

**PRELIMINARY BAT ROOST ASSESSMENT, NESTING BIRD SURVEY AND
SUMMER BAT SURVEYS FOR PROPOSED RE-ROOFING AND
RENOVATION WORKS AT HORSESHOE CORNER, THE STREET, CORPUSTY,
NORFOLK, NR11 6QP**



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PROTECTED SPECIES

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1.0 Executive Summary and Site Description

A European Protected Species Survey including a bat and nesting bird survey was undertaken by wildlife consultant James Hodson BSc, MSc (Natural England, Level 2 Bat Survey License 2017-30927-CLS-CLS), of Eco-Check Ltd on 22nd May 2020 of a two-storey dwelling house (B1) of brick and flint construction with a pan-tile roof and a single storey former workshop building/barn (B2) of brick and clay-lump construction and which are scheduled for conversion, renovation and re-roofing. The buildings have been unoccupied for a number of years and have fallen into a state of disrepair.

A planning application is submitted to North Norfolk District Council for the renovation and re-roofing of the main dwelling house (B1) and conversion and re-roofing of an adjoining barn (B2). The buildings are to form a single residential unit and utilising the existing access and car parking spaces. The existing site layout is detailed on the drawing attached in Appendix 1 and also showing the scope and extent of the proposed building works.

A detailed search of the exterior of the buildings found no bat droppings, feeding remains or any evidence of bat activity or roosting bats. An internal inspection of the buildings, floors and flat surfaces found evidence of bat activity and/or roosts inside the two enclosed roof spaces of the dwelling (R1 & R2). This comprised approximately 200-300 bat droppings of two species believed to be pipistrelle and brown long-eared bats, the droppings were of mixed age and a number of fresh droppings were evident. Some of the droppings were accumulated beneath the ridge boards consistent with roosting bats. A detailed survey of the roof spaces was not possible however as the joists were partly rotten and narrow and unsafe to walk on. The dwelling has frequent holes and cracks in the brickwork, gaps at the eaves, under fascias and weatherboards, beneath lifted lead flashing and numerous loose, slipped, broken or missing ridge tiles and pan-tiles. The dwelling was considered capable of supporting a number of bats and with potential for maternity roosts. The dwelling was considered to have High bat roost potential.

Adjoining the east gable wall of the dwelling is a barn of brick and clay lump construction (B2), formerly used as a workshop. At the west end of the barn is a mezzanine floor storage area where there was again a large number of bat droppings (100-200) of a size and texture consistent with brown long-eared bats. Above this area there were 4-5 rips in the roof felt and exit points from the barn which appeared to have been used by brown long-eared bats. Two bricks were also noted as missing from the east gable wall of the dwelling through to the attic space of the dwelling and providing further access and roosting opportunities. The barn (B2) itself has a window in the east gable wall and glazed windows/door in the north elevation and so it was relatively bright inside the building which may reduce its value to roosting bats. The timber roof frame has some mortice and tenon joints and externally there is lifting clay lump render providing further roosting areas as well as gaps beneath the ridge tiles and pan-tiles. The barn also has High bat roost potential.

The buildings were assessed as being unsuitable for barn owl nesting due to the lack of suitable access, nesting ledges and regular disturbance. No signs of barn owls were recorded but some old birds' nests were evident including those of blackbird, wren and pigeon. Swifts were actively nesting in the west roof aspect of the dwelling (R1) and pigeons nesting in the open sided tin shelter.

There is therefore an almost certain expectation that impacts to bats, such as would be considered an offence under Article 12 (1) of the Habitats Directive of The Conservation of Habitats and Species (Amendment EU Exit) Regulations 2019 will occur as a result of the proposal. A total of 3 dusk/dawn summer surveys were undertaken in June, July and August 2020 to confirm the location of roosts, species present and numbers of bats using the buildings and wider site.

The potential for roosting bats can rarely be excluded entirely due to the highly mobile nature of bats and seasonal use of roosts.

The buildings are bordered by mature garden areas which contain a number of trees, shrubs, hedging and ornamental plants and shrubs with areas of rough grassland which provide a commuting/foraging corridor for bats and so a sensitive lighting scheme must be implemented, this may include LED downlighters and low light transmission glazing to the north. The trees, shrubs and hedges bordering the buildings in addition to the buildings provided nesting habitat for birds between 1st March and 15th September inclusive. No other protected or priority species are considered likely to be present.

In accordance with Bat Surveys-Good Practice Guidelines, J. Collins, 2016 and 'Bat Workers Manual, 3rd Edition, Mitchell and Jones, 2012 buildings with High roost potential require a minimum of two dusk emergence surveys and one dawn return-to-roost survey during the optimal survey months of May-September to confirm presence/absence of roosting bats.

Emergence surveys were undertaken on the 18th June and 20th July 2020 and a dawn survey on the 4th August 2020. Four bat species were frequently recorded during the surveys; common pipistrelle *Pipistrellus pipistrellus*, soprano pipistrelle *Pipistrellus pygmaeus*, brown long-eared *Plecotus auritus* and common Noctule *Nyctalus noctula*. The majority of bat passes were for common pipistrelle and soprano pipistrelle. The site was confirmed to be used by foraging bats and in particular the north and west side of the dwelling (B1) and the garden areas to the north-west. Bat activity along the south roadside elevations was very low as expected.

Two Common Pipistrelle were observed emerging from under the eaves above a window on the north elevation of the dwelling and roof section (R2), as indicated in the survey drawing (Figure 16). A single soprano pipistrelle was also recorded emerging from a hole in the brickwork of the south-east gable wall of the dwelling. Two Brown long-eared bats were observed emerging from holes in the roof felt of the workshop barn (B2) and also returning to roost via the same areas of the roof. A further brown long-eared bat was recorded returning to roost under a loose roof tile on the north end of the north roof pitch of the dwelling (R1).

The proposed development has the potential to kill, injure and disturb individual bats and has the potential to damage/ destroy bat roosts. The presence of roosting bats in the dwelling and barn proposed for development therefore represents an ecological constraint to planning. Mitigation has been proposed, including no external lighting of the habitats to the north of the site which have good foraging and roosting opportunities. Biodiversity enhancement will be through the provision of bat boxes and/or bat bricks to be incorporated into the site during works and maintaining access points to the enclosed attic spaces for brown long-eared bats. This mitigation would reduce the impact of the development proposals upon these features to between Minor Adverse and Minor Adverse-Neutral.

Due to the possibility of other solitary non-breeding bats being present in the buildings at any time of year a precautionary approach should be adopted with regards to removal of roof materials and roof alterations due to the possibility of solitary roosting bats being present under the pan-tiles, wall tops or any voids in the brickwork or timber frames. These areas will be searched for roosting bats prior to infilling or any modifications of the brickwork. If development has not commenced within 18 months of August 2020, it is recommended that an updated survey is undertaken, as the suitability of the site for protected species may have changed.

1.1 Scope of the Report

This report details the methodology, results and conclusions of a daytime survey undertaken on the 22nd May 2020, emergence surveys on the 18th June and 20th July 2020 and a dawn survey on the 4th August 2020. The purpose of the surveys was to confirm the presence or absence of bat roosts, within the buildings, the value of the buildings for roosting bats and the presence of any nesting birds. The survey data collected was used primarily to evaluate the likely impact of the proposed conversion works and reroofing on roosting bats and also lighting and design layout proposals on roosting, foraging and commuting bats. A general assessment of the wider site was also undertaken to assess if any other protected or priority species are likely to be present.

1.2 Aim of Survey

To examine the buildings to determine the presence or likely absence of nesting barn owls and/or roosting bats, species protected under the Wildlife and Countryside Act 1981 with respect to the proposed development works. If found to be present, the survey aims to determine the use of the buildings by protected species so that the impacts of the development proposal can be assessed and appropriate advice given to address these impacts.

In the light of the survey this report provides initial recommendations for potential mitigation measures if protected species are likely to be affected by the proposed works. It may be necessary to obtain a European Protected Species (EPS) license in accordance with the above legislation.

This report has been prepared in accordance with the recommended format in 'Bat Surveys-Good Practice Guidelines, J. Collins, 2016' and 'Bat Workers Manual, 3rd Edition, Mitchell and Jones, 2004'. The methodology of the survey adopts the recommended best working practice for the inspection of buildings for bats and bat roosts.

1.3 Site Location and Description

The site is located to the western edge of the village of Corpusty in the civil parish of Saxthorpe and Corpusty in the North Norfolk District. The dwelling is located to the north side of The Street and accessed off the north-east site corner. The site comprises an L-shaped dwelling house (B1) with a former clay-lump workshop building (B2) adjoining the north gable of the dwelling. To the south and west are mature garden areas with grassland, scattered trees and ornamental plants and shrubs, a tributary of the River Bure flows through the middle of the garden. The site is approximately 0.25ha in area and centred at grid reference TG111302 (See Fig 1).

The site comprises the access and parking area to the north of the buildings, The Street to the south and east and garden areas to the west and north-west. Habitats within the site include bare ground, buildings, amenity grassland, running water, scattered trees, hedging and ornamental plants and shrubs.

Beyond the immediate site the landscape is primarily arable and pasture, residential dwellings, open woodland, parkland, grassland and agricultural buildings. The site is considered to be connected to the wider landscape and with habitat suitable for foraging, commuting and roosting bats within 100m of the site in all directions.



