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CONSULTING

NATURAL PROGRESSION

Land at Pollards Farm, Ditchling Common, West Sussex

Bat Survey

March 2019

Land at Pollards Farm, Ditchling Common, West Sussex

Bat Survey

Client:	Dim South Ltd	
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Author: Becci Bond BSc(Hons) MCIEEM	Proofed: Anna Douglas BSc(Hons) MSc GradCIEEM	Approved: Nick Pincombe BA(Hons) MSc CEnv MIEMA MCIEEM
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Abbreviations

BCT	Bat Conservation Trust
EPS	European Protected Species
LNR	Local Nature Reserve
LWS	Local Wildlife Site
MAGIC	Multi-Agency Geographic Information for the Countryside
Mps	Metres per second (wind speed)
NE	Natural England
NERC	Natural Environment and Rural Communities (Act 2006)
NNR	National Nature Reserve
NPPF	National Planning Policy Framework
PEA	Preliminary Ecological Appraisal
PRA	Preliminary Roost Assessment
PRF	Potential roost feature
SAC	Special Area of Conservation
SSSI	Site of Special Scientific Interest
SxBRC	Sussex Biodiversity Record Centre
TN	Target Note
WCA	Wildlife and Countryside Act 1981 (as amended)

0 Executive Summary

0.1 Introduction

- 0.1.1 A bat survey was carried out for the site of a proposed residential redevelopment at Land at Pollards Farm, Ditchling Common, West Sussex (Grid Reference: 533212,118313).
- 0.1.2 The study was undertaken to establish the presence or likely absence of bats using potential roosts within the site, identify and evaluate potential impacts of the development on roosting bats, and make recommendations accordingly. Two return-to-roost surveys and one emergence survey of building B2 were undertaken in August and September 2018 with reference to current industry guidelines (Collins (ed.), 2016). One emergence survey of building B1 was undertaken in August 2018. The surveys were supplemented by an internal/external inspection of structures to assess their suitability for roosting bats.

0.2 Results

- 0.2.1 The desk study data search returned 146 records of eight species of bat from within 2km of the survey area, during a date range of 1983 to 2017. The closest record of roosting bats was of a pipistrelle *Pipistrellus sp.* maternity roost located c.450m south-west in 2014. A search of the MAGIC database for granted mitigation licenses for bats within a 2km radius found three licenced sites. There are no designated sites notified for important populations of bats within 10km of the survey area.
- 0.2.2 The internal/external inspections concluded that the barn (B1) was of low suitability for roosting bats due to its form and limited availability of exploitable features. No signs of bats (droppings, urine staining, scratch marks or feeding remains) were present within the building.
- 0.2.3 The internal/external inspections concluded that the farmhouse (B2) was of moderate suitability for bats. A small number of bat droppings were found, these were of a size and shape characteristic of pipistrelle, and long-eared *Plecotus spp.* bats, and confirm B2 has been used as a roost. Although generally well-maintained, B2 presented a number of features suitable for roosting bats including missing and slipped hanging tiles, small sections of lifted lead flashing and a large and relatively uncluttered roof void.
- 0.2.4 One dawn re-entry survey of the barn (B1) was carried out on 31 August 2018. No bats were recorded re-entering the barn during the survey.
- 0.2.5 Three surveys of the house (B2) were carried out, one dusk emergence survey on 15 August 2018 and two dawn re-entry surveys on 29 August and 12 September 2018.

- 0.2.6 During the first survey of B2, five common pipistrelle *Pipistrellus pipistrellus* were recorded emerging from the building. The first common pipistrelle emerged from a roost at the south eastern aspect (front) of B2 at 20:34, before flying north east towards the hedgerow and offsite woodland. The point of emergence was uncertain but suspected to be from beneath a hanging tile close to the roof. The second emerged from a roost at the south west corner of the building at 20:36 before flying north-west towards a complex of hedgerows. The point of emergence was from the join of the soffit on the south elevation with the hip of the roof on the west elevation. The third and fourth emerged at 20:40 from hanging tiles just below the soffit on the south (side) elevation, either side of the chimney, the third bat flew east and then north towards the hedgerow and the fourth bat flew west towards further hedgerows. The fifth emerged from a roost at same spot as the first bat on the south eastern aspect (front) at 20:42, suspected to be from beneath a hanging tile, before flying north east towards the hedgerow.
- 0.2.7 During the second survey of B2, one common pipistrelle bat was recorded re-entering a roost on the south elevation at 05:50, having flown quickly along the west (rear) elevation. No swarming behaviour was observed and the re-entry was very swift, the access point being located beneath a hanging tile slightly above the western side of the conservatory roof.
- 0.2.8 During the third survey of B2, two common pipistrelle bats were recorded re-entering the building. The first re-entered a roost on the south elevation at 05:32, the access point being located beneath a hanging tile close to the soffit. The second also re-entered a roost on the south elevation, at 06:11, the access point being located in an area of missing mortar on the southern edge of the west-facing roof.
- 0.2.9 Low to moderate levels of foraging and commuting activity were observed within and around the site. This was principally common pipistrelle activity, but included occasional brown long-eared *Plecotus auritus* and soprano pipistrelle *Pipistrellus pygmaeus* bats, and one serotine *Eptesicus serotinus*.

0.3 Evaluation

- 0.3.1 The survey results provide a good level of confidence that the following species and types of roost were present within the house (B2) in 2018:
- ▶ Common pipistrelle: six occasionally used summer day roosts for low numbers of bats; and,
 - ▶ Brown long-eared: Inactive roost (historical exploratory use).
- 0.3.2 Both species are widespread and at least relatively abundant in Sussex, and both have previously been recorded within 2km of the site.
- 0.3.3 No bats were recorded using B1 and they are likely to have been absent from this structure in 2018.
- 0.3.4 In summary, if unmitigated, the proposed extension to the farmhouse (B2) will result in a short-term risk of killing, injury or disturbance to low numbers of common pipistrelle bats. The

development will also result in low to medium significance impacts from the permanent loss of six summer day roosts occasionally used by low numbers of common pipistrelle, and low significance impacts from the temporary damage of one inactive roost previously used by low numbers of brown-long-eared bats. These impacts will require mitigation but are not considered to be detrimental to maintaining the local populations of common pipistrelle and brown-long-eared bats at a favourable conservation status within their natural range.

0.4 Recommendations

0.4.1 A mitigation strategy is required to (a) remove or reduce the likelihood of damage to bats or their habitats, and (b) offset the damage caused by development through compensation. Mitigation should be implemented in accordance with an agreed Method Statement which will form part of a Natural England European Protected Species Mitigation (EPSM) Licence. The following bullets provide an indicative outline of what is likely to be necessary:

- ▶ Appointment of a licenced Ecological Clerk of Works (ECoW) to oversee mitigation and construction works;
- ▶ Timing works to the roof or hanging tiles on building B2 to occur between April and October , i.e. during the period in which hibernating bats are least likely to be present;
- ▶ Creation of temporary replacement habitats to provide a safe refuge for any bats which are found and moved during the works;
- ▶ A pre-commencement return-to-roost survey;
- ▶ Provision of information and toolbox talks to guide site operatives;
- ▶ Supervised roof strip to ensure any bats found can be captured and safely relocated into the pre-installed bat boxes;
- ▶ Specified procedures should bats be encountered during the works;
- ▶ Adjustments to be made to account for great crested newts *Triturus cristatus* and nesting birds, if necessary;
- ▶ Commencement of construction once the supervised roof strip is complete; and
- ▶ Compensation of habitats lost as a result of development.

0.4.2 To minimise the general risk of disturbance to roosting, foraging and commuting bats on and around the site during and after construction, lighting precautions are recommended for consideration during the detailed design stage.

0.4.3 In addition, a range of ecological enhancements are recommended to improve the overall value of the site for bats post-construction.

0.5 Conclusions

- 0.5.1 The proposed development will result in negative impacts to low numbers of individuals of two species of bat, however, detrimental effects on the conservation status of these species are not predicted. Mitigation and compensatory methods are recommended to reduce and offset the predicted impacts on a proportionate basis.

1 Introduction

1.1 Background

- 1.1.1 A Preliminary Ecological Appraisal (PEA) was carried out in April 2018 for the site of a proposed residential redevelopment at Land at Pollards Farm, Ditchling Common, West Sussex (Grid Reference: 533212,118313). It was recommended that further surveys for bats should be carried out due to the presence of bat droppings and potential roost features.
- 1.1.2 The PEA concluded that the existing dwelling (building B2) was of moderate suitability for roosting bats. Bat droppings found in the roof void confirmed that the building had previously been used as a bat roost. Building B1 was of low suitability for roosting bats. The proposed development would include alterations to the buildings and could result in killing, injury or disturbance to bats if present during construction, and loss of their roosting habitats. The surveys were therefore required to inform the planning application and determine whether the proposals could negatively impact on bats.

1.2 Objectives and Approach of the Study

- 1.2.1 The study was commissioned to fulfil the following objectives:
- ▶ To determine the presence or likely absence of bats using potential roosts within the site or adjacent habitats which may be affected by works on the site;
 - ▶ To establish the baseline assemblage and relative abundance of bat species using the site;
 - ▶ To identify and evaluate the types of roost present and assess the potential impacts of the development on bats;
 - ▶ To provide sufficient data to inform a European Protected Species Mitigation Licence application, if required; and
 - ▶ To outline the measures required for avoiding and mitigating negative impacts, including compensation of habitat losses if necessary, and make recommendations for ecological enhancement.
- 1.2.2 To meet these objectives the survey approach involved:
- ▶ A desk study involving a review of bat records from the local area (2km radius from the centre of the proposed development site) and designated site citations;
 - ▶ A Preliminary Roost Assessment of structures, including internal/external inspection to assess their suitability for roosting bats; and

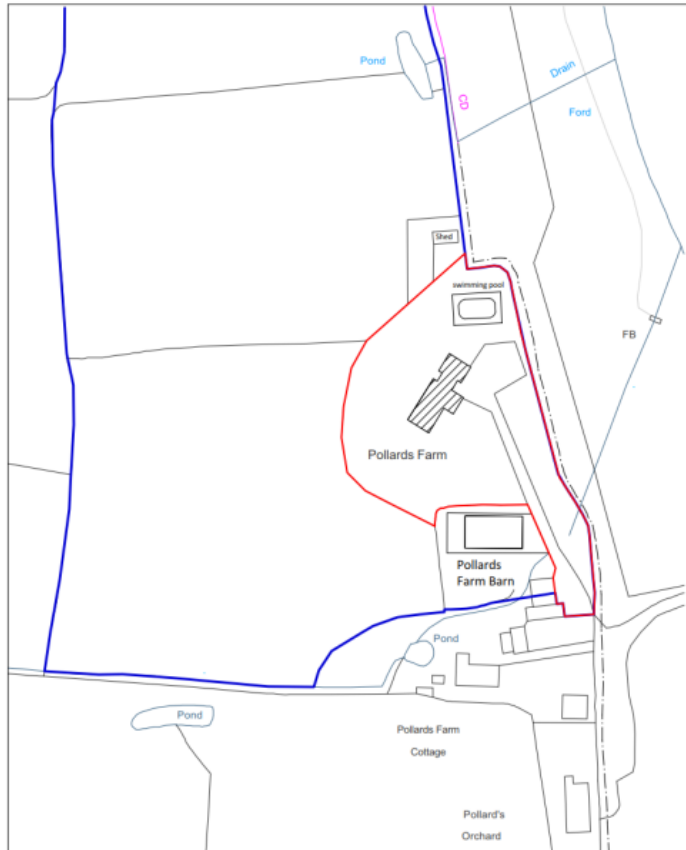
- ▶ Emergence and return-to-roost surveys of potential bat roost features likely to be affected by proposed development, based on current industry guidelines (Collins (ed.), 2016), to establish the presence or likely absence of bats.

1.3 Survey Area

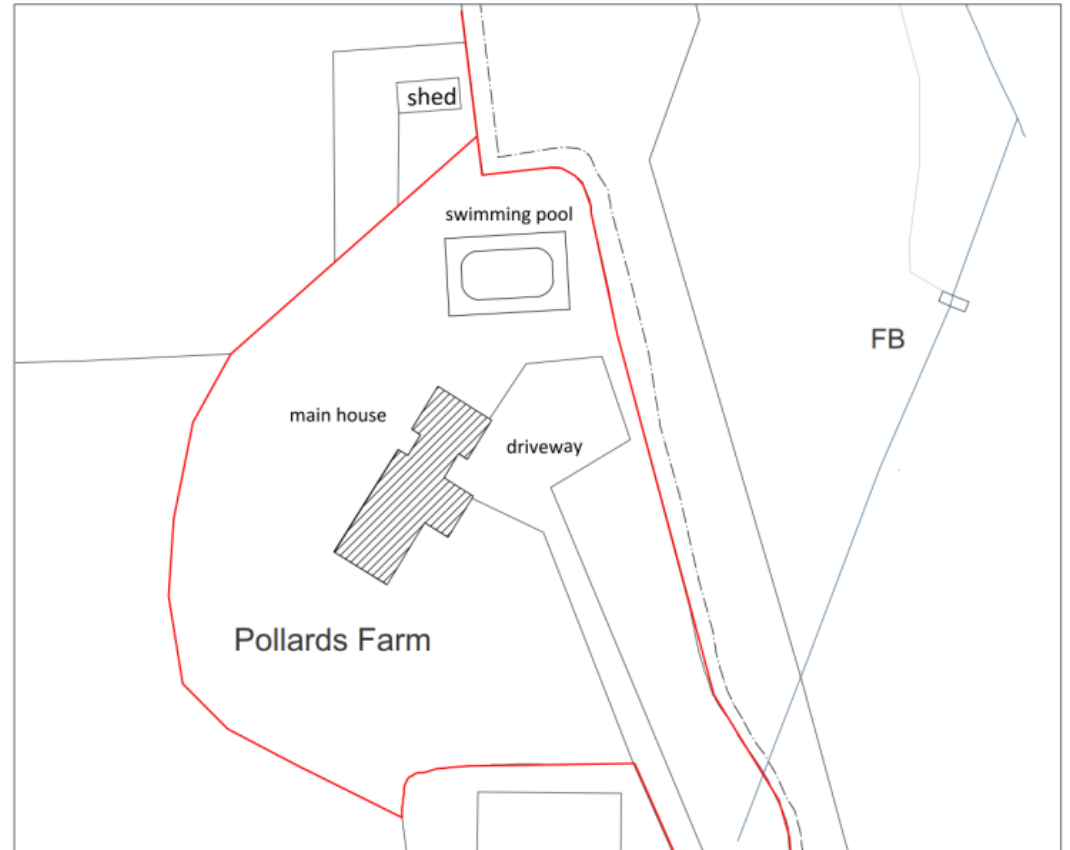
- 1.3.1 The application site lies to the east of the village of Burgess Hill in West Sussex. Brighton is the closest city, located approximately 13km to the south. The c.0.3ha site comprises a central farm house, associated gardens, pond and dilapidated swimming pool, with bordering mature hedgerow. The site is dominated by improved grassland. It is bounded to the north and west by woodland and grazing pasture, to the south by a large wooden barn and further rural residential dwellings and associated gardens, and to the east by a mature treeline, common land and ditch system. The extent of the site is outlined in red on Figure 1.1.
- 1.3.2 The wider rural landscape is dominated by pasture, woodland and arable farmland, and the settlement of Burgess Hill.
- 1.3.1 The bat survey area comprises a wooden barn (B1) and a residential house (B2) as shown on the Phase 1 Habitats Map for the application site at Appendix I.

