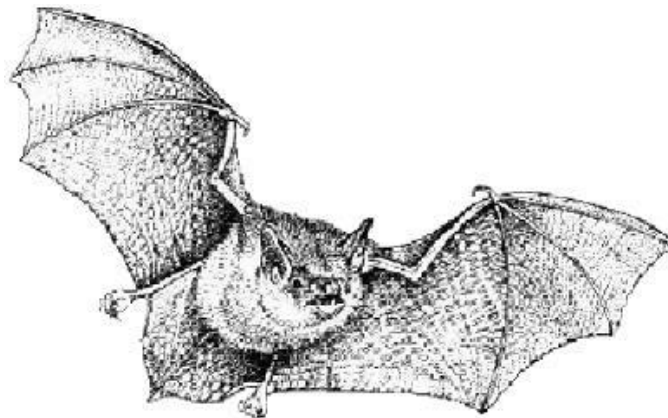


**ND Civils & Groundworks Ltd.,
Unit 1 Hillfield, Sower Carr Lane,
Hambleton, Poulton Le Fylde,
Lancashire.
FY6 9DJ**

**Preliminary Ecology Survey & Assessment
in respect of Bat Species and Nesting Birds.**

**Surveyor- Mike Fisher
(Bat Survey Licence Level 2 Class Survey Licence WML CL18)
(Bat Roost Visitor Level 1 Class Survey Licence WML CL15)**



Echo Calls Bat Surveys

28th November 2023

1. Introduction.

1.1 Reason for Survey.

As part of the process to obtain planning permission to develop the site, a preliminary ecological survey and assessment, including a daytime evidence and opportunity bat survey, and a current nesting bird survey were requested, on a dilapidated unoccupied bungalow, and a small container positioned nearby, and also on any trees, shrubs, and hedgerows within the site boundaries. The purpose of these surveys was to provide evidence on habitats, and protected species, within the site boundaries, as part of the Local Development Framework (UDP Policy EN9).

1.2 Survey Aims.

The aims of this preliminary ecological assessment were to:

- To provide clear advice to the client and the Local Planning Authority, on the nature conservation value of the site, and its surrounding area,
- To assess the site for the presence, or potential, for protected species within the proposed development site, by doing a detailed inspection of both the exterior and interior of any structures, to look for features that bats could use for entry/exit, and for roosting, and also to search for bats themselves.
- To enable the client to comply with legislation afforded to protected sites and species.
- To highlight the presence of any habitats or species of ecological importance, including Habitats and Species of Principal Importance (NERC Act, 2006).
- To identify any ecological constraints in relation to the proposed project, and any future development in the site..
- To establish the need for any further surveys and assessments.
- To make nature conservation recommendations, and identify opportunities for ecological enhancement within the proposals

1.3 The Site.

The site consisted of an unoccupied former bungalow and adjacent container, both positioned within the grounds of a working civil engineering company, and its surrounding land attached by a long drive, to the nearby Sower Carr Lane, in the Hambleton area of Poulton-le-Fylde, in Lancashire. The targeted buildings and the surrounding nearby land, from now on are referred to as the "site", at OS grid reference SD 38035 43801, (refer to **Fig 1 - The Site Location**).

1.4 The Buildings.

The two targeted buildings were located close to other buildings within the overall area, but as these others were not included in the current planning application, they were not surveyed.

1.5 Surrounding Area.

The targeted buildings were positioned centrally within a small plot of land overgrown with trees and shrubs, with a tangled "bramble type" understory, and which was positioned, between an occupied dwelling and its gardens to the south, and the buildings and vehicle parking, belonging to ND Civils and Groundworks to the north, both bordered by lines of fencing, with open pasture beyond these on all sides, but none of these buildings were part of the planning application and therefore not surveyed.

Further north lay further areas of open pasture, whose fields were bordered by a network of hedgerows and a few drainage ditches, and with a few farming complexes also positioned amongst

the fields.

Beyond the aforementioned localities to the east, lay the Hambleton Country Park Residential Village with the buildings, shops and dwellings that formed it together with the village of Sower Carr itself just beyond this, and which also contained a number of gardens, with some trees and shrubs, within them. There was also a few small ponds, a brook, gardens, and further areas of pasture lying to the west of the village. Whilst to the south beyond Sower Carr Lane, were the buildings and grounds belonging to a large farming complex, surrounded by hedge-lined fields of open pasture, which contained some drainage ditches and a few ephemeral ponds, with similar habitats positioned to the east of the site,

The River Wyre flowed through areas of salt marsh in a rough north to south orientation, approximately 0.19 km to the west of the site at its nearest point, whilst Highfield Leisure Lodge Park and Fisheries, lay about 0.98 km to the south-east of the site, but other than all of the above-mentioned habitats, there were no other large bodies of water or areas of woodland, in the nearby vicinity of the site, (refer to **Fig 1 -The Site Location, Fig 2 – Google Map of Area, Fig 3 – Main Plan Showing the Local Area and Habitats, Fig 4 - Plan of Photographs, and Fig 5 - Plan Showing Results of Preliminary Daylight Evidence and Opportunity Survey and Assessment**).

2. Methods.

2.1 Risk Assessment, Possible Hazards.

Although some of the site around the buildings was overgrown, the required access to the site for survey purposes could be done with care, and the external elevations of the buildings could be surveyed.

The bungalow was in a dilapidated condition, and appeared to be deteriorating rapidly, and the interior of the building was full of randomly placed items, materials and equipment, but as the eastern elevation was missing, and the interior could be surveyed, however, there were no more hazards, other than those normally associated with surveying both the inside and outside of this type of worn buildings.

2.2 Methodology of Bat Surveys.

A number of factors are used for the survey methodology, which include:

- Knowledge of bat species relevant to the site location, and geographical range.
- Nature of the immediate, and surrounding habitat, in relation to foraging opportunity.
- Presence/absence of roost potential.
- Value of roost potential – if present.
- Condition of nearby trees, shrubs, and any water bodies.

2.3 Preliminary Daylight Evidence and Opportunity Ecological Survey and Assessment.

The preliminary daylight evidence and opportunity ecological survey and assessment took place on 22nd November 2023, and was carried out in order to assess the site, to search for evidence of bat occupation, (including recent and historic use). It comprised a search for bats themselves, bat droppings, urine stains, remains of any invertebrate prey, or any grease marks from repeated contact or passage by bats, through narrow roost accesses, or against surfaces, and any other

signs of bat occupation, and at the same time looking for evidence of either current or historical nesting birds, active nests and feathers.

Areas within the targeted buildings searched were:

- Inside all parts of the buildings where bats could roost, on the floors, roof trusses, internal walls, or upon piles of furniture, equipment, broken buildings materials, and also in spiders' webs and other places where droppings or prey remains may collect. Likewise noting any noises such as scratching and squeaking which may be made by roosting bats.
- Outside both of the targeted buildings, their eaves, gables, soffits, open windows or doorways, and walls for signs of potential bat access holes, also, the ground, and any other surfaces such as low roofs, broken timber, shrubbery and scrub, or any piles of equipment, which may occur underneath the eaves, and around the perimeter of the buildings, any of which may catch bat droppings.

The optimum time to investigate buildings for evidence of a bat roost, is between May and September, however, this can sometimes be earlier or later in the year, and is weather and temperature dependant.

However, preliminary evidence and opportunity inspections and assessments, may be conducted outside of this time, and can often provide conclusive results, which can save expense and time for Planning Applicants.

The habitats and any trees surrounding the site, were assessed for their suitability for use by foraging and commuting bats.

All evidence of current or previous nesting bird species observed during the survey, was recorded.

2.4 Equipment.

Equipment used consisted of ladders, an endoscope, camera, close-focus binoculars, and a powerful hand-held torch.

3. Results.

3.1 Daylight Survey.

3.1.1 Weather.

The weather conditions at the start of the survey on 21st November 2023, were mixed. Although there were intermittent light showers, it was cloudy with a gentle breeze, (Beaufort Scale 3), and with a temperature taken during the survey of 10°C, such conditions were acceptable for a survey of this type.

3.2 Possible Roost Sites.

3.2.1 The Buildings.

There were two buildings, a former bungalow and a separate storage container, and both of these were surveyed for signs of bat roosting activity, as mentioned above (paragraph 2.3).

