



“Providing Common Sense Solutions for Sustainable Development”

Paul Keeling (Director/Principal Ecologist), Lulworth House, 51 High Street, Cheadle, Staffordshire, ST10 1AR,
M: 07838 377 612 (direct line), E: paul@evolutionecology.co.uk, www.evolutionecology.co.uk

The Withering Farm

Bat and Bird Presence/Absence Survey Report

May 2022



Bat and Bird Presence/Absence Survey

Bat and Bird Presence/Absence Survey

At

The Withering Farm,
Cheadle Road,
Alton,
Staffordshire,
ST10 4DH

For

David Byatt (Agent) on behalf of
Walter and Marilyn Keeling (Property Owners)

Bat and Bird Presence/Absence Survey

0. Executive Summary

0.1 Report rationale

This report has been prepared at the request of David Byatt (Agent) on behalf of Walter and Marilyn Keeling. This is in relation to the identification and location of protected bat and bird species at 'The Withering Farm', Cheadle Road, Alton, Staffordshire, ST10 4DH (grid reference: SK 06045 42328).

The daytime bat 'Preliminary Roost Appraisal Survey' (PRA) was undertaken by Evolution Ecology Ltd on;

- 11th of May 2022.

0.2 Background

Under the current proposals, the building is to be converted into a dwelling.

Bat and Bird Ecology

Bats - From the information obtained during the daytime survey (Preliminary Roost Appraisal – PRA), it can be established that the building is unsuitable for roosting bats because the internal space of the building is too brightly lit up by the sun, via the large open doorways and the skylights in the roof (bats prefer to roost in dark areas of a building).

Additionally, the modern single skin material means that there is nowhere for bats to roost (cracks, gaps, and crevices).

Birds – No birds are nesting inside the building.

0.3 Ecological Provisions

Please see 'Section 5 – Ecological Provisions' for an outline of the proposed ecological provisions for the works at the site.

Bat and Bird Presence/Absence Survey

Contents

0	Executive summary	3
1	Introduction	5
1.1	Site Description	
1.2	Proposed Works	
1.3	Aims of survey	
2	Survey Methodology	8
2.1	Summary of survey methods	
2.2	Pre-survey data search	
2.3	Surveyors information	
2.4	Field surveys	
2.4.1	Habitat surveys	
2.4.2	Roost survey – weather conditions and timing	
2.4.3	Roost and Activity surveys	
3	Results	13
3.1	Pre-survey data search	
3.2	Field surveys	
3.2.1	Habitat description	
3.2.2	Roost survey	
3.2.3	Summary of Roost survey	
3.2.4	Activity surveys	
4	Impact Assessment	17
4.1	Constraints on survey information	
4.2	Constraints on equipment used	
4.3	Potential impacts of development	
4.3.1	Designated sites	
4.3.2	Roosts	
4.3.3	Foraging and commuting habitat	
4.4	Legislation and policy guidance	
5	Ecological Provisions	19
6	Summary	20
6.1	Bat and Bird Ecology	
6.2	Ecological Provisions	
7	References	21
8	Appendices	22
9	LIMITING CONDITIONS / DISCLAIMERS	29

Bat and Bird Presence/Absence Survey

1 INTRODUCTION

This report has been prepared at the request of David Byatt (Agent) on behalf of Walter and Marilyn Keeling. This is in relation to the identification and location of protected bat and bird species at 'The Withering Farm', Cheadle Road, Alton, Staffordshire, ST10 4DH (grid reference: SK 06045 42328).

The daytime bat 'Preliminary Roost Appraisal Survey' (PRA) was undertaken by Evolution Ecology Ltd on;

- 11th of May 2022.

1.1 Site Description

The agricultural building of interest is situated on the edge of the village of Alton in Staffordshire. The farm building is surrounded by a dwelling, agricultural buildings and hardstanding ground.

Within the wider landscape, evidence of other agricultural lands, scattered trees/woodland, hedgerows, and residential and commercial units (with their associated gardens/yards) are present.

Therefore, the site contains potential roosting, commuting, and foraging opportunities for the local bat and bird populations.

