

Y FELIN, OSWESTRY

Preliminary Roost Assessment & Nocturnal Bat Survey Report

September 2023



Report Control Sheet

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CONTENTS

| | | |
|----------|--|-----------|
| 1 | INTRODUCTION | 4 |
| 1.1. | SCOPE & PURPOSE | 4 |
| 1.2. | LOCATION | 4 |
| 1.3. | OBJECTIVES | 4 |
| 2 | METHODOLOGY | 5 |
| 2.1. | PRELIMINARY ROOST ASSESSMENT | 5 |
| 2.2. | SURVEY LIMITATIONS OF PRELIMINARY ROOST ASSESSMENT | 5 |
| 2.3. | NOCTURNAL BAT SURVEY | 5 |
| 2.4. | SURVEY LIMITATIONS | 6 |
| 2.5. | ROOST ASSESSMENT AND MITIGATION | 6 |
| 3 | SURVEY RESULTS | 7 |
| 3.1. | PRELIMINARY ROOST ASSESSMENT | 7 |
| 3.2. | DUSK SURVEY (25/07/2023) | 11 |
| 3.3. | DUSK SURVEY (08/08/2023) | 12 |
| 3.4. | DUSK SURVEY (06/09/2023) | 14 |
| 3.5. | ASSESSMENT | 15 |
| 4 | RECOMMENDATIONS AND MITIGATION | 17 |
| 4.1. | IMPACT ASSESMENT | 17 |
| 4.2. | EUROPEAN PROTECTED SPECIES LICENCE..... | 17 |
| 4.3. | BAT ROOST COMPENSATION | 17 |
| 4.4. | TIMESCALES | 19 |
| 4.5. | METHOD STATEMENT | 19 |
| 4.6. | LIGHTING MITIGATION | 20 |
| 5 | BIBLIOGRAPHY | 21 |

1 INTRODUCTION

1.1. SCOPE & PURPOSE

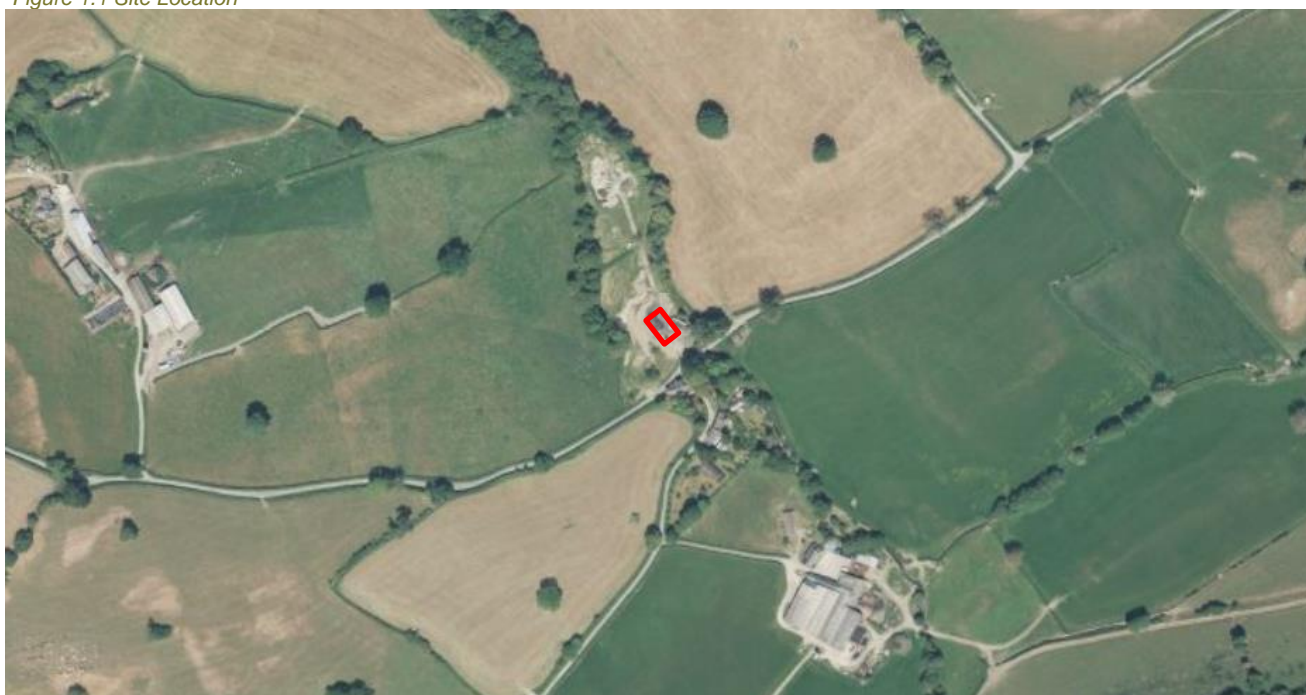
1.1.1. Collington Winter Environmental Ltd was commissioned by Mr Michael Perks to undertake a Preliminary Roost Assessment (PRA) and subsequent Nocturnal Bat SurveyS at the site at Y Felin, Efail Rhyd, Llanhraeadr-ym-Mochnant, Oswestry. This report has been produced to inform a planning application at the site. The proposed works include demolition of the current cottage and construction of a replacement dwelling adjacent to the current footprint.