1.4 Proposed Construction Activities

- 1.4.1 Planning consent is being sought for demolition of an existing conservatory and garage, extension and renovation of the existing dwelling, construction of a new garage, and associated works. The proposed block plan is shown at Figure 1.2.



1 Scale: 1:1250
Location Plan



2 Block Plan
Scale: 1:500

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Revisions:

Figure 1.1: Site location plan

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17048-P-001

Drawing Title

Location Plan and Block Plan

Address

Pollards Farm, Ditchling Common

Client

Patagonia Properties

Scale

1:1250 & 1:500@A3

Stage

Planning

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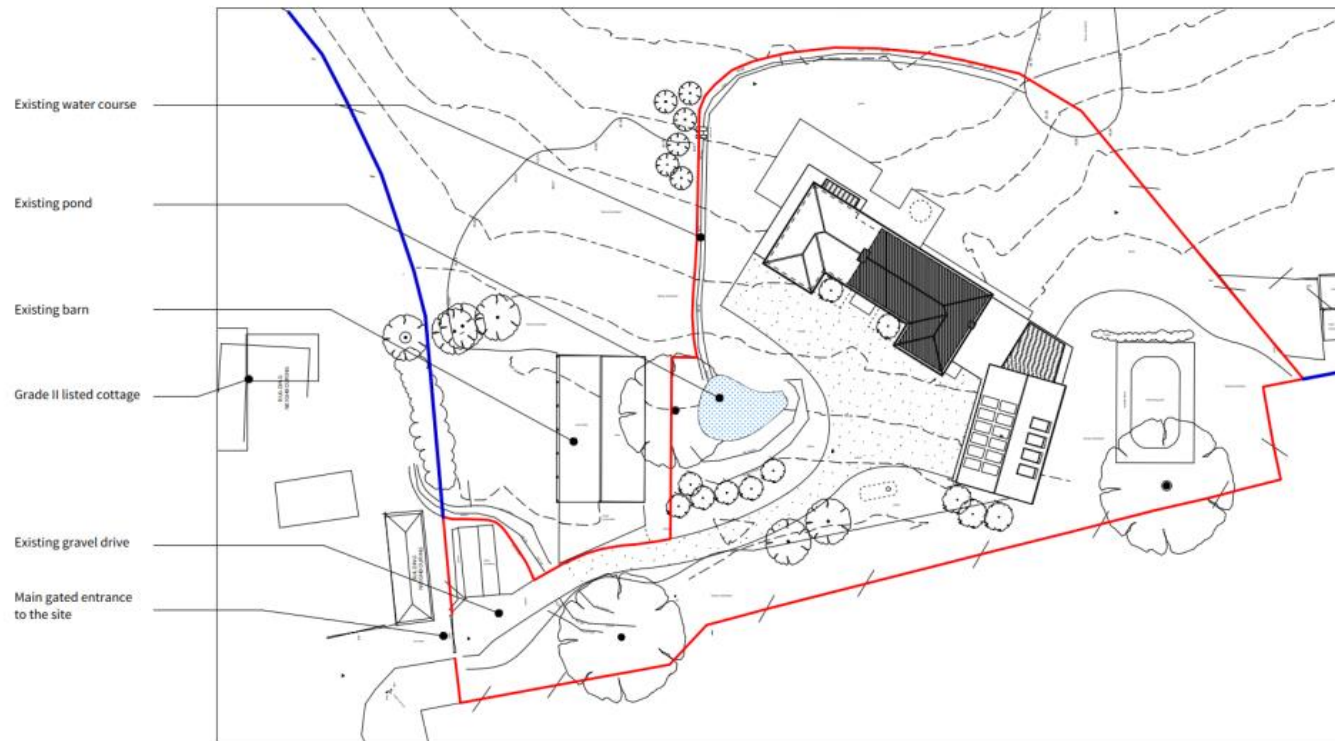
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Zinzan Stickland Thomas Architects Ltd.
3 dorset place, brighton BN2 1ST
e: studio@zsta.co.uk, t: 01273 964051
Company registered in England No. 07958805
www.zsta.co.uk



Proposed Block Plan
Scale: 1:500

Figure 1.2: Proposed block plan

4 Gloucester Passage, Brighton BN1 4AS
e: studio@sticklandwright.co.uk
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Revisions:	Revisions:	Revisions:
A	22/11/2018 02/01/2019	Planning submission Drawing updated

Checked

1:500 5m 10 20 30



Dwg No. 17048-P-005-A

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Client R. Slabbert and CK. Batchelor
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2 Bat Distribution, Ecology and Status

2.1 Distribution

- 2.1.1 There are eighteen native species of bats found in the UK. These range from relatively common and widespread species such as common pipistrelle *Pipistrellus pipistrellus* and brown long eared bat *Plecotus auritus* to the rare species such as Bechstein's bat *Myotis bechsteinii* and barbastelle bat *Barbastella barbastellus*.
- 2.1.2 Both common pipistrelle and brown long eared bats can be found throughout the UK. However, many other bat species have a much more limited distribution. The greater horseshoe bat *Rhinolophus ferrumequinum* is confined to south-west England and southern Wales and Bechstein's bat is located exclusively in the south of England. However it should be noted that there may still be areas of the country where bats are under recorded, and hence the distribution of species is not fully understood.

2.2 Ecology

- 2.2.1 The habitat preferences of different bat species are diverse, with some species being specialists and others more generalist. For instance Bechstein's bat typically forages and hibernates in mature woodland whereas Daubenton's bat *Myotis daubentonii* tends to hunt prey close to water. Pipistrelle bats on the other hand can be found foraging in almost any habitat and will roost in a variety of habitats ranging from hanging tiles on new buildings to beneath loose bark on trees.
- 2.2.2 Bat activity is highly seasonal and weather dependent. Generally they enter torpor when the temperature becomes unfavourable, usually from October to March, although bats may still emerge to feed on warmer nights. However, during the active period their behaviour is affected by weather conditions and breeding activity. Typically they are active in warm dry weather and are less active during heavy rain, high winds or in temperatures much below 10°C at dusk.
- 2.2.3 Mating occurs prior to hibernation with the young being born the following year around April and May. Female bats congregate in maternity roosts often numbering several hundred individuals and will give birth around June or July. Once the young are weaned the females will leave the roost to find mates prior to hibernation.

2.3 Status, Legislation and Policy

- 2.3.1 In the UK, the general trend is that bat populations have declined over the last century. In an attempt to halt this decline, all species of bat receive the greatest protection afforded by both European and UK wildlife legislation.

- 2.3.2 National legislation (Wildlife and Countryside Act 1981 (as amended)) gives full protection to the species and their habitats and this is further strengthened by European-derived legislation (Conservation of Habitats and Species Regulations 2017) which provides protection from disturbance and disturbing activities. Under this legislation it is an offence to:
- ▶ Intentionally kill, injure or capture/take a bat.
 - ▶ Intentionally or recklessly damage, destroy, or obstruct access to any structure or place of shelter or protection. This is taken to mean all bat roosts whether or not bats are present.
 - ▶ Intentionally or recklessly disturb a bat while it occupies such a structure or place that it uses for shelter or protection.
 - ▶ Sell, offer or expose for sale, or possess, or transport for the purpose of sale, any live or dead bat, any part of a bat, or anything derived from a bat.
- 2.3.3 Under the Habitats Regulations disturbance includes any activity which is likely to:
- ▶ Impair the ability of a bat to survive, breed, reproduce, or rear/nurture its young.
 - ▶ Impair the ability of a bat to migrate or hibernate.
 - ▶ Significantly affect the local distribution or abundance of the species.
- 2.3.4 Local Planning Authorities are obliged to have regard to conserving biodiversity when undertaking their functions. Section 40 of the Natural Environment and Rural Communities (NERC) Act 2006 states that public authorities must have regard to conserving, maintaining and enhancing biodiversity. Section 41 of the Act requires the Secretary of State to maintain a list of Habitats and Species of Principal Importance in England; the list includes several species of bat.
- 2.3.5 Furthermore, Government policy (National Planning Policy Framework – Section 15: Conserving and enhancing the natural environment) is clear that planning decisions should be “minimising impacts on and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures”.

2.4 Guidance and Best Practice

- 2.4.1 The methodology for the bat surveys was based on the latest *Good Practice Guidelines* from the Bat Conservation Trust (Collins (ed.), 2016; 3rd edition) as well as [Natural England Standing Advice on bats](#). The following documents were used for reference:
- ▶ *Acoustic Ecology of European Bats: Species Identification, Study of their Habitats and Foraging Behaviour* (Barataud, 2015);
 - ▶ Bat Conservation Trust websites; www.bats.org.uk and <http://roost.bats.org.uk/>;
 - ▶ *Bat Mitigation Guidelines* (English Nature, 2004);
 - ▶ *Bat Workers Manual* (Joint Nature Conservation Committee, 2004; 3rd edition);
 - ▶ *Bats of Britain and Europe* (Dietz & Kiefer, 2016); and
 - ▶ *British Bat Calls: A Guide to Species Identification* (Russ, 2012).

3 Methods

3.1 Desk Study

- 3.1.1 Sussex Biodiversity Record Centre (SxBRC) was consulted for records of bat species within a 2km search radius. The desk-study data search was carried out as part of the Preliminary Ecological Appraisal. Additionally, the Multi-Agency Geographic Information for the Countryside (MAGIC) website was consulted for granted European Protected Species (EPS) mitigation licenses for bats within a 2km radius, and for citations of Sites of Special Scientific Interest (SSSI) or Special Areas of Conservation (SAC) which are notified for important populations of bats within 10km of the survey area.

3.2 Field Survey

- 3.2.1 Field survey work undertaken for the project utilised a range of techniques in order to assess the usage of the site by bats:
- ▶ PRA, including internal/external structures inspection; and
 - ▶ Presence/absence surveys.

3.3 Preliminary Roost Assessment

- 3.3.1 Inspection of the structures to be affected was undertaken on 23 April 2018 by a suitably licenced and experienced ecologist. Weather conditions were warm (c.14°C), with a gentle south-westerly breeze (Beaufort Scale 2), it was overcast with some patchy sunshine. Buildings B1 and B2 were subject to an external and where possible internal inspection for potential roost features.
- 3.3.2 Two experienced surveyors undertook the inspections over a period of approximately two hours with the aid of the following equipment: telescopic ladders to gain safe access; Wildlife Acoustics EM3 full spectrum bat detector to record and identify the calls of any bats which were present; CB-2 high-powered searchlight fitted with a red filter to search dark areas for signs of bats; telescopic mirror and 9mm digital endoscope camera to inspect hidden cavities; Hawke Sport Optics 10x42 close-focusing binoculars to view areas inaccessible on foot; and digital camera with flash to record any evidence of bats or features suitable for use by bats.
- 3.3.3 All observable features potentially suitable for bats were noted and the overall suitability of the structure for roosting bats was classified with reference to Box 1 (Collins (ed.), 2016). The external inspection from ground-level focused on potential access points and roosting opportunities such as lifted lead flashing, broken, lifted or missing roof or ridge tiles, cracks in the render or gaps between exterior cladding and weatherboards, soffits or fascias. The internal inspection included a search for live animals and other signs that give an indication of

past or present occupancy. In the case of bats, typical indicators include droppings (which are characteristic and are often indicative of species), signs of fur oil staining, urine splashing, characteristic odours, and accumulations of discarded prey remains. It also assessed the overall suitability of the structure for roosting bats focusing particularly on the interior roof spaces and cellars (subject to safe access). The objective was to establish whether structures are of low, moderate or high bat roosting suitability.

Box 1: Potential suitability of structures/trees for roosting bats (after Collins, 2016)

Suitability	Roosting habitats
Negligible	Negligible habitat features on site likely to be used by roosting bats
Low	A structure with one or more potential roost features (PRF) that could be used by individual bats opportunistically, but 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 A tree of sufficient size and age to contain PRFs but with none seen from the ground / using ladders or features seen with only very limited roosting potential
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 (for roost type only)
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 and surrounding habitat

3.4 Presence/Absence Surveys

- 3.4.1 Where a structure/tree is found to contain evidence of roosting bats, or judged to be potentially suitable as a roost, then further surveys are required prior to undertaking works in order to confirm whether bats are currently present or are likely to be absent. These surveys typically take the form of emergence surveys (carried out as the bats leave the roost at dusk) and re-entry surveys (as bats return to the roost at dawn), and can be carried out between May and September (May to August being the optimal period).
- 3.4.2 Emergence surveys commenced at least quarter of an hour before dusk and continued for up to 2 hours after sunset, while return-to-roost surveys (where applicable) began 1.5 to 2 hours before dawn and continued until 15 minutes after sunrise. The objective was to establish the presence or likely absence of bats within each feature, determine the assemblage and relative abundance of bat species using the features, and identify the type(s) of roost (e.g. day roost or maternity roost).
- 3.4.3 Detection equipment included Wildlife Acoustics Echo Meter Touch, EM Touch2 Pro and EM3 handheld detectors. Recordings of bat calls were analysed using BatSound (v4) and Kaleidoscope Pro (v5.0.3) software. The number of bats leaving/entering each building were noted, together with observations regarding point of emergence/re-entry, type of behaviour and areas of particularly high activity. Survey covariates were also noted (minimum/maximum

air temperatures, wind speed/direction, precipitation and cloud cover). Table 3.1 shows the dates and weather conditions for each survey visit.