Bat and Bird Presence/Absence Survey

Figure 1: An aerial map showing the location of the building (red outline) at the site in relation to some of the local landscape.



1.2 Proposed works

Under the current proposals, the building is to be converted into a dwelling.

1.3 Aims of the survey

The actions of the surveyors on-site and during the production of the report were conducted in accordance with Bat Conservation Trust (BCT) guidelines (3rd Edition).

The aim of the survey was to undertake an appraisal of the building/s and the surrounding area to establish the following:

Bat and Bird Presence/Absence Survey

1.3.1 Survey protocol considered any protected bat species on-site**Bats**

- To establish the probability of bats and their roost sites being present at the proposed redevelopment site.
- To assess the roost status.
- To assess suitable food resources and habitat requirements.
- If a roost site is found, to provide an impact assessment.

1.3.2 Survey protocol also considered any protected bird species on-site:**Barn Owls**

- To establish if barn owls were using the site.
- To locate nest sites if present.
- To assess what types of activities were shown within the site of interest.
- To evaluate suitable food resources and habitat requirements.
- To provide an impact assessment if barn owls are present.

Birds

- To establish if birds were using the site.
- To locate nest sites if present.
- To assess what types of activities were shown within the site of interest.
- To evaluate suitable food resources and habitat requirements.
- To provide an impact assessment if nests are found.

1.3.3 The information was subsequently used in conjunction with the knowledge of the proposed works at the site to determine:

- What impacts the works are likely to have on any protected species found at the site.
- The need for any Natural England development licence application to be made in respect of activities concerning protected species.
- Recommendations for any mitigation measures that would be required.

Bat and Bird Presence/Absence Survey

2 SURVEY METHODOLOGY

2.1 Summary of survey methods

The objective of this report is to provide an ecological evaluation of the site in relation to its suitability for bat and bird utilisation. The survey considered the potential for roosting bats and gathered any anecdotal evidence (i.e., bats, bat droppings, feeding remains, urine stains and grease marks) that may support their presence within the building unit(s).

2.1.1 Walkover survey

A walkover survey of the site and a visual inspection of the building/s and any trees were undertaken to determine the availability of the required resources for the protected species in the immediate area. This would allow us to determine:

- Presence or absence of bats on-site (i.e., roosting).
- Evidence and/or potential of bat roosts on-site (i.e., summer roosts).
- Whether additional surveys are required.

2.1.2 External Inspection of the Building/s Elevations

The building/s on-site were inspected both externally and internally for signs of bat activity. Notes were made on the following in accordance with the guidelines published by the BCT for the scoping and surveying of building/s and built structures:

The objective of this survey was to locate suitable ingress and egress points that protected species (bats) could use to fly into the building/s and also to identify any areas within the building/s in which these species may be able to roost and/or nest. The survey method used to inspect the external walls and roof of the buildings was a visual assessment with the use of binoculars, torch, endoscope, and ladders in full daylight.

This allowed us to determine the following information:

- Type and age of building/s.
- Type of construction.
- Presence of potential roost features (e.g., missing roof tiles, raised tiles, roof voids).
- Presence of suitable entry and exit points (e.g., broken windows, missing windows and doors/ridges and the apex of the buildings).
- Amount and location of evidence of bats such as the presence of live or dead bats, droppings, grease marks, urine stains and/or characteristic smell of bats.

Bat and Bird Presence/Absence Survey

2.1.3 Internal Inspection of the Building/s Elevations and Rooms

The object of this survey was to locate and focus on areas that provide appropriate environmental conditions for bats. To do this, we must:

- Look for warm dark areas, joints, crevices, beams and cavities for possible bat roost sites and nest sites.
- Locate roost sites.
- Listen for bats.
- Examine floors, walls and structural elements for droppings, corpses, skeletons and dead insects.

2.1.4 Building/s Rating

In the absence of any evidence, structures have been assigned a rating of suitability from negligible to a high potential for supporting bats. The rating is based on the location of the structure in the surrounding landscape, the number, and type of features suitable for use by bats and the surveyor's experience.