1.1.2. The author of this report is Emma Anderson MSc, Assistant Ecologist at Collington Winter Environmental Ltd. The project has been managed and overseen by Katie Bird MEnvSci, ACIEEM Principal Ecologist at Collington Winter Environmental Ltd. Katie is highly experienced managing schemes and has produced many ecological reports to inform planning management plans.

1.2. LOCATION

1.2.1. Please refer to Figure 1.1 for the approximate site location. The site is in Llanhraeadr-ym-Mochnant, a village and ecclesiastical parish in the north of Powys, Wales.

Figure 1.1 Site Location



1.3. OBJECTIVES

1.3.1. The objectives of the PRA are as follows:

- Identify any areas of bat roosting potential within the building
- Assess the value of the building for roosting bats
- Search for signs of bats
- Provide recommendations on any further surveys or mitigation required for bats

1.3.2. The objectives of the Nocturnal Bat Survey are as follows:

- Identify any bats roosting within the buildings.
- Assess the value of the buildings for roosting bats.
- Identify the species assemblage of bats using the site.
- Provide recommendations on any further surveys or mitigation required for bats.

2 METHODOLOGY

2.1. PRELIMINARY ROOST ASSESSMENT

- 2.1.1. A Preliminary Roost Assessment (PRA) of the site was undertaken on 25th July 2023 by Emma Anderson, and was overseen by Katie Bird, ACIEEM Principal Ecologist who holds a Natural England Class II Bat Licence (Reference: 2020-46960-CLS-CLS).
- 2.1.2. The survey was undertaken following guidance set out in Collins (2016). This includes undertaking a detailed internal and external inspection of any features to compile information on potential roosting features (PRFs) and potential access points. A search for field signs of bats (i.e. droppings, urine stains and feeding remains) was also completed. The use of binoculars and torches assisted with the survey.
- 2.1.3. The building was assessed as per categories listed in Table 4.1 Collins (2016) and reproduced in Table 2.1.

Table 2.1 Assessment Criteria for Bat Roosting Potential

| Bat Roosting Potential | Description |
|------------------------|--|
| Negligible | Negligible features on site likely to be used by roosting bats. |
| Low | A structure with one or more potential roost sites that could be used by individual bats opportunistically. However, these potential roost sites do not provide enough space, shelter, protection, appropriate conditions and/ or suitable surrounding habitats to be used on a regular basis by larger numbers of bats. |
| Moderate | A structure or tree with one or more potential roost sites that could be used by bats, but unlikely to support a roost of high conservation status. |
| High | A structure or tree with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis and for longer periods of time. |