3.2.2 The Bungalow

The bungalow was an "L" shaped, hipped, single storied building, positioned in an approximate south-east to north-west orientation. It had a small extension attached both internally and externally

to the bungalow's south-western corner. It was all constructed from horizontal timber planking mounted around a timber frame, with a pitched roof covered in unlined corrugated sheeting, but with no roof void in either part.

The whole building was in a very dilapidated condition, and was unoccupied and contained numerous items of old furniture, broken timber and other debris, which was testament to the current run-down condition of the building. However, both parts of the building were neither heated nor insulated, and would be extremely damp, draughty and cold throughout most of the year, and therefore the main building and its' extension were both deemed unsuitable for either daytime roosting bats, or breeding bats. Also, as frost and inclement bad weather was very likely to penetrate the interior of the dwelling in the colder months, it did not offer the optimum humidity, and constant low temperatures that are required for hibernating bats, and therefore it was judged to be of very low bat roost suitability, (refer to **figs 3, 4, and 5, and photos 1 to 20**).

There were some potential bat access points however, and these were:

- There was a hole in the roof, close to the western gable, a long gap beneath the underside of the roof and the top of the timber walls, at the upper south-western corner, and both of these areas and the roof and walls around them were carefully searched, but neither bat droppings, urine staining, invertebrate prey remains, nor any grease fur staining from the continual passage of bats through the gaps found, and therefore both of these were deemed to be of low roost suitability, (refer to **figs 3, 4, and 5, and photos 2 to 5**).
- The glass from a window frame, positioned partly along the southern elevation was missing, and there were panes of broken glass in the windows within the southern elevation of the hipped extension, but again a search around the holes, and the walls, window frames and floor beneath, found neither droppings or any other sign of bat usage, and therefore the empty window frame was of low bat suitability, (refer to **figs 3, 4, and 5, and photos 4 to 7, and 18**).
- The roof around the chimney positioned on the apex of the roof, had started to collapse, resulting in large cracks and gaps around the chimney in both the northern and southern pitches of the roof, but again a search of the roof and the inside of the building where possible, found neither bat droppings, invertebrate prey remains, nor any fur or urine stains, and all of these locations were judged to be of low roosting suitability, (refer to **figs 3, 4, and 5, and photos 5, 9, 11, 15 and 19**).
- The majority of the wall itself in both the eastern elevation of both the dwelling and its extension had collapsed, and some of the timber lay within the bungalow itself. This would allow access for bats, birds or other creatures to easily access the interiors, but a careful search of the materials on the ground, and also on the ground itself as well as the remainder of the walls, but no evidence of usage of this opportunity by anything was found, and it was believed that nothing had used this opportunity to access the building interior, (refer to **figs 3, 4, and 5, and photos 7, 8, and 20 to 23**).
- The eastern end of the north-eastern pitch of the roof had broken away, resulting in a large hole, also, there was another small hole at the northern edge of the roof, as well as the glass being missing in a roof lite in the same pitch. Also, the timber planking in a section of the northern elevation, had rotted and fallen away, resulting in a large hole in the wall, and all of these were searched, including the interior of the building, and again neither bats, their droppings, or any other sign of bat occupation or usage, was discovered, and these areas were all deemed to be of low roosting suitability, (refer to **figs 3, 4, and 5, and photos 8, 10, 13 to 15, and 20**).

3.2.3 The Container

The container was positioned close to the north-eastern corner of the bungalow in a rough north-to-south orientation. It was a rectangular single storied building, constructed from metal, with a slightly curved plastic roof, but no void.

Although it was currently being used for the storage of various types of items, it was well sealed and of sound construction. However, the container was neither heated or insulated, and would be damp, draughty and cold throughout most of the year, and therefore it was deemed unsuitable for either daytime roosting bats, or breeding bats. Also, as frost and bad weather was very likely to penetrate the interior of the container in the colder months, it did not offer the optimum humidity, and constant low temperatures that are required for hibernating bats, and therefore it was judged to be of very low roosting suitability, (refer to **figs 3, 4, and 5, and photos 21 to 24**).

No evidence of either current or historical roosting bats was detected in, on, or around any part of the bungalow or the container, either internally or externally. Nor was there any evidence of previous use by roosting bats detected anywhere else within the surrounding site.

During the survey, (21st November 2023), the search found no evidence to suggest that any part the targeted buildings, any other part of site, or anywhere else within the nearby surrounding area, had been used historically by either nesting or roosting birds, nor was there any other currently active nesting behaviour observed. It was also surmised that due to the time of year that most birds will have already bred, and their young will have already fledged, (Refer to **Appendix 1**).

3.2.8 Trees and Shrubs.

There were a few immature trees and shrubs growing within the site itself, plus there were numerous trees, shrubs and hedgerows growing just beyond the site perimeter, and where possible these were all inspected for signs of potential bat roosting suitability. However, none were found to have any lifted bark, canker damage, any cracks, or holes suitable for roosting bats, and as such, all were judged to be Category 3 (of negligible value for roosting bats) in accordance with **Appendix 4**.

It was thought likely that the overall site, and some of the nearby features, could be used by nesting birds during the nesting season, but at the time of the survey, although there was some bird activity in and around the trees and shrubs, no active nests were found amongst the vegetation, and it was also surmised that due to the time of year, most birds will have bred, and their young will have fledged and dispersed, (Refer to **Appendix 1**).

3.3.1 Foraging Potential and Alternative Bat Roost Potential.

The site was in a mainly rural area, and the bungalow and container were both located within a small plot of land overgrown with trees and shrubs, positioned between an occupied dwelling and its gardens to the south, and the buildings and vehicle parking to the north, which belonged to ND Civils and Groundworks, all bordered by lines of fencing.

Surrounding these on all sides were large areas of open pasture, whose fields were bordered by a network of hedgerows and with a few drainage ditches, and with a few farming complexes also positioned amongst the fields.

Lying a short distance away to the east of the site, was the Hambleton Country Park Residential Village, together with the village of Sower Carr just beyond this, and which also contained a number of various types of buildings and their gardens containing some trees and shrubs, and a few small ponds, a brook, and further areas of pasture lying to the west of the village. The River Wyre flowed through areas of salt marsh further west, in a rough north to south orientation, whilst to the south were the buildings and grounds belonging to a large farming complex, surrounded by hedge-lined fields of open pasture, also containing some drainage ditches and a few ephemeral ponds.

Highfield Leisure Lodge Park and Fisheries lay to the south-east of the site, and all these features together with the lines of trees and nearby buildings, offered linear features suitable for foraging bats such as Common Pipistrelle, (*Pipistrellus pipistrellus*), and possibly other bat species, to help them navigate and commute, and to hunt along for their insect prey, (**paragraph 1.5**).

However, in accordance with the “Bat Survey, Good Practice Guidelines” (Bat Conservation Trust 2016), it says, “A structure with one or more potential roost sites that could be used opportunistically by individual bats, could be classed as roosting habitat. However, if these potential roost sites do not provide enough space, shelter, protection, appropriate conditions, and/or suitable surrounding habitat to be used on a regular basis, or by large numbers of bats (i.e., unlikely to be suitable for maternity or hibernation), then they are of low bat roost suitability”, (Refer to **Appendix 2**).

Both the bungalow and the container fit these criteria, and as there were no really large areas of woodland, or large bodies of open water in the nearby vicinity, the local area overall, was assessed to offer only low to moderate suitability for foraging bats, primarily pipistrelle species, but it was thought that small numbers of other species could be present.

It was considered that other buildings, especially occupied dwellings, in the surrounding area could offer greater potential as bat roosts, as bats favour heated, taller buildings whilst breeding.

It was thought likely that the overall area, could be used by nesting birds during the nesting season, and although there was some bird observed nearby, it was concluded however, that due to the time of year, most birds will have already bred, and their young will have grown and dispersed, (Refer to **Appendix 1**).

Although there was good potential for barn owl to forage in the nearby vicinity, it was felt that neither the dwelling or container, offered any potential for either roosting, nesting or breeding owls.

4. Conclusions.

4.1 In summary, during the preliminary survey and assessment carried out on 21st November 2023, neither current, nor historic evidence of roosting bats was found in any part of either the bungalow or container, nor elsewhere within the overall site.

