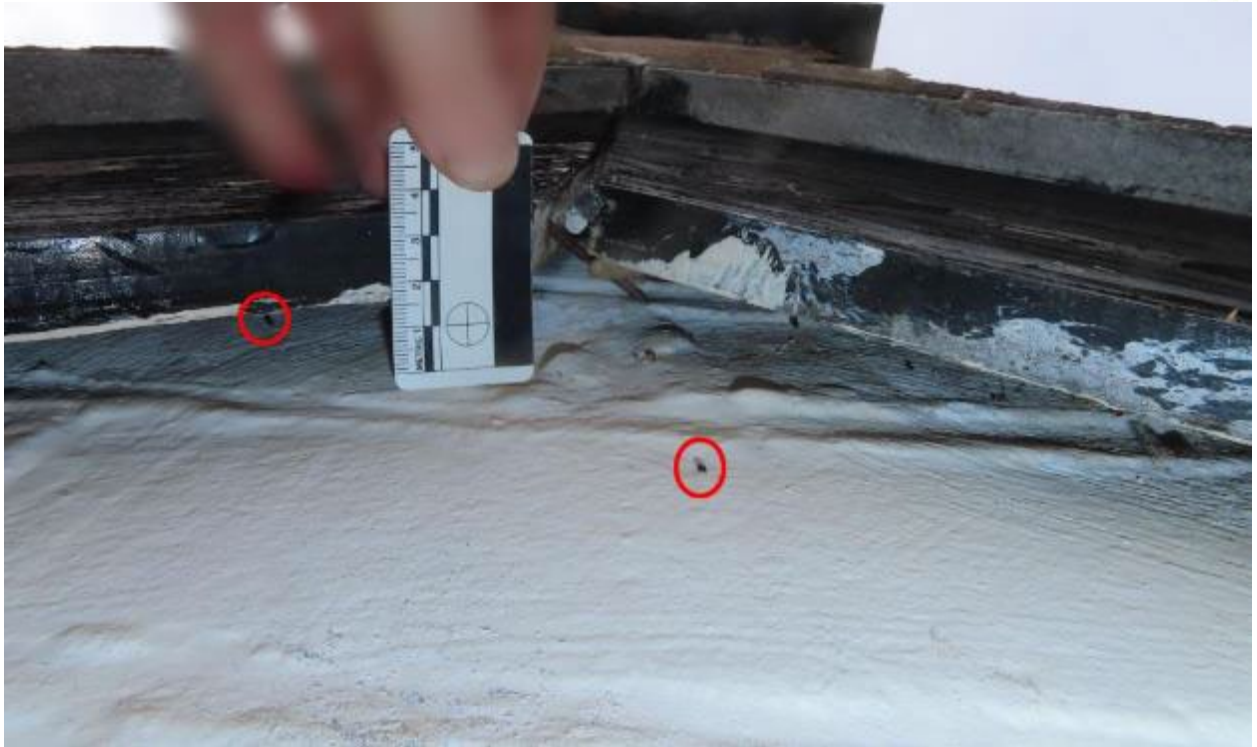
Photograph 5. Exterior.

Lower left: part of the Section 2 roof structure.
Mid-ground left: part of the Section 1 roof structure.
Centre: part of the Section 4 Southwest elevation roof-slope.
Lower right: part of the Section 5 Southwest elevation roof structure.



Photograph 6. Exterior.

View of part of the Section 6 Northwest elevation roof-slope.



Photograph 7. Exterior.

View of part of part of the Section 6 Northeast elevation gable apex, showing the location of the identified bat roost and two Soprano pipistrelle bat droppings (circled in red) stuck to the wall surface.



Photograph 8. Exterior.

View of part of the group of Soprano pipistrelle bat droppings found within the gutter between the Section 5 Southwest elevation roof-slope and the Section 6 Northeast elevation gable.

The droppings were immediately beneath the Section 6 Northeast elevation gable apex (as shown in Photograph 7).