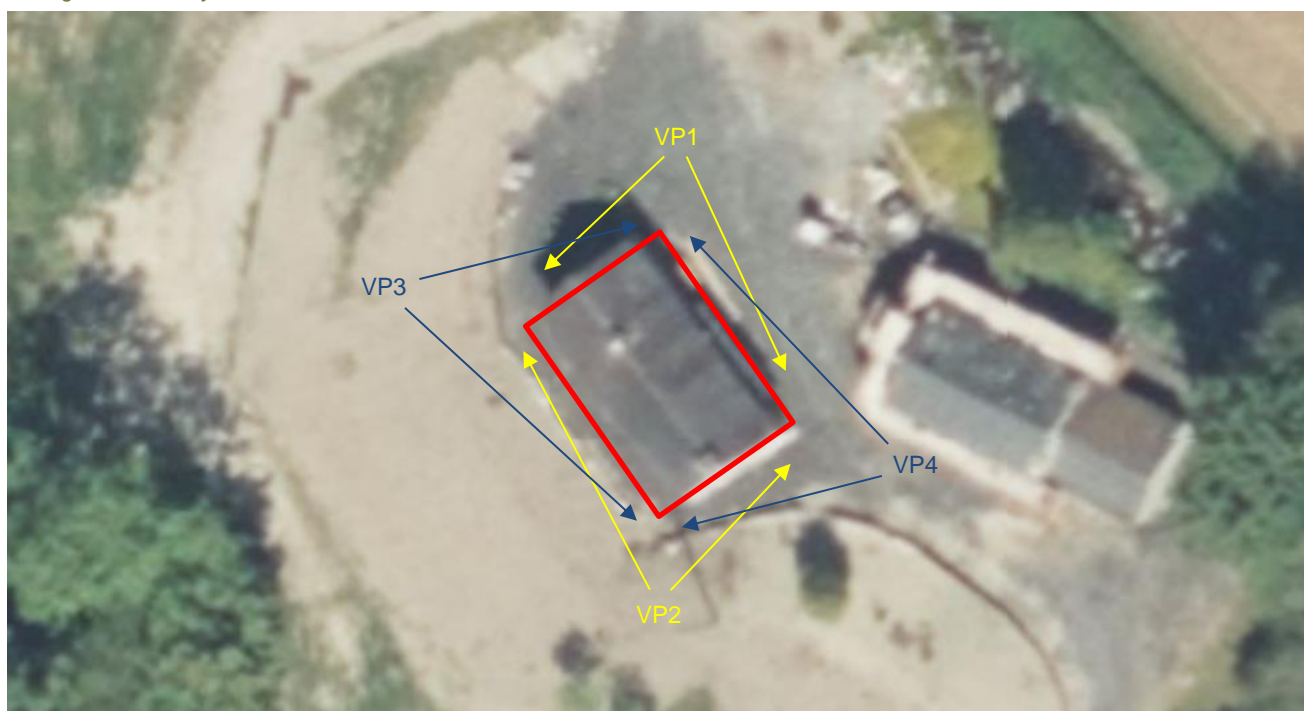
2.2. SURVEY LIMITATIONS OF PRELIMINARY ROOST ASSESSMENT

- 2.2.1. Access into the loft space of the building was not possible, resulting in the south portion of the loft being assessed from the centrally located access hatch. Due to the internal red brick chimney in the centre of the property, a full view of the north portion of the loft interior was not possible. This was not deemed to be a major constraint to the PRA due to all other aspects of the roof assessed.

2.3. NOCTURNAL BAT SURVEY

- 2.3.1. The nocturnal surveys were undertaken as dusk surveys on 25th July, 8th August, and 6th September 2023, each by two qualified surveyors.
- 2.3.2. Please refer to Figure 2.1 for locations of vantage points used during the survey.
- 2.3.3. During the first survey, the vantage points indicated in yellow were used by the surveyors. These were altered to the vantage points indicated in blue for the latter two surveys, in order to better survey the areas of bat activity.

Figure 2.1 Surveyor Locations



2.3.4. The surveys were undertaken in line with guidance as set out in Collins (2016). Surveyors used heterodyne handheld bat detectors. All surveyors were suitably experienced undertaking bat emergence surveys. Please refer to Table 2.1 below for details of surveyors.

Table 2.1 Nocturnal Survey Details

| Date | Sunset/ Sunrise Time | Start | Finish | Surveyors | Weather Conditions |
|------------|----------------------------|-------|--------|--|---|
| 25/07/2023 | 21:18 | 21:03 | 22:48 | VP1 – Laura Sheedy VP2 – Emma Anderson | Temp at start: 16 Celsius Cloud start: 1 (Oktas) Wind: 1 max (Beaufort scale) Rain:0 |
| 08/08/2023 | 20:55 | 20:40 | 22:25 | VP3 – Michael Boucher VP4 – Kira Lawton | Temp at start: 14 Celsius Cloud start: 2 (Oktas) Wind: 1 max (Beaufort scale) Rain:0 |
| 06/09/2023 | 19:50 | 19:35 | 21:20 | VP3 – Kira Lawton VP4 – Michael Boucher | Temp at start: 25 Celsius Cloud start: 6 (Oktas) Wind: 1 max (Beaufort scale) Rain:0 |

2.4. SURVEY LIMITATIONS

2.4.1. Since the surveys were conducted, new guidance for conducting bat surveys has been published (Collins, 2023). The surveys were therefore conducted under guidance of the previous edition (Collins, 2016).

2.4.2. There were no additional limitations throughout the nocturnal surveys.

2.5. ROOST ASSESSMENT AND MITIGATION

2.5.1. The roost assessment was completed following guidance set out in UK Bat Mitigation Guidelines (2023). The guidance was also utilised to assist in mitigation proposals, where necessary.