For example, a structure with a high level of regular disturbance with few opportunities for access by bats, that is in a highly urbanised area with few, or no mature trees, parkland, woodland or wetland would generally equate to having negligible potential. Conversely, a pre 20th century or early 20th-century building with many features suitable for use by bats close to good foraging habitat would have high potential.

2.1.5 Roost Categories

Any structures with evidence of bats will be further evaluated to assess which of the following roost categories may be present on-site (if any):

- **Maternity or Nursery Roost** – used by breeding bats, where pups are born and raised to independence (anecdotal evidence may support this prospect).
- **Hibernation Site** – where bats may be found during the winter (this is assessed within the context of this report).
- **Daytime Summer Roost** – used by males and/or non-breeding females.
- **Night Roost** – where bats rest between feeding bouts during the night but are rarely present during the day.
- **Feeding Roost** – where bats temporarily hang up to eat an item of prey.

Bat and Bird Presence/Absence Survey

- **Transitional (or Swarming) Site** – where bats may be present during the spring or autumn (this cannot be assessed within the context of this report).

2.1.6 Bat Detector Survey (Dusk/Dawn surveys)

If required, the object of this survey is to detect active bats leaving possible roost sites identified in the external and internal surveys. This is achieved by:

- Being at the site 30 minutes before sunset and 90 minutes before sunrise.
- Listening for social calls at potential roost sites.
- Standing at different transect points around the buildings, using the bat detector to hear the bats plus trying to see the first bats emerge.
- Standing at different transect points at foraging areas.
- Carrying out this survey up to two hours after the first bats emerge and 15 minutes after sunrise. This will cover the emergence and returning period to the roost site, for some bat species.

2.1.7 Evidence will be used to determine whether a European Protected Species (EPS) licence will be required to ensure legal compliance during development. This will also include identifying which mitigation measures [if any] would be most appropriate.

2.2 Pre-survey data search

2.2.1 A Local Records Centre (LRC) data search was not undertaken due to the small size and nature of the redevelopment works. The overall impact on biodiversity is likely to be localised and of low significance. It is considered very unlikely that the conversion works will have any impact outside of the footprint of the works.

The data search results are considered unlikely to impact on the decisions-making process, and therefore, an LRC search has not been undertaken. This approach is consistent with CIEEMs Guideline for Accessing and Using Biodiversity Data (2016), which states that a 'low impact or small-scale development (e.g. by size, extent, duration of works, magnitude or locality)' may not require a LRC search where: there is no requirement for any other preliminary survey (e.g. for habitats or other protected species) other than nesting birds or barn owls; and no trees likely to use by roosting bats are to be affected (e.g. felling, pollarding, crown reduction, limb removal).

Bat and Bird Presence/Absence Survey

2.3 Surveyors Information

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

- **Mr Paul Keeling** BSc (Hons), MCIEEM, Principal Ecologist, Natural England Bat Survey Licence Number: 2015-11546-CLS-CLS Bat Survey Level 2.

2.4 Field surveys

2.4.1 Evolution Ecology Ltd has no previous information about the site.

2.4.2 Roost Surveys - weather conditions and timing

The building/s on-site was externally and internally inspected for the presence of bats and birds with the use of binoculars, torches, an endoscope and ladders in full daylight.

Table 1: Scoping Survey, Environmental Variables

Environmental variables	Scoping Survey of the building/site – 11 th May 2022
Temp Start	18°C
Temp Finish	18°C
Humidity Start	80%
Humidity Finish	82%
Cloud Cover Start	50%
Cloud Cover Finish	50%
Wind Speed Average	Light
Precipitation	Dry

Bat and Bird Presence/Absence Survey

2.4.3 Roost and Activity Surveys

During the roost/scoping survey, the types of equipment used included an endoscope, ladders, and torches.

The type of equipment used during bat activity surveys are the Batbox Duet, S.S.F. Bat2 heterodyne and frequency division bat detectors, along with the Echo Meter Touch 2 (E.M.T.) bat detector.