Appendix 2 – EcoWarwicker ecological Forensics



9 September 22

Re: Identification Results for Ross Jones, Star Ecology

Job number 18713, received 17 August 2022

Sample labelled: W12

PCR amplification successful. DNA sequence:

ATGACAAACATTTCGAAAGTCCCATCCCCTAATCAAATTATTAACAGCTCATTTCATTG
ACCTACCAGCTCCATCAAACATCTCAGCATGATGGAATTTGGATCCCTATTAGGCA

Phylogenetic analysis identification: *Pipistrellus pygmaeus*

Confirmed by maximum likelihood, maximum parsimony, bootstrap 100%.

Best regards,

Professor Robin Allaby

The results and conclusions in this report are based on an investigation of mtDNA sequence analysis. The results obtained have been reported with accuracy. The interpretation represents the most probable conclusion for the DNA sequence obtained rather than the sample provided given current levels of species data. It should be borne in mind that different circumstances might produce different results. Therefore, care must be taken with interpretation of the results especially if they are used as the basis for commercial recommendations.

Professor Robin Allaby

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Appendix 3 – Enhancement for Bat

Bat roost boxes

In order to encourage bats to reside within the Little Rock property in the future: it is recommended that woodcrete (or similar) purpose-made bat roost boxes are installed.

Ideally Bat Boxes should be positioned in areas of low future disturbance and Bat Boxes should be installed more than 3m height above the ground.

Specially designed Bat Boxes are available that may be built into walls or encased by exterior weather boarding.

Recommended designs are the Schwegler 1FR and 2FR Bat Tubes which provide maintenance-free roosting opportunities, Istock Enclosed Bat Boxes and Wienerberger Habibat Bat Boxes.

These Bat Tubes and Boxes may be aesthetically unobtrusive if sympathetically integrated into the finished design of the proposed development.

It is recommended that a minimum of either:

- one Schwegler 1FF Bat Box;
- or,
- one Schwegler 1FD Bat Box (or similar alternatives)

is installed within the Little Rock property post-development.

Ridge tile bat roosts

Ridge tiles on the apex of the roof of the proposed new extension may be permanently raised to potentially allow bats to roost on the underside of them.

It is recommended that a minimum of two ridge tile bat roosts be created during the development.

Purposely raised ridge tiles

Raised ridge tiles may be created by:

- a) narrowing the gap between tiles and resting the middle tiles on their neighbours, or by packing the ends of tiles with an excess amount of mortar (or similar).
- b) laying all ridge tiles onto a 20mm deep bed of mortar and at approximately every 1.5m, leaving gaps between 30 and 150mm without mortar. (A temporary support, such as a piece of roof tile, may be required to support ridge tiles until mortar has set).
- c) securing ridge tiles on the roof with mortar placed on the inner lower half of the ends of ridge tiles only. The height of bat openings will be between 18mm and 22mm.

Where possible, fixing ridge tiles with mortar on their inner lower half only - rather than in the apex – would create long voids favoured by crevice dwelling bats.

It may be possible to avoid using any mortar at all.

Reclaimed and/or misshaped ridge tiles

Should re-claimed and/or misshaped ridge tiles be used during roofing work, it is possible that not all of the ridge tile will fit closely with roof tiles underneath them. Should these gaps be between approximately 12mm and 22mm in height – there is potential that crevice

dwelling bats may use them to gain access to the undersides of ridge tiles. The 'natural' gap of misshaped ridge tiles may be exaggerated by packing with mortar and the undersides of the ridge tile should not be completely filled with mortar to provide a potential roosting space for bats.

Purpose-made ridge tile bat roosts

Purpose-made ridge tiles with bat-access openings are available commercially. For example (only), the handmade 'bat access ridge tile' produced Tudor Roof Tile Co. Limited, Dengemarsh Road, Lydd, Kent, TN29 9JH.

External Lighting

In order to avoid any unnecessary disturbance to bats in the future, any external lighting to be installed should:

- use Light emitting diodes (LED) luminaries
- have a warm white spectrum <2700° Kelvin (degrees colour temperature)
- have peak wavelengths higher than 550nm
- be set on motion-sensors
- use short duration (e.g. one minute) timers
- not be in the vicinity of, or shine towards, bat roost openings
- not shine towards (the) roof structure(s)
- not be in the vicinity of, or shine towards, boundary vegetation