4.2 The bungalow was in a very poor dilapidated condition, and was full of miscellaneous items and debris, but the nearby container however was in a reasonable overall condition, and was being used for a limited amount of storage, but both buildings were unheated and uninsulated, and would be cold, draughty, and damp throughout most of the year, and therefore they were deemed unsuitable for either daytime roosting, or breeding bats. Also, as frost and inclement bad weather was likely to penetrate the interior of each building in the colder months, neither building was seen to offer the optimum humidity, and constant low temperatures that are required for hibernating bats, and therefore both were concluded to be of low bat roosting suitability, (Refer to **Appendix 2**).

4.3 None of the trees, shrubs or hedgerow, growing either within the site, or close by, beyond the site boundaries, offered any cracks, canker damage, or lifted bark or holes, that could be used by roosting bats of any species, and therefore, they were all concluded to offer low bat roost suitability, (refer to **Appendix 4**).

4.4 The adjacent habitats had the potential to support low to moderate numbers of foraging common pipistrelles, but large numbers of other species of bats was unlikely. It is concluded that since there is currently no evidence of the presence of bat roosts within either the bungalow or the container, nor within any other part of the site, that any proposed modifications to the site, will not have significant implications on the population status of local bat species. There will not be requirement for an EPS mitigation licence (as issued by Natural England) but as a measure of best-practice, precautionary measures should be applied as described in section 5 below.

4.5 It was also concluded that since no evidence of roosting bats, or evidence of either recent or historic bat occupation had been found during either survey carried out on 21st November 2023, then a single visit to the site to carry out a preliminary daylight evidence and opportunity bat survey and assessment was considered sufficient to assess the overall site, (refer to the 'Bat Worker's Manual' (JNCC 2004) and 'Bat Surveys – Good Practice Guidelines' (BCT 2016), paragraph 8.3.4).

4.6 Since bats, particularly Pipistrelles, are opportunistic, an absence of roost evidence within the site, does not preclude the low possibility of small numbers of bats, using the site occasionally in the future and/or at other times of year. It is considered that the likelihood of a significant roost (such as a maternity roost) being established is very unlikely, with lone and/or transient roosting likelihood being negligible.

4.7 It was thought possible that there may be some site clearance work carried out during the planned development, but details of what this would entail were not known at the time of the survey. It was hoped that this will be kept to a minimum, and that the trees, shrubs and hedgerows growing close to the site boundaries, will be mostly unaffected by the work, and as bats use linear features such as lines of trees or building walls, as foraging, navigating and commuting routes, it was concluded that any small loss of the habitats, and any future development works on the site, would not affect the overall foraging or commuting potential for bats in the area.

4.8 All wild birds are protected under the Wildlife and Countryside Act 1981 (as amended) while they are breeding. There was potential for the shrubbery both within, and around the sites' perimeter, to be used by birds for both roosting and nesting purposes, but no active nor historic nests were found during the surveys. It was also surmised that due to the time of year, the majority of birds will have completed breeding, and their young will have fledged and dispersed, (Refer to **Appendix 1**).

4.9 As no evidence of roosting barn owls was observed in any part of the site, it was concluded that barn owls do not use the site, either as a regular nesting roost, overnight roost, or breeding roost, but occasional foraging could not be ruled out.

5. Recommendations.

5.1 The proposed changes to the site, as laid out in the planning application, can commence with minimal risk to roosting bats or nesting birds, if the following mitigation measures are adhered to.

5.2 The aim of any mitigation is to ensure that any work is conducted in a manner that avoids harm, or significant disturbance to bats, also, to create new enhanced roosting opportunities for bats, both during and after the development. However, a key issue in successful mitigation measures, is the scheduled timing of the works. Ideally, both the dwelling and the container, (not considered suitable for hibernation), especially their roofs, should be worked on in winter to avoid the possibility of bats moving in and using the building as a spring, summer, or autumn roost after the survey. The safest period will be from the first hard frosts, normally mid-December, until mid-March, although this could be earlier in a warm spring or later in a cold spring.

5.3 As it is likely that the targeted buildings will be worked on at other times, it will be very unlikely, that roosting bats will be disturbed. It is recommended however, that work starts as soon as possible after this survey, and that any slates or sheeting over the roofs, walls and gables affected by the development, be carefully removed by hand, as these features, are the ones most likely to harbour potential for the support of roosting bats.

5.4 Although the whole complex has low bat roosting suitability, it is recommended that if the building work is delayed until the middle part of 2024, or beyond, then further surveys may be

required, including a suitable number of evening bat emergence surveys and a possible dawn re-entry survey. Also, if more than 12 months' elapses between this survey, and any commencement of building work, then the surveys must be repeated, and these need to be carried out under weather conditions suitable for normal bat activity, and when bats are fully active (May to September but is weather dependent).

5.5 As a measure of best practice and in accord with a key principle of National Planning Policy Framework (2012), it is recommended that the re-development scheme for this site, incorporates biodiversity enhancement measures, and an appropriate measure will be the installation of either bat bricks, and/or Schwegler 1FD bat boxes. The bricks can be incorporated within any new building walls at the gable ends of the buildings, and the bat boxes can be attached either to any surrounding suitable trees or to the walls of nearby buildings themselves. In connection with the development proposals however, it is recommended that these measures are implemented to optimise the opportunities for wildlife, and also to ensure maximum biodiversity gain for bats at the site, (refer to **Appendix 7** for details).

5.6 As there was some potential for both foraging bats, and also for roosting and nesting birds to use the trees, shrubs, and hedges close the site and its boundaries, it is recommended that where possible, most of these should be left untouched, to encourage future bird nesting, and to maintain navigation, foraging and commuting routes for bats.

5.7 However, it must be remembered, that it is an offence to disturb active birds' nests. It is recommended therefore, that before any commencement of any tree or shrub clearance, and any new building work, that a careful survey looking for any evidence of nesting birds, is carried out. If evidence of an active bird's nest is detected, then the nest must be left undisturbed, until it is appropriately confirmed, that the young birds have fledged. It is recommended therefore to reduce any nest disturbance, that no activity involving people, or their equipment is conducted within a 3m radius of active nests. If there is any doubt, please refer to the consultant. This guidance is applicable during the bird breeding season which typically extends from March to August inclusive.

5.8 It is also recommended that some wooden nest boxes are erected around the site and its perimeters, amongst the shrubbery, and these will be a mixture of open fronted and hole fronted boxes, and are to be erected to mitigate for potential loss of nesting opportunities, during, and after the development, to encourage and enhance future colonisation and nesting by bird species and gain an increase in local biodiversity for birds, (refer to **Appendix 8** for details).

5.9 Close boarded fences with concrete bases are barriers to animal movement, and It is recommended, that any new perimeter fences along the boundaries are not to be sealed at their bases. Where possible, hedgerows are to be used instead, with timber post and wire fencing also serving to enforce boundary lines, without prohibiting wildlife movements. If any boarded fences are required, it is recommended that there is a 3 – 5 cm gap between the wood and the ground, (greater in some locations and less in others is not a problem) so that wildlife such as hedgehog and amphibians can pass into and out of the garden.

5.10 It is recommended that, if any tree, shrub, or hedgerow around the site perimeter is removed, pruned or disturbed during building works, all clearance and disturbance should be undertaken outside the hedgehog hibernating months, November to mid-March. If this is not possible, a suitably experienced ecologist must be present, to oversee all vegetation removal, to ensure that no hedgehogs are disturbed whilst hibernating (Hedgehogs are a UK BAP Priority species).

5.11 During the development, no hole or pit should be left uncovered over-night, to ensure that wildlife such as amphibians or hedgehogs are not trapped, and unable to escape. As such, all excavations should be checked first thing each morning, prior to the start of works that day. Any animals found within excavations should be allowed to escape and move off, or carefully removed

and placed within suitable habitat cover before site works commences for the day. Alternatively, a broad wooden plank or similar can be placed in the excavation to allow animals to escape. A scaffolding board pitched at a maximum 45° angle would be ideal.

5.12 It is also recommended that an Eco-plate Hedgehog Box should be positioned in the site, in an appropriate location, to maximise the opportunities for hedgehog within the site, (refer to **Appendix 9** for details).