Echo Meter Touch 2

The E.M.T. bat detector is a data recorder that distinguishes bat calls from other sound sources in real-time (online signal analysis). Calls are recorded digitally as call sequences. The E.M.T. is used alongside Batbox Duet and S.S.F. Bat2 heterodyne and Frequency Division bat detectors and provides an unbiased statistical analysis of bat species recorded during a survey on site. All statistical analysis software is included in the E.M.T., giving us real-time results quickly and efficiently.

Bat and Bird Presence/Absence Survey

3 RESULTS

3.1 Field surveys

3.1.1 Habitat description

The agricultural building is located in a rural location and is surrounded by a dwelling and other agricultural buildings.

Within the wider landscape, evidence of other agricultural lands, scattered trees/woodland, hedgerows, and residential and commercial units (with their associated gardens/yards).

3.2.1 Bat roost and birds nest (including barn owl) survey

Table 2: Access/roosting/nesting features for bats and birds to gain entry and roost/nest - identified externally during the scoping survey.

<u>External Features for the agricultural building</u>	<u>Yes</u>	<u>No</u>
Staffordshire Blue Tiles		☒
Stone Ridge Tiles		☒
Shed roof		☒
Pitch roof	☒	
Hip roof		☒
Skylights	☒	
Flat roof		☒
Stone walls	☒	☒
Cavity walls		☒
Brick skin		☒
Missing/open doors		☒
Gaps in the windows		☒
Cracks/crevices on walls		☒
Slipped/missing/dislodged tiles		☒
Gaps around fascia/soffit		☒
Air/ridge vents		☒
Birds' nests		☒
Prefabricated steel/cement sheeting	☒	
Breeze Blocks	☒	
Notes: The agricultural building is a modern prefabricated structure (single skin material). This means there is nowhere for bats to roost (cracks, gaps, and crevices).		

Bat and Bird Presence/Absence Survey

Table 3: Features identified internally during the scoping survey.

<u>Internal Features for the building</u>	<u>Yes</u>	<u>No</u>
Shed Roof		☒
Timber beams		☒
Steel beams		☒
Commercial rooms		☒
Educational rooms		☒
Storage rooms	☒	
Warehouse		☒
Agricultural (inc. domestic livestock)		☒
Derelict building		☒
Moth/Butterfly remains		☒
Mouse droppings		☒
Cobwebs	☒	
Bat droppings		☒
Birds' nests		☒
Notes: The internal inspection of the building identified the following: Bats - The inside of the barn is unsuitable for roosting bats because the building is too brightly lit up by the sun, via large open doorways and the sky lights in the roof (bats prefer to roost in dark areas of a building). Additionally, the modern single skin material means that there is no where for bats to roost (cracks, gaps, and crevices). Birds – No birds are nesting inside the building.		

Bat and Bird Presence/Absence Survey

3.2.2 Summary of the external and internal inspections

Due to no suitable roosting features for bats, the building is deemed as 'negligible' potential for roosting bats.

Therefore, two bat activity surveys are **not** required during the bat activity season to confirm the presence of bats.

Table 4: Features of buildings and built structure classification, which may indicate the potential for bats. The full guidance can be found in the Bat Conservation Trust Good Practice Survey Guidelines.

Bat Conservation Trust

Table 7.3 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	Moderate roost suitability	High roost suitability
One survey visit. One dusk emergence or dawn re-entry survey ^a (structures). No further surveys required (trees).	Two separate survey visits. One dusk emergence and a separate dawn re-entry survey. ^b	Three separate survey visits. At least one dusk emergence and a separate dawn re-entry survey. The third visit could be either dusk or dawn. ^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 Section 5.2.9). If there is a possibility that quiet calling, late-emerging species are present then a dawn survey may be more appropriate, providing weather conditions are suitable. 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 two weeks apart, preferably more. A dawn survey immediately after a dusk one is considered only one visit.

Bat and Bird Presence/Absence Survey

Table 5: Low/Moderate/High potential building(s) survey recommendations. The full guidance can be found in the Bat Conservation Trust Good Practice Survey Guidelines. These guidelines are what all local authorities abide by.