Fig 1. Site Location Map – StreetMap 2020

1.4 Building Description

B1- The main dwelling is roughly L-shaped measuring approximately 22m in length and 6m in width with a ridge height of approximately 7m. There are a number of lean-to's and single storey extensions along the north and east elevations including a cart-shed off the north gable. The building is of mostly red brick construction with some brick and flint single storey extensions on the north and east elevations. The brickwork is mostly well pointed but with frequent cracks and missing mortar, particularly the west gable elevation and join between the two building sections. Internally there are two-attic spaces which are inter-connected with a timber roof frame. There are timber windows and doors around the building and timber fascias and weatherboards, many of which had voids behind and are loose or rotten.



Fig 2 & 3. North and east elevations of dwelling B1 (left) and loose, slipped and gappy tiles (right)



Fig 4 & 5. Vertical brick cracks in west facing elevations of main dwelling (B1)

The dwelling has a pan-tile roof with a lath and plaster roof lining, most of which was intact but with frequent gaps and missing/rotten sections. The roof timbers were mostly intact although many were rotten and unsafe to walk on, the roof timbers are nailed with butt joints and there are no voids in the timber frame. The ridge boards are mostly dark and sheltered apart from some sections where there are missing tiles and holes in the roof. The eaves are mostly closed and the wall plates tight to the wall-tops. There are numerous windows, roof pitches, windows and doors around the building. There are a number of external voids which could not be inspected including some hole and cracks in the brickwork, particularly the west elevations, cracked or missing mortar, gaps under tiles, lead flashing around the chimney stacks, lifted and rotten fascia boards and soffits and some voids under the eaves above the wall plate. A detailed survey of the roof spaces of the dwelling (R1 & R2) was not possible as the timbers did not appear to be safe enough to walk on. The building was assessed to have **High bat roost potential**.



Fig 6 & 7. South and west elevations of building B3 (left) and north elevations (right)



Fig 8 & 9. Internal view of north loft space (left) and gaps at eaves into the loft (right)

B2- The barn is 14m by 6m with a ridge height of approximately 5m. The building is of red brick and clay lump construction with concrete floor. There are holes and cracks in the internal and external clay lump walls. The roof is pan-tiles over felt sarking with a number of holes and tears in the sarking. There is a timber mezzanine store along the west end of the barn. There is a glazed window in the east gable wall and glazed windows and door in the north elevation. There were some small voids at the eave's and gap in the dwelling gable wall into the attic space. The building was previously used as a workshop. The building was assessed to have High bat roost potential.



Fig 10 & 11 South and east elevations of barn (left) and internal view (right)



Fig 12 & 13 Gap in east gable wall of dwelling into attic space R2 (left), holes in roof felt and voids in frame (right)

1.5 Proposed Works

The proposed works are for the renovation, conversion and re-roofing of the buildings to maintain a single residential unit. This will likely require some re-roofing works as well as structural repairs, repointing and internal alterations. The existing access and car parking area will be retained and used for residents. The existing trees and plants/shrubs are to be retained.

1.6 Protected and Notable Species Records

Habitats within and adjacent to the site are considered unsuitable to support Otter *Lutra lutra*, White-clawed Crayfish *Austropotamobius pallipes*, Hazel Dormouse *Muscardinus avellanarius*, Harvest Mouse *Micromys minutus*, and most species of reptiles. In addition, there are no historical records of these species within 2km of the site. Therefore, these species require no further survey and are not considered any further in this report.

The data search results from the NBN Atlas recorded 5 bat species within a 5km radius. These included common pipistrelle, soprano pipistrelle, brown long-eared, daubenton's and barbastelle. Bat species (Bern2, CMS_A2, CMS_EUROBATS-A1, FEP7/2, HabRegs2, HSD4, ScotBL, WCA5/9.4b, WCA5/9.4c, WCA5/9.5a, WCA5/9.5b). 9 Other protected species records include 2 records of badger (*Meles meles*), 1 record of water vole (*Arvicola amphibius*) and 10 records of European hedgehog (*Erinaceus europaeus*). There are no records of great crested newt or reptiles within 2km.

The protected species recorded within 2km also include 79 flowering plant species, 279 insect species and 85 bird species including a number of Schedule 1, Red/Amber list and Birds of Conservation Concern (BoCC).

Schedule 1 Listed Birds

Records of whooper swan *Cygnus cygnus*, merlin *Falco columbarius*, hobby *Falco subbuteo*, wood kingfisher *Alcedo atthis*, hoopoe *Upupa epops*, fieldfare *Turdus pilaris*, redwing *Turdus iliacus*, barn owl *Tyto alba*, greylag *Anser anser*, brambling *Fringilla montifringilla*, nightjar *Caprimulgus europaeus*, quail *Coturnix coturnix*, goldeneye *Bucephla clangula*, woodlark *Lullula arborea* and bearded tit *Panurus biamicus* were identified within 2km over the past 10 years. None of these species' records pertain to the site itself, but are a strong indication that these species are likely to be present locally and underlines the importance of retaining mature trees and the hedgerows along the site margins.

1.7 Statutory Sites of Nature Conservation Significance

Nationally designated sites –

There are no statutory designated wildlife sites within a 2km radius.

There are a number of blocks of broadleaved deciduous woodland (UK Priority Habitat) within 2km. A MAGIC search map is provided in Fig.14 and Appendix 2.

Locally designated sites –

There are 2 locally designated County Wildlife Sites within a 1km radius. No designated sites are connected to the development site by continuous ecological corridors;

CWS 1070- Dismantled Railway-	TG098308-	370m north-west
CWS-1127- Corpusty Fen-	TG101309-	980m north-west

There is a record for a bat mitigation license 2014-4740-EPS-MIT approximately 565m north-east of the site for common pipistrelle, soprano pipistrelle, brown long-eared and natterer's bats. There are no further mitigation license records within 1km.

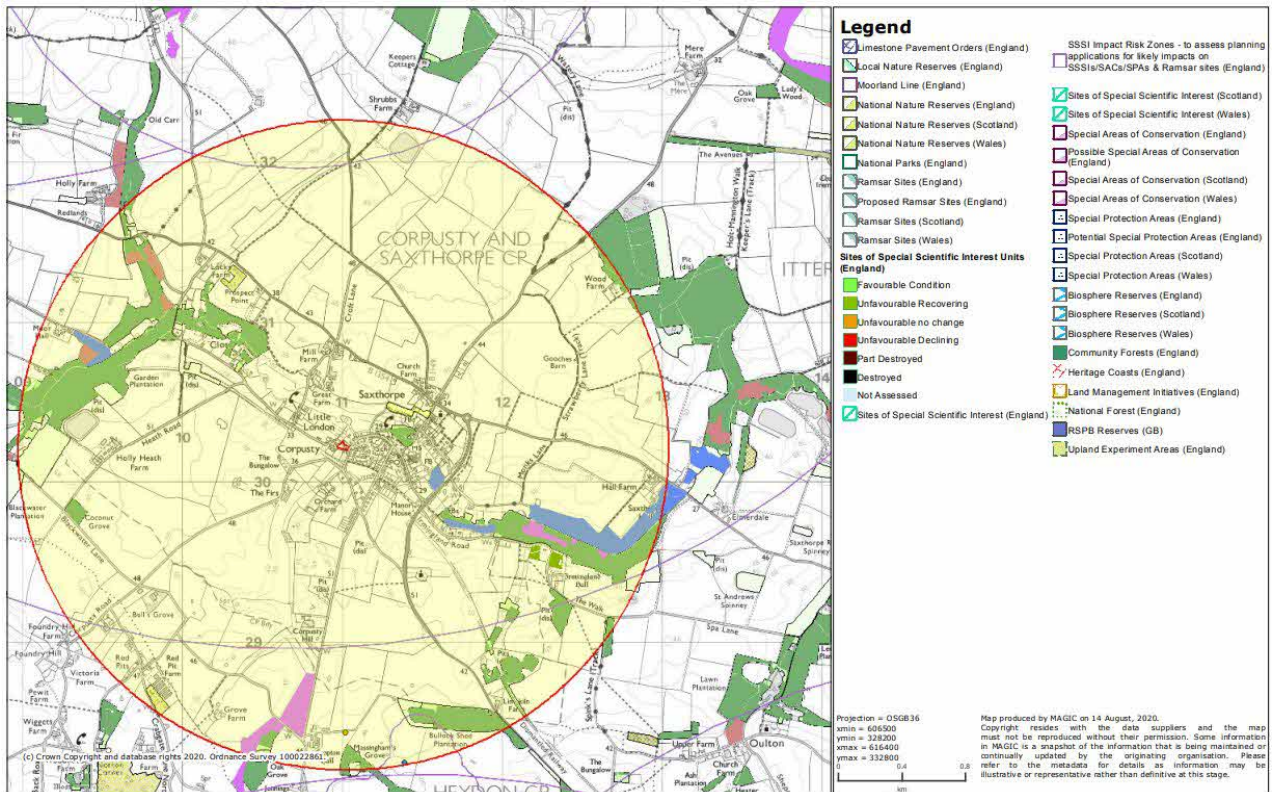


Fig 14. Map of Designated Wildlife Sites and Priority Habitats within 2km – Magic Map 2020



Fig 15. Aerial view of site and bordering habitats- September 2017

2.0 Legislation

2.1 All species of bat are fully protected under The Conservation of Habitats and Species (Amendment EU Exit) Regulations 2019, through their inclusion on Schedule 2. Regulation 39 prohibits:

Deliberate killing, injuring or taking (capture) of Schedule 2 species (e.g. bats);

Deliberate disturbance of bat species as:

a) to impair their ability:

(i) to survive, breed, or reproduce, or to rear or nurture young;

(ii) to hibernate or migrate

b) to affect significantly the local distribution or abundance of the species;

Damage or destruction of a breeding site or resting place; and

Keeping, transporting, selling, exchanging or offering for sale whether live or dead or of any part thereof.