Table 3.1: Survey dates and weather conditions

Date	Dusk/dawn	Weather conditions
Building B1: the barn		
31 Aug 2018	Dawn	16.2°C – 15.3°C, 80% cloud cover, no wind, no precipitation.
Building B2: the farmhouse		
15 Aug 2018	Dusk	18.2°C – 17.4°C, 20% cloud cover, moderate south-westerly (Beaufort 3), no precipitation.
29 Aug 2018	Dawn	12.5°C – 13.0°C, 100% cloud cover, no wind, intermittent light rain (total of 13mins).
12 Sep 2018	Dawn	15.1°C – 12.2°C, 100% cloud cover, light north-westerly (Beaufort 2), light drizzle.

- 3.4.4 Current guidelines (Collins (ed.), 2016) recommend the minimum levels of presence/absence survey effort for structures and trees, based on their overall suitability for roosting bats; see Box 2. The PEA concluded that building B1 had low suitability for roosting bats and one presence/absence survey was undertaken using a two person survey team. B2 had moderate suitability and was a confirmed roost due to the presence of bat droppings; three presence/absence surveys were undertaken using a three person survey team. Figure 3.1 shows a plan of surveyor positions.

Box 2: Recommended minimum survey effort for presence/absence surveys (Collins, 2016)

Low roost suitability	Moderate roost suitability	High roost suitability
One survey visit: One dusk emergence or dawn re-entry survey	Two survey visits: One dusk emergence and a separate dawn re-entry survey	Three survey visits: At least one dusk emergence & at least one separate dawn re-entry survey

3.5 Evaluation

- 3.5.1 Within this bat survey report, the potential suitability of roosting and foraging/commuting habitats is classified as 'negligible', 'low', 'moderate' or 'high' with reference to Table 4.1 in the *Good Practice Guidelines* (Collins (ed.), 2016). The conservation significance of bat roosts is classified as 'low', 'moderate' or 'high' with reference to Figure 4 in the *Bat Mitigation Guidelines* (English Nature, 2004). However, these are relative terms which require an interpretation of the rarity of different species and regional variations therein. The terms are hence applicable within the survey area only and are intended to indicate which features of the survey area may be of importance to the conservation status of local bat populations.

- 3.5.2 Evaluation of the potential impacts on bats was undertaken with reference to Chapter 6 of English Nature (2004) and Natural England Standing Advice¹, with predicted impacts to each feature noted as of 'low', 'medium' or 'high' significance.

3.6 Limitations

- 3.6.1 The presence/absence surveys reported herein were instructed on 9 August 2018 and carried out during August and September. The surveys were hence undertaken in accordance with the BCT's recommended timings for presence/absence surveys (Collins (ed.), 2016) and during the peak maternity period of May to August, with at least 14 days between each survey.
- 3.6.2 There were generally no difficulties in gaining access to the site to carry out the external/internal inspections or subsequent presence/absence surveys. However, the entrance gate was locked during the second survey of the farmhouse (B2) which led to a slightly delayed start. Weather conditions were generally good during the surveys and within acceptable parameters. Drizzle occurred on the 12 September survey but otherwise conditions were suitable and overall within acceptable parameters; bats were still flying during the surveys. There were no equipment malfunctions or other limitations of relevance to the methods applied.
- 3.6.3 See Appendix VIII for general Legal and Technical Limitations which apply to this document.

3.7 Personnel

- 3.7.1 Site surveys were led by Nick Pincombe BA(Hons) MSc CEnv MIEMA MCIEEM, director of Urban Edge Environmental Consulting, who has over ten years' experience in leading survey and impact assessment teams for a wide range of ecology and environmental planning projects. Nick holds Natural England Class Licences to survey for bats (WML-CL18) and great crested newt (WML-CL08).
- 3.7.2 Nick was assisted by: Becci Bond BSc(Hons) MCIEEM, Olly Edmonds BSc(Hons) MSc, Anna Douglas BSc(Hons) MSc GradCIEEM, and Adrian Price qCIEEM. Becci is a Senior Ecological Consultant with over seven years' experience in professional practice and extensive experience in surveying for bats and other taxa, and holds Natural England Class Licences to survey for dormouse (WML-CL10a) and great crested newt (WML-CL09). Olly is an ecologist with over five years' professional bat survey experience and holds Class Licence WML-CL17 for bats. Anna is a Graduate Ecologist who has three seasons' professional consultancy experience, has undertaken numerous bat surveys, holds Class Licence WML-CL08 for great crested newt and is currently working towards gaining a bat licence. Adrian has three seasons' professional bat survey experience, is a BCT registered bat carer and has assisted with a number of BCT NBMP surveys and hibernation counts for the Sussex Bat Group, and holds Class Licence WML-CL08 for great crested newt.

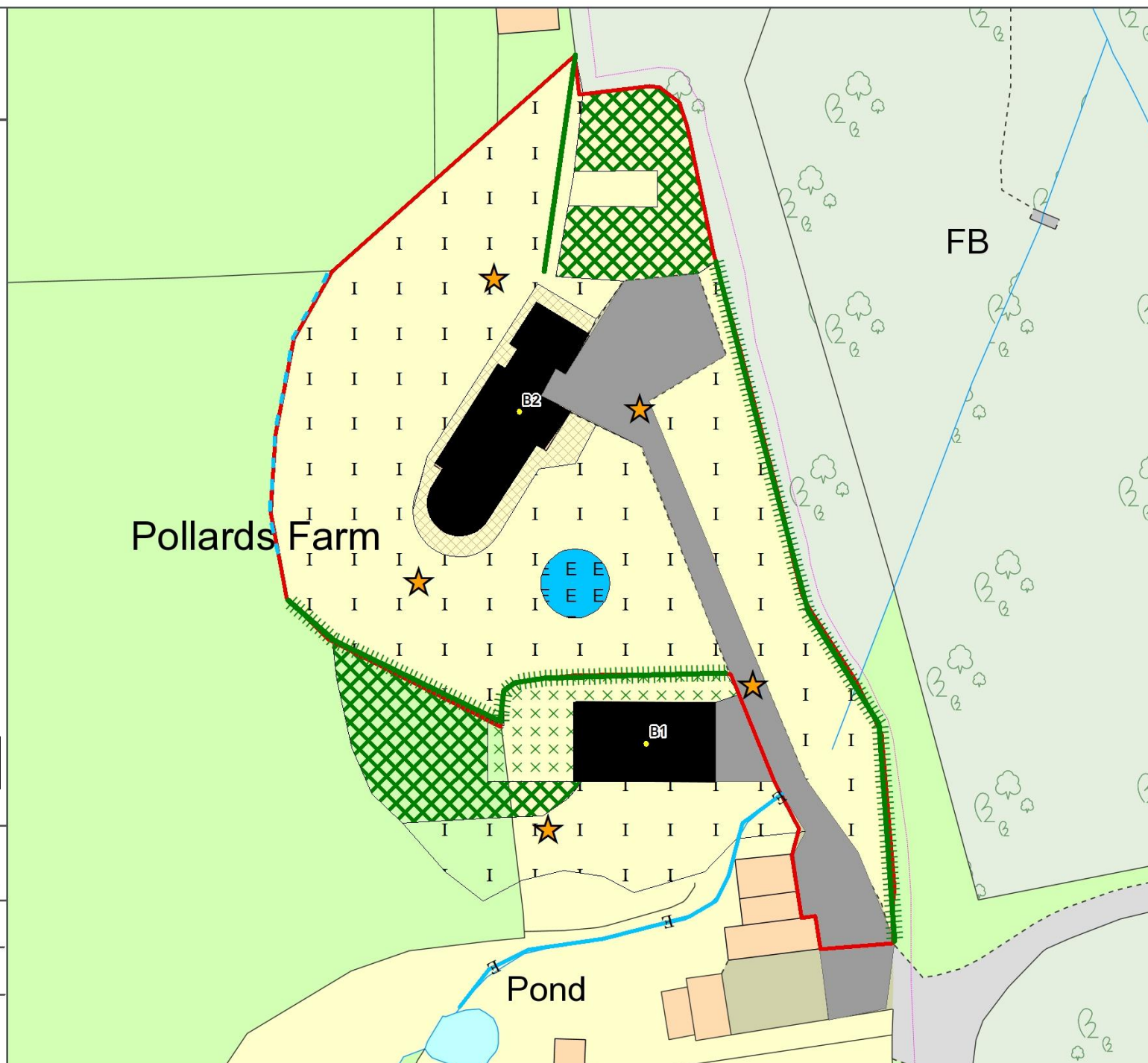
¹ Natural England (2015): *Bats: surveys and mitigation for development projects*. Accessed online [23/7/17] at: <https://www.gov.uk/guidance/bats-surveys-and-mitigation-for-development-projects>

Pollards Farm, Ditchling Common

-  Hard-standing
-  Dense scrub
-  Scattered scrub
-  Improved grassland
-  Eutrophic standing water
-  Introduced shrub
-  Building
-  Eutrophic running water
-  Spp-poor hedge
-  Spp-poor hedge w/ trees
-  Dry ditch
-  Survey area 2
-  Building numbers
-  Bat surveyor locations

Figure 3.1: Surveyor positions

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Ordnance Survey 0100031673



4 Results

4.1 Desk Study

- 4.1.1 SxBRC returned 146 records of eight species of bat from within 2km of the survey area, during a date range of 1983 to 2017, as summarised in Table 4.1. The closest record of roosting bats was of a pipistrelle maternity roost located c.450m south-west in 2014.

Table 4.1: Summary of bat records data within 2km of the site

Species	Protection
Serotine <i>Eptesicus serotinus</i>	Habs.Dir.Ax.4, CHS Sch.2, WCA Sch.5 full
Brandt's/whiskered <i>Myotis brandtii/mystacinus</i>	Habs.Dir.Ax.4, CHS Sch.2, WCA Sch.5 full
Daubenton's <i>Myotis daubentonii</i>	Habs.Dir.Ax.4, CHS Sch.2, WCA Sch.5 full
Natterer's <i>Myotis nattereri</i>	Habs.Dir.Ax.4, CHS Sch.2, WCA Sch.5 full
Noctule <i>Nyctalus noctula</i>	Habs.Dir.Ax.4, CHS Sch.2, WCA Sch.5 full, NERC s41
Common pipistrelle <i>Pipistrellus pipistrellus</i>	Habs.Dir.Ax.4, CHS Sch.2, WCA Sch.5 full
Soprano pipistrelle <i>Pipistrellus pygmaeus</i>	Habs.Dir.Ax.4, CHS Sch.2, WCA Sch.5 full, NERC s41
Brown long-eared <i>Plecotus auritus</i>	Habs.Dir.Ax.4, CHS Sch.2, WCA Sch.5 full, NERC s41

Habs.Dir.Ax.4

Habitats Directive 92/43/EEC Annex 4

CHS Sch.2

Conservation of Habitats & Species Regulations 2010 Schedule 2 (EPS animals)

WCA Sch.5 full

Wildlife and Countryside Act (1981), Schedule 5 (fully protected)

NERC s41

Natural Environment and Rural Communities (Act 2006) Section 41

- 4.1.2 A search of the MAGIC database for granted EPS mitigation licenses for bats within a 2km radius found three licenced sites, summary details of which are listed in Table 4.2.
- 4.1.3 There are eight SSSI and no SAC within 10km of the survey area. Bat populations do not feature among the notified features of any of the SSSI.

Table 4.2: Summary of granted EPS mitigation licences within 2km of the site

Case ref.	Location	Species affected & licensed actions	Start date	End date
2017-29042-EPS-MIT	c.1,515m south-west	Soprano pipistrelle <i>Destruction of a resting place</i>	16/05/2017	31/08/2017
2017-30502-EPS-MIT	c.1,550m north-east	Brown long-eared Common pipistrelle <i>Destruction of a breeding site</i> <i>Destruction of a resting place</i>	17/08/2017	11/08/2027
EPSM2009-	c.1,215m	Common pipistrelle	01/11/2010	01/11/2012

Case ref.	Location	Species affected & licensed actions	Start date	End date
1023	north-east	Brown long-eared Serotine <i>Destruction of a breeding site</i> <i>Destruction of a resting place</i>		

4.2 Preliminary Roost Assessment: Structures

Landscape setting

- 4.2.1 The improved grassland and scrub habitat within the survey area is unlikely to host an abundant invertebrate fauna and is considered to have low suitability as foraging habitat for bats, but the boundary hedgerows may serve as a navigation route or foraging feature for bats. However, the site is positioned in a rural area surrounded by large areas of favourable foraging habitat. The wider rural landscape is dominated by pasture, woodland and common land which provide features suitable for roosting, foraging and commuting bats. The presence of a building or structure within landscape of good potential value for bats increases the likelihood that it will be used by roosting bats.

The barn (B1)

- 4.2.2 Building B1 comprised a recently built, less than 50 years old, open sided wood panelled barn. Photos from the building inspection are presented at Appendix II.

Exterior

- 4.2.3 Building B1 had a corrugated bitumen panelled roof with a gentle pitch and was c.5m tall at the apex. The external condition of the barn was generally sound although there were occasional gaps in the weather boarding. To the south the barn was open sided, which provided access to the open sided roof void.

Interior

- 4.2.4 The roof void was very exposed due to its open face to the south. It had wood panelled faces at both gable ends. These were occasionally gappy and light could be seen filtering through the knot holes. The timbers were new and presented no access gaps for crevice dwelling bat species. Roof lining was not present and in areas the roofing material had been broken and had fallen into the roof space leaving large areas exposed. In some areas occasional cobwebbing present within the roof void. No signs of bats were present within the roof void, no droppings, urine staining, scratch marks or feeding remains were noted.
- 4.2.5 The lower internal barn space was used as a garage. It was enclosed and had windows to the westerly face. The ceiling and walls were mostly sound but had occasional peeling and some panels were damaged. The space appeared not to be water tight a there was a lot of water staining on the walls and ceiling. The area was cobwebbed and no signs of bats were found. Occasional rat or mouse droppings were scattered throughout.

- 4.2.6 The interior inspection of the barn found no evidence that it was being, or had recently been, used by roosting bats. The barn was of low potential for roosting bats, principally due to occasional gaps in the weather boarding.

The farmhouse (B2)

- 4.2.7 Building B2 was a two storey brick built dwelling, less than 50 years old, with a connected garage and conservatory. Photos from the building inspection are presented at Appendix II.