5.13 Outdoor lighting is typically a deterrent to wildlife, especially bats and nesting birds, it is therefore recommended, that any future outdoor lighting, installed during the proposed development, be screened, hooded, or positioned low at bollard level, so that it does not illuminate the roof or eaves, or nearby trees and shrubs, (refer to **Appendix 10** for details).

5.14 It should be remembered that bats are occasionally found in the most unexpected places. If any bats are found during unsupervised work, the consultant (07745 268815) or the Bat Conservation Trust (0345 1300 228), should be notified and work stopped immediately.
Failure to do so would be a criminal offence.

6. References

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Owen, James (2018). Spotlight Hedgehogs - RSPB

7. Surveyors Qualifications

The surveyor Mike Fisher is a holder of:

- Natural England Class Licence Registration Number: 2015-10595-CLS-CLS, this is the Bat Survey Level 2 Class Survey Licence, WML CL18.
- Natural England Class Licence Registration Number: 2015-10592-CLS-CLS which is the Volunteer Bat Roost Visitor Level 1 Class Survey Licence WML CL15.

- The surveyor also has a licence to disturb and take bats for scientific, educational, or conservational purposes by Countryside Council for Wales (Licence Number S085859/1).

8. Plans & Photographs

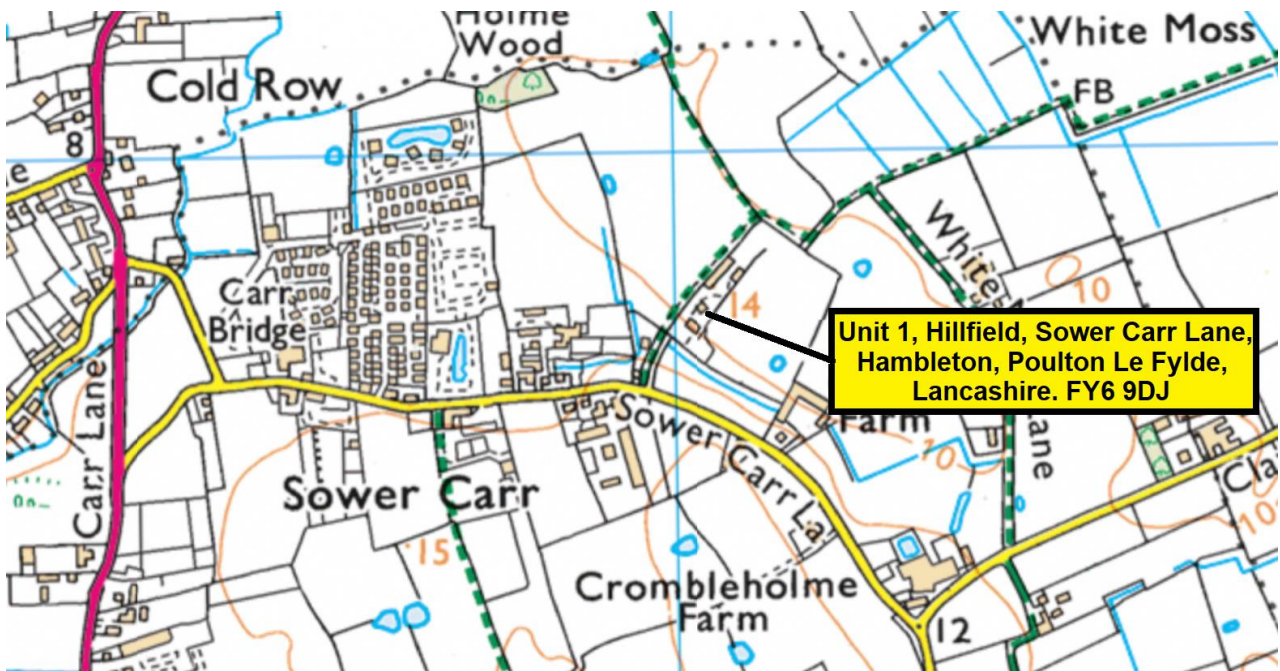
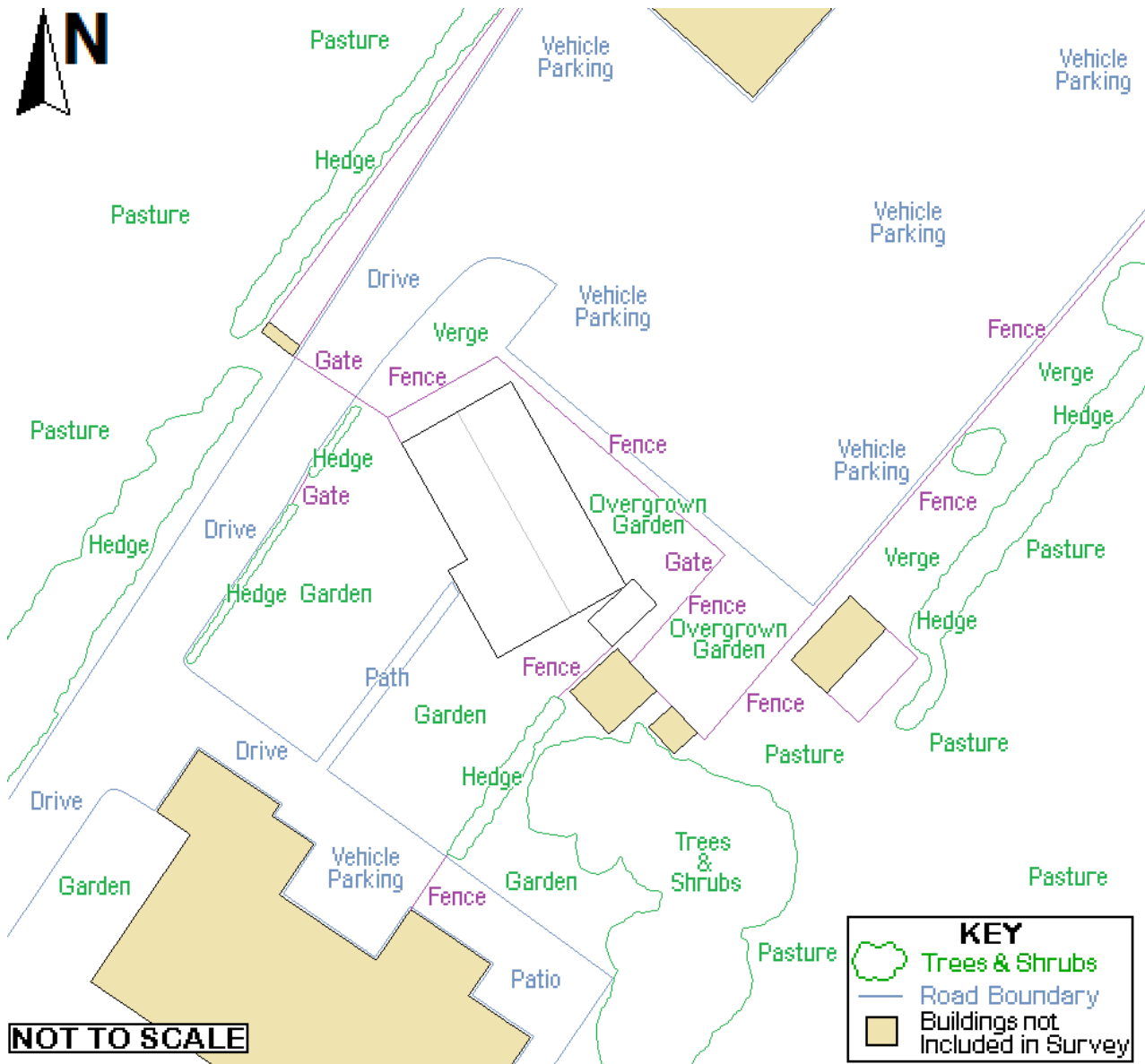


Fig 1 - The Site Location.



Fig 2 – Google Plan.



