Bat Emergence Survey Report

Mill Farm, Cumbria

Survey Date: June 2025

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0. Executive Summary

0.1 This report was commissioned by Mr. Mark Carroll to assess the likelihood of the presence of bats and birds at the proposed redevelopment site located at Mill Farm, The Green, Millom, Cumbria, LA18 5HL (OS Grid Reference: SD 17861 84703). To complete this task, Eco 360 carried out a desktop study and a field survey.

0.2 This report was written to support a planning application. The proposals are for the conversion of existing barns into two residential dwellings.

0.3 Due to the amount of potential ingress/egress points and suitable roosting features, the building was deemed as being a **confirmed** roost for bats to roost and **confirmed presence** of nesting birds**.** Therefore, three emergence surveys were required during the bat survey season (May to September, inclusive).

0.4 Summary

Bat presence/absence

From the survey visits undertaken on the site, it is evident that the structure is in use by roosting bats. The building contains a day roost of brown long-eared (Plecotus auritus) bats and a day roost of common pipistrelle (Pipistrellus pipistrellus) bats. Due to this, further mitigation efforts will be required as outlined in section 6.

Bird presence/absence

From the survey visit undertaken on the site, it can be concluded that the surveyed structure does contain active birds nests. Moreover, several bird species are anticipated within the local landscape and their presence can be assumed.

Ecological value of building units

The ecological value of the building has been deemed as high to bats. This is due to presence of a brown long-eared (Plecotus auritus) bat day roost and a common pipistrelle (Pipistrellus pipistrellus) bat day roost.

The ecological value of the building to birds has been deemed high due to the presence of active nests within the structure.

0.5 Recommendations

The recommendations for the surveyed building can be summarised as follows (please refer to section '5 – Recommendations' for a more in-depth description):

- Apply for a Natural England development licence to legally carry out the works.
- No development works can commence until 1st of October.
- At the start of the works, site supervision by a licenced bat ecologist in accordance with the Natural England Development Licence will be required.
- Prior to works commencing, a single Schwegler Bat Box will be installed to relocate any bats encountered during the works.
- Install bat compensatory features on the site in accordance with section 5 recommendations.

- No works can be undertaken on the structure during the bird breeding season (March to August, inclusive). Alternatively, an inspection by a qualified ecologist is required no more than 24 hours prior to commencements of the works.
- Install at least two Large Bird Nest Boxes.
- Optional: Install a variety of bird boxes around the site post development to enhance the site for the local bird populations.

Contents

1 Introduction

1.1 Report rationale

This report was commissioned by Mr. Mark Carroll to assess the likelihood of the presence of bats and birds at the proposed redevelopment site located at Mill Farm, The Green, Millom, Cumbria, LA18 5HL (OS Grid Reference: SD 17861 84703). To complete this task, Eco 360 carried out a desktop study and a field survey. The survey was undertaken by licensed bat ecologist/s and members of the Chartered Institute of Ecology & Environmental Management (CIEEM).