Exterior

- 4.2.8 The brick work to B2 was sound with no observable gaps or cracks in the mortar that could provide roosting opportunities for bats. The upper storey was clad in hanging clay tiles which were in a generally sound condition, although there were occasional slipped and missing tiles that could allow entry for crevice roosting bat species such as pipistrelles *Pipistrellus spp.*.
- 4.2.9 The pitched and hipped roof was tiled and in generally good condition, with a height of c.8m at the ridge. There were occasional gaps where lead flashing connected the wall to the conservatory and the roof to chimney. Lead flashing around the window features was generally sound however. The soffits were of uPVC type construction, tightly fitting and presented no gaps. Large downward-facing security lights were present at each of the four main corners.

Interior

- 4.2.10 The internal roof void was accessed through a hatch in the central corridor on the first floor. The internal space was open and consisted of two connected voids. The first second ran on a north-west to south-east alignment, with approximate internal dimensions of 8.8m length, 4.8m width and 2.5m ridge height. The second ran on a north-east to south-west alignment over the length of the house, with approximate internal dimensions of 7.9m length, 6.3m width and 2.5m ridge height. The beams were rough-hewn and in good condition, with no evident gaps between the joists. The roof lining was a textured plastic, in good condition with no light coming through at any point. A high degree of cobwebbing throughout the void suggested that bats had not recently used the void as a flight space. Although the void space was generally uncluttered, there was a water tank to the north-east of the entrance hatch, below the ridge beam, and cross beams protruded through the centre of the void.
- 4.2.11 A small number of bat droppings were found on top of the water tank, a mixture of mainly old and some fresher droppings were noted; see Appendix III. Around twenty droppings were found in total, scattered but primarily underneath the ridge beam. The size and shape were characteristic of pipistrelle, and long-eared *Plecotus spp.* bats. Occasional mouse droppings were also noted. A large inactive wasp nest was found towards the south west gable.
- 4.2.12 The interior inspection of B2 found that that building had previously been used by roosting bats. Overall B2 was considered to be of moderate potential for roosting bats, principally due to occasional gaps beneath the hanging tiles and lifted lead flashing.

4.3 Presence/Absence Surveys

- 4.3.1 One dawn re-entry survey of the barn (B1) was carried out on 31 August 2018.
- 4.3.2 Three surveys of the farm house (B2) were carried out, one dusk emergence survey on 15 August and two dawn re-entry surveys on 29 August and 12 September 2018. Elevation drawings illustrating the points of emerging and re-entering bats recorded at the site are shown at Appendix III. Full survey results are detailed in Appendix IV while sample sonograms recorded at the site are given at Appendix V.

Barn (B1) Survey: Dawn on 31 August 2018

- 4.3.3 Sunrise on 31 August was at 06.11 and the survey started at 04.25. No bats were recorded re-entering the building during the survey.
- 4.3.4 During this survey very low levels of foraging and commuting activity were recorded within and around the survey area by both surveyors, with only four calls being recorded during the whole survey. This was principally common pipistrelle *Pipistrellus pipistrellus* activity, but included one soprano pipistrelle *P. pygmaeus* call. The first bat recorded was a common pipistrelle at 05.14 and the last bat recorded was also a common pipistrelle at 05.27, 44 minutes before sunrise.

Farmhouse (B2) Survey 1: Dusk on 15 August 2018

- 4.3.5 Sunset on 15 August was at 20.22 and the survey started at 20.05. Five common pipistrelles were recorded emerging from the building. The first common pipistrelle emerged from a roost at the south eastern aspect (front) of B2 at 20:34, before flying north east towards the hedgerow and offsite woodland. The point of emergence was uncertain but suspected to be from beneath a hanging tile close to the roof. The second emerged from a roost at the south west corner of the building at 20.36 before flying north-west towards a complex of hedgerows. The point of emergence was from the join of the soffit on the south elevation with the hip of the roof on the west elevation. The third and fourth emerged at 20.40 from hanging tiles just below the soffit on the south (side) elevation, either side of the chimney, the third bat flew east and then north towards the hedgerow and the fourth bat flew west towards further hedgerows. The fifth emerged from a roost at same spot as the first bat on the south eastern aspect (front) at 20.42, suspected to be from beneath a hanging tile, before flying north east towards the hedgerow.
- 4.3.6 Moderate levels of foraging, social and commuting activity were recorded within the site by all three surveyors during the survey. This was principally common pipistrelle activity, but included occasional brown long-eared *Plecotus auritus* bat activity, and one call each from serotine *Eptesicus serotinus* and soprano pipistrelle bats. Bat activity was recorded frequently from 20.34 to 21.10, and then occasionally until the survey ended at 22.05. The first bat recorded was a common pipistrelle at 20.34 (emergence at 12 minutes after sunset) and the last bat was also a common pipistrelle at 21.50.

Farmhouse (B2) Survey 2: Dawn on 29 August 2018

- 4.3.7 Sunrise on 29 August was at 06.08 and the survey started at 04.38, seven minutes later than planned due to a locked gate. One common pipistrelle bat was recorded re-entering a roost

on the south elevation at 05.50, having flown quickly along the west (rear) elevation. No swarming behaviour was observed and the re-entry was very swift, the access point being located beneath a hanging tile slightly above the western side of the conservatory roof.

- 4.3.8 Low levels of foraging and commuting activity were recorded within the site by all three surveyors. This was mainly common pipistrelle activity but included three brown long-eared bat calls. The first bat recorded was a brown long-eared bat at 04.49 and the last bat recorded was a common pipistrelle (re-entry) at 05.50, 18 minutes before sunrise.

Farmhouse (B2) Survey 3: Dawn on 12 September 2018

- 4.3.9 Sunrise on 12 September was at 06.29 and the survey started at 04.45. Two common pipistrelle bats were recorded re-entering the building. The first re-entered a roost on the south elevation at 05.32, the access point being located beneath a hanging tile close to the soffit. The second also re-entered a roost on the south elevation, at 06.11, the access point being located in an area of missing mortar on the southern edge of the west-facing roof.
- 4.3.10 Low levels of foraging and commuting activity were recorded within the site. Other than the roosting common pipistrelles, further common pipistrelle and soprano pipistrelle were recorded by all surveyors. The first bat recorded was a common pipistrelle at 05.09 and the last bat recorded was the roosting common pipistrelle at 06.11 (re-entry), 18 minutes before sunrise.



Survey 1 (B2): Point of emergence, one at 20.34 and one at 20.42 on 15 August (south east aspect, common pipistrelle x 2).



Survey 1 (B2): Point of emergence at 21.36 on 15 August (south west aspect, west corner, common pipistrelle x 1)



Survey 1 (B2): Point of emergence at 20.40 on 15 August (south elevation common pipistrelle x 1); and Survey 2 (B2): Point of re-entry at 05.32 on 12 September (south elevation common pipistrelle x 1)



Survey 1 (B2): Point of emergence at 20.40 on 15 August (south elevation, common pipistrelle x 1).



Survey 2 (B2): Point of re-entry at 05.50 on 29 August (south elevation, common pipistrelle x 1)



Survey 3 (B2): Point of re-entry at 06.11 on 12 September (missing mortar on edge of roof on south elevation, common pipistrelle x1).

5 Evaluation

5.1 Introduction

- 5.1.1 This chapter presents an evaluation of survey results and an assessment of likely impacts to roosting bats as a result of the development proposals, before making recommendations for avoidance, mitigation, enhancement or compensatory measures.

5.2 Presence or Absence of Bats

- 5.2.1 The survey results provide a good level of confidence that low numbers of common pipistrelle bats used the farmhouse (building B2) within the application site as a day roost during the summer months in 2018. All six of the pipistrelle roost locations are considered to be occasionally used, four of them having been used on one occasion during the surveys, and two used on two occasions. There is also evidence of past use of B2's roof void by brown long-eared bats, in the form of droppings observed in April 2018. It is not possible to reliably age bat droppings but they were not very fresh and the low number of droppings observed indicate exploratory use of the void by a single or low number of bats. No brown long-eared bats were recorded emerging from or re-entering B2.
- 5.2.2 No bats were recorded using B1 and they are likely to have been absent from this structure in 2018. Surveys were carried out at an appropriate time of year and weather conditions were within acceptable parameters. The results are therefore considered to provide an accurate account of the bat roost status of B1 and B2.

5.3 Species Assemblage

- 5.3.1 Species diversity recorded during the bat surveys was limited to two species. Their local and national conservation status is listed in Table 5.1 (BCT, 2010; Mathews *et al.*, 2018; Russ, 2012; Sussex Bat Group²). Both species have previously been recorded within 2km of the site, as confirmed during the desk study stage.

Table 5.1: Status of recorded bat species (abundance and distribution)

Species	Sussex abundance/distribution	UK abundance/distribution	UK status
Common pipistrelle	Abundant, widespread	Widespread, abundant	Least concern
Brown long-eared	Relatively abundant, widespread	Widespread, relatively abundant	Least concern

² Sussex Bat Group website: Bats in Sussex. Accessed online [11/7/18] at: <http://www.sussexbatgroup.org.uk/batsinsussex>

5.4 Population Size Class Assessment

5.4.1 Table 5.2 sets out a population size class assessment for each of the bat species using building B1 within the application site.

Table 5.2: Population size class assessment

Data	Common pipistrelle	Brown long-eared
Number of droppings	<10	<20
Pattern/extent of droppings	Scattered in roof void of B2	Mainly below ridge beam of B2 and on water tank
Pattern/extent of feeding remains	n/a	n/a
Number of bats counted in roost	0	0
Positions of bats in roost	▪ Hanging tiles close to soffit between windows on east (front) elevation (x2) ▪ Join of soffit on south (side) elevation with hip of roof on west (rear) elevation (x1) ▪ Hanging tiles close to soffit on south (side) elevation, left side of the chimney (x2) ▪ Hanging tiles close to soffit on south (side) elevation, right side of the chimney (x1) ▪ Hanging tile on south (side) elevation, slightly above west side of conservatory roof (x1) ▪ Missing mortar on south (side elevation) edge of the west-facing roof (x1)	n/a
Number of bat registrations*	8	0
Maximum count of bats per survey	5	0
Roost status	6x occasionally used summer day roosts for low numbers	Inactive (historical exploratory roost)
Species rarity	Abundant	Relatively abundant
Conservation significance	Low	Low

* Registrations are instances of emerging from or re-entering the roost

5.5 Impact Assessment

Designated sites

- 5.5.1 No impacts to designated sites notified for their bat populations are predicted.

Roosts – buildings/structures

- 5.5.2 The proposed works include the following activities which are likely to affect bats and their roosts:

- ▶ Demolition of the existing conservatory extension to building B2, including removal of hanging tiles on the south-west (side) elevation;
- ▶ Construction of a new two-storey side extension in its place, including extending the existing roof to the south-west; and
- ▶ Replacing and adjusting the position of windows on the ground and first floors, including on the south-east (front) elevation.

Short-term impacts

- 5.5.3 Works to building B2 are likely to result in the following short-term impacts unless mitigated:

- ▶ Disturbance to low numbers of one common species of bat if present during the works;
- ▶ Risk of killing or injury to low numbers of one common species of bat if present during the works.

- 5.5.4 Any works planned to building B1 are not likely to result in impacts through disturbance, killing or injury.

Long-term impacts

- 5.5.5 Unless mitigated, works to building B2 will result in the following long-term impacts. The significance of roost loss impacts is predicted for each species with reference to Natural England (2016³) taking into account their recorded abundance and frequency within the application site, and rarity in a local context.

- ▶ Low to medium significance impact from permanent loss of 6 summer day roosts occasionally used by low numbers of common pipistrelle bats; and
- ▶ Low significance impact from temporary damage of 1 inactive roost previously used by low numbers of brown-long-eared bats.

- 5.5.6 Any works planned to building B1 are not likely to result in roost loss impacts.

³ Natural England (2016): *Standing Advice: Bats: surveys and mitigation for development projects*. Accessed online [11/7/18] at: <https://www.gov.uk/guidance/bats-surveys-and-mitigation-for-development-projects>

Foraging and commuting habitats

- 5.5.7 The site as a whole provides habitat suitable for foraging and commuting bats, including areas of open grassland, a pond, scrub and hedgerows. Low to moderate levels of foraging activity were recorded. However, the works proposed are focused on the footprint of the existing building and other habitats within the site are expected to be retained in their current condition. Development is unlikely to result in an increase in human activity and external lighting as the proposal is for a householder extension to an existing dwelling.

Summary

- 5.5.8 In conclusion, if unmitigated, the proposed extension to the farmhouse (B2) will result in a short-term risk of killing, injury or disturbance to low numbers of common pipistrelle bats. The development will also result in low to medium significance impacts from the permanent loss of six summer day roosts occasionally used by low numbers of common pipistrelle, and low significance impacts from the temporary damage of one inactive roost previously used by low numbers of brown-long-eared bats. These impacts will require mitigation but are not considered to be detrimental to maintaining the local populations of common pipistrelle and brown-long-eared bats at a favourable conservation status within their natural range.

5.6 Recommendations for Avoidance, Mitigation and Compensation of Impacts

- 5.6.1 A mitigation strategy is required to (a) remove or reduce the likelihood of damage to bats or their habitats, and (b) offset the damage caused by development through compensation. The aim is to achieve both the avoidance of harm to individual bats and compensation for loss of suitable habitat or connectivity, thereby ensuring the local conservation status of the species is maintained.

European Protected Species Mitigation Licence

- 5.6.2 A European Protected Species Mitigation (EPSM) licence will need to be obtained from Natural England prior to commencing the works. A mitigation Method Statement will form part of the licence application and will specify precautionary working methods, mitigation and compensation of lost habitats, based on the recommendations outlined below.

Risk of killing, injury or disturbance

- 5.6.3 Other than the roof voids and external cladding (which are likely to be subject to rapid temperature fluctuations during winter), no significant voids or cavities (e.g. cellars) suitable for hibernation were noted. The possibility nonetheless exists that bats could be present in small numbers during the winter months as common pipistrelle and brown-long-eared bats are known to use buildings for hibernation (Collins, 2016; English Nature, 2004).
- 5.6.4 As there was no evidence of a maternity roost, in order to avoid the risk of killing, injury or disturbance to individual bats, it is recommended that works to building B2 are carried out between April and October. This scheduling of construction activities will remove the low risk that hibernating bats are present.