Table 4.1 Guidelines for assessing the potential suitability of proposed development sites for bats, based on the presence of habitat features within the landscape, to be applied using professional judgement.		
Suitability	Description Roosting habitats	Commuting and foraging habitats
Negligible	Negligible habitat features on site likely to be used by roosting bats.	Negligible habitat features on site likely to be used by commuting or foraging 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^a and/or suitable surrounding habitat to be used on a regular basis or by larger numbers of bats (i.e. unlikely to be suitable for maternity or hibernation^b). A tree of sufficient size and age to contain PRFs but with none seen from the ground or features seen with only very limited roosting potential.^c	Habitat that could be used by small numbers of commuting bats such as a gappy hedgerow or unvegetated stream, but isolated, i.e. not very well connected to the surrounding landscape by other habitat. Suitable, but isolated habitat that could be used by small numbers of foraging bats such as a lone tree (not in a parkland situation) or a patch of scrub.
Moderate	A structure or tree with one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions ^a and surrounding habitat but unlikely to support a roost of high conservation status (with respect to roost type only – the assessments in this table are made irrespective of species conservation status, which is established after presence is confirmed).	Continuous habitat connected to the wider landscape that could be used by bats for commuting such as lines of trees and scrub or linked back gardens. Habitat that is connected to the wider landscape that could be used by bats for foraging such as trees, scrub, grassland or water.
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 potentially for longer periods of time due to their size, shelter, protection, conditions ^a and surrounding habitat.	Continuous, high-quality habitat that is well connected to the wider landscape that is likely to be used regularly by commuting bats such as river valleys, streams, hedgerows, lines of trees and woodland edge. High-quality habitat that is well connected to the wider landscape that is likely to be used regularly by foraging bats such as broadleaved woodland, tree-lined watercourses and grazed parkland. Site is close to and connected to known roosts.

Bat and Bird Presence/Absence Survey

4 IMPACT ASSESSMENT

4.1 Constraints on survey information

There were no constraints in obtaining the survey results.

4.2 Constraints on equipment used

No constraints were present with regards to the equipment used during the survey (i.e., endoscope, ladders, and high-powered binoculars).

4.3 Potential impacts of the re-development

Based on the current planning proposal, whereby:

Under the current proposals, the building is to be converted into a dwelling.

- The potential impacts have been identified as follows:

4.3.1 Designated sites

Any designated sites nearby are not applicable to the proposed project, as the conversion works to the building are taking place. This, therefore, means that any building work would be of no detriment to the surrounding landscape.

4.3.2 Roosts

Short-term impacts: Disturbance [Unknown]

There will be no impact to bat roosts, with no species-specific mitigation measures required to safeguard bats and their roost/s.

Long-term impacts: Roost modification [Unknown]

Same as 'Short-term impacts: Disturbance.'

Long-term impacts: Roost loss [Unknown]

Same as 'Short-term impacts: Disturbance.'

Bat and Bird Presence/Absence Survey

4.3.3 Foraging and commuting habitat.

It is considered that the works to the building would have a negligible effect on potential foraging and commuting habitat. The site offers little foraging habitat, as it consists primarily of a building and hard standing ground.

The surrounding habitats provide all the necessary foraging habitats that bats require, and during the redevelopment works, this will remain the status quo.

4.4 **Legislation and Policy Guidance**

National Planning Policy Framework, Section 11: The recently published framework in 2012, replaces the previous Planning Policy Statement 9. Section 11: Conserving and enhancing the natural environment reaffirms the government's commitment to maintaining green belt protections and preventing urban sprawl, retains the protection of designated sites and preserves wildlife, aims to improve the quality of the natural environment and halt declines in species and habitats, protects and enhances biodiversity and promotes wildlife corridors.

Article 10 of the E.C. Habitats Directive: The published article requires government to develop features such as 'stepping-stones' on the landscape, such as clusters of ponds, tracts of rough grassland or scrubland and vegetated railway line embankments.