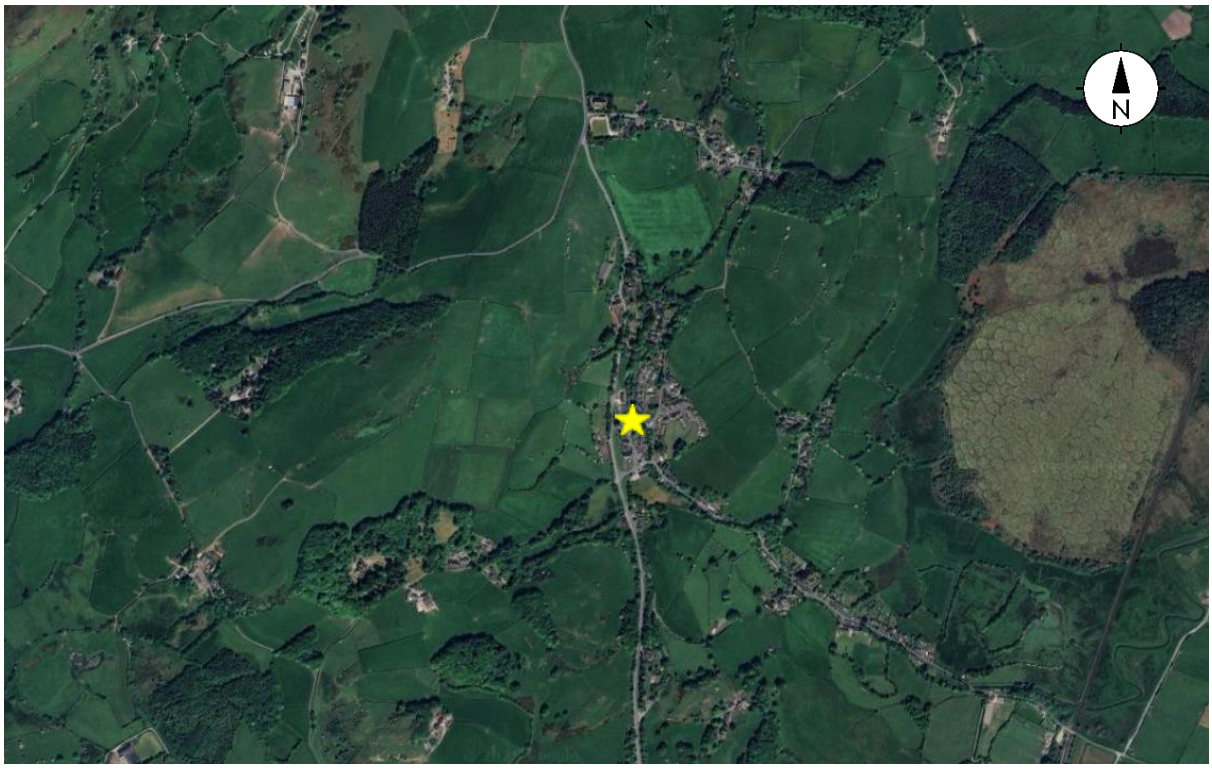
1.2 Site description

The site is located behind Mill Farm and consists of a neglected area of buildings and land with a variety of habitats. The site lies in a rural area characterized by surrounding grazing farmland, occasional woodland, and proximity to the Duddon Estuary and Black Combe mountain. These features support commuting and foraging opportunities for bats and birds.

Given its location and surroundings, the site has potential to support local bat and bird populations by providing commuting and foraging opportunities within the nearby green spaces and the mature gardens of surrounding properties.

Figure 1: An aerial photograph of the surveyed building (as shown by the red outline).

Figure 2: An aerial photograph of the surveyed site (yellow star) and some of the nearby habitats



1.3 Description of Proposed works

This report supports a planning application for the conversion of existing barns into two residential dwellings.

1.4 Purpose of surveys

The purpose of the surveys was to determine if any bats or birds were present at the site, and if so, to understand how they were using the building(s), vegetation, and surrounding area. The surveys were carried out following Bat Conservation Trust guidelines (4th edition).

1.4.1 This survey effort considered the potential for all **bat and bird species (including barn owls)** onsite:

- To establish the possibility of bat roosts and bird nests being present at the proposed development site.
- To assess any roost/nest status (i.e. what type and numbers of individuals).
- To assess suitable food, resources and habitat requirements on site and in the local landscape.

1.4.2 The proposed works at the site will be evaluated using the gathered information and current knowledge in order to determine if further survey efforts are necessary, assess the potential impacts of the proposed scheme, and determine if a Natural England Development Licence is required for the protection of any protected species on site. This is done in order to maintain a favourable conservation status for these species.

2 Legislation

2.1 Legislation

All species of bat are fully protected under The Conservation of Habitats and Species Regulations 2017 (as amended).

In addition to this, some species have additional protection by being listed on the UK Biodiversity Action Plan (UKBAP).

The legislation afforded to bats makes it illegal to possess or control any live or dead specimens, to damage, destroy or obstruct access to any structure or place used for shelter, protection or breeding, and to intentionally disturb a bat while it is occupying a structure or place which it uses for that purpose.

All nesting birds are protected under the Wildlife and Countryside Act 1981 (as amended), which protects birds, nests, eggs and nestlings from harm. In addition to this, some rarer species, such as barn owls are afforded extra protection.

2.2 National Planning Policy Framework

The National Planning Policy Framework promotes sustainable development. The Framework specifies the need for protection of designated sites and priority habitats and species. An emphasis is also made on the need for ecological infrastructure through protection, restoration and re-creation. The protection and recovery of priority species (considered likely to be those listed as species of principal importance under Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006) is also listed as a requirement of planning policy

In determining a planning application, planning authorities should aim to conserve and enhance biodiversity by ensuring that: designated sites are protected from harm; there is appropriate mitigation or compensation where significant harm cannot be avoided; measurable gains in biodiversity in and around developments are incorporated; and planning permission is refused for development resulting in the loss or deterioration of irreplaceable habitats including aged or veteran trees and also ancient woodland.

3 Survey Methodology

3.1 Desktop Survey Methodology

3.1.1 A variety of resources were independently consulted to assess the known local records within the nearby area and the importance of the site within the local landscape from an ecological perspective. The resources used were the Local Records Centre, www.naturalengland.org.uk, www.ordnancesurvey.co.uk, Google Maps, Google Earth and Bing Maps. A search of other relevant nature conservation information was made through the use of the Multi-Agency Geographic Information for the Countryside (MAGIC) database.

3.1.2 The local records centre was contacted to provide data on all bat and bird species within 2km of the proposed development site at this point.

3.2 Field Survey Methodology

3.2.1 Initial Site Survey

This is done by assessing the site by visually inspecting all building/s/structures and any trees/vegetation to be impacted by the proposed works. This is done to assess the resource availability for protected species on site and in the immediate area. Particular reference is made to:

- The presence or absence of bats and birds' onsite.
- Any evidence of potential bat roosts and birds' nests onsite.
- Whether any additional survey effort will be required.

During the initial survey, an internal and external inspection of the building(s) is undertaken to look for signs of bat activity. This is done in accordance with BCT guidelines for the assessment of building(s) and built structures.