Bats are also currently protected under the Wildlife and Countryside Act 1981 (as amended) through their inclusion on Schedule 5. Under this Act, they are additionally, protected from:

Intentional or reckless disturbance (at any level);

Intentional or reckless obstruction of access to any place of shelter or protection; and

Selling, offering or exposing for sale, possession or transporting for purpose of sale.

An EPS Licence issued by the relevant countryside agency (e.g. Natural England) will be required for works liable to affect a bat roost or for operations likely to result in a level of disturbance which might impair their ability to undertake those activities mentioned above (e.g. survive, breed, rear young and hibernate). The licence is to allow derogation from the relevant legislation but also to enable appropriate mitigation measures to be put in place and their efficacy to be monitored.

Though there is no case law to date, the legislation may also be interpreted such that, in certain circumstances, important foraging areas and/or commuting routes can be regarded as being afforded de facto protection, for example, where it can be proven that the continued usage of such areas is crucial to maintaining the integrity and long-term viability of a bat roost.

The species protection provision of the Habitats Directive, as implemented by The Conservation of Habitats and Species (Amendment EU Exit) Regulations 2019 contain three “derogation tests” which must be applied by the Local Planning Authority when deciding whether to grant planning permission for a development that could harm a European Protected Species. The three tests are that:

The activity to be licensed must be for imperative reasons of overriding public interest or for public health and safety
There must be no satisfactory alternative; and
Favourable conservation status of the species must be maintained.

It is the responsibility of the applicant to submit sufficient information to address these tests when applying for planning permission. NB: For development activities, a Natural England EPS Licence application can only be obtained after planning permission has been granted. However, the granting of planning permission does not guarantee that a licence will be issued by Natural England.

2.2 Natural Environment and Rural Communities Act 2006 (NERC)

The NERC Act 2006 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’, otherwise known as the Biodiversity Duty. Under Section 41 of the Act, the Secretary of State must publish a list of the living organisms and types of habitat which in the Secretary of State’s opinion are of principal importance for the purpose of conserving biodiversity.

This list is based on those species listed in the UK Biodiversity Framework as priority species (see Section 2.3) in addition to Annex II species listed under The Conservation (Natural Habitats, &c.) Regulations 2017. The S41 list replaces the list published under Section 74 of the Countryside and Rights of Way (CRoW) Act 2000.

2.3 UK Biodiversity Framework and Biodiversity 2020

The ‘[UK Post-2010 Biodiversity Framework](#)’ published in July 2012, is the government’s response to the publication of the Convention of Biological Diversity’s ‘Strategic Plan for Biodiversity 2011–2020’, and the launch of the new EU Biodiversity Strategy (EUBS) in May 2011. The framework focuses on a more holistic landscape scale approach to managing the environment and now replaces the UK level BAP and its associated processes.

[Biodiversity 2020](#) - The EU Biodiversity Strategy aims to halt the loss of biodiversity and ecosystem services in the EU and help stop global biodiversity loss by 2020. It reflects the commitments taken by the EU in 2010, within the international Convention on Biological Diversity.

Now the UK BAP partnership no longer operates, but many of the outputs originally developed under the UK BAP still remain valid and of use. For example, background information on UK priority habitats

and species still inform much of the biodiversity work at country level and remain a point of reference for targeted conservation efforts. Priority habitats and species lists can be seen on the [JNCC website](#).

Current UK Bat Priority Species include:

- soprano pipistrelle
- lesser horseshoe bat
- greater horseshoe bat
- barbastelle
- bechstein's bat
- noctule
- brown long-eared bat

3.0 Methodology

3.1 Preliminary Roost Assessment

Bat surveys usually involve two elements, surveying sites for likely roost and hibernation sites and surveying likely foraging areas. The daytime survey of the site was carried out on the 22nd May 2020. The weather conditions were dry, cloudy and warm with a temperature of 18°C. The survey was undertaken in accordance with the Bat Conservation Trust's Bat Surveys for Professional Ecologists: Good Practice Guidelines (Collins, 2016).

The objectives of survey were to:

- Determine the presence or likely absence of bats;
- Locate any bat roosts and determine the species (where possible);
- Estimate the size of the roost (i.e. small / moderate / large);
- Identify access / egress points to and from potential / confirmed roosts;
- Assess potential flight paths to and from potential / confirmed roosts in terms of the arrangement of current vegetation and lighting layout; and,
- Determine the status and seasonal usage of any bat roosts present.

The survey comprises a systematic search of the exterior to locate confirmed and/or identify potential roosts and access points, and to locate any evidence of bats such as live or dead specimens, droppings, urine splashes, fur-oil staining and/or squeaking noises.

The external survey focuses upon the ground surrounding Potential Roost Features (PRFs), particularly beneath potential access points, and structural features of interest such as: windowsills, window panes, walls, behind peeling paintwork or lifted rendering, hanging tiles, weatherboarding, eaves, soffit boxes, fascia's, lead flashing, gaps under felt, under tiles / slates and in any existing bat boxes. Any gaps in brickwork or stonework are also identified and searched to check for potential access points to cavity or rubble filled walls behind.

A brief internal survey was undertaken although the attic spaces had narrow and rotten timbers and so were not searched in full detail for health and safety reasons.

A search was made of the terrestrial habitats bordering the buildings and any trees, outbuildings or other features that may support roosting bats or nesting birds.

In examining the buildings for bats, particular attention was given to any gaps in which bats may roost. It is important to remember that bats are difficult to survey and find and it is usually signs of their activity rather than their actual presence that indicates the existence of a bat roosting site. The presence of moth and butterfly wings for example can indicate bat presence. Bat droppings on walls, floors and flat surfaces can be used to identify species.

Floors, walls, supports, and exposed surfaces were inspected for bat droppings, bat urine, feeding remains, oil staining from the fur of bats (indication of frequent use of a particular site), clean cob-web free areas on the ridge boards or crevices and wear of substrates caused by the movement of bats in and out of potential roost exit holes over a long period of time. Beneath ledges, the ground was examined for feathers, pellets and birdlime that could indicate occupation by barn owls.

3.2 Preliminary Roost Assessment Category

Following completion of the external and internal surveys, each building / structure are classified in one of the following categories (See table 1):

Confirmed bat roost: Presence determined from evidence of bats;

High potential: A structure 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 and surrounding habitat;

Moderate potential: A structure with one or more potential roost sites that could be used by bats due their size, shelter, protection, conditions and surrounding habitat but is unlikely to support a roost of high conservation status;

Low potential: A structure with one or more potential roost sites that could be used by individual bats opportunistically. These 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 number of bats (i.e. unlikely to be suitable for maternity or hibernation); or,

Negligible potential: No habitat features likely to be used by roosting bats.

3.3 Dusk Emergence and Dawn Return to Roost Surveys

Dusk emergence surveys were undertaken at the site by wildlife consultants James Hodson MSc, Natural England Level 2 Bat Licence(2017-30927-CLS-CLS), Steve Holland HCD and John Gibson MSc on the 18th June and 20th July 2020 and a dawn survey on the 4th August 2020. The project site was divided into three survey sections combining the all the elevations of the buildings with bat roosting potential.

The surveyors were equipped with Wildlife Acoustics Echometer EMT2 (Heterodyne and Frequency Division) bat detectors and an Anabat Walkabout. Recordings made were analysed using Anlook and Kaleidoscope software to ensure that species were correctly identified, 'Bat Surveys-Good Practice Guidelines, J. Collins, 2016' and 'Bat Workers Manual, 3rd Edition, Mitchell and Jones, 2012'. Two Sony FDR-AX53 Nightshot Cameras and Infrared Illuminators were also used to ensure coverage of the potential roost features, particularly for observations an hour after sunset when light levels have dropped such that observations with the naked eye were insufficient.

3.4 Limitations

The extensiveness of the ecological assessment was limited by the season in which the site visit was made. To confirm the presence or absence of all protected species usually requires multiple visits at suitable times of the year. Summer surveys between May and September are considered optimal. The site visit focussed on assessing the potential of the site to support species given protection under British or European law.

Bats make use of multiple roosts throughout their active season and may not always be present or leave appreciable evidence at a particular roost during the time of a survey. It is therefore very difficult to ever completely dismiss the possibility of encountering a roosting bat within a given structure.

It is expected that evidence of bats (particularly in exposed areas or on external faces of the building) which may be present at other times of the year may not have been visible during the survey. A difficulty in inspecting buildings for bats is that the presence of smaller roosts is generally harder to detect than more significant colonies, particularly those of crevice dwelling bats such as pipistrelle. In addition, bats are very transient in nature with complex roosting behaviour and often move between several different roosting sites during the year. Therefore, the presence of transient singleton roosts (e.g. single male roost) can be present at any time of year. Species that emit quiet echolocation calls such as long-eared bats *Plecotus* sp and/or species which typically forage by gleaning and are

associated with dense vegetation cover such as *Myotis* sp may be under recorded as they are only picked up by the bat detectors at very close range. The emergence/return to roosts surveys were undertaken during suitable weather conditions with night time temperatures between 10-17°C, no or low wind speeds and dry. The periphery of the buildings were accessible for survey and monitoring.