5.6.5 An outline of the precautionary working methods to be followed under the EPSM licence is given below:

- ▶ **Appointment of Ecological Clerk of Works:** A named Ecological Clerk of Works (ECoW) who is licenced by Natural England will be appointed to oversee operations which could negatively affect bats and other ecological features of value.
- ▶ **Timing of the works:** Works to the roof or hanging tiles on building B2 will be carried out between April and October, i.e. during the period in which hibernating bats are least likely to be present.
- ▶ **Creation of temporary replacement habitats:** Prior to any works to the roof or hanging tiles on building B2, three bat boxes will be installed on nearby mature trees which are to be retained. These will provide a safe refuge for any bats which are found and moved during the works; 1no. Schwegler 2F and 2no. 1FF bat boxes (or another manufacturer's equivalent) will be suitable.
- ▶ **Pre-commencement return-to-roost survey:** Prior to any works to the roof or hanging tiles on building B2, a dawn return-to-roost survey will be carried out on the day works are scheduled to commence unless weather conditions are such that bats are very unlikely to be active. This will allow particular attention to be paid by the ECoW to any part of the structure known to contain a bat.
- ▶ **Toolbox talks:** All site operatives will receive a briefing from the ECoW to explain the legal protection for bats, the precautionary methods to be followed, tips on identifying bats, and the procedure to be followed should a bat be found at any stage during the works.
- ▶ **Supervised roof strip:** Works to remove the roof and hanging tiles of building B2 will take the form of a 'soft-strip' using hand tools only, under the supervision of an ecologist licenced to handle bats. Particular attention will be paid to the roost locations listed in Table 5.2 and any other part of the structure known to contain a bat as a result of the pre-commencement survey. If any bats are found during the roof strip, they will be captured and safely relocated into the pre-installed bat boxes by the supervising ecologist.
- ▶ **Procedure if bats are encountered:** If bats are found within the construction zone during subsequent works, site operatives will be advised to cease activity in its vicinity while advice from the ECoW is sought. The ECoW will then assess the most appropriate course of action which may include removing the individual(s) from the site and moving it to a pre-installed bat box or nearby area of suitable habitat outside of the construction zone.
- ▶ **Great crested newts:** A great crested newt (GCN) *Triturus cristatus* survey found a small population in a pond c.215m north of the application site, and there is a low risk that GCN may be present within hibernation habitats on site. This resulted in recommendations for vegetation clearance and site preparation works to be carried out during the active season for GCN (normally between February and October). This is compatible with the timing recommended above for works to remove the roof and hanging tiles on B2, however, each mitigation strategy will need to take account of the other.

- ▶ **Nesting birds:** As a result of the precautionary timing outlined above, it is possible that the work will be carried out during the nesting bird season which runs from early March to late August. If vegetation clearance or building alteration is required during the nesting season, a survey for active bird nests will be carried out by the ECoW immediately prior to the works. If an active nest is found, the nest must be cordoned off and works adjacent to this nest must be delayed until such time that the chicks have fledged.
- ▶ **Commencement of construction works:** Once the supervised roof strip is complete it is likely that no bats will be present within building B2 and subsequent works can commence.

5.6.6 It should be noted that the above bullets are indicative and that the mitigation strategy will be finalised following consultation with Natural England prior to an EPSM licence being issued. The current report is based on one emergence survey and two return-to-roost surveys during the 2018 active season. If an EPSM licence is not obtained within 12 months of the date of these surveys (i.e. by September 2019), updated active season surveys may be required to confirm the status of the roost and identify any changes which may have occurred in the interim.

Roost loss – buildings/structures

- 5.6.7 The permanent loss of six summer day roosts occasionally used by low numbers of common pipistrelle (and temporary damage to an inactive brown-long-eared bat roost) is unavoidable if the scheme is to proceed as planned. Compensatory measures are required to ensure there is no net loss of roosting habitats and to enable the recorded bat population to persist in the long-term.
- 5.6.8 The following measures are recommended in order to re-provide equivalent roosting features following construction. General considerations for installation of bat roosts are listed in Boxes 3 and 4 below, while bat box specifications are listed at Appendix VI.

Crevice-roosting bats

- 5.6.9 The new south-westerly (side) elevation of building B2's extension would be suitable for installation of roost features, as this would create roosting features similar to those used by the common pipistrelle bats recorded at the site. It is recommended that the following replacement roosting habitat features are installed at a height of c.6m in similar positions to the existing roosts. Further details on the specification of these and alternative systems can be found in Gunnell *et al.*, 2013. The precise number, type and location of features to be installed will be agreed as part of the EPSM licence:
- ▶ South west aspect: 2no. Ibstock Enclosed Bat Box: provides a self-contained bat box with a range of roosting zones, integrated within the exterior wall; OR
 - ▶ South west aspect: 2no. Schwegler Bat Tube 1FR: provides a self-contained bat box, integrated within the exterior wall.

5.6.10 Indicative locations for replacement bat roost features are marked on Figure 5.1.



South East Elevation



South West Elevation

LEGEND:

- ★ Bat box/tube
- ✚ Bat access tile (x1 to front, x1 to rear)

Figure 5.1: Proposed locations of compensatory roost features

Brown long-eared bats

- 5.6.11 No brown long-eared bats were recorded emerging or re-entering the building during the surveys and it is concluded that the roof void is an inactive roost (historical exploratory use). However, brown long-eareds were recorded in the gardens on eight occasions. In order to ensure the species is able to continue to roost on in the building following construction the following is recommended:

- ▶ 2no. Habibat Bat Access Tile to be installed in the existing roof on the south-west and south-east pitches: to provide an access for bats to crawl behind the tiles into the batten cavity and, by creating an aperture in the underlay, into the roof space.

Artificial lighting

- 5.6.12 To minimise the general risk of disturbance to roosting, foraging and commuting bats on and around the site during and after construction, it is recommended that the following lighting precautions are considered during the detailed design stage (Gunnell *et al.*, 2012; Gunnell *et al.*, 2013):

- ▶ Lighting should be appropriately located and directed to avoid illuminating newly created bat roosts and retained mature trees and hedgerows to the site boundaries, in particular along the east and west boundaries;
- ▶ Security lighting should be kept to the minimum necessary for its intended purpose, be set on short timers, and be sensitive to large moving objects only;
- ▶ Other lighting around the site should be kept to the minimal feasible lux level, illuminated only when it is being used, installed on lighting columns at the lowest practical height level, and designed to minimise spill. Eliminate bare bulbs and upward-pointing lights, and increase the spacing between lanterns. The spread of light should be kept near to or below the horizontal. Flat cut-off lanterns or accessories should be used to shield or direct light to where it is required.
- ▶ For pedestrian lighting, use low-level lighting (e.g. light bollards) that is as directional as possible. It should be below 3 lux at ground level, and ideally below 1 lux.
- ▶ Use narrow-spectrum bulbs to lower the range of species affected by lighting. Use light sources that emit minimal UV light and avoid the white and blue wavelengths of the light spectrum so as not to attract high numbers of invertebrates. Lights should peak higher than 550nm or use glass lantern covers to filter UV light. White LED lights do not emit UV, but they have still been shown to disturb slow-flying bat species.

Monitoring

- 5.6.13 It is recommended that a programme of monitoring is prepared and agreed within the EPSM licence to monitor the success of mitigation and compensatory habitats during at least one active season following completion of the works. Monitoring should aim to:
- ▶ Use equivalent methods to those described in this report;
 - ▶ Confirm whether target species are using the replacement habitats;

- ▶ Monitor any significant changes in species abundance (including non-target species); and
- ▶ Assess the efficacy of compensatory and enhancement measures.

5.7 Recommendations for Ecological Enhancement

- 5.7.1 The following ecological enhancements could be considered to improve the overall value of the site for bats post-construction.
- 5.7.2 It is recommended that new botanical species planting at the site should aim to encourage a diverse range of invertebrate food sources and increased bat roost potential. The table at Appendix VII lists suggested species of plants that can provide benefit for bats either by providing a food source for insects on which bats feed, or providing additional roosting opportunities (Gunnell *et al.*, 2012). The plants species are predominantly native to Britain, but not all species will be suitable in all situations.

Box 3: Considerations & key requirements for crevice-dwelling bats (after Gunnell *et al.*, 2013)

Species	Barbastelle, serotine, Bechstein's, Brandt's, Daubenton's, whiskered, noctule, Leisler's, pipistrelles (common, soprano & Nathusius')
Consideration	Solution
Where in a development	Anywhere that the access is not illuminated by artificial lighting If possible they should be installed facing vegetation features such as mature hedgerows or trees, but with a clear line of flight for bats entering or leaving the roost
Where in a building	Summer maternity roosts in most southerly or westerly aspect for solar heating, or in a location that provides thermal stability Male roosts and winter hibernation roosts on northerly aspect
Height	2m–7m, preferably >4m above ground level
Dimensions	Any size as long as some components of the area are crevices of c.20-30mm wide Total area of >c.1m ² would be useful for summer maternity roosting Male roosts contain a smaller number of individual bats
Access dimensions	20mm–50mm (w) x 15mm–20mm (h)
Other considerations	Rough interior surface (for grip) Non-toxic and non-corrosive materials Absence of breathable roofing membranes to avoid the risk of entanglement Suitable thermal properties (reducing 24hr fluctuations), providing stability but allowing maximum thermal gain for summer roosts The use of thermal insulation materials for maternity roosts should be carefully considered in relation to other desired properties e.g. energy efficiency

Box 4: Considerations & key requirements for bats needing flight space (after Gunnell, 2013)	
Species	Natterer's, brown long-eared, grey long-eared
Consideration	Solution
Where in a development	Anywhere that the access is not illuminated by artificial lighting Internal flight space should also be kept dark
Where in a building	The crevice roosting provision within the roost is to be located on the south or west side for solar heating, or a suitable location that ensures thermal stability The location of the flight area is not as important
Height	>2m above ground level
Flight area	5m (w) x 5m (d) x 2.8m (h), not trussed Ideally 2.8m height, but a height of 2m may be acceptable
Roost dimensions	Any size as long as some components of the area are crevices of c.20-30mm wide Total area of >c.1m ² would be useful for summer maternity roosting Male roosts contain a smaller number of individual bats
Access dimensions	20mm–50mm (w) x 15mm–20mm (h)
Other considerations	Rough interior surface (for grip) Non-toxic and non-corrosive materials Absence of breathable roofing membranes to avoid the risk of entanglement Suitable thermal properties (reducing 24hr fluctuations), providing stability but allowing maximum thermal gain for summer roosts The use of thermal insulation materials for maternity roosts should be carefully considered in relation to other desired properties e.g. energy efficiency

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6 Summary and Conclusions

6.1 Introduction

- 6.1.1 A bat survey was carried out for the site of a proposed residential redevelopment at Land at Pollards Farm, Ditchling Common, West Sussex.
- 6.1.2 The study was undertaken to establish the presence or likely absence of bats using potential roosts within the site, identify and evaluate potential impacts of the development on roosting bats, and make recommendations accordingly. Two return-to-roost surveys and one emergence survey of building B2 were undertaken in August and September 2018 with reference to current industry guidelines (Collins (ed.), 2016). One emergence survey of building B1 was undertaken in August 2018. The surveys were supplemented by an internal/external inspection of structures to assess their suitability for roosting bats.

6.2 Results

- 6.2.1 The desk study data search returned 146 records of eight species of bat from within 2km of the survey area, during a date range of 1983 to 2017. The closest record of roosting bats was of a pipistrelle maternity roost located c.450m south-west in 2014. A search of the MAGIC database for granted mitigation licenses for bats within a 2km radius found three licenced sites. There are no designated sites notified for important populations of bats within 10km of the survey area.
- 6.2.2 The internal/external inspections concluded that the barn (B1) was of low suitability for roosting bats due to its form and limited availability of exploitable features. No signs of bats (droppings, urine staining, scratch marks or feeding remains) were present within the building.
- 6.2.3 The internal/external inspections concluded that the farmhouse (B2) was of moderate suitability for bats. A small number of bat droppings were found, these were of a size and shape characteristic of pipistrelle, and long-eared bats, and confirm B2 has been used as a roost. Although generally well-maintained, B2 presented a number of features suitable for roosting bats including missing and slipped hanging tiles, small sections of lifted lead flashing and a large and relatively uncluttered roof void.
- 6.2.4 One dawn re-entry survey of the barn (B1) was carried out on 31 August 2018. No bats were recorded re-entering the barn during the survey.
- 6.2.5 Three surveys of the house (B2) were carried out, one dusk emergence survey on 15 August 2018 and two dawn re-entry surveys on 29 August and 12 September 2018.
- 6.2.6 During the first survey of B2, five common pipistrelle were recorded emerging from the building. The first common pipistrelle emerged from a roost at the south eastern aspect (front)

of B2 at 20:34, before flying north east towards the hedgerow and offsite woodland. The point of emergence was uncertain but suspected to be from beneath a hanging tile close to the roof. The second emerged from a roost at the south west corner of the building at 20.36 before flying north-west towards a complex of hedgerows. The point of emergence was from the join of the soffit on the south elevation with the hip of the roof on the west elevation. The third and fourth emerged at 20.40 from hanging tiles just below the soffit on the south (side) elevation, either side of the chimney, the third bat flew east and then north towards the hedgerow and the fourth bat flew west towards further hedgerows. The fifth emerged from a roost at same spot as the first bat on the south eastern aspect (front) at 20.42, suspected to be from beneath a hanging tile, before flying north east towards the hedgerow.

- 6.2.7 During the second survey of B2, one common pipistrelle bat was recorded re-entering a roost on the south elevation at 05.50, having flown quickly along the west (rear) elevation. No swarming behaviour was observed and the re-entry was very swift, the access point being located beneath a hanging tile slightly above the western side of the conservatory roof.
- 6.2.8 During the third survey of B2, two common pipistrelle bats were recorded re-entering the building. The first re-entered a roost on the south elevation at 05.32, the access point being located beneath a hanging tile close to the soffit. The second also re-entered a roost on the south elevation, at 06.11, the access point being located in an area of missing mortar on the southern edge of the west-facing roof.
- 6.2.9 Low to moderate levels of foraging and commuting activity were observed within and around the site. This was principally common pipistrelle activity, but included occasional brown long-eared and soprano pipistrelle bats, and one serotine.