3.2.2 External Inspection

This survey method is used to locate potential ingress and egress points around the structures that both bats and birds could use to gain access into the building. It also aims to identify any areas where cracks and crevices are present to be used as roosting/nesting features. This visual inspection is carried out in full daylight using binoculars, endoscope, torches and ladders.

This will allow for the determination of the following information:

- The type of building(s) surveyed.
- The approximate age of building(s) surveyed.
- The construction type and materials used.
- The presence of potential roost features (e.g. missing roof tiles, raised ridge tiles, air vents, cracks and crevices within the mortar).
- The presence of suitable ingress and egress points (e.g. missing windows and doors, missing mortar, lifted tiles).
- The location of any annecdotal evidence for the presence of protected species (e.g. nests, droppings or food remains).

3.2.3 Internal Inspection

This survey method aims to locate and examine areas which potentially provide suitable environmental conditions for bats. This visual inspection was undertaken by using binoculars, endoscope, torches, ladders and bat detectors to inspect internal features of the building(s).

This will allow for the determination of the following information:

- The presence of warm areas, dark areas, joints, crevices, beams and cavities that could be used for roosting and nesting purposes by bats and birds.
- To locate possible bat roost and bird nest sites.
- To listen for social calling bats.
- To locate any evidence of bat and bird presence through the identification of live or dead specimens, grease marks, droppings, food remnants, urine stains and/or the characteristic smell of bats.

3.2.4 Building/Vegetation Classification

A building/vegetation classification will be assigned to each surveyed feature that is proposed to be impacted by the scheme of works. This classification is based on the features potential to support roosting bats. The rating is also influenced by the location of the structure(s) in the local landscape, along with the number of suitable alternative roosting features, the type of features present in the landscape and the surveyor's experience. For example:

A structure that has a high level of anthropogenic disturbance with limited opportunities for access by bats, that is also situated within an urbanised area with few or no mature trees, parkland, woodland or wetland would generally equate to having negligible/low potential.

Conversely, an older structure (e.g. pre 20th century or early 20th century) with multiple features suitable for use by bats that is close to optimal foraging habitat would equate to having high potential.

The amount of additional survey effort required for each feature will depend on its rating:

- Negligible – No further survey effort is required
- Low – One further activity survey is required (structures only).
- Moderate – Two further activity surveys are required.
- High – Three further activity surveys are required.

3.2.5 Roost Categories

Any structures with evidence of bats will be further evaluated to assess which of the following roost categories may be present onsite:

- **Day Roost:**

  A place where individual bats or small groups of males, rest or shelter during the daytime. These bats are rarely found at night at these sites.

- **Feeding Roost:**

  A place where individual bats rest or feed during the night, but are rarely present in the day.

- **Hibernation Roost:**

  A place where bats may be found either individually or together during the winter months. These roosts often have a constant cool temperature and high humidity.

- **Maternity Roost:**

  A place where female bats give birth and raise their young to independence.

- **Mating Roost:**

  A place where mating/copulation takes place between male and female bats. These can continue through the winter months.

- **Night Roost:**

  A place where bats rest and/or shelter during the night, but will rarely be found here during the day. These can be used colonially or individually by the bats.

- **Satellite Roost:**

  These are alternative roosting sites that are found within close proximity to the main nursery colony within the maternity roost. These are used throughout the breeding season by individual or small groups of female bats.

- **Swarming Site:**

  A place where large numbers of bats come together during the latter summer months through until Autumn. These sites are classed as being important mating areas.

- **Transitional/Occasional Roost:**

  A place that is used by individuals or small groups of bats for a small period of time. These are used by the bats prior to hibernation and/or shortly after hibernation.

3.2.6 Bat Detector Survey (presence/absence survey)

If required, the object for this survey method is to detect any bats leaving or returning to their roost sites within the surveyed features. This is achieved by undertaking dusk and dawn activity surveys under the following protocol:

- Commencing the survey 15 minutes before sunset (dusk survey) and 2 hours before sunrise (dawn survey).
- Listening for any social calls at potential roost sites using bat detectors.
- Standing at different survey points around the building(s) and/or vegetation using bat detectors to hear the bat echolocation.
- The survey will attempt to witness the first bats emerging (dusk) and the bats returning (dawn) to their roosts.
- Standing at different transect points at foraging/commuting areas around the site.
- Carrying out this survey methodology for up to two hours after sunset (dusk) and up to 15 minutes after sunrise (dawn). This will cover the emergence and re-entry of the bats at the potential roost site, for some bat species.

3.2.7 In order to comply with the required legislation, the results from the surveys will be collated to establish whether a European Protected Species (EPS) development licence will be required. If required, project appropriate species-specific compensation and mitigation measures will be devised to ensure the species remains at a favourable conservation status at the impacted site.

4 Results

4.1 Desktop Survey Results

Please refer to the Preliminary Roost Assessment (PRA) report for the desktop survey results.

4.2 Field surveys

4.2.1 Site Surveys

In addition to the surveys undertaken by Eco 360, we acknowledge that a Preliminary Roost Assessment (PRA) was conducted by Arbtech Consulting Ltd on 5th August 2024.