Table 1.0 - Guidelines for assessing the potential suitability of proposed development sites for bats, based on the presence of habitat features within the landscape (Adapted from table 4.1 pp. 35 in Collins, 2016)

Suitability.	Description of Roosting habitats.	Description of 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.</p>	<p>Habitat that could be used by small numbers of commuting bats such as a gappy hedgerow or un-vegetated 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>
Medium	<p>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>	<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	<p>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 and surrounding habitat.</p>	<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. Site is close to and connected to known roosts.</p>

4.0 Survey Results

4.1 Barn Owls (*Tyto alba*)

The buildings were assessed as being unsuitable for barn owls nesting due to the lack of suitable access and nesting ledges. No signs of barn owls were recorded in the buildings.

4.1.1 Nesting Birds

An active pigeon nest was noted in the corrugated tin sheet shelter and swifts were also actively nesting in the west facing roof elevation of the dwelling (B1). The proposed development is not predicted to have an impact on nesting birds if works are to proceed in the autumn and winter of 2020/2021. In the event that works commence or continue during the period 1st March to 15th September then further surveys for nesting birds must be undertaken before destructive activities are undertaken. The buildings are bordered by trees as well as hedging and shrubs and other open outbuildings suitable for nesting birds.

4.2 Bats: (All species)

A detailed search of the exterior of the buildings found no bat droppings, feeding remains or any evidence of bat activity or roosting bats. An internal inspection of the buildings, floors and flat surfaces found evidence of bat activity and/or roosts inside the two enclosed roof spaces of the dwelling (R1 & R2). This comprised approximately 200-300 bat droppings of two species believed to be pipistrelle and brown long-eared bats, the droppings were of mixed age and a number of fresh droppings were evident. Some of the droppings were accumulated beneath the ridge boards consistent with roosting bats. A detailed survey of the roof spaces was not possible however as the joists were partly rotten and narrow and unsafe to walk on. The dwelling has frequent holes and cracks in the brickwork, gaps at the eaves, under fascias and weatherboards, beneath lifted lead flashing and numerous loose, slipped, broken or missing ridge tiles and pan-tiles. The dwelling was considered capable of supporting a number of bats and with potential for maternity roosts. The dwelling was considered to have High bat roost potential.

Adjoining the east gable wall of the dwelling is a barn of brick and clay lump construction (B2), formerly used as a workshop. At the west end of the barn is a mezzanine floor storage area where there was again a large number of bat droppings (100-200) of a size and texture consistent with brown long-eared bats. Above this area there were 4-5 rips in the roof felt and exit points from the barn which appeared to have been used by brown long-eared bats. Two bricks were also noted as

missing from the east gable wall of the dwelling through to the attic space of the dwelling and providing further access and roosting opportunities. The barn (B2) itself has a window in the east gable wall and glazed windows/door in the north elevation and so it was relatively bright inside the building which may reduce its value to roosting bats. The timber roof frame has some mortice and tenon joints and externally there is lifting clay lump render providing further roosting areas as well as gaps beneath the ridge tiles and pan-tiles. The barn also has High bat roost potential.



Figure 16. Summary of evidence from bat and bird surveys

4.2.1 In accordance with Bat Surveys-Good Practice Guidelines, J. Collins, 2016 and 'Bat Workers Manual, 3rd Edition, Mitchell and Jones, 2012 buildings with High roost potential require a minimum of two dusk emergence surveys and one dawn return-to-roost survey during the optimal survey months of May-September to confirm presence/absence of roosting bats.

4.2.2 Survey Results Summary-

An emergence survey was undertaken on the 18th June and 20th July 2020 and a dawn survey on the 4th August 2020. Four bat species were frequently recorded during the surveys; common pipistrelle *Pipistrellus pipistrellus*, soprano pipistrelle *Pipistrellus pygmaeus*, brown long-eared *Plecotus auratus*) and common Noctule *Nyctalus noctula*. The majority of bat passes were for common pipistrelle and soprano pipistrelle. The site was confirmed to be used by foraging bats and in

particular the north and west side of the dwelling (B1) and the garden areas to the north. Bat activity along the south roadside elevations was very low as expected.

Two Common Pipistrelle were observed emerging from under the eaves above a window on the north elevation of the dwelling and roof section (R2), as indicated in the survey drawing (Figure 16). A single soprano pipistrelle was also recorded emerging from a hole in the brickwork of the south-east gable wall of the dwelling. Two Brown long-eared bats were observed emerging from holes in the roof felt of the workshop barn (B2) and also returning to roost via the same areas of the roof. A further brown long-eared bat was recorded returning to roost under a loose roof tile on the north end of the north roof pitch (R1).

4.2.3 Foraging and commuting bats

Common pipistrelle, Soprano pipistrelle and Brown long-eared bat were frequently observed and recorded commuting and foraging around the buildings and garden features. Peak activity was recorded on 20th July, when 68 passes, including feeding, were observed by what is believed to be 7 individual bats. On the morning of 4th August, two Brown long-eared bats were seen returning to roost via holes in the roof of the barn (B2), it is unknown if they are roosting in the barn or entering into the attic space (R2) via the hole in the gable brickwork as indicated in Figure 12.

Common and soprano pipistrelle were most frequently recorded foraging within the site or commuting through the site. Common noctule were also recorded during all three surveys.

In order to avoid a detrimental impact on bats using the site, it is recommended that there should be no increased light spillage onto the adjacent habitats to the west and north-west. This could be achieved through low light transmission glazing on the north/west elevations of the buildings. Lighting should be restricted to the periphery of the access and parking area and should be kept to a low level. The following measures should be implemented within the lighting scheme:

- Minimise light spill, through use of lighting hoods, and setting the height and angle appropriately;

- Reduce the light intensity to the minimum required for safety and security;

- Set lighting curfews, e.g. lights off at night

- Where security lamps are used these should use a trigger to illuminate them (e.g. infra-red detector), and switch off after a short period, rather than remaining on all night.

The site is assessed as being of value at the parish scale for foraging and commuting bats. The unmitigated impact of the proposed development on foraging and commuting bats is provisionally assessed as being minor adverse due to potential disturbance during development works and a potential increase in external lighting across the site. This would be reduced to minor adverse-neutral or neutral with the implementation of mitigation including a sensitive lighting scheme as detailed in Section 5.0.

4.3 Other species

Breeding Birds

The site is considered to be of value to breeding and nesting birds, owing to its size and suitable habitats within and adjacent to the site, particularly the mature garden, scattered trees, shrubs and hedgerows in addition to the open fronted shelter/garage on the north end of the dwelling. An active pigeon nest was noted in the corrugated tin sheet shelter and swifts were also actively nesting in the west facing roof elevation of the dwelling (B1).

Herpetofauna

There are no ponds within the site, there is a large pond/lake approximately 65m north-west of the buildings but is considered isolated from the site as on the distal side of the running stream through the garden. The habitats bordering the buildings comprising hard surfaces, disturbed ground, amenity grassland etc. are mostly unsuitable for reptiles and amphibians and there are no records within 2km. Therefore, this group is not considered to represent a constraint to development.

Additional Protected Species

Habitats suitable for hedgehog *Erinaceus europaeus*, a S41 Species of Principal Importance, are present on site and in the area, in particular, gardens and grassland provide habitat for hedgehogs and foraging opportunities. No evidence of or potential habitat for any other protected species was recorded within the site boundary.

Conclusions

The results of the survey confirm that both the dwelling (B1) and barn (B2) are used by common pipistrelle, soprano pipistrelle and brown long-eared bats with a maximum emergence/return-to-roost count of 5 bats. The presence of roosting bats beneath the ridge boards, tiles, fascia's, soffits and other cavities remains a possibility at most times of year and so reasonable avoidance measures will be adopted in addition to the required mitigation licensing. There is evidence that nesting birds are using the buildings as well as the trees/hedges/shrubs and so works should be timed to avoid the active nesting season where possible.

5.0 Interpretation of Results and Requirement for Wildlife Licensing

5.1. Bat Species

5.1.1. Overview of legislation relating to bat species

British bat species are protected under the Wildlife and Countryside Act (1981) and The Conservation of Habitats and Species (Amendment EU Exit) Regulations 2019. This makes it an offence to kill or injure bats or damage or destroy a place of shelter or protection, amongst other actions (see Appendix 2 for more details).

5.1.2. Summary of findings and likely impacts in absence of mitigation

A total of 5 bats of 3 species were recorded as roosting within the buildings. There it is an almost certain expectation that impacts to bats, such as would be considered an offence under Article 12 (1) of the Habitats Directive of The Conservation of Habitats and Species (Amendment EU Exit) Regulations 2019 will occur as a result of the proposal.

The results of the survey would indicate that a European Protected Species and Mitigation License (EPS & M) or Low Impact License (BLICL) is required for works to the dwelling (B1) and barn (B2). This is based on the presence of what appears to be at least 3-4 separate non-maternity roost sites for common pipistrelle, soprano pipistrelle and brown long-eared bats.

There was also evidence of other nesting birds including wren, blackbird, pigeon and swallow. The active nests of all bird species are protected and buildings should be inspected if works commence during the period March-August inclusive.