3 SURVEY RESULTS

3.1. PRELIMINARY ROOST ASSESSMENT

- 3.1.1. No granted European Protected Species Licenses were observed within 5km of the site, based on Magic.gov.uk.
- 3.1.2. The site consisted of a two-storey residential dwelling in a state of disrepair, due to having been uninhabited. The building comprised a slate tile roof with a stone chimney on the south elevation and a red brick chimney to the centre north of the roof. The south, east, and north elevations were constructed of stone, with red brick on the west elevation. Wooden soffits and barge boards were present on east, south, and west, with gutters present on the east and west elevations. A slate tiled wooden porch was present on the south half of the east aspect.
- 3.1.3. The south elevation contained multiple PRFs, with gaps, cracks and holes across the upper portion of the aspect due to missing and crumbled mortar, providing access to both the loft area and to the interior chimney cavity. Additional areas of missing mortar were observed at the apex, chimney stack, and beneath the roof tiles. The soffits were moderately well-sealed, although small gaps were present where the wood had warped.
- 3.1.4. The west elevation was predominantly constructed with well-sealed red brick in good condition. A hole was present in the barge board at the southwest corner, with fallen soffits and guttering providing further potential ingress points. There were broken and open windows present on the aspect.
- 3.1.5. The north elevation comprised better-sealed stone, with a well-sealed door and windows. Gaps in the barge board were present at both corners of the elevation, with an additional access point provided by the broken end of a timber beam. A gap was present in the mortar at the apex, although the rest of the mortar appeared in moderate condition.
- 3.1.6. The east elevation featured a porch with a slate tile roof and wooden panel lining. Several of the slate tiles were lifted. The stone wall appeared to be in predominantly good condition, although a large crack in the centre of the façade was present. This may prove too small to allow access. Gaps were present in the wooden soffits, and the wooden window frames appeared rotten in several places.
- 3.1.7. The roof featured lifted ridge tiles, with missing and lifted slate tiles observed in multiple locations.
- 3.1.8. Internally the loft area of the building comprised timber beam and wood board flooring, which was broken in several places, allowing some natural light into the loft space. The roofing comprised timber sarking and bitumen felt lining on the east and west aspects, which was intact and well-sealed. The south wall contained numerous gaps and holes allowing access, and a small amount of natural light within the loft space. The north area of the loft could not be assessed entirely due to the internal red brick chimney stack. A large quantity of droppings was observed across the loft floor, the majority of which were found to be mouse droppings. A small number of historic bat droppings were identified, but no feeding remains could be seen from the limited vantage point of the surveyor.
- 3.1.9. The interior of the rest of the house featured many holes and cracks in the interior walls, allowing access into the cavity. Access to the interior of the stone chimney stack was also observed internally.
- 3.1.10. Please refer to Table 3.1 for photographs.

Table 3.1 Building Photographs

| Feature | Photograph |
|--|--|
| <p>The south and west elevations of the property.</p> |  |
| <p>Gaps and holes in south elevation mortar and stonework, and gaps in warped soffits.</p> |  |
| <p>West elevation featuring broken window, fallen guttering, and hole in barge board.</p> |  |
| <p>Broken soffits and barge boards, open window.</p> |  |

Lifted ridge tiles, and missing and lifted tiles on western roof elevation.



North elevation.



Gaps in barge boards and mortar on the northwest corner.



Gaps in barge boards and hole due to broken timber beam on northeast corner.



East elevation.



Gaps in wood panels of porch.



Lifted tiles on porch.



Interior loft space, featuring bitumen felt lining and timber beams.



Potential entry points on south wall.



Mouse and bat droppings on loft floor.



SUMMARY OF PRA

3.1.11. The survey identified multiple PRFs and internal access points, with areas of lifted, slipped or missing roofing tiles, areas of missing mortar, and holes in both the interior and exterior stone walls. Inspection of the interior north portion of the loft was restricted, due to the internal red brick chimney stack, and additional PRFs may have been missed in this area. Overall, the building was assessed as having **'high'** bat roosting potential.

3.2. DUSK SURVEY (25/07/23)

3.2.1. Bat activity was recorded consistently throughout the survey, with common pipistrelle (*Pipistrellus pipistrellus*), soprano pipistrelle (*Pipistrellus pygmaeus*), noctule (*Nyctalus noctula*) and unidentified myotis (*Myotis* spp.) observed foraging or commuting in proximity of both vantage points.