**Fig 3 – Main Plan
Showing the local area and habitats.**

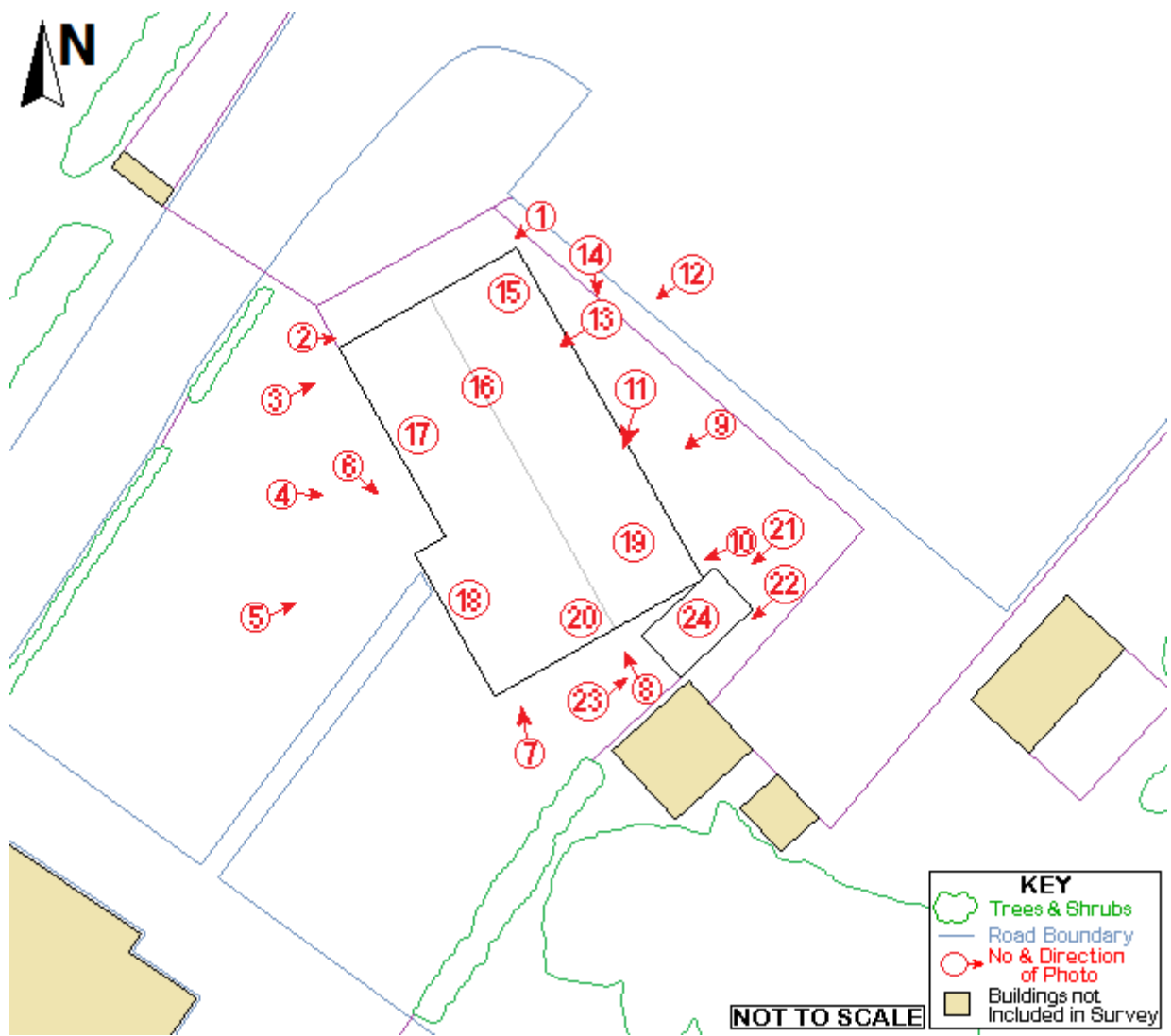


Fig 4 - Plan of Photographs.

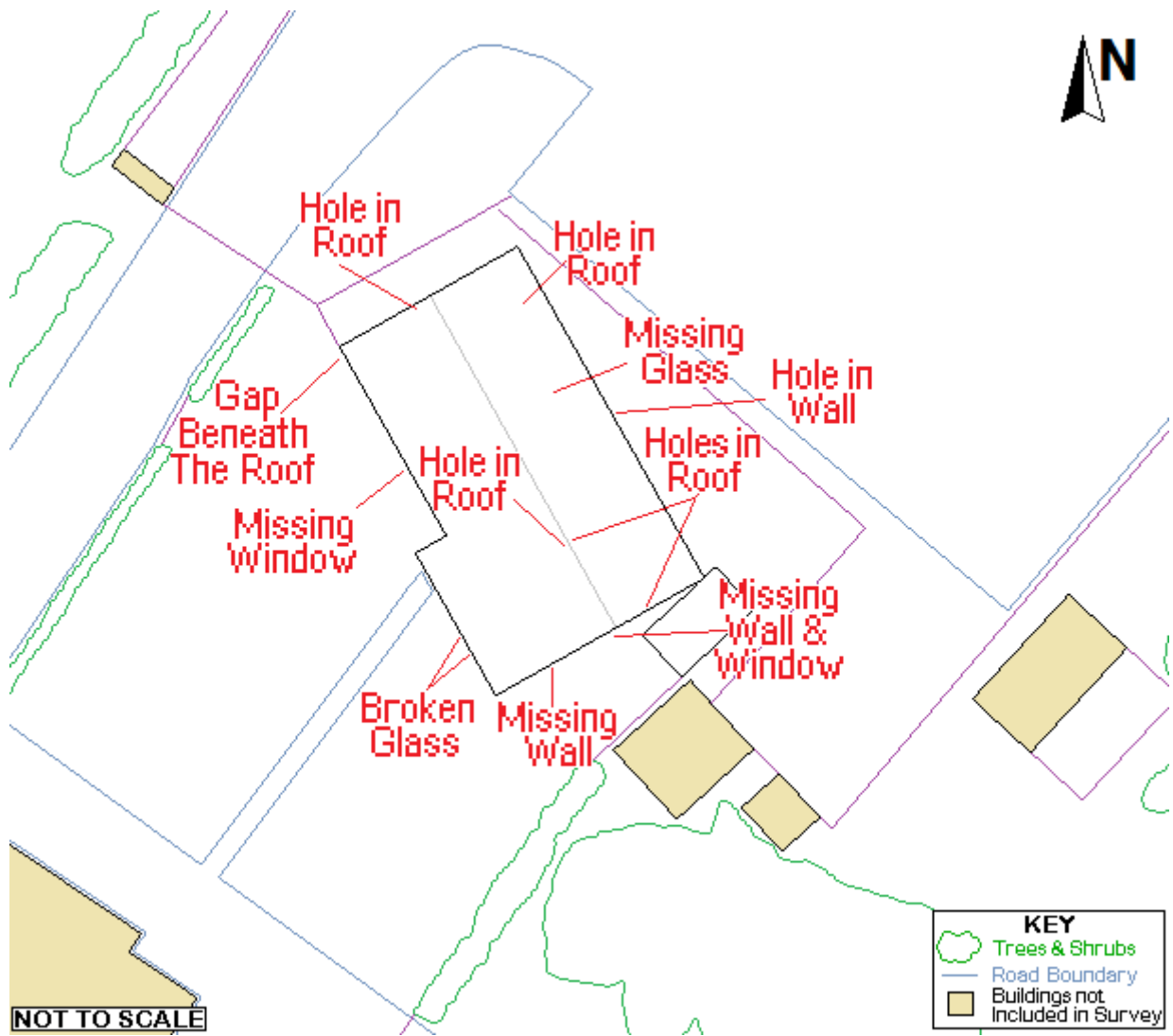


Fig 5 – Plan Showing Results of Preliminary Daylight Evidence and Opportunity Survey and Assessment.



PHOTO 1
Western Elevation



PHOTO 2
South-western Elevation



PHOTO 3
South-western Corner



PHOTO 4
South-western View



PHOTO 5
Southern Elevation



PHOTO 6
South-western View of Extension



PHOTO 7
South-eastern Corner



PHOTO 8
Eastern Elevation



PHOTO 9
Northern Elevation



PHOTO 10
Eastern End of Northern Roof



PHOTO 11
Central Part of Roof



PHOTO 12
North-western Elevation



PHOTO 13
Western Part of Northern Roof



PHOTO 14
North-western Corner



PHOTO 15
Underside of North-western Roof



PHOTO 16
View of Underside of Main Apex



PHOTO 17
Underside of Southern Roof



PHOTO 18
Underside of Extension Roof



PHOTO 19
Underside of North-eastern Roof



PHOTO 20
Underside of Eastern Roof



PHOTO 21
Northern Elevation of Container



PHOTO 22
Eastern Elevation of Container



PHOTO 23
Southern Elevation of Container



PHOTO 24
Underside of Container Roof

28th November 2023
Mike Fisher, Bat Worker
Holder of Natural England Bat Roost Licence

Disclaimer.