4.2.2 Roost Surveys

The structure was externally and internally inspected for the presence of bats and birds with the use of various types of equipment (including binoculars, torches, endoscope and ladders) in full daylight. Subsequent activity surveys use a variety of bat detectors that include Echometer Touch 2 Pro, Batbox Duet, Elekon Batscanner, SSF Bat2 and the EcoObs Batcorder. Additional, activity surveys use Night-Vision Aids (NVA) including Infrared Cameras. The Night-Vision Aids used include Bushnell Equinox Z2 Night Vision Monocular and Canon XA40 Camcorder paired with some additional infrared lighting.

4.2.3 Building survey

The building surveys was inspected externally and internally during the PRA survey. The barn is a traditional stone structure with numerous gaps in mortar, raised roof tiles, displaced ridge tiles, and gaps between wall tops and the roof verge, all providing suitable roosting opportunities for bats.

Over 200 bat droppings (likely pipistrelle) were identified in B1b near the southern gable, with ~150 likely brown long-eared bat droppings in the northern section. These findings support the classification of B1b as a confirmed bat roost. Additionally, a number of old birds nests were recorded internally within B1a and B1b with dead birds also recorded internally.

Table 1: Bat Conservation Trust Good Practice Survey Guidelines.

Table 7.2. Recommended minimum number of survey visits for presence/absence surveys to give confidence in a negative result for structures (also recommended for trees but unlikely to give confidence in a negative result).

Low roost suitability or PRF-I	Moderate roost suitability	High roost suitability or PRF-M
One survey visit. One dusk emergence survey[a] (structures). No further surveys required (trees).	Two separate dusk emergence survey visits[b].	Three separate dusk emergence survey visits[b].

a Structures that have been categorised as low potential can be problematic and the number of surveys required should be judged on a case-by-case basis (see para 5.2.44). In some cases, more than one survey may be needed, particularly where there are several buildings in this category.

b Multiple survey visits should be spread out to sample as much of the recommended survey period (see Table 7.1) as possible; it is recommended that surveys are spaced at least three weeks apart, preferably more.

4.2.4 DNA Results

No DNA Results were obtained for the site by Eco 360 as no bat droppings were found. Eco 360 only completed the emergence surveys.

4.2.5 Emergence surveys

Emergence Survey 1

The emergence survey was undertaken at dusk, with sunset recorded at 20:42. Four Common Pipistrelle (*Pipistrellus pipistrellus*) bats were observed emerging from the structure. Foraging activity was recorded at both the front and back of the property, with Common Pipistrelle and Soprano Pipistrelle (*Pipistrellus pygmaeus*) bats frequently detected. One brown long-eared (*Plecotus auritus*) bat was also detected but not seen during the survey. Occasional commuting passes by Noctule (*Nyctalus noctula*) bats were also noted.