5.1.3. Recommendations

Bats: The built scheme will take the opportunity to enhance roosting opportunities through the provision of bat boxes, bat bricks and maintaining bat access to the attic spaces of the main dwelling (B1). As part of general biodiversity enhancement for the site, it is recommended that new bat roosting and bird nesting resources are introduced. This will include bat roosting boxes erected on the buildings or mature trees within the site (Appendix 3):

- One Weatherlite Pentagon Bat Box
- One Weatherlite Kent Bat Box
- One bat brick in the south gable wall of PH

In order for the resources discussed to be viable bat sensitive lighting should be employed to avoid light pollution. In general, it is recommended that site lighting is kept to a minimum. Security lighting should be operated on short timers. Any new external lights will be set on a motion detector and positioned in such a way that they do not shine on the boundary habitats, tree canopies or hedges. Low intensity lighting must be used where possible in place of high intensity discharge or sodium lamps, this will minimize disturbance to foraging and commuting bats.

In accordance with the Bat Conservation Trust's publication Bats and artificial lighting (BCT, 2018) light pollution by artificial lighting will be kept to a minimum and light spillage avoided. The following specific mitigation will be put in place to minimize disturbance to bats caused by the lighting of the site. The following mitigation strategies have been taken from Bat Conservation Trust Landscape and Urban Design for Bats and Biodiversity (Gunnell et al., 2012) and other referenced sources:

Appropriate Luminaire Specifications

The following should be considered when choosing luminaires.

- All luminaires should lack UV elements when manufactured. Metal halide, fluorescent sources will not be used.
- LED luminaires will be used due to their sharp cut-off, lower intensity, good colour rendition and dimming capability.
- A warm white spectrum (ideally <2700 0Kelvin) will be adopted to reduce blue light component.
- Luminaires will feature peak wavelengths higher than 550nm to avoid the component of light most disturbing to bats (Stone, 2012).
- Internal luminaires will be recessed where installed in proximity to windows to reduce glare and light spill.
- The use of specialist low-level downward directional luminaires to retain darkness above will be used (See Figure 1.0)
- Column heights will be carefully considered to minimise light spill.
- Only luminaires with an upward light ratio of 0% and with good optical control will be used – See ILP Guidance for the Reduction of Obtrusive Light.
- Luminaires will be mounted on the horizontal, i.e no upward tilt.
- The external lights will be set on motion-sensors (PIR) and short (1-2min) timers.
- 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.

In accordance with the Bat Conservation Trust's publication *Bats and artificial lighting* (BCT, 2018) light pollution by artificial lighting will be kept to a minimum and light spillage avoided. The following specific mitigation will be put in place to minimize disturbance to bats caused by the lighting of the site. The following mitigation strategies have been taken from Bat Conservation Trust *Landscape and Urban Design for Bats and Biodiversity* (Gunnell et al., 2012) and other referenced sources:

Minimise light spill by eliminating any bare bulbs and upward pointing light fixtures. The spread of light should be kept near to or below the horizontal plane, by using as steep a downward angle as possible and/or shield hood. Flat, cut-off lanterns are best;

Use light sources that emit minimal ultra-violet light (van Langevelde and Feta, 2001) and avoid the white and blue wavelengths of the light spectrum, so as to avoid attracting insects and thus potentially reducing numbers in adjacent areas;

Limiting the height of lighting columns to eight metres and increase the spacing of lighting columns (Fure, 2006) can reduce the spill of light into unwanted areas;

Avoid using reflective surfaces under lights or light reflecting off windows (e.g. on to trees);

Only the minimum amount of light needed for safety and access should be used and or turned off when the site is not in use;

Artificial lighting proposals should not directly illuminate boundary habitats, which may be of value to foraging or commuting bats and birds (e.g. green corridors);

Lighting that is required for security reasons should use a lamp of no greater than 2000 lumens (150 Watts) and be PIR sensor activated, to ensure that the lights are not on only when required (Jones, 2000; Collins, 2016);

Birds- To increase nesting opportunities generally 3 bird nest boxes will be installed. Installation of the nest boxes will be supervised by 'Eco- Check Ltd' or an experienced ecologist to ensure the correct positioning for each species. The types of nest boxes will include;

Weatherlite nest box (32mm)

Weatherlite nest box (28mm)

Weatherlite open fronted robin box.

6.0 Habitats Regulations and Derogation Test

With respect to the impact on bats, an offence under Article 12 of the European

Directive and Regulation 41 of Conservation of Species and Habitats (Amendment EU Exit) Regulations 2019 is likely to occur when undertaking re-roofing and conversion works and so in accordance with the Standing Advice issued by Natural England, as part of the decision making process, the Local Planning Authority must consider whether an EPS Licence is likely to be required or granted by Natural England in order to derogate from the protection afforded by the Habitats Regulations.

Given the low numbers of common species (maximum count 2 c.pip, 1 s.pip and 2 brown long-eared) it is considered that an EPS license or low impact license registration would be forthcoming and there are reasonable and realistic opportunities to maintain the favourable conservation status of the local bat population despite the proposed works. The buildings are in a poor and structurally unsafe condition and will continue to degrade without intervention which may potentially result in the loss of roosts over time. The unsafe condition of the buildings is such that it is also in the public interest to make them safe as well as providing new local housing. We recommend that the following condition be attached to any planning consent;

No development shall take place (including any conversion, ground works, or site clearance) until a copy of the EPS/LICL license and a method statement for bats, barn owl and other nesting birds has been submitted to and approved in writing by the local planning authority. The content of the method statement shall include:

- a) Purpose and objectives for the proposed works;
- b) Detailed design(s) and/or working method(s) necessary to achieve stated objectives (including where relevant, type and source of material to be used);
- c) Extent and location of proposed works shown on appropriate scale maps and plans;
- d) Timetable for implementation, demonstrating that works are aligned with the proposed phasing of construction;
- e) Persons responsible for implementing the works;
- f) Initial aftercare and long-term maintenance (where relevant); The works shall be carried out strictly in accordance with the approved details and timescales and shall be retained in that manner thereafter to the satisfaction of the local planning authority.

Reason: In accordance with the requirements of the adopted Joint Core Strategy and paragraph 118 of the National Planning Policy Framework, and for the undertaking of the council's statutory function under the Natural Environment and Rural Communities Act (2006).

7.0 Recommendations for Further Surveys

If development has not commenced within 2 years of August 2020, it is recommended that an updated survey is undertaken. Due to the potential for solitary bats to be present within other areas of the buildings it is recommended that the removal of roof materials and re-pointing works are done under the supervision of a suitably licensed bat worker.

8.0 References

Barn Owl Trust (2002) Barn Owls on Site –Natural England

Bat Surveys-Good Practice Guidelines, J. Collins, 2016'

Corbet and Harris (1991). The Handbook of British Mammals – Blackwell

Joint Nature Conservancy Council (2004). The Bat Workers Manual – JNCC

Mitchell-Jones, & McLeish, A.P. Ed.(2012),3rd Edition Bat Workers' Manual, JNCC.

BS 420202: 2013 Biodiversity; Code of Practice for Planning and Development

Ordnance Survey (2019) Get a Map

Appendix 1



Site Location Map-



Aerial view of site and surrounding landscape – Google Maps September 2017

The existing and the building works elevations are the copyright of the Rural Architect Ltd and may not be reproduced or amended except by written permission. Liability will be accepted for amendments made by other persons.
 All dimensions to be checked on site and verified against all drawings prior to commencement.
 No part made.



South East Elevation



South West Elevation



North West Elevation



North East Elevation

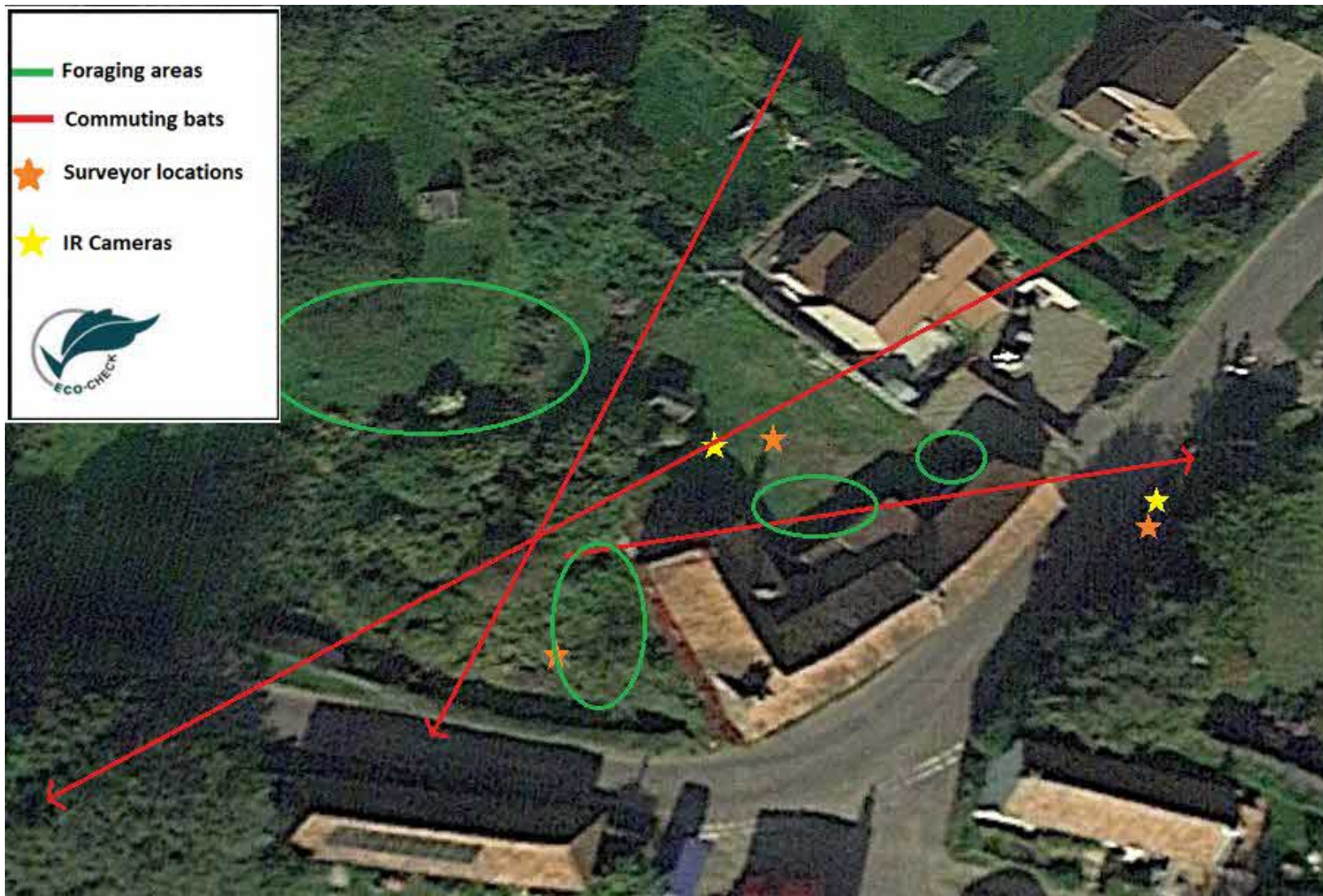
PLANNING
 MR A MORRIS
 HORSE SHED CORNER
 EXISTING ELEVATIONS
 MARCH 2020 1:100
 19.070 04