All reasonable effort has been taken to ensure an accurate assessment of the birds and bats at this site. The absence of recorded presence or sign should not be taken as an absolute guarantee that a site is not being used by a particular species. There is also no guarantee that any particular species will not use the site at any time in the future. Survey results for both bird and bat activity may be weather or seasonally dependent. Any interpretation of legislation is based on our understanding and experience of the law. The relevant statutory authority can provide a more definitive interpretation.

This report has been prepared by Echo Calls Bat Surveys with all reasonable skill, care and diligence, within the terms of the Contract with the Client.

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APPENDIX 1: Synopsis of Relevant Legislation.

Bats and the Law

In Britain, all bat species and their roosts are legally protected, by both domestic and international legislation.

This means you will be committing a criminal offence if you:

Deliberately capture, injure, or kill a bat.

Intentionally or recklessly disturb a bat in its roost or deliberately disturb a group of bats.

Damage or destroy a bat roosting place (even if bats are not occupying the roost at the time).

Possess or advertise/sell/exchange a bat (dead or alive) or any part of a bat.

Intentionally or recklessly obstruct access to a bat roost.

Licensing

Licenses to permit illegal activities relating to bats and their roost sites can be issued for specific purposes and by specific licensing authorities in each country. These are sometimes called 'derogation licenses' or 'European Protected Species' licenses, and are issued under the Habitats Regulations. It is an offence not to comply with the terms and conditions of a derogation Licence. If you carry out work affecting bats or roosts without a Licence, you will be breaking the law.

Who needs to take particular note of the legislation?

Property owners/householders who have a bat roost in their property.

Woodland owners, arboriculturalists and foresters.

Pest controllers.

Planning officers & building surveyors.

Architects, property developers, demolition companies, builders, and roofers.

Which legislation is relevant for bats and roosts?

In England and Wales, the relevant legislation is the Wildlife and Countryside Act (1981) (as amended); the Countryside and Rights of Way Act, 2000; the Natural Environment and Rural Communities Act (NERC, 2006); and by the Conservation of Habitats and Species Regulations (2010).

In Scotland, the key legislation that applies is the Conservation (Natural Habitats &c.) Regulations 1994 (as amended).

In Northern Ireland bats are listed under Schedule 2 of the Conservation (Natural Habitats etc.) Regulations (Northern Ireland) 1995 and in the Republic of Ireland, under Schedule 5 of the Wildlife Act 1976 and Schedule 1 of the European Communities (Natural Habitats) Regulations 1997.

Defences include:

Tending/caring for a bat solely for the purpose of restoring it to health and subsequent release

Mercy killing where there is no reasonable hope of recovery, (provided that person did not cause the injury in the first place - in which case the illegal act has already taken place).

Penalties on conviction –

People committing bat crimes can face six months' imprisonment and/or unlimited fines. Additionally, any profits made as a consequence of not following lawful process can be confiscated and items used to commit the offences such as vehicles, plant or machinery can be forfeited.

Under the National Planning Policy Framework (2012), it is recommended that the re-development scheme for any site, protected species, such as bats should be a material consideration in planning applications. This has implications for bat foraging areas as well as their roosts.

The National Planning Policy Framework (NPPF) places a clear responsibility on Local Planning Authorities to conserve and enhance biodiversity and to encourage on the consideration that should be given to Protected Species where development may affect them.

The Office of the Deputy Prime Minister (ODPM) Circular 06/2005 provides administrative guidance on the application of the law in relation to planning and nature conservation. This is supported by a guide to good practice entitled 'Planning for Biodiversity and Geological Conservation: Building in Biodiversity' in which paragraphs 5.34 and 5.35 identify that species such as bats are highly dependent upon built structures for survival and that roosts can be easily incorporated into existing and new developments/conversions to benefit these species.

Breeding Birds

All wild birds are protected under the *Wildlife and Countryside Act 1981* (as amended), whilst they are actively nesting or roosting. Section 1 of this Act, makes it an offence to kill, injure or take any wild bird, and to intentionally take, damage or destroy the nest of any wild bird while that nest is in use or being built. It is also an offence to take or destroy any wild bird eggs.

Barn Owl and the Law.

Barn owls are listed on Schedule 1 of the *Wildlife and Countryside Act 1981* which gives them special protection.

It is an offence, with certain exceptions, to:

- Intentionally kill, injure, or take (handle) any wild barn owl.
- Intentionally take, damage, or destroy any wild barn owl nest whilst in use or being 'built' (barn owls do not 'build' a nest but may make a nest scrape.
- Intentionally take or destroy a wild barn owl egg.
- Have in one's possession or control a wild barn owl (dead or alive), or egg, (unless one can show that it was obtained legally).
- Intentionally or recklessly disturb any wild barn owl whilst 'building' a nest or whilst in, on, or near a nest containing eggs or young.
- Intentionally or recklessly disturb any dependent young of wild barn owls.

Hedgehogs.

Hedgehogs are protected by British law under Schedule 6 of the *Wildlife and Countryside Act 1981*, making it illegal to kill or capture them using certain methods. Similar protection exists in Northern Ireland under Schedule 6 & 7 of the *Wildlife Order 1985*. They are also protected in Britain under the *Wild Mammals Protection Act (1996)*, prohibiting cruelty and mistreatment.

They're listed as a Species of Principle Importance in England under the *Natural Environment and Rural Communities (NERC) Act 2006* Section 41, in Wales under the *Environment Act 2016*, and in Scotland under the *Nature Conservation Act 2004*. Similarly, hedgehogs are on the Priority Species List for Northern Ireland.

APPENDIX 2: Bat Roost Suitability

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	<p>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 habitat to be used on a regular basis or by larger numbers of bats (i.e. unlikely to be suitable for maternity or hibernation).</p> <p>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</p>	<p>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.</p> <p>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.</p>
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 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).	<p>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.</p> <p>Habitat that is connected to the wider landscape that could be used by bats for foraging such as trees, scrub, grassland or water.</p>
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.	<p>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.</p> <p>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.</p> <p>Site is close to and connected to known roosts.</p>

**In accordance with Table 4.1 of
Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd Edition) (Collins. J. (ed) 2016)**

APPENDIX 3: Bat Survey Timings and Frequency.

Table 7.1 Recommended timings 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
May to August (structures) No further surveys required (trees)	May to September ^a with at least one of surveys between May and August ^b	May to September ^a with at least two of surveys between May and August ^b

^a September surveys are both weather- and location-dependent. Conditions may become more unsuitable in these months, particularly in more northerly latitudes, which may reduce the length of the survey season.

^b Multiple survey visits should be spread out to sample as much of the recommended survey period as possible; it is recommended that surveys are spaced at least two weeks apart, preferably more, unless there are specific ecological reasons for the surveys to be closer together (for example, a more accurate count of a maternity colony is required but it is likely that the colony will soon disperse). If there is potential for a maternity colony then consideration should be given to detectability. A survey on 31 August followed by a mid-September survey is unlikely to pick up a maternity colony. An ecologist should use their professional judgement to design the most appropriate survey regime.

Table 7.2 Recommended timings for presence/absence surveys.

Survey type	Start time	End time
Dusk emergence	15 minutes before sunset ^a	1.5–2 hours after sunset ^b
Dawn re-entry	1.5–2 hours before sunrise ^b	15 minutes after sunrise ^c

^a Survey start time should be adjusted on subsequent surveys if bats are recorded already in flight at 15 minutes before sunset on the first survey (or, if only one survey had been planned, this survey may then need to be repeated).

^b The possibility of late-emerging and early-returning species should be considered in setting times for surveys (see Section 3.5).

^c If bats are still in flight 15 minutes after sunrise then ecologists should remain in position until all the bats have entered their roosts.

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.