3.2.2. The first bat was recorded at 21:15 (approximately three minutes before sunset) by VP2 and was a common pipistrelle which was heard but not seen. Between 21:25 and 21:35 a peak count of four common pipistrelle and fourteen soprano pipistrelle bats were observed commuting from an oak tree offsite to the south, and a cove of

trees northwest of the site. Common and soprano pipistrelle bats were observed foraging and commuting in the vicinity of the building throughout the survey by both VP1 and VP2. Up to five instances of unidentified myotis were recorded foraging or commuting across the site between 21:55 and 22:37. Four instances of noctule were recorded between 22:18 and 22:37 three of which were heard but not seen, with one observation of a noctule commuting across the site at 22:18.

3.2.3. One roost location was observed throughout the survey. This was recorded at 21:39 (approximately eleven minutes after sunset) and was a soprano pipistrelle observed emerging from the east side of the stonework on the south aspect by VP2 (R1). See Figure 3.1.

Figure 3.1 Roost Locations



3.3. DUSK SURVEY (08/08/2023)

- 3.3.1. Bat activity was recorded consistently throughout the survey, with common pipistrelle, and noctule observed foraging or commuting in proximity of both vantage points.
- 3.3.2. The first bat was recorded at 20:59 (approximately four minutes after sunset) by VP3 and was a common pipistrelle which was heard but not seen. Common pipistrelle bats were recorded commuting and foraging in the vicinity of the building intermittently by both vantage points between 20:49 and 21:41. Three instances of noctule were also recorded, commuting across the site between 21:40 and 22:07.
- 3.3.3. Three roost locations were observed throughout the survey. The first roost was recorded at 21:11 (approximately sixteen minutes after sunset) by VP4 (R2). A single common pipistrelle emerged from the upper central area of the south aspect. A second common pipistrelle was observed emerging from this same location a 21:23. See Figure 3.2.

The second roost was recorded at 21:28 (approximately thirty-three minutes after sunset) by VP3 (R3). A single common pipistrelle was observed emerging from the gable apex of the north aspect. The third roost was also recorded at 21:28 by VP3 (R4). A single common pipistrelle was observed emerging from the lifted tile area above the guttering in the centre of the west aspect. See Figure 3.3.

Figure 3.2 Roost Locations



Figure 3.3 Roost Locations



3.4. DUSK SURVEY (06/09/2023)

- 3.4.1. Bat activity was recorded consistently throughout the survey, with common pipistrelle, soprano pipistrelle, noctule and unidentified myotis observed foraging or commuting in proximity of both vantage points.
- 3.4.2. The first bat was recorded at 20:16 (approximately twenty-six minutes after sunset) by VP3 and was a noctule which was heard but not seen. Three instances of noctule were recorded between 20:16 and 20:22 two of which were heard but not seen, with one observation of a noctule commuting across the site at 20:22. Common and soprano pipistrelle bats were observed foraging and commuting in the vicinity of the building between 20:20 and 21:10 by both VP3 and VP4. One unidentified myotis bat was recorded by both vantage points consistently between 20:37 and 21:02.
- 3.4.3. Five roost locations were observed throughout the survey. The first roost was recorded at 20:20 (approximately thirty minutes after sunset) by VP4 (R2). Three common pipistrelle bats were observed emerging from the central area of the south aspect. The second roost was recorded at 21:28 (approximately thirty-eight minutes after sunset) by VP4 (R5). Two common pipistrelle bats were observed emerging from a lower central area of the south aspect. The third roost was also recorded at 21:28 by VP4 (R1). One common pipistrelle was observed emerging from the east side of the stonework on the south aspect. See Figure 3.4.
- 3.4.4. The fourth roost was recorded at 20:29 (approximately thirty-nine minutes after sunset) by VP3 (R6). One soprano pipistrelle was observed emerging from the lifted tile area above the guttering to the north side of the west aspect. The fifth roost was recorded at 20:35 (approximately forty-five minutes after sunset) by VP3 (R7). One common pipistrelle was observed emerging from the east corner of the north aspect. See Figure 3.5.

Figure 3.4 Roost Locations



Figure 3.5 Roost Locations



3.5. ASSESSMENT

3.5.1. Common pipistrelle and soprano pipistrelle bats are confirmed to be roosting in the building. The roosts vary in size, with the majority comprising a peak count of one bat - indicative of day roosts. A summary of the roosts present on site is present in Table 3.2 below.