6.3 Evaluation

- 6.3.1 The survey results provide a good level of confidence that the following species and types of roost were present within the house (B2) in 2018:
- ▶ Common pipistrelle: six occasionally used summer day roosts for low numbers of bats; and,
 - ▶ Brown long-eared: Inactive roost (historical exploratory use).
- 6.3.2 Both species are widespread and at least relatively abundant in Sussex, and both have previously been recorded within 2km of the site.
- 6.3.3 No bats were recorded using B1 and they are likely to have been absent from this structure in 2018.
- 6.3.4 In summary, if unmitigated, the proposed extension to the farmhouse (B2) will result in a short-term risk of killing, injury or disturbance to low numbers of common pipistrelle bats. The development will also result in low to medium significance impacts from the permanent loss of six summer day roosts occasionally used by low numbers of common pipistrelle, and low significance impacts from the temporary damage of one inactive roost previously used by low numbers of brown-long-eared bats. These impacts will require mitigation but are not

considered to be detrimental to maintaining the local populations of common pipistrelle and brown-long-eared bats at a favourable conservation status within their natural range.

6.4 Recommendations

6.4.1 A mitigation strategy is required to (a) remove or reduce the likelihood of damage to bats or their habitats, and (b) offset the damage caused by development through compensation. Mitigation should be implemented in accordance with an agreed Method Statement which will form part of a Natural England European Protected Species Mitigation (EPSM) Licence. The following bullets provide an indicative outline of what is likely to be necessary:

- ▶ Appointment of a licenced Ecological Clerk of Works (ECoW) to oversee mitigation and construction works;
- ▶ Timing works to the roof or hanging tiles on building B2 to occur between April and October , i.e. during the period in which hibernating bats are least likely to be present;
- ▶ Creation of temporary replacement habitats to provide a safe refuge for any bats which are found and moved during the works;
- ▶ A pre-commencement return-to-roost survey;
- ▶ Provision of information and toolbox talks to guide site operatives;
- ▶ Supervised roof strip to ensure any bats found can be captured and safely relocated into the pre-installed bat boxes;
- ▶ Specified procedures should bats be encountered during the works;
- ▶ Adjustments to be made to account for great crested newts and nesting birds, if necessary;
- ▶ Commencement of construction once the supervised roof strip is complete; and
- ▶ Compensation of habitats lost as a result of development.

6.4.2 To minimise the general risk of disturbance to roosting, foraging and commuting bats on and around the site during and after construction, lighting precautions are recommended for consideration during the detailed design stage.

6.4.3 In addition, a range of ecological enhancements are recommended to improve the overall value of the site for bats post-construction.

6.5 Conclusions

6.5.1 The proposed development will result in negative impacts to low numbers of individuals of two species of bat, however, detrimental effects on the conservation status of these species are not predicted. Mitigation and compensatory methods are recommended to reduce and offset the predicted impacts on a proportionate basis.

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Appendix I: Phase 1 Habitats Map

Please see insert.

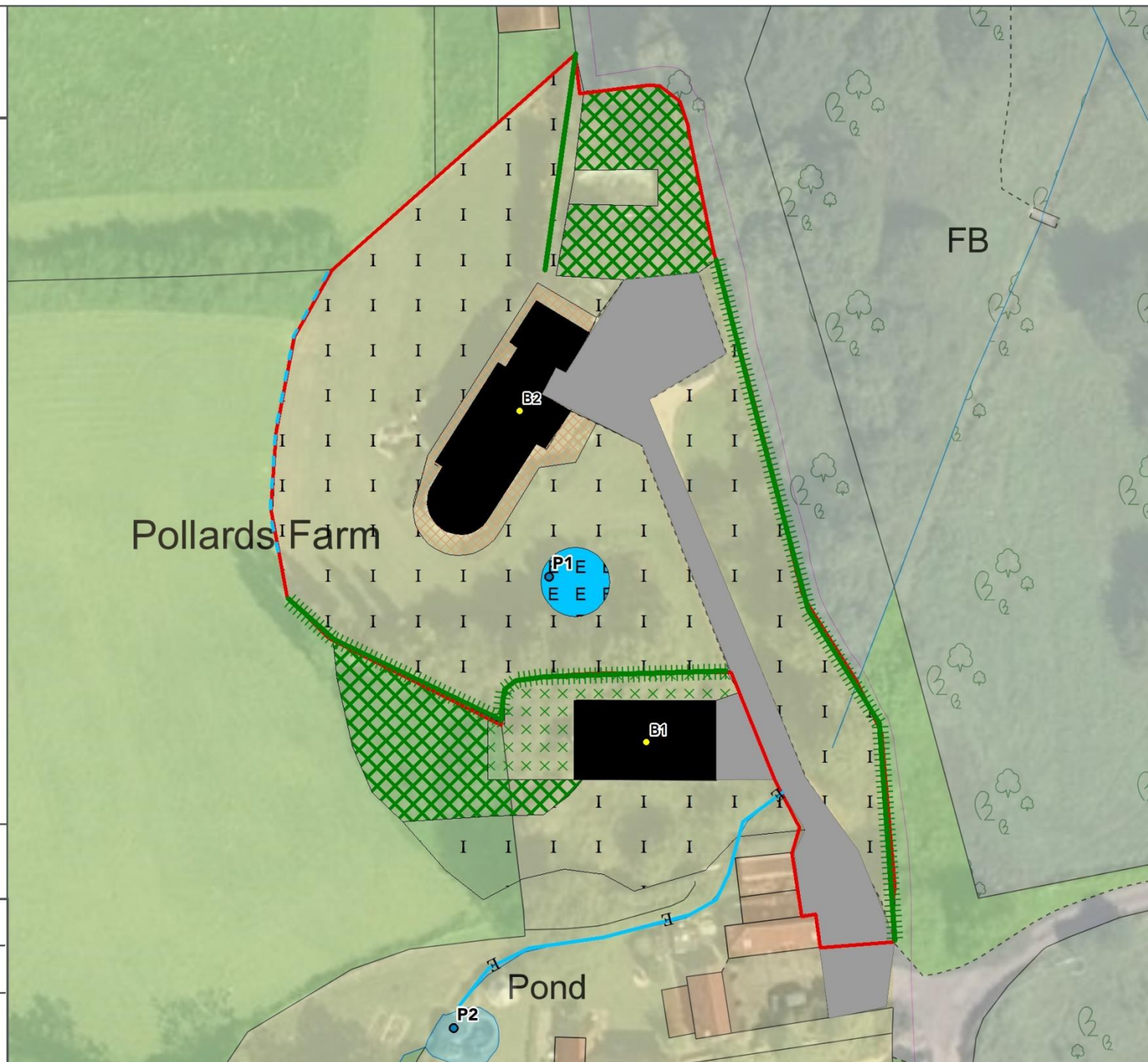
Pollards Farm, Ditchling Common

-  Hard-standing
-  Dense scrub
-  Scattered scrub
-  Improved grassland
-  Eutrophic standing water
-  Introduced shrub
-  Building
-  Eutrophic running water
-  Spp-poor hedge
-  Spp-poor hedge w/ trees
-  Dry ditch
-  Survey area 2
-  Pond numbers
-  Building numbers



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Business Centre
Brighton
BN2 4QN

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Created by NP	Reviewed by NP
Drawing number UE0263ECO-Phase1_2_180713	



Appendix II: Photographic Record

Building B1: the barn



Exterior view, open sided to the south



North face of the barn, sound construction



Exposed south face of roof void



Eastern face of building, gaps in weather boarding



Exposed timbers, tightly fitting



Broken roof panelling



Internal space, peeling ceiling panels, light



Windows and boarding tightly fitting to the west face

Building B2: the farmhouse



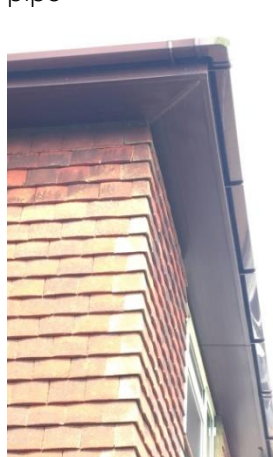
Main house, with associated shrub borders



Tightly fitting lead flashing to the window, drainage pipe



Lifted lead flashing at chimney join with conservatory



Tightly fitting soffits, no gaps



Many hanging tiles in good condition



Occasional missing hanging tiles



Brickwork in good condition



Garage in good condition, no access points for bats



Rough timber beams



South east void



Tightly fitting lining



Non cluttered space



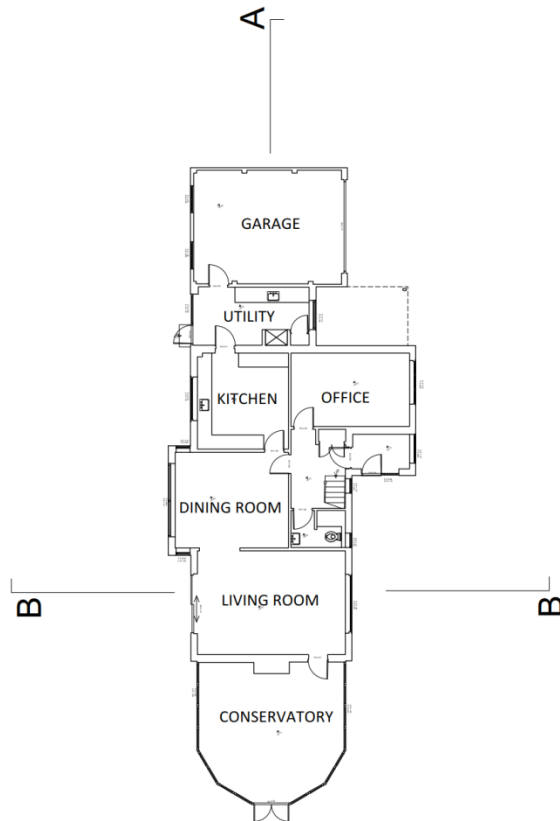
Internal flight space, some cross beams



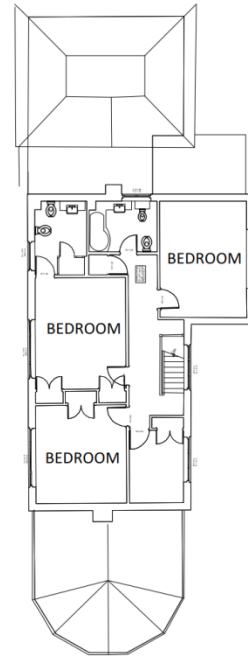
Bat droppings on top of water tank

Appendix III: Bat Activity Plans

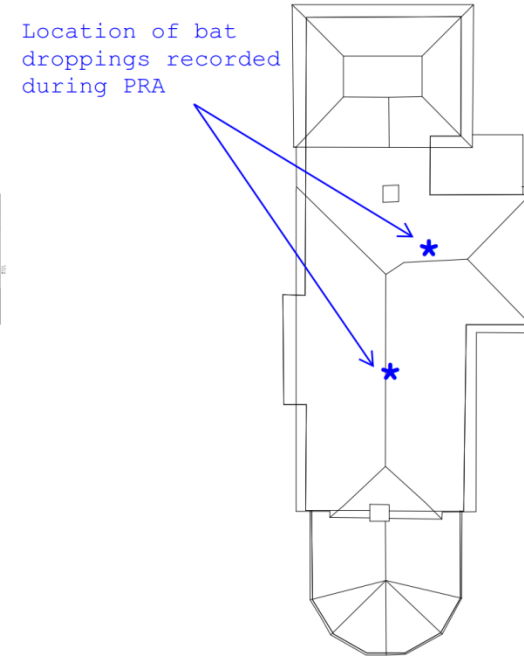
Please see following pages.



3 Ground Floor Plan
Scale: 1:200



4 First Floor Plan
Scale: 1:200



5 Roof Plan
Scale: 1:200

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xx/xx/2017	
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Checked

mj



Dwg No. 17048-P-010

Drawing Title Existing Plans
Address Pollards Farm, Ditchling Common
Client Patagonia Properties
Scale 1:200@A3
Stage Planning
Drawn by JB
Checked by NS



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3 dorset place, brighton BN2 1ST
e: studio@zsta.co.uk, t: 01273 964051
Company registered in England No. 07959806
www.zsta.co.uk

PIPI emerged 20.34 on 15/8/18

PIPI emerged 20.42 on 15/8/18

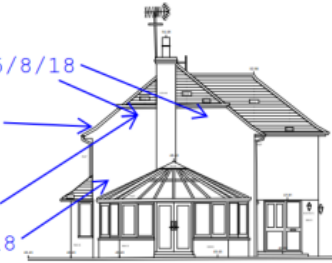


2x PIPI emerged 20.40 on 15/8/18

PIPI re-entered
06.11 on 12/9/18

PIPI re-entered
05.32 on 12/9/18

PIPI re-entered 05.50 on 29/8/18



6

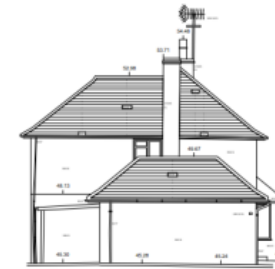
Existing Front Elevation
Scale: 1:200

9

Existing Rear Elevation
Scale: 1:200



PIPI emerged 20.36 on 15/8/18



7

Existing Rear Elevation
Scale: 1:200

10

Existing Rear Elevation
Scale: 1:200



8

Existing Rear Elevation
Scale: 1:200

11

Existing Rear Elevation
Scale: 1:200

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Dwg No.