**In accordance with Tables 7.1, 7.2 and 7.3 of
Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd Edition) (Collins. J. (ed) 2016)**

APPENDIX 4: Bat Tree Assessment Criteria

Criteria for Assessment of Trees in accordance with Category 1 to 3 as defined in Table 8.4 of *Bat Surveys: Good Practice Guidelines 2nd Edition* (Hundt, L. 2012).

CATEGORY	DESCRIPTION	CRITERIA
Known or Confirmed	Confirmed roost	Confirmed roost Evidence found that indicates tree/tree features are being used by bats. Droppings found at the base of the tree, below a cavity. Bats heard 'chattering' inside a feature on a warm day or at dusk Bat(s) observed flying from or to a feature.
1*	Very high value	Trees with multiple, highly suitable features capable of supporting larger roosts. Features of particular significance, suitable for high priority roosts such as maternity roosts, used by large numbers of bats, offering conditions that are uncommon or rare in the local area. Features such as large cavities, extensive branch or trunk splits, also including multiple features in the same tree that offer a diversity of opportunities. Features may also include dense ivy.
1	High value	Trees with definite bat potential supporting fewer suitable features than category 1* trees or with potential for use by single bats. Features which provide a more secure form of roost for small groups of bats and individuals, but may still be quite common types of feature, such as small cavities, minor splits or sparse ivy cover.
2	Moderate value	Trees with no obvious potential, although the tree is of a size and age that elevated surveys may result in cracks or crevices being found; or the tree supports some features which may have limited potential to support bats. A tree which on close inspection the potential roost positions are in some way not ideal. They could be upward facing or holes very low down or cluttered by adjacent branches.
3	Low/Negligible value	Trees that have no features which could be used by bats for roosting (Usually young trees).

APPENDIX 5: Planning Considerations

When considering each planning application, the presence of protected species, such as those listed above, is a material consideration which must be fully considered by the Local Authority when granting planning permission. If a licence from Natural England is required, then prior to issuing any planning consent, the local planning authority will need to be satisfied that there is no reason why such a licence would not be issued. Therefore, in reaching the planning decision the local planning authority will need to have regard to the requirements of the Conservation of Habitats and Species Regulations 2010.

The three licensing tests given in the Regulations must be considered. In summary, these are that:

1. The development is required for the purpose of:
 - preserving public health or public safety,
 - for other imperative reasons of over-riding public interest, including those of a social or economic nature and beneficial consequences of primary importance for the environment.
 - to preventing serious damage to property.
2. There is no satisfactory alternative.
3. The proposal will not be detrimental to the maintenance of the population of the species at a favourable conservation status.

All necessary information would need to be provided to the planning authority as part of the planning application in order to address the above tests.

The Natural Environment and Communities Act (NERC Act) 2006 extended the biodiversity duty set out in the Countryside and Rights of Way (CROW) Act to public bodies and statutory undertakers to ensure due regard to the conservation of biodiversity. The Duty is set out in Section 40 of the Act, and states that:

"Every public authority must, in exercising its functions, have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity".

The Duty applies to all local authorities, community, parish and town councils, police, fire and health authorities and utility companies. Section 41 (S41) of this Act (the 'England Biodiversity List') also requires the Secretary of State to publish a list of habitats and species that are of principal importance for the conservation of biodiversity in England. This list is used to guide decision-makers such as public bodies, including local and regional authorities, in implementing their duty under section 40(1) of the Act.

Also, Local Authorities must follow the National Planning Policy Framework (NPPF) which provides guidance on the interpretation of the law in relation to wildlife issues and development. For each development proposal considered by the Local Planning Authority the NPPF states that the authority must aim to conserve and enhance biodiversity. If significant harm resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused.

APPENDIX 6: Bats: What to do should bats be found during building work?

All of the UK's bats and their roosts, are protected by law, (see Appendix 1), so it is important to understand these laws, if you are planning any building or remedial work that may affect or disturb a bat roost. The relevant statutory authority should be initially contacted for advice.

Having bats roosting within a building does not necessarily mean that work cannot be carried out. What it does mean is that the work will need careful consideration, especially in terms of time and materials, so that the area can continue to be used by both bats and people. Therefore, the earlier in the process the bats are taken into account, the less disruption to building plans there will be.

If at any point during either new building work, renovation work, or demolition, one or more bats are found, then all work being undertaken by contractors should stop immediately. All working machinery and contractors should be removed from the area where the bats have been found, and advice sought immediately from one of the following, on how to proceed while causing minimal disturbance to bats.

Advice can either be provided by a professional licensed ecological consultant - Echo Calls Bat Surveys on 07745 268815, the Bat Conservation Trust on 0345 1300 228, or from your Statutory Nature Conservation Organisation (SNCO) , or from Natural England on 01270 754 000.

Depending on the advice given, a licensed bat worker, or suitably qualified Natural England approved representative, will then be sent to site to liaise with the site manager, and Natural England itself. Depending on the advice given, actions will be recommended that may include the safe removal of the bat by the nominated person, only where written, or verbal permission has been gained, by Natural England.

Works will recommence when Natural England are satisfied that the risk to bats has been removed. If, however, it is determined that the proposed work on site contains more risk to bats than was originally thought, then it is probable that further work will only proceed under a Natural England Development Licence.

If a bat is found under a tile, slate, flashing or any other covering material, work must stop immediately. If the bat does not fly out immediately, then the area around the roost must be carefully covered over, to protect the bat from the elements and further disturbance, leaving a small gap for bats to escape voluntarily. At this point, advice must be sought as mentioned above. The materials used to cover the occupied bat roost must be free from liquid, oil, grease, and other contaminants.

It is recommended that the handling of bats be avoided wherever possible, but if it absolutely necessary, then to avoid a bat being harmed, gloves must be worn whilst handling the bat. It should be carefully caught, placed in a cardboard box with air holes in the lid, and a small container containing water. The box should then be kept in a very quiet, dark area, away from further disturbance, whilst awaiting the arrival of the licensed bat worker, or Natural England approved representative.

Failure to do any part of this could result in a criminal offence.

APPENDIX 7: Bats: Types of Bat Box and Bat Bricks.

The aim of any mitigation is to ensure that any work is conducted in a manner that avoids harm or significant disturbance to bats, and also to create new roosting opportunities for bats both during and after the development.

Schwegler 1FD boxes are to be erected to larger trees located along the edges of the site. This type of bat box is a “general all-rounder” and is suitable for all types of bats.

These boxes are to be erected as recommended by the Bat Conservation Trust guidelines which state that

- Ideally, erect the boxes facing so they face in different directions, to provide a range of temperature conditions. For example, boxes facing from south-east to south-west allow the sun to fall on each box for part of the day. During very hot days a south-facing box may overheat, but the other boxes should have some shade during the day.
- Bat boxes should be located close to a linear vegetation feature such as a tree line or hedgerow or to lines of buildings. Some bat species use these features for navigation between their roosting site and feeding ground and to avoid flying in open and exposed areas.
- Ensure that tree branches or other items will not impede the bats’ approach to the box – clear away underneath the box so the bats can land easily before crawling into the box.
- Boxes should be erected at a height of approximately 4m above ground level.



Schwegler 1FD Bat Box

This Schwegler 1FD bat box has been developed specifically for smaller bats. The interior and the type and size of the entrance hole match the requirements of smaller species. It features a special layout inside the domed roof, an increased interior height, and two grooved internal wooden front panels with precise spacing between them.

This model has proved highly effective as a nursing area.

Occupants: Small bats such as the Common Pipistrelle (*Pipistrellus pipistrellus*), Soprano Pipistrelle (*Pipistrellus pygmaeus*), Daubenton’s Bat (*Myotis daubentonii*) and Common Long-eared bat (*Plecotus auritus*).

Bat Brick

Standard bricks to provide access for bats into roof or wall spaces.

With the increase in development of new building sites and redevelopment of older buildings, especially in rural areas, availability of roost sites for bat species is becoming more limited. However, bats can be encouraged to remain at old sites or colonise new sites by incorporating artificial roost spaces into the building during the build or renovation process.

The bat brick is a standard sized brick, shaped especially to allow bats to access the cavity of a house. They can be incorporated during both new build or renovation projects. (A cavity chamber may need to be constructed to maintain an area free of insulating material where bats can roost).

The bricks are available in three standard colours - Red, Golden and Brown.