Table 3.2 Building Photographs

| Roost No. | Peak count of bats | Species | Date(s) | Roost location | Roost Type |
|-----------|--------------------|---|--------------------------|---|--------------------|
| 1 | 1 per species | Soprano pipistrelle Common pipistrelle | 25/07/2023 06/09/2023 | Upper east area of the south aspect. Roost located within the external crevice within the brickwork. | Day Roost |
| 2 | 3 | Common pipistrelle | 08/08/2023 06/09/2023 | Upper central area of the south aspect. Roost located within the external crevice within the brickwork. | Day Roost |
| 3 | 1 | Common pipistrelle | 08/08/2023 | Gable apex of the north aspect. Roost located within external gap of missing fascia board. | Transitional Roost |
| 4 | 1 | Common pipistrelle | 08/08/2023 | Lifted tile area above the guttering in the centre of the west aspect. Roost located between the slate tile and internal roofing felt. | Transitional Roost |
| 5 | 2 | Common pipistrelle | 06/09/2023 | Lower central area of the south aspect. Roost located within the external crevice within the brickwork. | Transitional Roost |
| 6 | 1 | Soprano pipistrelle | 06/09/2023 | Lifted tile area above the guttering to the north side of the west aspect. Roost located between the slate tile and internal roofing felt. | Transitional Roost |

| | | | | | |
|---|---|--------------------|------------|--|--------------------|
| 7 | 1 | Common pipistrelle | 06/09/2023 | East corner of the north aspect. Roost located within external gap of missing fascia board. | Transitional Roost |
|---|---|--------------------|------------|--|--------------------|

4 RECOMMENDATIONS AND MITIGATION

4.1. IMPACT ASSESMENT

4.1.1. The following section provides an overview of what mitigation will be required. Based on survey effort, a European Protected Species Licence (EPSL) will be required to allow the proposed development to proceed in a lawful manner. **No works should be undertaken on these buildings until the licences are in place - doing so could be a breach of wildlife legislation.**

4.1.2. The following works have been proposed for the building at Y Felin:

- Full demolition of the current cottage occupying the site.
- Construction of an environmentally sustainable dwelling adjacent to the current footprint.

4.1.3. Please note these are accurate at the time of writing and are subject to change.

4.2. EUROPEAN PROTECTED SPECIES LICENCE

4.2.1. Due European Protected Species Licence (EPSL) will be required to allow the lawful destruction of the roosts and minimise risk of killing/injuring individual bats prior/during the proposed works. The licence application comprises of five elements:

- Application Form
- Method Statement
- Work Schedule
- Associated Figures
- Reasoned Statement

4.2.2. A Method Statement is to be produced to outline the required mitigation and compensation for roost and habitat loss for the relevant planning application. The licence can be submitted to Natural Resources Wales once full planning permission and all wildlife conditions have been discharged. It is yet to be determined whether separate planning applications are to be completed per building, or if the site will be covered under a phased licence. It is possible to obtain a licence with more than one planning approval, though consideration of timescales will need to be determined.

4.2.3. The data collected in 2023 is sufficient to inform the submission of an EPSL and subsequent mitigation/compensation as roost types are considered to be accurately determined with the evidence available.

4.3. BAT ROOST COMPENSATION

4.3.1. Development must not result in overall loss of bat roost sites therefore replacement roost site will be required for each species and roost affected at a ratio of 1:1. Full details of the mitigation will be provided within the EPSL documentation. An outline of the mitigation, compensation and enhancements is included below:

Alternative Roosting Provision

4.3.2. **Bat Boxes:** Based on the evidence gained it is likely that these roosts present on site are day and transitional roosts of common and soprano pipistrelle. These will be compensated for through the provision of seven suitable boxes such as Vincent Pro Bat Box, greenwood “small hollow” and Schwegler 1FR bat box (or similar as available), which have all been recorded in use by common pipistrelle and soprano pipistrelle, known to be roosting on site. These boxes will be installed immediately prior to the proposed works on mature trees or an existing building on site. **These boxes will act as a receptor site, if any bats are identified during the roost destruction works under the EPSL but will remain in situ post development.**