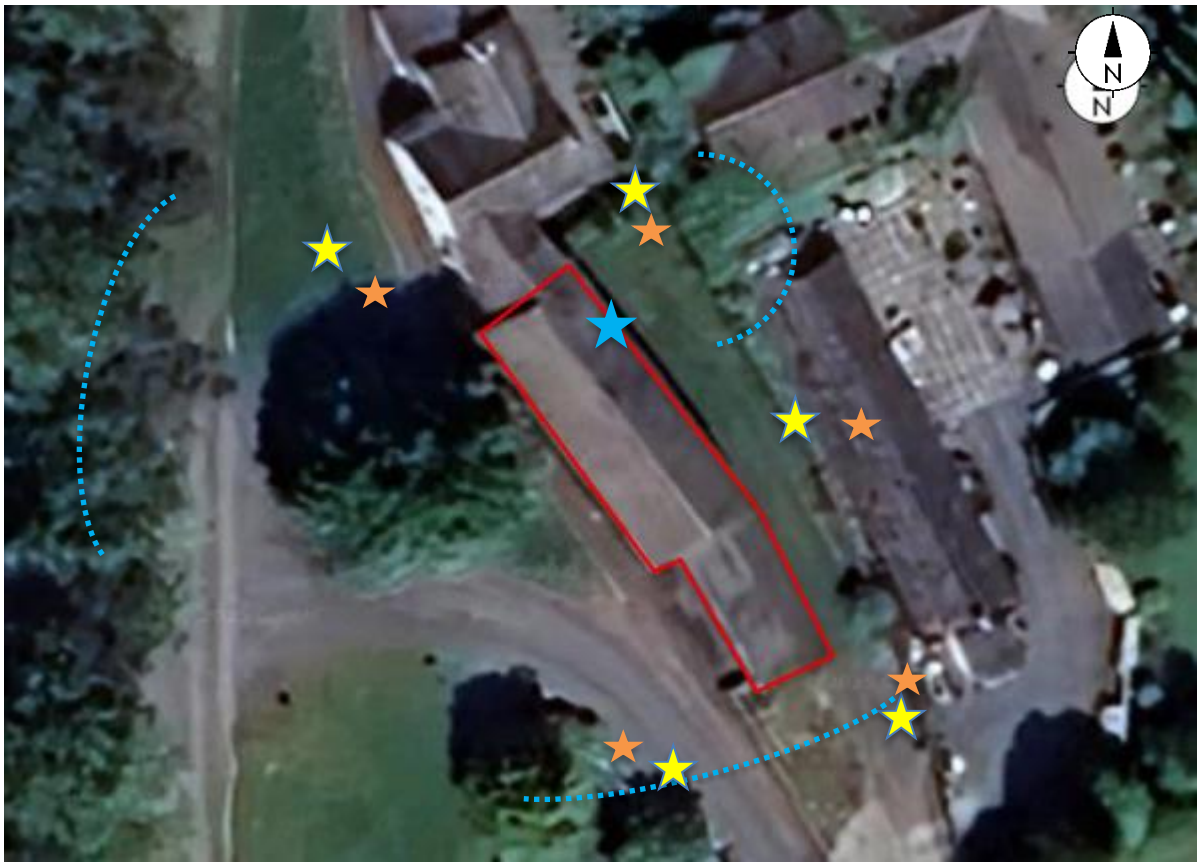
Emergence Survey 2

The dusk emergence survey began at 21:10. Two Common Pipistrelle bats and one brown long-eared (*Plecotus auritus*) bat were observed emerging from the north eastern elevation of the property from a gap in the stonework One bat was also seen to re-enter the building at the same point. Soprano Pipistrelle and brown long-eared bat activity was also recorded. Noctule bats were detected acoustically but not visually. Common Pipistrelles were seen actively foraging around the site.

Emergence Survey 3

The final dusk survey started at 21:11. One Common Pipistrelle was seen emerging from the north eastern elevation of the building. Additional commuting activity by Common Pipistrelles was noted at the front of the property. Foraging by Common and Soprano Pipistrelles was observed at the back, with intermittent Noctule detections.

Figure 5: An aerial photograph of the surveyed buildings (red outline), the surveyor locations (yellow stars), infrared camera positions (orange stars) and the common bat flight paths (dotted blue lines). The blue stars illustrate the ingress/egress points in use by the bats using the building.



Summary:

It can be concluded that the surveyed structure contains a day roost of Common Pipistrelle (*Pipistrellus pipistrellus*) bats and a day roost of brown long-eared (*Plecotus auritus*) bats

Additionally, commuting and foraging common pipistrelle, soprano pipistrelle and noctule bats were seen on site throughout the surveys.

Surveyors Information

The survey was undertaken by licensed bat ecologist/s and members of the Chartered Institute of Ecology & Environmental Management (CIEEM) and Eco 360 staff members:

Mr. John Roberts: MSc, Ecologist.

Ms. Nadia Patel: BSc (Hons), Ecologist.

Mr. Liam Smeethe: BSc (Hons), Ecologist.

Mr. John Harper: Assistant Ecologist.

Mr. Rodrigo Alves: Assistant Ecologist.

The following table outlines the environmental variables from the survey visits:

Variable	01/05/2025	22/05/2025	15/06/2025
Temperature (°C)	14	16	18
Humidity (%)	77	80	85
Cloud Cover (%)	50	70	20
Wind Speed (km/h)	20	15	13
Rain	None	None	None

5 Impact Assessment

5.1 Survey Limitations

There were no constraints to carrying out the survey.

5.2 Potential Impacts of the re-development

5.2.1 Designated sites

As the proposed works are due to remain within the site boundary, the presence of any designated sites nearby is not applicable to this project. This, therefore, means that any building works would be of no detriment to the surrounding habitats and landscape.

5.2.2 Bat Roosts

The structure was found to contain a day roost of Common Pipistrelle (*Pipistrellus pipistrellus*) bats. Further species-specific compensation and mitigation is required. Please see Section 6 Recommendations for more details. The proposed scheme of works will not alter the wider landscape and will not disturb foraging or commuting bats.

5.2.3 Bird Nests

Due to the presence of bird nests, the proposed works are likely to have a high effect on the local bird populations. Please see section 5 for more details.

5.2.4 Foraging and commuting habitat

It is considered that the re-development of the site would have a **negligible** effect on potential foraging and commuting habitat. The site itself offers little foraging habitat, with the adjacent land containing better opportunities for bats and birds to use. Post development, all foraging and commuting habitats will be maintained, thus not negatively affecting the local landscape.

6 Recommendations

6.1 Bats

From the site surveys, it has been established that the building is in use as a day roost of Common Pipistrelle (*Pipistrellus pipistrellus*) bats and a day roost of brown long-eared (*Plecotus auritus*) bats.

Due to the proposed works affecting the known roosts, a Natural England Development Licence is necessary to legally carry out the works. These licences can take up to thirty working days once the paperwork has been completed and submitted.

All works on the structure must wait to be carried out between the 1st of October and the 1st of April when the bats will have typically relocated to their hibernation roosts. However, it is possible that some bats may remain within their summer roosts over the winter months for hibernation. Due to this, at the beginning of the works, a licenced ecologist is required to undertake soft demolition by accompanying building contractors in inspecting the structure by hand. This will ensure no hibernating bats are harmed by the works. One 2F Schwegler Bat Box will be required to be installed on the morning of the bat inspection so that any hibernating bats found can be translocated to this feature and allow the works to commence without impacting upon the bats.