Brick dimensions:

- * Height: 60 mm
- * Width: 215 mm
- * Depth: 100 mm
- * Entrance dimensions: approx. 110 x 25 mm

Brick codes:

- * Red - Ibstock A0610A (cheddar red)
- * Golden - Ibstock A0611A (cheddar golden)
- * Brown - Ibstock A0612A (cheddar brown)



APPENDIX 8: Nesting Birds: Mitigation and Compensation Measures.

Birds are declining throughout the country due to loss of roost and nesting places, and as the development may disturb nesting potential on the site, artificial nests are to be erected to compensate for this possible loss. The erection of artificial nests around the complex, will provide alternative sites for all three species of bird, and make a positive contribution to their conservation.

Making a nestbox suitable for robins and other box builders

What you need

Natural nest holes do not come in standard sizes, so use these dimensions only as a guide. Any plank or sheet of about 15 mm thick weatherproof timber is suitable. However, do not use CCA pressure-treated timber, since the leachates may harm birds. Cut each section as per our plan, which you can download by clicking on the link to the right.

Dimensions

The plan gives measurements for a small and a large box. Use only the first or the second figure throughout. For starlings and great spotted woodpeckers, use the dimensions for the large box; all the others need the small one.

The bottom of the entrance hole must be at least 125 mm from the floor of the nestbox. If it's less, young birds might fall out or be scooped out by a cat. The inside wall below the entrance hole should be rough to help the young birds to clamber up when it's time for them to leave.

Putting it together

Drill drainage holes to the base of the box, and use galvanised nails or screws to assemble. It's always best to leave the box untreated. As it weathers, it will blend into its surroundings. Softwood boxes can be treated with selected water-based preservatives, which are known to be safe for animals, such as Sadolin. Apply it only to the outside of the box, and not around the entrance hole. Make sure the box dries and airs thoroughly before you put it up.

A woodpecker box should be filled with a block of balsa wood, rotting log or wood chips – woodpeckers like to excavate their own nesting cavities.

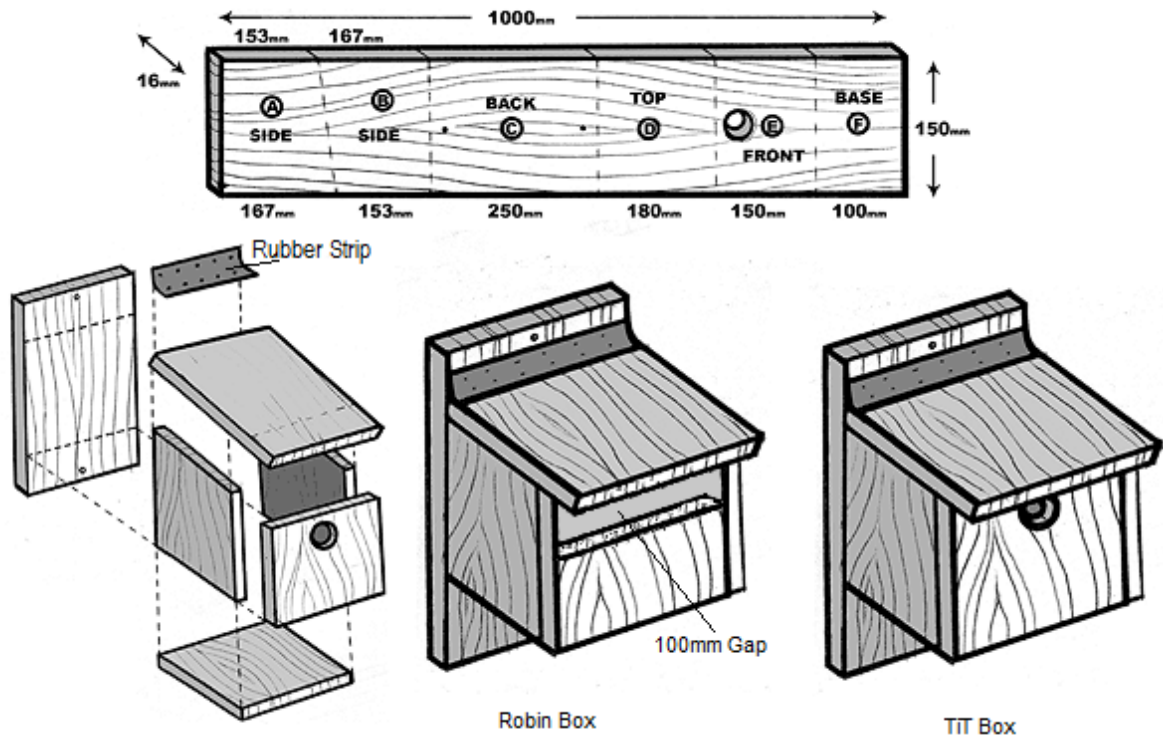
Do not nail down the lid since you will need to clean out the box in the autumn. Attach the lid with a brass or a plastic hinge that will not rust, or hinge it with a strip of leather or rubber (an old piece of bicycle inner tube will do). Fasten it down with a good catch.

How big does the hole need to be?

The entrance hole size depends on the species you hope to attract:

- 25 mm for blue, coal and marsh tits
- 28 mm for great tits, tree sparrows and pied flycatchers
- 32 mm for house sparrows and nuthatches
- 45 mm for starlings

The small box with a 100 mm high open front may attract robins, or pied wagtails. A wren would need a 140 mm high front panel, while spotted flycatchers and blackbirds prefer a low 60 mm front to the box.



Eco-plate Hedgehog House



Eco-plate Hedgehog House



Specifications			
Width (cm)	Height (cm)	Length (cm)	Tunnel Length (cm)
60	35	46	36

Hedgehogs were once commonly seen in most UK gardens; now however a loss of hedgerows and agricultural intensification has resulted in a 30% reduction in populations in the last ten years. Hedgehogs are an important indicator species, and a decline in their numbers is often symptomatic of a far bigger problem with ecosystem health.

There are many ways that you can help support this species including providing them a home which is predator proof, secure home.

This hedgehog box was designed in collaboration with the Egelstichting (the Dutch Hedgehog protection society). This box is made of Eco-plate, a material similar in density to plywood, but produced from recycled car seats sourced from reputable suppliers, and grown from native stock.

This environmentally friendly material is weather resistant and very durable. The entrance tunnel is hidden inside the house to make it more difficult for predators to reach hedgehogs inside the house.

To make it habitable, part-fill the nest chamber with dried leaves. Place the box in a secluded corner and cover with soil or leaves to boost the chances of the box being used.

It would give a hedgehog daytime shelter between April and October, and will also allow them the space to hibernate during harsh winter months between November and mid-March.

The lid can be easily removed for cleaning, however, do not disturb the box while it is occupied.

APPENDIX 10: Bats and Lighting.

The detailed lighting plan on-Site should be functional and directional and in line with current guidance (BCT and ILP, 2018). Habitat retained, enhanced or planted for roosting, foraging and/or commuting bats will need to be considered within a suitable lighting plan in order to be used by bats. Where designing with bats in mind:

- Light emitting diodes (LED) should be used, as these typically feature no UV component and as a result are less attractive to invertebrates and less disturbing to bats;
- Only luminaires with 0 % upward light ratio should be used and fitted on the horizontal to avoid excessive up-lighting, back lighting and light spill onto boundary hedgerows and trees;
- A warm white spectrum (ideally under 2700 Kelvin) should be used in order to reduce blue light component, therefore reducing the number of invertebrates attracted to the lights;
- Internal luminaires can be recessed where installed in proximity to windows to reduce glare and light spill;
- The use of specialist bollard or low-level downward directional luminaires to retain darkness above can be considered, although this has certain drawbacks and should only be used as directed by a lighting professional;
- Column heights should be carefully considered to minimise light spill;
- Any external security lighting should be set on motion-sensors and short (e.g., 1 minute) timers;
- Luminaires should feature peak wavelengths higher than 550nm to avoid the component of light most disturbing to bats;
- As a last resort, accessories such as baffles, hoods or louvres can be used to reduce light spill and direct it only to where it is needed;
- Where habitat needs to be unlit (e.g., important foraging and commuting corridors/roost sites), illuminance should be below 0.2 lux on the horizontal plane and below 0.4 lux on the vertical plane.