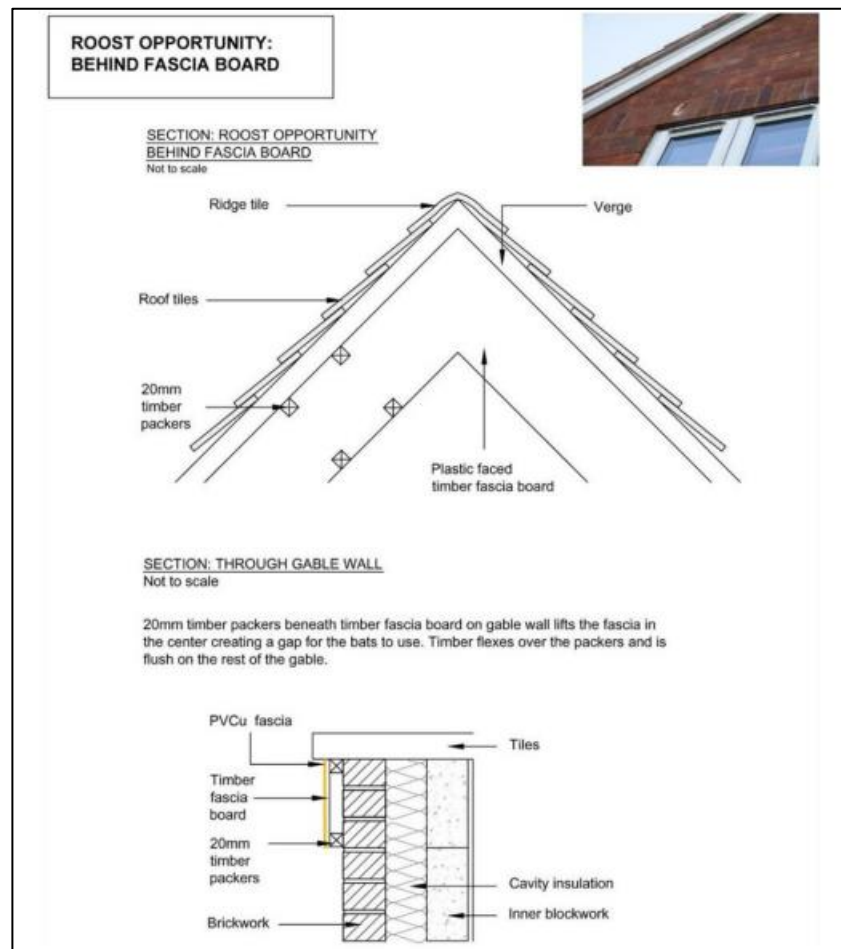
4.3.3. The UK Bat Mitigation Guidelines (Reason, P.F. and Wray, S., 2023) detail the efficacy of bat boxes mounted on different surfaces and found that wall mounted boxes are most frequently occupied by roosting bats. It is therefore recommended that bat boxes should be wall-mounted, where possible.

4.3.4. The locations of the boxes will be determined by a licensed bat ecologist to ensure the likelihood of uptake is

increased. The boxes will be sheltered from strong winds but will be exposed to sun for parts of the day. They will be situated at a height of between 4-10m, preferably on sheltered, southern, un-cluttered aspects with good connectivity to linear features such as mature trees and hedgerows. The boxes must be installed prior to the building works and remain on site in perpetuity. This will ensure that roosting opportunities are available on site at all times during and post development and will be used as release sites for bats encountered during works by the licensed ecologist.

- 4.3.5. **Post Development:** Integrated bat roosting features should be included within the proposed designs for the new building. The following features are recommended and will be suitable for pipistrelle bats identified roosting within the building.
- 4.3.6. Where non-standard design and building materials are used, integrated features should be incorporated following the same principles as outlined below. These must be approved by the ecologist and Natural Resources Wales prior to the commencement of works.
- 4.3.7. A fascia board roost should be incorporated into the northern and southern gable elevations to replace the loss of roosts from these locations (Reason, 2023). Creation of a fascia board roost involves insertion of 20mm timber packers beneath the timber fascia board on the gable wall, which lifts the fascia creating a gap for bats to use. The timber flexes over the packers and is flush on the rest of the gable (Case Study 13: Reason, P.F. and Wray, S., 2023).

Figure 4.1 (Case Study 13; Reason, 2023)



- 4.3.8. The roof construction should comprise reused slate tiling. Bitumen Felt can be used, as this is safe for roosting bats. If a non-bitumen coated roofing membrane (NBCRM) is preferred, it must have passed a 'snagging propensity test' valid in Wales. If using such a NBCRM, the certificate that proves the roofing membrane selected has passed a 'snagging propensity test' must be included with the licence application. Note that a certificate will not automatically guarantee that a licence application will be accepted, as every case is different.
- 4.3.9. Other potential integrated features may include the intentional creation of crevices within the external brick work, to replicate the existing roosting features for R1, R2 and R5. These crevices can be created through leaving gaps

within the brick work, of similar depth to what exists and will allow single to low number of crevices dwelling bats to roost.