17048-P-011

Drawing Title

Existing Elevations & Sections

Address

Pollards Farm, Ditchling Common

Client

Patagonia Properties

Scale

1:100@A3

Stage

Planning

Drawn by

JB

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Zinzan Stickland Thomas Architects Ltd.
3 Dorset Place, Brighton BN2 1ST
e: studio@zsta.co.uk, t: 01273 964051
Company registered in England No. 07958805
www.zsta.co.uk

Pollards Farm, Ditchling Common

-  Survey area 2
-  Building numbers
-  Bat surveyor locations
-  Roosting bats

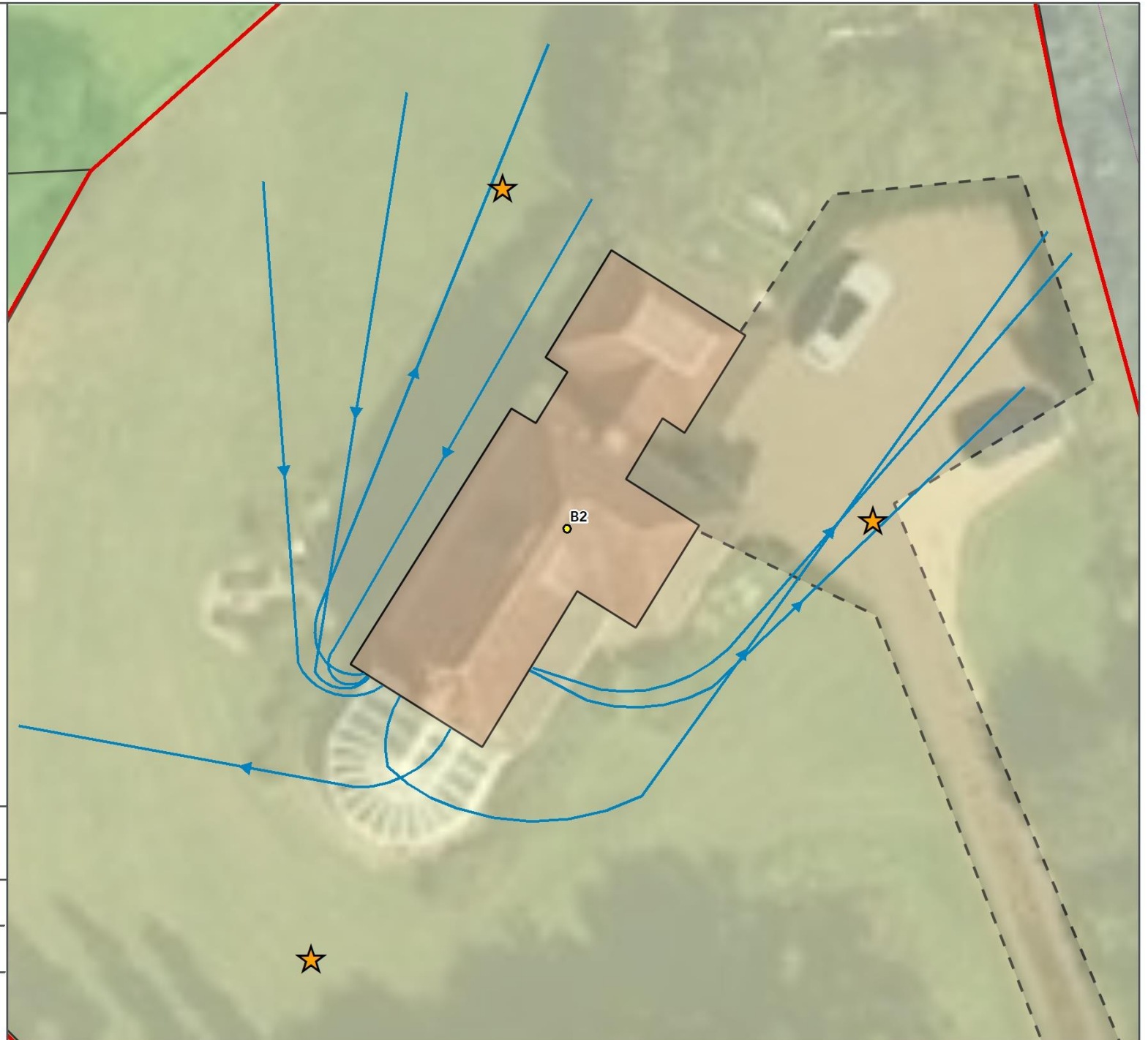
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Appendix IV: Presence/Absence Survey Results

Abbreviations:

BABA	Barbastelle	EPSE	Serotine	MYBE	Bechstein's
MYBR	Brandt's	MYDA	Daubenton's	MYMY	Whiskered
MYNA	Natterer's	MYsp	Myotis sp.	NYLE	Leisler's
NYNO	Noctule	PINA	Nathusius' pipistrelle	PIPI	Common pipistrelle
PIPY	Soprano pipistrelle	Plsp	Pipistrelle sp.	PLAU	Brown long-eared
RHFE	Greater horseshoe	RHHI	Lesser horseshoe		

B1 (Barn), Survey 1: Dawn, 31/08/18

Sunset/sunrise: 06.11	Start time: 04.25	End time: 06.25	Precipitation: None
Air temp start: 16.2°C	Air temp end: 15.3°C	Wind: 0	Cloud cover: 80%
Equipment: Wildlife Acoustics Echo Meter Touch, EM Touch2 Pro handheld detectors			

TP: Transect point

Time: of recording and/or time at transect point

No.(I): Number of bats

No.(P): Number of passes

E/R: emergence/re-entry

F/C: Foraging/commuting

Soc.: Social calls

S/NS/SNH: Seen / not seen / seen not heard Comment: e.g. location of roost, direction of flight, behaviour, frequency, call shape

Surveyor 1 (AD): south-west aspect

TP	Time	Spp.	No.(I)	No.(P)	E/R	F/C	Soc.	S/NS	Comment
	05:15	PIPY	1	1				NS	
	05:27	PIPI	1	1				NS	

Surveyor 2 (AP): north-east aspect

TP	Time	Spp.	No.(I)	No.(P)	E/R	F/C	Soc.	S/NS	Comment
	05:14	PIPI	1	1				NS	
	05:27	PIPI	1	1				NS	

B2 (Farmhouse), Survey 1: Dusk, 15/08/18

Sunset/sunrise: 20.22	Start time: 20.05	End time: 22.05	Precipitation: None
Air temp start: 18.2°C	Air temp end: 17.4°C	Wind: B3 SW	Cloud cover: 20%
Equipment:			

Wildlife Acoustics Echo Meter Touch, EM Touch2 Pro handheld detectors

TP: Transect point Time: of recording and/or time at transect point No.(I): Number of bats
No.(P): Number of passes E/R: emergence/re-entry F/C: Foraging/commuting Soc.: Social calls
S/NS/SNH: Seen / not seen / seen not heard Comment: e.g. location of roost, direction of flight, behaviour, frequency, call shape

Surveyor 1 (NP): north-west aspect

TP	Time	Spp.	No.(I)	No.(P)	E/R	F/C	Soc.	S/NS	Comment
	20:36	PIPI	1	1	E		Y	S	Emerged from west corner hip tile
	20:40	PIPI	1	1	E			S	Emerged south side, probably from hanging tiles given the height
	20:49	PIPI	1	1		C		S	West to east over lawn
	20:54-21:13	PIPI	?	Many		F	Y	S	Up down hedge north of house and over garden, almost constantly
	21:23	EPSE	1	1				HNS	Distant
	21:40	PIPI	1	1		C		HNS	
	21:41	PIPI	1	1		C	Y	HNS	V loud social call
	21:50	PIPI	1	1			Y	HNS	

Surveyor 2 (AD): north-east aspect

TP	Time	Spp.	No.(I)	No.(P)	E/R	F/C	Soc.	S/NS	Comment
	20:43	PIPI	1					NS	
	20:40	PIPI	1	1		C		S	From South out to north east
	20:42	PIPI	1	1		C		S	From South out to north east
	20:49	PIPI	1	4		F		S	Foraging around garden
	20:51	PIPI	1	1		C		S	Foraging in south and out to north east
	20:53	PIPI	1	1				NS	
	20:55	PIPI	1	1				NS	Extended call
	20:21	PIPI	1	1		C		S	
	20:23	PIPI	1	1			Soc	NS	
	20:26	PIPI	1	1				NS	
	20:28	PLAU	1	1				NS	
	20:36	PIPI	1	1				NS	

Surveyor 2 (AD): north-east aspect									
TP	Time	Spp.	No.(I)	No.(P)	E/R	F/C	Soc.	S/NS	Comment
	20:40	PIPI	1	1				NS	
	20:41	PIPI	1	1				NS	
	20:42	PIPI	1	1			Soc	NS	
	20:49	PIPI	1	1			Soc	NS	
	20:50	PIPY	1	1				NS	

Surveyor 3(BB): southern aspect									
TP	Time	Spp.	No.(I)	No.(P)	E/R	F/C	Soc.	S/NS	Comment
	20:34	PIPI	1	1	E			S	Emerged from south east aspect from just below gutter line
	20:36	PIPI	1	1	E			S	Emerged from west corner hip tile
	20:40	PIPI	2	2	E			S	Emerged from close to soffit on southern aspect, one flew east, the other west
	20:42	PIPI	1	1	E			S	Emerged from south east aspect from just below gutter line
	20:47	PIPI	1	1		F		S	Foraging at front of house
	20:55	PIPI	1	1		F		S	Foraging to west
	20:56	PIPI	1	1		F		NS	
	21:05	PIPI	1	1		C		S	Entered from west and flew north
	21:07	PIPI	2	1		C		S	North to west
	21:08	PIPI	1	1		C		NS	
	21:10	PIPI	1	1		C		NS	
	21:33	PLAU	1	1		C		NS	
	21:26	PLAU	1	1		C		NS	
	21:36	PLAU	1	1		F		S	Flew south to north
	21:41	PLAU	1	1		C		NS	

B2 (Farmhouse), Survey 2: Dawn 29/08/18			
Sunset/sunrise: 6.08	Start time: 4.38 (4.25 planned,	End time: 6.23	Precipitation: Light rain 5.05-05.10, 05.15-

	gate locked)		05.23
Air temp start: 12.5°C	Air temp end: 13.0°C	Wind: 0	Cloud cover: 100%
Equipment: Wildlife Acoustics Echo Meter Touch, EM Touch2 Pro handheld detectors			

TP: Transect point

Time: of recording and/or time at transect point

No.(I): Number of bats

No.(P): Number of passes

E/R: emergence/re-entry

F/C: Foraging/commuting

Soc.: Social calls

S/NS/SNH: Seen / not seen / seen not heard Comment: e.g. location of roost, direction of flight, behaviour, frequency, call shape

Surveyor 1 (NP): southern aspect

TP	Time	Spp.	No.(I)	No.(P)	E/R	F/C	Soc.	S/NS	Comment
	05:05	PLAU	1	1				HNS	Brief
	05:23	PIPI	1	1		C	Y	HNS	
	05:30	PIPI	1	1		C		HNS	
	05:35	PIPI	1	2		C	Y	S	Two passes across face of house
	05:50	PIPI	1	1	R		Y	S	Dashed along back of house, swooped round corner, disappeared under hanging tiles, super-fast

Surveyor 2 (OE): north-west aspect

TP	Time	Spp.	No.(I)	No.(P)	E/R	F/C	Soc.	S/NS	Comment
	04:49	PLAU	1	1				NS	Quiet, faint call
	05:13	PLAU	1	1				NS	Quiet, faint call
	05:34	PIPI	1	2		C		S	Flying south to north past east side of house
	05:38	PIPI	1	1		C		NS	Very brief
	05:50	PIPI	1	1				NS	Very brief and faint

Surveyor 3 (AD): north-east aspect

TP	Time	Spp.	No.(I)	No.(P)	E/R	F/C	Soc.	S/NS	Comment
	05:24	PIPI	1	1				NS	
	05:34	PIPI	1	1				NS	Faint
	05:35	PIPI	1	2				S	Up and down lawn
	05:37	PIPI	1	1				NS	Over from trees
	05:39	PIPI	1	3				S	Faint
	05:40	PIPI	1	1				NS	Flew down track

B2 (Farmhouse), Survey 3: Dawn, 12/09/18

Sunset/sunrise: 6.29	Start time: 4.45	End time: 6.44	Precipitation: Light drizzle
Air temp start: 15.1°C	Air temp end: 12.2°C	Wind: B2 NW	Cloud cover: 100%
Equipment: Wildlife Acoustics Echo Meter Touch, EM Touch2 Pro handheld detectors			

TP: Transect point

Time: of recording and/or time at transect point

No.(I): Number of bats

No.(P): Number of passes

E/R: emergence/re-entry

F/C: Foraging/commuting

Soc.: Social calls

S/NS/SNH: Seen / not seen / seen not heard Comment: e.g. location of roost, direction of flight, behaviour, frequency, call shape

Surveyor 1 (NP): southern aspect

TP	Time	Spp.	No.(I)	No.(P)	E/R	F/C	Soc.	S/NS	Comment
	05:09	PIPI	1	1		C		HNS	
	05:18	PIPI	1	1		C	Y	HNS	
	05:29	PIPI	?	3		C	Y	HNS	
	05:32	PIPI	1	1	R	C	Y	S	Close to soffit on southern aspect
	06:11	PIPI	1	1	R		Y	S	Gap at edge of roof tile above hanging tiles

Surveyor 2 (OE): north-west aspect

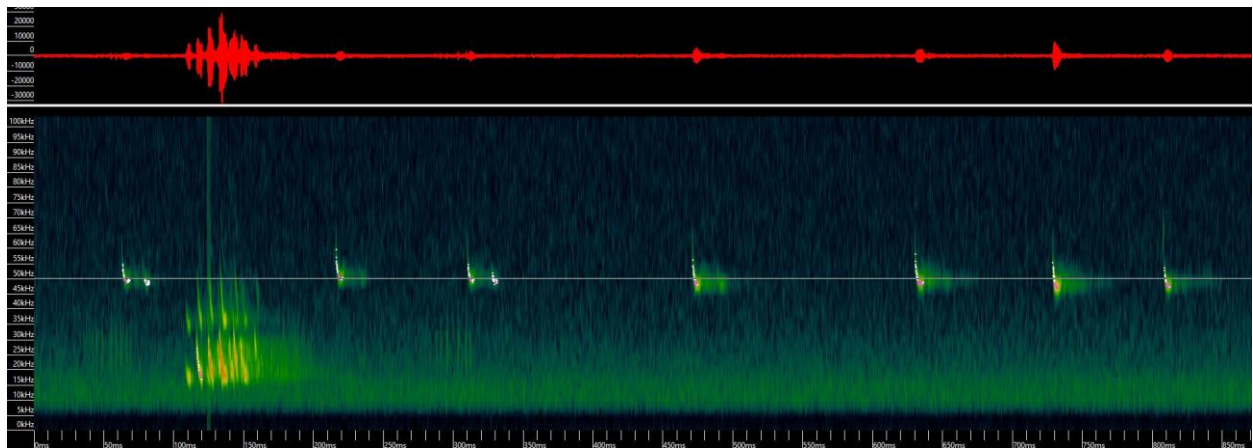
TP	Time	Spp.	No.(I)	No.(P)	E/R	F/C	Soc.	S/NS	Comment
	05:09	PIPI	1	1				NS	Brief faint pass
	05:19	PIPI	1	1			Soc	NS	Brief pass
	05:32	PIPI	1	1	R		Soc	S	Flying down building north to south, appeared to re-enter at corner – check with NP
	05:36	PIPI	1	2		C		NS	Brief pass
	05:48	PIPY	1	1		C		NS	Brief pass
	06:11	PIP	1	1				SNH	Very fast pass at roof height down house north to south towards southern gable