THE RURAL ARCHITECT

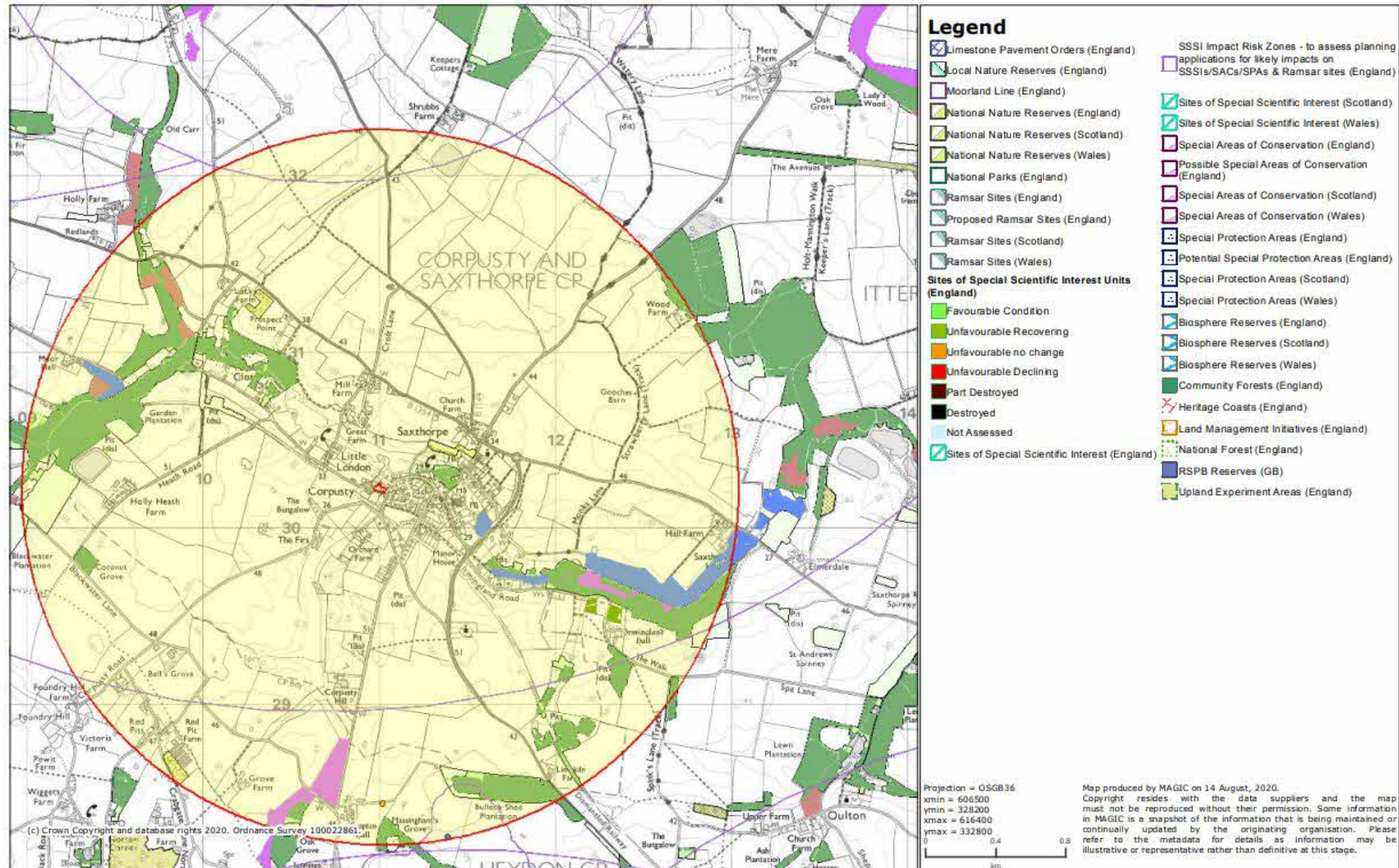
0 1 2 3 4 5 6 7 8m
Scale 1:100

Existing Elevations of Buildings B1 and B2



Map of bat foraging and commuting, surveyor and camera locations.

Appendix 2



Map of Statutory Wildlife Sites and Priority Habitats – Magic Map 2020

Appendix 3

Table 6.1 Guidance on the optimal timing for carrying out specialist ecological surveys and mitigation

This is not definitive and is intended to provide an indication only. The timing of surveys and animal activity will be dependent on factors such as weather conditions. Please consult the species briefing sheets for more detailed information, including species distribution.

KEY	
	Recommended survey time
	No surveys
	Mitigation conducted at these times
	Mitigation works restricted

- * Where survey techniques involve the capture, handling or disturbance of protected species then only licensed persons can undertake surveys; personal survey and monitoring licences are obtained from English Nature, Countryside Council for Wales, Environment and Heritage Service (NI) or Scottish Natural Heritage
- ** Where mitigation involves the killing, capture, injury and/or disturbance of protected species and/or the damage, destruction or obstruction of their habitats, a development licence must be obtained from the Department for Food and Rural Affairs (England), Scottish Executive's Environment and Rural Affairs Department, Welsh Assembly (Countryside Division) or the Environment and Heritage Service Northern Ireland. Licences will be granted only to persons who have proven competence in dealing with the species concerned. Development licence applications will need to be submitted approximately 30 days to be processed by government departments. Where mitigation works need to be conducted under licence before works begin, licence applications will need to be submitted considerably earlier.

		Licence required?	J	F	M	A	M	J	J	A	S	O	N	D
Habitats / vegetation	Surveys	N	Mosses and lichens. No other detailed plant surveys - Phase 1 surveys only (least suitable time)			Detailed habitat assessment surveys. Surveys for higher plants and ferns. Mosses and lichens in April, May and September only						Mosses and lichens. No other detailed plant surveys - Phase 1 surveys only (least suitable time)		
	Mitigation	N	Planting and translocation		An obligation for security of species						Planting and translocation			
Birds	Surveys	N	Winter birds		Breeding birds / migrant species			Breeding birds		Breeding birds / migrant species		Winter birds		
	Mitigation	N	Clearance works may be conducted at this time, but must stop immediately if any nesting birds are found		No clearance or construction works. Bird nesting season						Clearance works may be conducted at this time, but must stop immediately if any nesting birds are found			
Badgers	Surveys	*	All survey methods - best time is in spring and early autumn / winter											
	Mitigation	**	Stopping up or destruction of existing setts						Stopping up or destruction of existing setts					
Bats	Surveys	*	Inspection of hibernation, tree and building roosts		No surveys		Activity surveys and inspection of hibernating roosts. Emergence counts.				No surveys		Inspection of hibernation, tree and building roosts	
	Mitigation	**	Works on vegetation cover		Works on vegetation cover until mid-May. Works on hibernation, tree and building roosts		Works on vegetation cover only		Inspection works. Some hibernating roosts built and destroyed		Works on vegetation cover only		Works on vegetation cover only	