Post development, two Eco Bat Boxes or Integrated Eco Bat Boxes should be placed on the structures on the site to compensate for the loss of the existing roosts. It is imperative that no modern breathable felt is used in the building where bats could be present. This is due to the membrane on the modern felt entangling bats and leading to their demise.

Artificial lighting should be avoided around compensatory roosting features. If artificial lighting is required, a sensitive lighting plan with sensored lights triggered by large bodies should be incorporated.

It will be necessary to incorporate a bat loft within the structure for the identified void dwelling species. Ideally, the existing loft spaces will be maintained, with the inclusion of bat access features in the new roof. This will ensure that the bats can continue to undertake their pre-emergent flights, whilst being able to access their existing roost. Bat Access Tiles will be required to facilitate access into the loft space post-development.

It is imperative that no modern breathable felt is used in the new roof design, where bats could be present. This is due to the membrane on the modern felt entangling bats and leading to their demise. Artificial lighting should be avoided around compensatory roosting features. If artificial lighting is required, a sensitive lighting plan with sensored lights triggered by large bodies should be incorporated.

To ensure continued connectivity for brown long-eared bats (BLE) within the loft space, it is recommended that a bat access point is incorporated into the proposed

fire separation wall. This access point should measure a minimum of **20mm x 50mm** and be positioned near the ridge or another known flight path used by the bats.

A number of additional measures could be included to ensure that the roost is of the highest value possible to the target species. These measures include incorporating a ridge and/or dormer vent upon the roof to allow bat access into the building. Additionally, two Schwegler 1FQ bat boxes should be placed upon the interior gable end walls and a ply-board lining should be introduced [approximately] halfway up the roof (heading towards the apex) in order to provide further roosting opportunities for the brown long-eared (Plecotus auritus) bats.

Figure 6: An illustration of the proposed bat loft design from an external viewpoint.

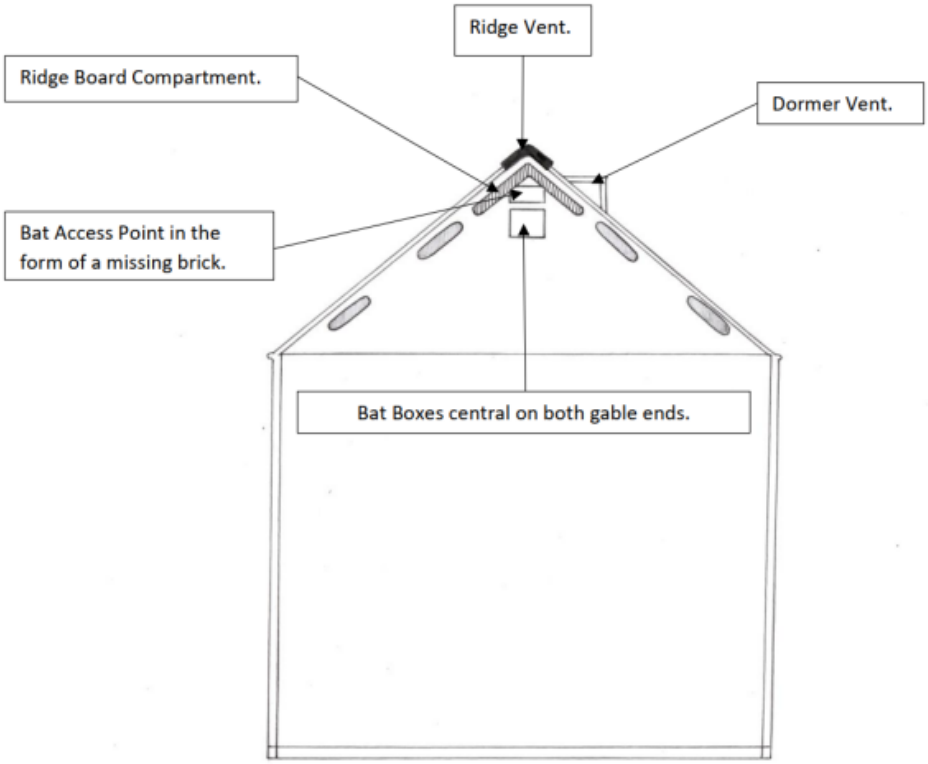
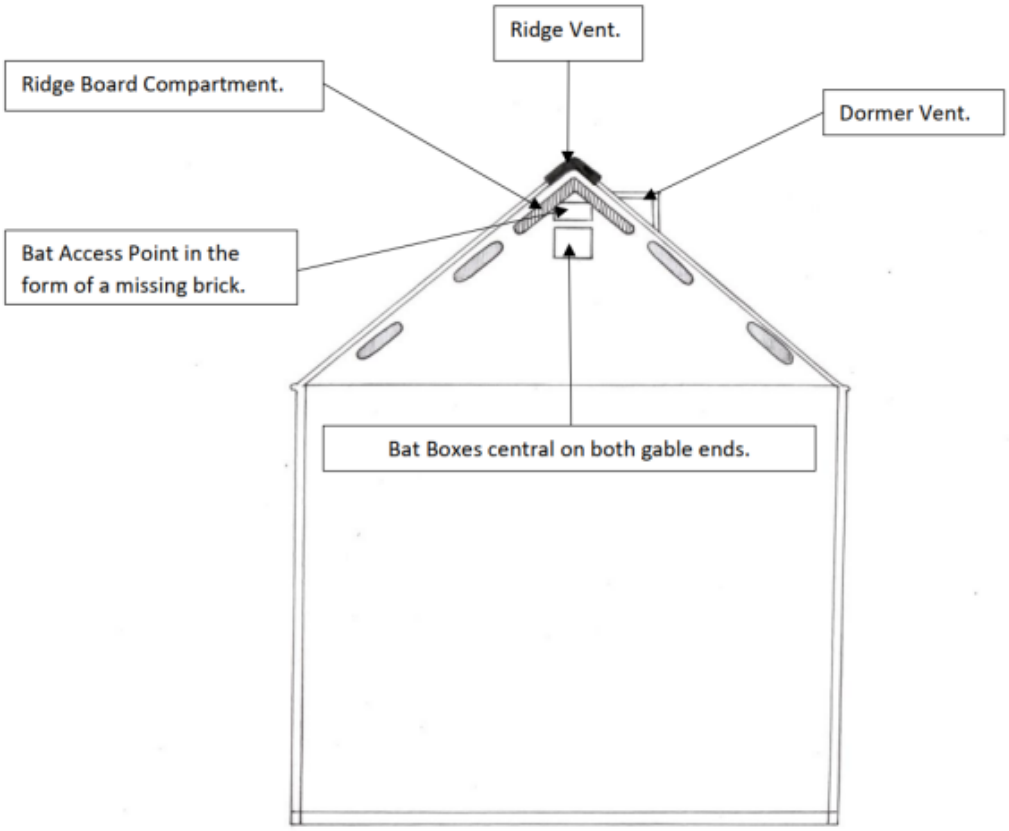