Wildlife and Countryside Act 1981: All species of bat are fully protected under the Wildlife and Countryside Act 1981, the European Conservation (Natural Habitats, etc.) Regulations 1994, and the Countryside and Rights of Way Act 2000. This legislation 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.

Most resident nesting birds are protected under the Wildlife and Countryside Act 1981, which protects birds, nests, eggs, and nestlings. Some rarer species, such as barn owls are afforded extra protection.

Bat and Bird Presence/Absence Survey

5 ECOLOGICAL PROVISIONS

Bats - From the information obtained during the daytime survey (Preliminary Roost Appraisal – PRA), it can be established that the building is unsuitable for roosting bats because the building is too brightly lit up by the sun, via large open doorways and the skylights in the roof (bats prefer to roost in dark areas of a building).

Additionally, the modern single skin material means that there is nowhere for bats to roost (cracks, gaps, and crevices).

Birds – No birds are nesting inside the building.

Bat and Bird Presence/Absence Survey

6 SUMMARY

6.1 Bat and Bird Ecology

Bats and Birds - From the information obtained during the survey, it can be confirmed that there are no roosting bats or nesting birds at the section of the building proposed to be turned into a dwelling.

Therefore, no mitigation or compensation measures will need to be implemented.

6.2 Ecological Provisions

Please see 'Section 5 – Ecological Provisions' for an outline of the proposed ecological provisions for the works at the site.

Bat and Bird Presence/Absence Survey

7 REFERENCES

Bat Conservation Trust (2016). *Bat Surveys – Good Practice Guidelines*. 3rd Edition. Bat Conservation Trust: London.

Berthinussen, A. & Altringham, J.D. (2012). The effect of a major road on bat diversity. *Journal of Applied Ecology* 49: p.p. 82–89.

Biodiversity Action Reporting System (2010). *Biodiversity Action in Staffordshire*. BARS. [Online]. Available at: http://ukbap-reporting.org.uk/plans/map_county.asp [accessed on 20th October 2010].

BSBI (2008). *BSBI 2007 List*. [Online]. Available at: <http://www.bsbi.org.uk/html/database.html> [accessed on 6TH January 2013].

The Conservation of Habitats and Species Regulations 2010. SI 2010/490.

The Conservation (Natural Habitats, &c.) (Amendment) Regulations 2007. SI 2007/1843, London: HMSO.

Countryside and Rights of Way Act 2000 (c.37). London: HMSO.

Dietz, C., von Helversen, O. & Nill, D. (2009) *Bats of Britain, Europe and Northwest Africa*. London: A. C. Black

Hutson, A.M., Spitzenberger, F., Aulagnier, S., Coroiu, I., Karataş, A., Juste, J., Paunovic, M., Palmeirim, J. & Benda, P. (2008) *Pipistrellus pipistrellus*. In: IUCN 2012. IUCN Red List of Threatened Species. Version 2012.1

RSPB (2002). *The Population Status of Birds in the U.K. 2002-2007*

Rydell J & Racey, P A (1993). Street lamps and the feeding ecology of insectivorous bats. Recent Advances in Bat Biology, *Zool Soc Lond Symposium abstracts*.

U.K. Biodiversity Action Plan (2007). *UK List of Priority Species*. Joint Nature Conservation Committee. [Online]. Available at: <http://www.ukbap.org.uk/NewPriorityList.aspx> [accessed on 20th October 2010].

Wildlife and Countryside Act 1981 (and amendments) (c.69). London: HMSO.