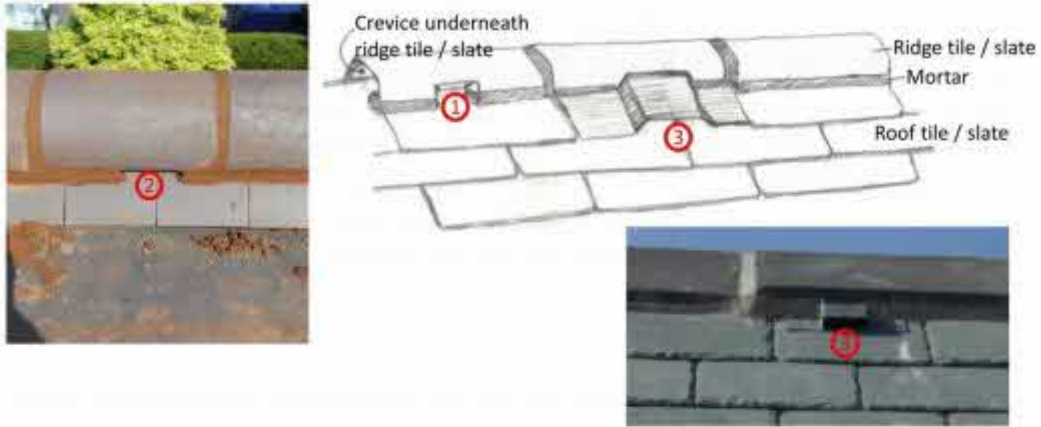
Table 6.1 Guidance on the optimal timing for carrying out specialist ecological surveys and mitigation (continued)

		Licence required?	J	F	M	A	M	J	J	A	S	O	N	D	
Other reptiles	Surveys	N	No surveys - reptiles in hibernation		Activity surveys from March to June and in September / October. Surveys are limited by high temperatures during July and August. Peak survey months are April, May and September.								No surveys - reptiles in hibernation		
	Mitigation	N	Scrub clearance		Capture and translocation programmes can only be conducted whilst reptiles are active (March to June and September / October). Trapping is limited by high temperatures during July / August. Scrub clearance								Scrub clearance		
Great crested newts (n/a in NI)	Surveys	*	No surveys - newts in hibernation		Pond surveys for adults: mid-March to mid-June. Surveys must include visits undertaken between mid-April and mid-May. Egg surveys April to mid-June. Larvae surveys from mid-May. Terrestrial habitat surveys				Larvae surveys to mid-August. Terrestrial habitat surveys		Terrestrial habitat surveys		No surveys - newts in hibernation		
	Mitigation	**	No trapping or pond management work		Nest trapping programmes in ponds and on land								Nest trapping on land only		No trapping of ponds (pond management) only
Natterjack toads	Surveys	*	No surveys - toads in hibernation		Surveys of breeding ponds for adults. Surveys for tadpoles from May onwards. Surveys for adults on land				Surveys for adults on land		No surveys - toads in hibernation				
	Mitigation	**	Pond management work		Trapping of adults in ponds from April to July. Trapping of adults on land. Trapping of tadpoles from May to early September								Pond management work		
White-clawed crayfish	Surveys	*	Reduced activity		Surveys can be undertaken		Adult surveys (females are releasing young)		Optimum time for surveys				Reduced activity		
	Mitigation	**	Work capture programmes. Use activity traps and traps to remove any early breeders		Exclusion of crayfish from construction areas		Adult capture programmes		Exclusion of crayfish from construction areas				Work capture programmes. Use activity traps and traps to remove any early breeders		
Fish	Surveys	*	For coastal, river and stream-dwelling species, the timing of surveys will depend on the migration pattern of the species concerned. Where surveys require information on breeding, the timing of surveys will need to coincide with the breeding period, which may be summer or winter months, depending on the species.												
	Mitigation	**	Mitigation for the protection of watercourses is required at all times of year. Mitigation for particular fish species will need to be timed so as to avoid the breeding season. This varies from species to species.												

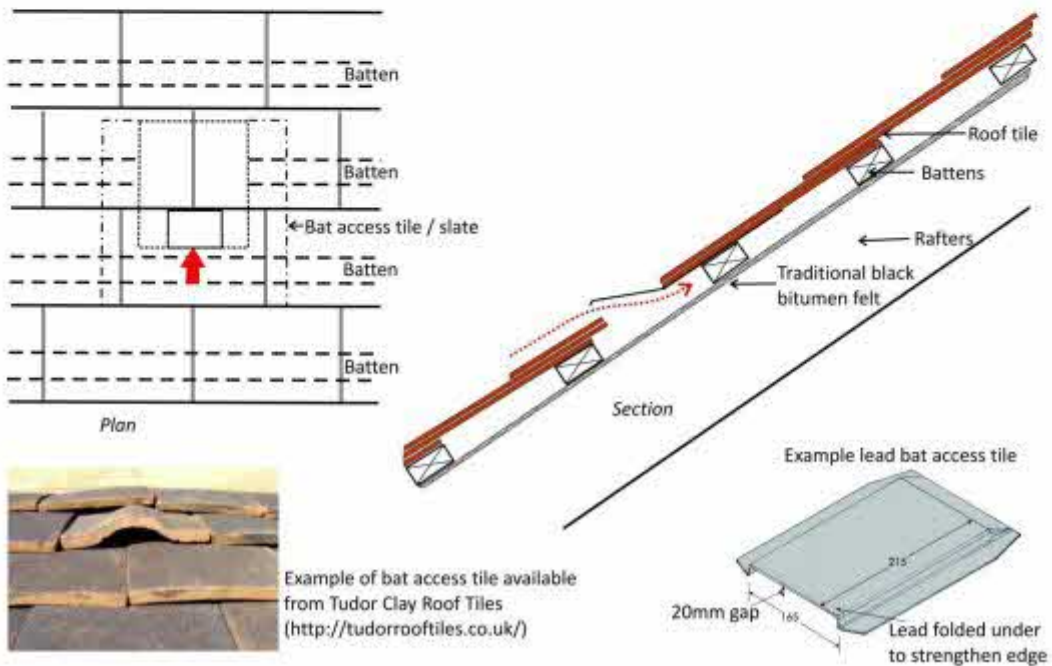
*** Where mitigation involves the capture of white-clawed crayfish, a mitigation licence must be obtained from English Nature, Countryside Council for Wales, Environment and Heritage Service (NI) or Scottish Natural Heritage. Licences will be granted only to persons who have proven competence in dealing with the species concerned.





Bat Ridge Tile Design




Ridge tiles with section of edge cut away to leave an access hole measuring 15mm-20mm high by 50mm-70 mm long (*shown as 1*); or an access hole of similar dimensions created by leaving an area free of mortar (*shown as 2*), or by straddling two tiles with a third (*not shown*) to leave an appropriate gap. If necessary (i.e. if weather ingress is considered a problem (e.g. where ridges are in very exposed locations)), a lead 'saddle' (*shown as 3*) should be used to increase the distance from the entry hole to the ridge hole.



Bat Access Tile Design



Examples of Bat Boxes		
<p>It is important that the bat boxes are positioned sufficiently high above the ground to dissuade ground predators, a minimum of 4m up; and at a distance from sources of artificial lighting. The boxes should be located on the west, south and east facing sides of the trees / buildings giving bats a range of microclimates through the year and direct access to foraging and commuting habitat along site boundaries.</p>		
Schwegler 1FF Bat Box		The 1FF bat box can be sited in trees or on buildings. Size: 43cm high x 27cm wide x 14cm deep.
Schwegler 2F Bat Box		The 2F bat box can be sited in trees or on buildings. Size: 33cm high x 16cm diameter.
1FQ Schwegler Bat Roost (For External Walls)		Suitable for a variety of crevice-dwelling bats, for larger roosts or maternity groups. Internal layout provides 3 different areas where bats can roost, offering different levels of light and temperature. Gaps ranging from 1.5cm to 3.5cm wide offering various places for bats to roost. Suitable to erect on most types of external brick, timber or concrete structures. Size: 60cm high x 35cm wide x 9cm deep.
Improved Roost-Maternity Bat Box		A large 3 crevice bat box. 3 separate crevices each with different temperature characteristics. Suitable for larger roosts or maternity groups of small crevice-dwelling species such as pipistrelle bats. Suitable to erect on buildings or trees. Size: 49cm high x 26cm wide x 13cm deep.
Timber Double Chamber Bat Box		This bat box is suitable for siting on trees in gardens or woodland and requires no annual maintenance. Should not be painted or treated with any type of preservative, as these can harm the bats. Size: 31.3cm high x 16cm wide x 16cm deep.
The Kent Bat Box		Made from untreated rough-sawn timbers ca.20mm thick. Crevices can be between 15mm and 25mm wide. Suitable to fit to walls, other flat surfaces or trees. Approximate dimensions (boxes vary in size): 24cm wide x 47.5cm high x 17cm deep.

Bird Nesting Habitat	
<p>CedarPlus Nest Box</p> <p>Available with 2 entrance hole sizes:</p> <p>32mm hole – suitable for great, marsh and coal tits, redstart, nuthatch, pied flycatcher, house sparrow and tree sparrows.</p> <p>26mm hole – to allow access only to blue, marsh and coal tits (and possibly wrens).</p> <p>Height: 370mm; Width: 156mm; Depth: 175mm</p>	
<p>Schwegler 1B Bird Box</p> <p>The 1B nest box will attract a wide range of species and is available with different entrance hole sizes to prevent birds from competing with each other for the boxes.</p> <p>It is available in 4 colours: brown, green, white and red. The nest box can be attached to the tree or wall using an aluminium nail or by hanging over a branch and is made from Woodcrete to ensure that it is long-lasting.</p> <p>Entrance hole sizes:</p> <p>32mm hole – will attract great, blue, marsh, coal and crested tit, redstart, nuthatch, collared and pied flycatcher, wryneck, tree and house sparrow.</p> <p>26mm hole – suits blue, marsh, coal and crested tit and possibly wren. All other species are prevented from using the nest box due to the smaller entrance hole.</p> <p>Oval hole (29x55mm) – suits redstarts because more light enters the brood chamber. It is also suitable for all other species which nest in the 32mm boxes.</p> <p>Height: 23cm; Diameter: 16cm</p>	
<p>No. 10 Schwegler Swallow Nest</p> <p>The Swallow Nest No. 10 consists of a woodcrete nesting bowl which is attached to a wooden panel of formaldehyde-free chipboard. The nest should be placed inside outbuildings such as sheds, barns or stables leaving a distance of at least 35mm between the top of the nest and wall top. Ensure there is always access for the birds through an open window or skylight, or other high level access (minimum of 50mm (H) x 70mm (W) gap). Multiple nests should not be placed at less than 1m intervals.</p> <p>To avoid problems with droppings accumulating, a droppings board could be placed beneath each nest box to collect the droppings.</p>	



Artificial lighting and wildlife

Interim Guidance: Recommendations to help minimise the impact artificial lighting

Wherever human habitation spreads, so does artificial lighting. This increase in lighting has been shown to have an adverse effect on our native wildlife, particularly on those species that have evolved to be active during the hours of darkness. Consequently, development needs to carefully consider what lighting is necessary and reduce any unnecessary lighting, both temporally and spatially. When the impacts on different species groups are reviewed, the solutions proposed have commonalities that form the basis of good practice. These are outlined in the following document.