4.4. TIMESCALES

4.4.1. In principle, the optimum time for works of all types is likely to lie outside the maternity and hibernation seasons. Spring and autumn therefore represent the periods when bats are least vulnerable to disturbance (Reason, P.F. and Wray, S., 2023). The roosts identified are non-breeding summer roosts, however the building does have the potential to support hibernating roosts. As demonstrated in Figure 4.2 (extracted Table 6.1 of Reason, P.F. and Wray, S., 2023), the optimum period to carry out works is **April to end of October**, as no restrictions are outlined for non-breeding summer roosts.

Figure 4.2 (Reason, P.F. and Wray, S., 2023)

Table 6.1: Optimum season for works in different types of roosts

The period of works may be extended if the way in which the bats use the site is well understood.

| Roost type | Months to avoid | Optimum period for carrying out works (some variation between species and weather-dependent) ^a |
|---|--|---|
| Maternity | May-August (potentially September) | September to end April |
| Hibernation (not used for swarming) | November to March | April to end October [see also 6.2.14 et seq] |
| Hibernation and swarming site | August to March (key); potentially July until April | April to July (potentially later, depending on site and nature of works) |
| Mating/swarming: not used for hibernation | August to October (key); potentially July until mid-November Also April-early May in at least some species ^b | Mid-November – end March (potentially later, maybe species-specific) Broader restrictions if site also used for hibernation: see above |
| Non-breeding summer roost | None | No restrictions – assuming bats can be excluded if present in small numbers or otherwise safely managed |

4.5. METHOD STATEMENT

4.5.1. **Toolbox Talk:** Before commencing any work on site, all contractors will be given a toolbox talk by a licensed bat ecologist or their accredited agent to ensure that they are aware of the presence of bat roosts and any other protected species, in order to ensure working practices on site follow legal requirements. The toolbox talk will also include information on how to proceed if a bat is discovered during the course of the work. Further topics to be covered will include safe working practices to minimise the chances of bats being present during the works and how to proceed if a bat is discovered during the course of the work.

4.5.2. **Ecological Supervision:** Following the toolbox talk and immediately before to the commencement of works, the bat licenced ecologist will undertake an internal and external inspection of the building to confirm no Potential Roosting Features have formed since the survey date, as well as to confirm the absence of bats within the works area and immediate surrounds. Any bats recorded will be moved to a suitable alternative roosting location e.g. bat box.

4.5.3. The buildings and their features suitable or known to have bats in will be demolished/refurbished under supervision of the licensed bat ecologist. Features with bat roosting potential will be removed by hand under direct supervision of a bat licenced ecologist services may need to be accessed via scaffolding, cherry picker or alternative lifting platform. Bat exclusion devices may also be used on the R1, R2 and R5 to ensure no bats within the crevices are present, if they cannot be fully checked. Please note that works proceed safer and quicker with the use of scaffolding and is the preferred option in most instances.

4.5.4. Once the most likely areas for bats have been cleared, it is at the ecologist's discretion if further supervision is required.

4.5.5. Contractors are forbidden to handle bats discovered during the development process, unless the bat appears to be in immediate danger (i.e. falling debris).

4.5.6. **Materials:** No breathable roofing membrane will be permissible in any part of the building which may be used by bats. Breathable roofing membrane creates a lethal entanglement hazard to bats. All bat licence projects require that type 1F bitumen felt lining is used. Any deviation from this will need to be approved by the ecologist and Natural Resources Wales.

4.6. LIGHTING MITIGATION

4.6.1. All bats have some degree of sensitivity to artificial, night-time lighting. Introducing artificial lighting to areas that are not currently illuminated may sever important bat flight lines and discourage bats from using roost provisions. It is recommended external lighting is not to be provided on the building to ensure roosting bats are not impacted by introduced lighting.

4.6.2. It is advised that a light mitigation plan is produced to assess the pre- and post-development changes in lighting and to advise on an appropriately sensitive lighting scheme as part of the development.

4.6.3. The following measures will be implemented in the final proposed lighting strategy, following guidance outlined in the Institute for Lighting Engineers document "Guidance for the Reduction of Obtrusive Lighting" (2005) and BCT's "Bats and Artificial Lighting in the UK" (2023):

- Keep site lighting to minimum levels.
- LED lighting with a warm white light to be used over cool white light (<2700Kelvin).
- Lighting feature peak wavelengths greater than 550nm.
- Light placement to be downward facing to prevent excess horizontal or vertical light spill.
- Avoid illuminating habitats of value.
- Use of time security lights should be set on motion-sensors and using short, 1-minute timers, to minimise light use.

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