Bat and Bird Presence/Absence Survey

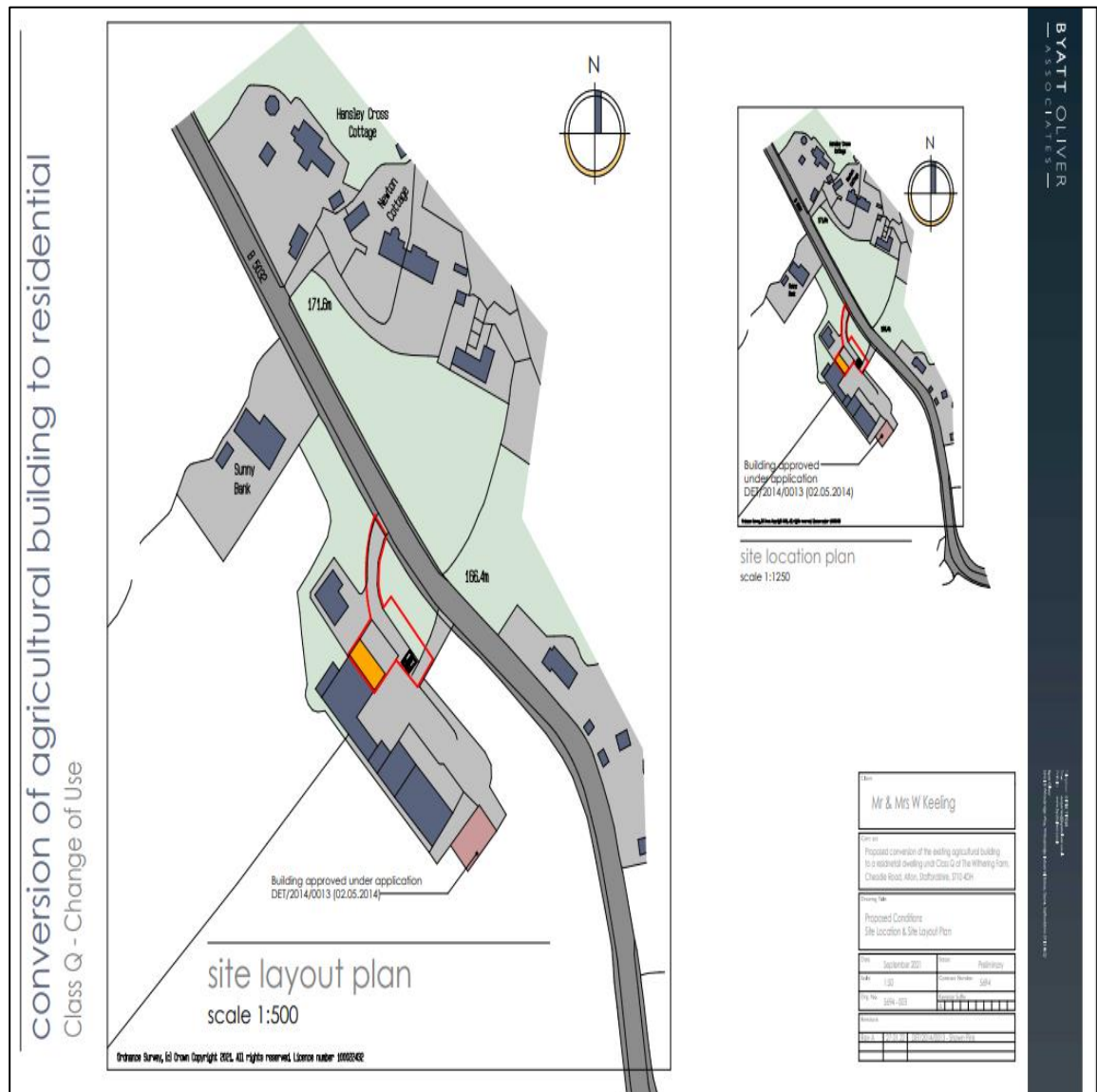
8 APPENDICES

Appendix A: Site Plans

Appendix B: Photographic Records

Appendix C: Bats and Artificial Light

Bat and Bird Presence/Absence Survey

Appendix A: Site Plan (the surveyed building is outlined in orange).

Bat and Bird Presence/Absence Survey

Appendix B: Additional Photographic Records

Plate 1: This image shows the southeast elevation of the agricultural building.



Plate 2: This image is an internal view of the agricultural building, which shows how the large doorway and the skylights allow daylight to illuminate the interior room.



Bat and Bird Presence/Absence Survey

Plate 3: This image shows the internal breeze block walls with no cavities because they have been filled in with concrete. Additionally, you can see the single skin sheeting walls.