Overview of impacts

Invertebrates

Artificial light significantly disrupts natural patterns of light and dark, disturbing invertebrate feeding, breeding and movement, which may reduce and fragment populations. Some invertebrates, such as moths, are attracted to artificial lights at night. It is estimated that as many as a third of flying insects that are attracted to external lights will die as a result of their encounter.¹ Insects can become disoriented and exhausted making them more susceptible to predation. In addition, the polarisation of light by shiny surfaces attracts insects, particularly egg laying females away from water. Reflected light has the potential to attract pollinators and impact on their populations, predators and pollination rates. Many invertebrates natural rhythms depend upon day-night and seasonal and lunar changes which can be adversely affected by artificial lighting levels.

It is not always easy to disentangle the effects of lighting on moths from other impacts of urbanisation. However, it is known that UV and green and blue light, which have short wavelengths and high frequencies, are seen by most insects and are highly attractive to them. Where a light source has a UV component, male moths in particular will be drawn to it. Most light-induced changes in physiology and behaviour are likely to be detrimental. They discern it to be 'light', so they do not fly to feed or mate.²

Birds

There are several aspects of changes to bird behaviour to take into account. The phenomenon of robins and other birds singing by the light of a street light or other external lighting installations is well known, and research has shown that singing did not have a significant effect on the bird's body mass regulation. However, it was felt that the continual lack of sleep was likely to be detrimental to the birds' survival and could disrupt the long-term circadian rhythm that dictates the onset of the breeding season³. Many species of bird migrate at night and there are well-documented cases of the mass mortality of nocturnal migrating birds as they strike tall lit buildings. Other UK bird species that are particularly sensitive to artificial lighting are long-eared owls, black-tailed godwit and stone curlew.⁴

¹ Bruce-White C and Shardlow M (2011) A Review of the Impact of Artificial Light on Invertebrates - See more at: <http://www.buglife.org.uk/advice-and-publications/publications/campaigns-and-reports/review-impact-artificial-light#sthash:s7GPA1vL.dpuf>

² As above

³ Pollard A. (2009) Visual constraints on bird behaviour. University of Cardiff

⁴ Rodriguez A., Garcia A.M., Cervera F. and Palacios V. (2006) Landscape and anti-predation determinants of nest site selection, nest distribution and productivity in Mediterranean population of Long-eared Owls, *Asio otus*. *Ibis*, 148(1), pp. 133-145

Mammals

A number of our British mammals are nocturnal and have adapted their lifestyle so that they are active in the dark in order to avoid predators. Artificial illumination of the areas in which these mammals are active and foraging is likely to be disturbing to their normal activities and their foraging areas could be lost in this way. It is thought that the most pronounced effect is likely to be on small mammals due to their need to avoid predators. However, this in itself has a knock-on effect on those predators.

The detrimental effect of artificial lighting is most clearly seen in bats. Our resident bat species have all suffered dramatic reductions in their numbers in the past century. Light falling on a bat roost exit point, regardless of species, will at least delay bats from emerging, which shortens the amount of time available to them for foraging. As the main peak of nocturnal insect abundance occurs at and soon after dusk, a delay in emergence means this vital time for feeding is missed. At worst, the bats may feel compelled to abandon the roost. Bats are faithful to their roosts over many years and disturbance of this sort can have a significant effect on the future of the colony. It is likely to be deemed a breach of the national and European legislation that protects British bats and their roosts.

In addition to causing disturbance to bats at the roost, artificial lighting can also affect the feeding behaviour of bats and their use of commuting routes. There are two aspects to this: one is the attraction that short wave length light (UV and blue light) has to a range of insects; the other is the presence of lit conditions.

As mentioned, many night-flying species of insect are attracted to lamps that emit short wavelength component. Studies have shown that, although noctules, serotines, pipistrelle and Leisler's bats, take advantage of the concentration of insects around white street lights as a source of prey, this behaviour is not true for all bat species. The slower flying, broad-winged species, such as long-eared bats, barbastelle, greater and lesser horseshoe bats and the *Myotis* species (which include Brandt's, whiskered, Daubenton's, Natterer's and Bechstein's bats) generally avoid external lights.

Lighting can be particularly harmful if it illuminates important foraging habitats such as river corridors, woodland edges and hedgerows used by bats. Studies have shown that continuous lighting along roads creates barriers which some bat species cannot cross⁵. It is also known that insects are attracted to lit areas from further afield. This could result in adjacent habitats supporting reduced numbers of insects, causing a further impact on the ability of light-avoiding bats to feed.

These are just a few examples of the effects of artificial lighting on British wildlife, with migratory fish, amphibians, some flowering plants, a number of bird species, glow worms and a range of other invertebrates all exhibiting changes in their behaviour as a result of this unnatural lighting.

Recommendations

Survey and Planning

The potential impacts of obtrusive light on wildlife should be a routine consideration in the Environmental Impact Assessment (EIA) process⁶. Risks should be eliminated or minimised wherever possible. Some locations are particularly sensitive to obtrusive light and lighting schemes in these areas should be carefully planned.

In August 2013, Planning Minister Nick Boles launched the new National Online Planning Guidance Resource aimed at providing clearer protection for our natural and historic environment. The guidance looks at when lighting pollution concerns should be considered and is covered within one of the on line planning practice

⁵ Stone E. L., Jones G and Harris (2009) Street lighting disturbs commuting bats. *Current Biology*, 19, pp 1-5

⁶ See also: Institution of Lighting Professionals - Professional Lighting Guide (PLG 04) Guidance on undertaking lighting environmental impact assessments)

guides⁷. The guide provides an overview for planners with links to documents that aim to give planners an overview of the subject through the following discussion points:

1. When is obtrusive light / light pollution relevant to planning?
2. What factors should be considered when assessing whether a development proposal might have implications for obtrusive lighting / light pollution?
3. What factors are relevant when considering where light shines?
4. What factors are relevant when considering how much the light shines?
5. What factors are relevant when considering possible ecological impact?

This can help planners reach the right design through the setting of appropriate conditions relating to performance and mitigation measures at the planning stage.

The Institution of Lighting Professionals (ILP) recommends that Local Planning Authorities specify internationally recognised environmental zones for exterior lighting control within their Development Plans⁸. In instances lacking classification, it may be necessary to request a Baseline Lighting Assessment/Survey conducted by a Lighting Professional in order to inform the classification of areas, particularly for large-scale schemes and major infrastructure projects.

When assessing or commissioning projects that include the installation of lighting schemes, particularly those subject to the EIA process, the following should be considered and relayed to applicants:

- *Ecological consultants should confirm the presence of any sensitive fauna and flora*, advising the lighting designers of bat routes and roosts and other areas of importance in order to ensure that reports correspond with each other.
- *Ecological consultants should consider the need for quantitative lighting measurements*. In some instances it may be necessary for further lighting measurements to be taken. For example, outside an important bat roost. These should follow best practice guidance from the ILP and would ideally be conducted by a Lighting Professional.
- *Where appropriate, professional lighting designers should be consulted* to design and model appropriate installations that achieve the task but mitigate the impacts. This should be done at the earliest opportunity. Early decisions can play a key role in mitigating the impact from lighting.
- *Reports submitted should outline the impacts of lighting in relation to ecology*, making clear reference to the ecological findings, highlighting any sensitive areas and detail proposed mitigation. Consideration should also be given to internal lighting where appropriate.
- *Post -installation checks and sign off upon commissioning should be carried out by the lighting designer* to ensure that the lighting installation has been installed in accordance with the design, that predictions were accurate and mitigation methods have been successful.

Principles and design considerations

Do not

- *provide excessive lighting*. Use only the minimum amount of light needed for the task.
- *directly illuminate bat roosts* or important areas for nesting birds

Avoid

- *installing lighting in ecologically sensitive areas* such as: near ponds, lakes, rivers, areas of high conservation value; sites supporting particularly light-sensitive species of conservation significance (e.g. glow worms, rare moths, slow-flying bats) and habitat used by protected species.
- *using reflective surfaces under lights*.

⁷<http://planningguidance.planningportal.gov.uk/blog/guidance/light-pollution/when-is-light-pollution-relevant-to-planning/>

⁸Institution of Lighting Professionals (2011) Guidance Notes for the Reduction of Obtrusive Light GN01:2011.