Figure 7: An illustration of the proposed bat loft design from an internal viewpoint.



Additionally, the site can also be enhanced by introducing a bat friendly planting scheme in the soft landscaping plan, with one Eco Bat Box potentially installed on any suitable retained mature tree or in a suitable location on any new structures built.

The table below outlines species recommended by the Bat Conservation Trust, all of which could be incorporated into the site post development.

Flowers for borders	Trees, shrubs & climbers
Aubretia	Bramble
Candytuft	Buddleia
Cherry pie	Common alder
Corncockle	Dogrose
Corn marigold	Elder
Corn poppy	English oak
Echniacea	Gorse
English bluebell	Guelder rose
Evening primrose	Hawthorn
Field poppies	Hazel
Honesty	Honeysuckle (native)
Ice plant ‘pink lady’	Hornbeam
Knapweed	Ivy
Mallow	Jasmine
Mexican aster	Pussy willow
Michaelmas daisy	Rowan

Night-scented stock	Silver birch
Ox-eye daisy	**Wild flowers for pond edges & marshy areas**
Phacelia	Bog bean
Poached egg plant	Bugle
Primrose	Creeping Jenny
Red campion	Flag Iris
Red valerian	Hemp agrimony
Scabious	Lady's smock
St. John's Wort	Marsh mallow
Sweet William	Marsh marigold
Tobacco plant	Marsh woundwort
Verbena	Meadowsweet
Wallflowers	Purple loosestrife
Wood forget-me-not	Water avens
Yarrow	Wood forge-me-not
Herbs	Water mint
Angelica	
Bergamot	
Borage	
Coriander	
English marigolds	
Fennel	
Feverfew	
Hyssop	
Lavenders	
Lemon balm	
Marjoram	
Rosemary	
Sweet Cicely	
Thyme	

6.2 Birds

Due to the presence of nesting birds, no works can be undertaken on the structures during the bird breeding season (March to August, inclusive). If this timescale cannot be achieved, the structures are required to be assessed by a suitably qualified ecologist to confirm the presence or absence of active nests. If active nests are located, exclusion zones around the nest will be required until the chicks have fledged the nest.

In addition to this, a variety of bird boxes should be installed around the site to enhance the nesting opportunities for a number of additional species within the local landscape.

7 References

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8 Appendices

Appendix A: Site Plans

Appendix B: Eco Data Map

Appendix C: Artificial Light and Bats

Appendix D: Photographic Records

Appendix E: DNA Analysis

Appendix A: Site Plans

No site plans have been provided to Eco 360 at the production of this report.

Appendix B: Data Search Maps

No data search maps were provided.

Appendix C: Artificial Lighting and Bats

Artificial lighting is known to affect bat's roosting and foraging behaviour, with lighting resulting in a range of impacts that includes roost desertion (BCT, 2009), delayed emergence of roosting bats (Downs et al., 2003), increased activity of some bat species and decreased activity by others (Stone et al., 2012).

An experimental approach using LED units, demonstrated that relatively fast-flying bat species, including the common pipistrelle, showed no significant impacts as a result of new artificial lighting, even when lighting was set at relatively high levels close to 50 lux.

In contrast, slow flying bats such as the myotid bats (Myotis spp.) showed sharp reductions in presence, even at low light levels of 3.6 lux (Stone et al., 2012).