Bat and Bird Presence/Absence Survey

Appendix C: Bat and Artificial Lights

Artificial lighting is known to affect bat roosting and foraging behaviour with lighting shown to result in a range of impacts including 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 L.E.D. units, demonstrated that relatively fast-flying bat species, including 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, including myotis 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 (BCT 2014).

Mitigation and lighting design Bat friendly lighting plans should firstly look to avoid lighting where possible and minimise lighting impacts by adopting the following measures:

- Lighting curfews or use of P.I.R. 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 P.I.R. sensors can be expected to be illuminated only when required and for a low proportion of the overall time.
- Consider no lighting solutions where possible. Options such as white lining, good signage, and L.E.D. cat's eyes, should be considered as preferable, especially within Zones 1 and 2. Reflective fittings may help make use of headlights to provide any necessary illumination in some areas.
- Use only high pressure sodium, or warm white L.E.D. lamps where possible. High pressure sodium and warm white L.E.D. lamps emit lower proportions of insect attracting U.V. light than mercury, metal halide lamps, and white L.E.D. lighting. Generally, lamps should have a lower proportion of white or blue wavelengths, with a colour temperature <4200 kelvin recommended (BCT, 2014).
- 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, louvers, and shields should be used where necessary to reduce light spill.
- Consider the height of 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 up lighting. Column height should be carefully considered to balance task and mitigation measures.
- 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.

Bat and Bird Presence/Absence Survey

The Bat-Year

January Hibernating; using up fat reserves.



February Still hibernating; few fat reserves left.



March Some activity; occasional bat seen feeding.



April Awake and feeding at night.



May Females looking for nursery sites.



June Young born usually only one.

Bat and Bird Presence/Absence Survey



July Young still suckling.



August Young start catching insects; females leave nursery to find males.



September Mating season begins; start building fat reserves for hibernation.



October Search for suitable hibernation site.



November Hibernation begins although still some activity in warm weather.



December Hibernating.

Bat and Bird Presence/Absence Survey

9 LIMITING CONDITIONS/DISCLAIMERS (Unless stated otherwise)

9.1 The Service

- 9.2 Evolution Ecology agrees to supply ecological consulting services of a preliminary nature or a more thorough service as advised or as commissioned.

10 Fees

- 10.1 The client(s) will settle the agreed fee in full, within 30 days of receiving the invoice. Reports will remain the property of Evolution Ecology until full payment has been received. No liability is accepted for the contents of a report that is not paid in full. Any queries should be notified to Evolution Ecology within 7 days of the invoice date.
- 10.2 If the client(s) fails to pay within the time specified in 2.1 then Evolution Ecology shall charge the client(s) interest on the outstanding fee, both before and after any judgment, at the rate of 4% per annum above the HSBC Bank base rate, until payment is made in full (A part of a month being treated as a full month for the purposes of calculating interest).
- 10.3 In the event that it is necessary to recover any outstanding fees from the client(s), the client(s) will fully reimburse any costs and expenses incurred during the recovery period, including court costs. Evolution Ecology reserves the right to make a charge for every letter sent and telephone/fax call made, in connection with the recovery.

11 The Report

- 11.1 If any part of the report is lost, or altered without the written consent of Evolution Ecology, then the entire report becomes invalid.
- 11.2 The general format of reports is a certified product and cannot be shown, copied or distributed to third parties without the permission of Evolution Ecology. No liability is accepted for the contents of the report, other than to that of the client(s).
- 11.3 The report will purport not to express any opinion or comment as to the condition or structural integrity of any building and no reliance should be made on any such comments.

Bat and Bird Presence/Absence Survey

12.1 Insurance Cover

12.2 All work carried out by Evolution Ecology is covered by a £1,000,000 professional indemnity insurance.

13.1 Quality of Craftsmanship

13.2 When appointing an Ecologist, please use only suitably qualified and experienced companies (The Local Authority and the Institute of Ecology and Environmental Managers may be able to provide a select list of such companies)

13.3 Evolution Ecology will not accept liability for any works undertaken by any other companies, or contractors.