Current recommendations for all bat species specifies that no bat roost should be directly illuminated.

Due to the impacts of lighting, mitigation and sensitive lighting design schemes are required for projects where bats are present. These should include bat friendly lighting plans that should aim to avoid lighting wherever possible. If this is not possible, then the minimisation of any lighting impacts is required by adopting the following measures:

- To introduce lighting curfews or use of PIR sensors.

  Lighting curfews can be an effective way of avoiding impacts on bats. These curfews may involve either turning off lighting or dimming light units at specific times of the night, dimming units at key times of the year, providing the luminaire allows for this option via a control unit. Lighting to be triggered by PIR sensors can be expected to be illuminated only when required and for a low proportion of time.

- To consider no lighting solutions where possible.

  Options such as white lining, good signage and LED cats eyes should be considered as preferable. Reflective fittings may help make use of headlights to provide any necessary illumination in some areas.

- To use only high pressure sodium or warm white LED lamps where possible.

  High pressure sodium and warm white LED lamps emit lower proportions of insect attracting UV light than mercury, metal halide lamps and white LED lighting. Generally, lamps should have a lower proportion of white or blue wavelengths, with a colour temperature <4200 kelvin recommended (BCT, 2014).

- To minimise the spread of light.

  The light spread should be kept at or near horizontal to ensure that only the task area is lit. Flat cut-off lanterns or accessories should be used to shield or direct light to where it is required. Baffles, hoods, louvres and shields should be used where necessary to reduce light spill.

- To consider the height of the lighting column.

  While downward facing bollard lighting is often preferable, it should be noted that a lower mounting height does not automatically reduce impacts to bats as bollard lighting can often be designed to provide up-lighting. Where bollard lighting is considered to be the most appropriate system, bollard spacing or unit density should be kept to a minimum and units should be fitted with the appropriate hoods/deflectors to reduce any up-lighting.

- To avoid reflective surfaces below lights.

  The polarisation of light by shiny surfaces attracts insects increasing bat activity (BCT, 2012). Consequently, surface materials around lighting require consideration.

Appendix D: DNA Analysis

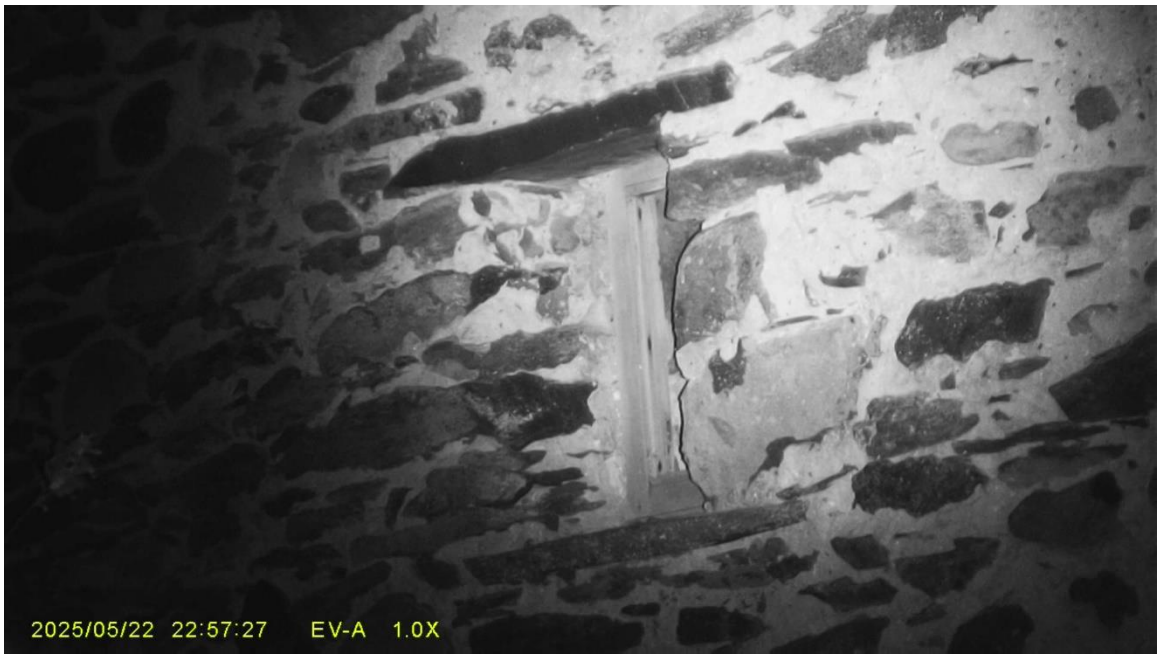
No bat droppings were found.

Appendix E: Night-Vision Aid (NVA) Screenshots

Camera Position 1

Camera Position 2

Camera Position 3



Camera Position 4

Camera Position 5

Camera Position 6

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No reliance should be made on any such comments in relation to the structural integrity of the features located on the surveyed site. All information within the report is based solely on evidence that has been found on site during the service provided. No individual opinion or inference will be made other than that of the suitably qualified ecologist appointed to the project.