Surveyor 3 (AD): north-east aspect

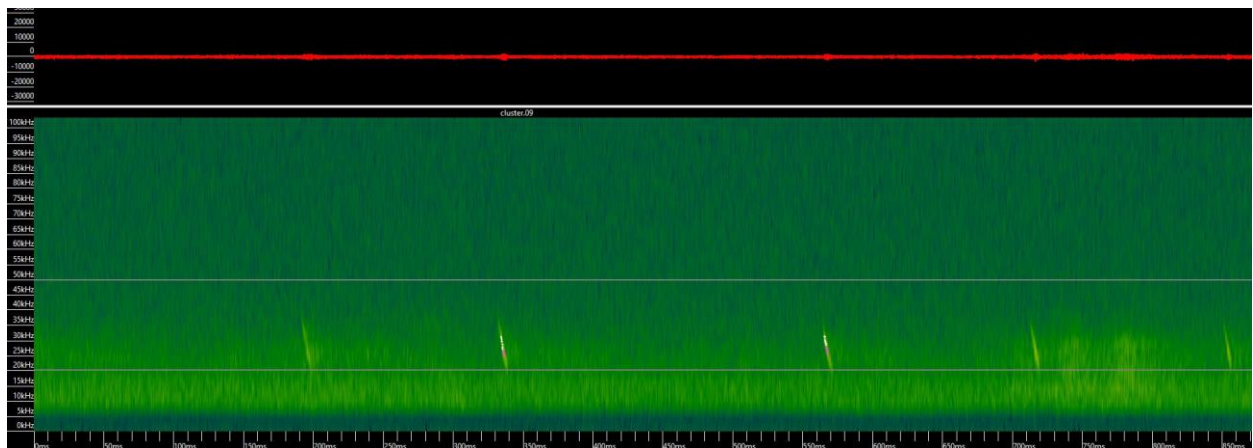
TP	Time	Spp.	No.(I)	No.(P)	E/R	F/C	Soc.	S/NS	Comment
	05:09	PIPI	1	1				NS	
	05:18	PIPI	1	1				NS	

Surveyor 3 (AD): north-east aspect									
TP	Time	Spp.	No.(I)	No.(P)	E/R	F/C	Soc.	S/NS	Comment
	05:29	PIPI	1	1				S	Flew round house to south
	05:33	PIPI	1	1				NS	
	05:36	PIPI	1	1				NS	
	05:48	PIPY	1	1				S	Looping house

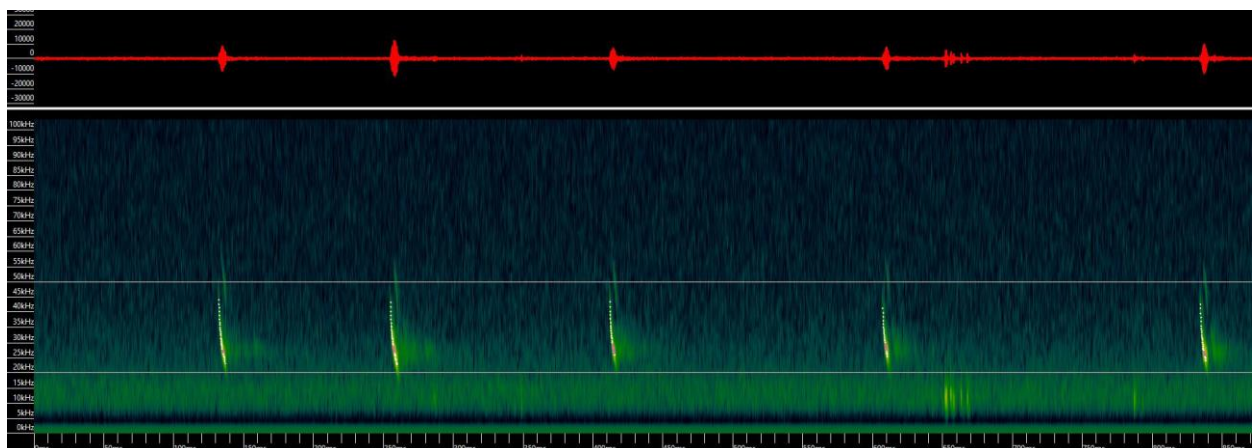
Appendix V: Example Sonograms



PIPI recorded emerging from southern gable end of B2 at 20.36 on 15/8/18; social calls

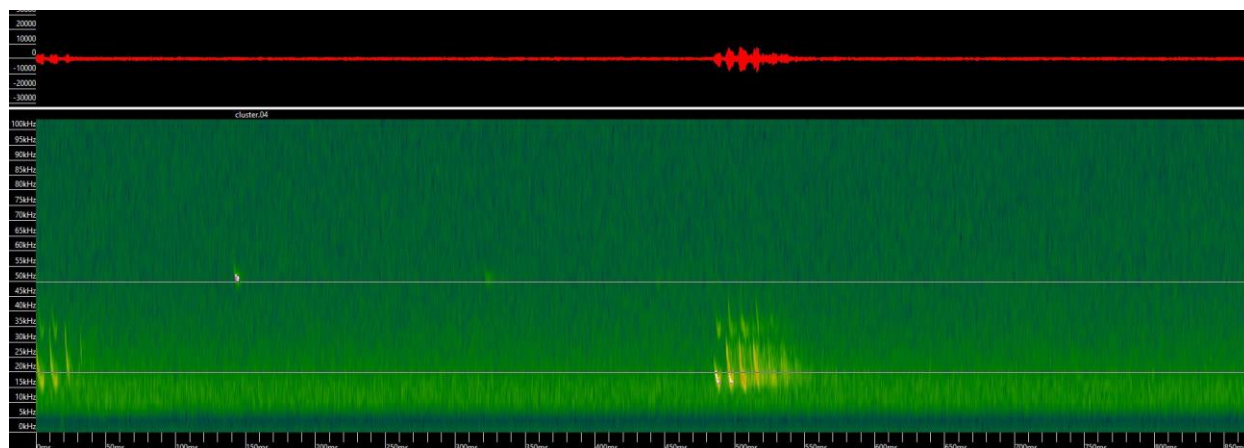


Distant EPSE recorded at 21.23 on 15/8/18

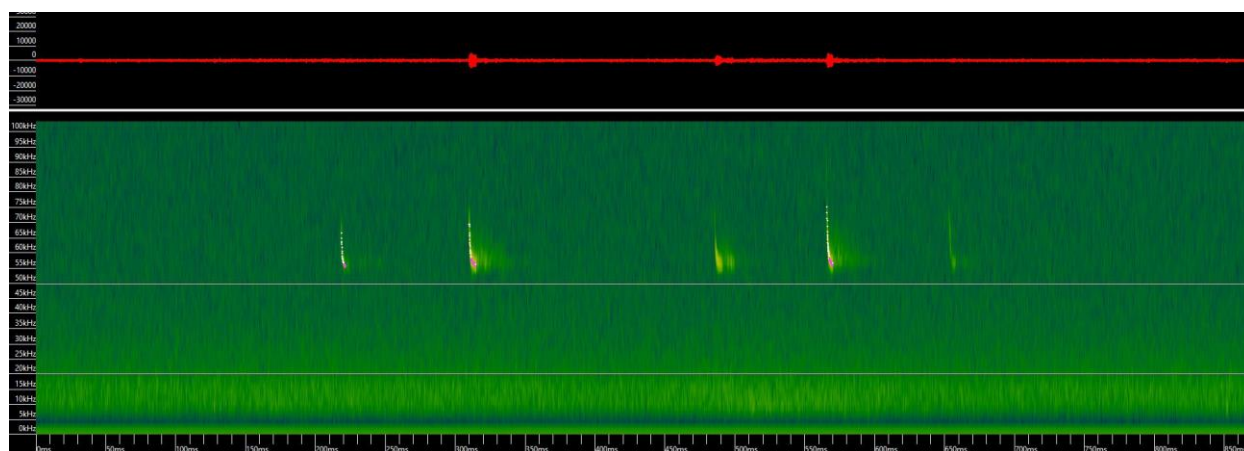


PLAU recorded at 21.36 on 15/8/18

UE0263 PollardsFm Bats_0_190306



PIPI recorded re-entering southern gable end of B2 at 05.50 on 29/8/18



PIPY recorded at 05.48 on 12/9/18

Appendix VI: Bat Box Specifications



Schwegler 2F DFP General Purpose Bat Box:
Apex roof to mimic tree cavity, suitable for noctule, brown long-eared, Bechstein's and Daubenton's. Internal double front panel creates a crevice suitable for pipistrelles

Siting and Positioning:

On a tree-trunk or on buildings

Cleaning and Inspection:

Easy cleaning and inspection due to removable front panel. If occupied by bats, inspection and cleaning must be carried out by a licensed professional

Entrance hole:

Slotted hole

Occupants:

Bats

Material:

Air-permeable and long lasting SCHWEGLER wood-concrete



Schwegler 1FF Flat Bat Box:

Open at bottom so cleaning not required. Varied internal roost surfaces. Suitable for crevice roosters such as pipistrelles, and large enough for use as maternity roost

Siting & positioning:

On the tree-trunk or on buildings

Cleaning and inspection:

Open at bottom, cleaning not required. Easy to inspect due to removable front panel. If occupied by bats, inspection and cleaning must be carried out by a licensed professional

Entrance hole:

Width 12-24 mm x Length 21cm

Occupants:

Bats

Material:

Air-permeable and long lasting SCHWEGLER wood-concrete

Kit includes:

Roost box with removable front panel
 Galvanized steel hanger - forestry approved
 Aluminium Nail - forestry approved

Colour:

Black

Dimensions:

Height: 350mm

Dia.: 165mm

Weight:

4kg approx.



Schwegler 2FN Woodland Bat Box:

Two entrances, one at the rear against the tree trunk and one at the front. A domed roof to form clusters and an increased internal height. Suitable for brown long-eared and woodland species e.g. noctule

Siting and Positioning:

On a tree-trunk or on buildings

Cleaning and Inspection:

Easy cleaning and inspection due to removable front panel. If occupied by bats, inspection and cleaning must be carried out by a licensed professional

Kit includes:

Roost box with swing-away front panel
 Galvanized steel hanger - forestry approved
 Aluminium Nail - forestry approved

Colour:

Black

Dimensions:

Depth: 140mm

Width: 270mm

Height: 430mm

Weight:

10kg approx.



Schwegler 1FR/2FR Bat Tube:

Suitable for building into or mounting onto external walls. Open at bottom so cleaning not required. Can be used individually (1FR) or by connecting two or more 2FR. Suitable for bats that use buildings e.g. pipistrelles or serotine

Siting & positioning:

Can be installed on external walls – either flush or beneath a rendered surface in concrete and, during renovation work, under wooden panelling or in building cavities (e.g., slab-type building structures, bridges, etc). If required, it can be painted using standard air-permeable exterior paint. Birds will not

Entrance hole:

Slotted hole

Occupants:

Bats

Material:

Air-permeable and long lasting SCHWEGLER wood-concrete

Kit includes:

Roost box with removable front panel
 Galvanized steel hanger - forestry approved
 Aluminium Nail - forestry approved

Colour:

Black

Dimensions:

Height: 360mm

Dia.: 160mm

Weight:

4.9kg approx.

occupy this box.

Cleaning:

Maintenance-free

Entrance hole:

Height: 20mm

Width: 150mm

Occupants:

Bats

Material:

SCHWEGLER wood-concrete

Kit includes:

1 x Bat Tube

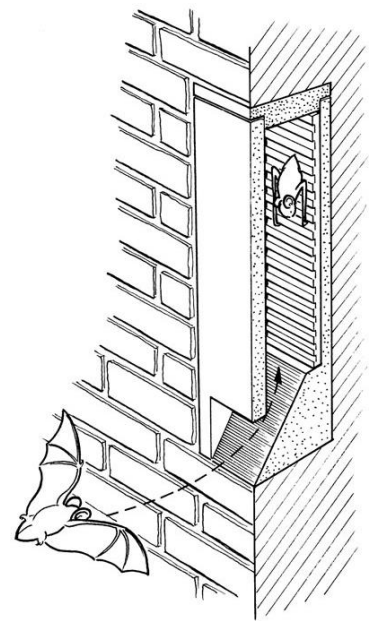
Colour:

Grey material, paintable with standard air-permeable wall-paint

Dimensions:

Height: 475mm; Width: 200mm; Depth: 125mm

Weight: 10kg approx.



Ibstock Enclosed Bat Box (Type B or C):

- Designed specifically for pipistrelle bats
- Available in all brick types
- Discrete home for bats
- Various sizes
- Several roosting zones are created inside the box
- Bats are contained within the bat box itself
- Maintenance free with entrance at the base
- Suitable for new build & conservation work
- Bat Box Type B: 215 x 215 or 215 x 290 / Bat Box Type C: 215 x 215 or 215 x 290



Habibat Bat Access Tile (available in clay, slate or lead):

The Habibat Access Tile is a roof tile which has been modified to allow bats either into the batten space (between tiles and liner for pipistrelles) or into the roof void (for brown long-eared bats).

The Habibat Access Tile consists of a vacuum-moulded plastic cowl embedded into the tile. The access cowl is designed to prevent rainwater ingress to the roof but is of correct size and roughened to be suitable for bats.

The 5 piece clay tile set fits on any roof with plain clay tiles to provide access for bats either behind the tiles or into the roof space.

The slate tile consists of a standard sized slate, with a capped vent which allows access into the batten space (between tiles and liner for pipistrelles) or into the roof void (for brown long-eared bats).

Dimensions: (H) 418 x (W) 375 x (D) 80mm

Entrance hole dimensions: (H) 20 x (W) 100mm

Weight: 1.3kg

Appendix VII: Plant Species which encourage Bats

Please see following pages which are drawn from Gunnell *et al.* (2012).

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Plant Species	Common name	Native	Type	Benefit	Soil	Light	Extensive green roofs	Living walls	Rain Gardens	Hedges/trees	Beds/borders
<i>Acer campestre</i>	Field maple	N	T/S	C	Any	Sun / shade				Y	
<i>Acer platanoides</i>	Norway maple		T	S	Well drained / alkaline	Sun / shade				Y	
<i>Acer saccharum</i>	Sugar maple		T	S	Any	Sun / shade				Y	
<i>Achillea millefolium</i>	Yarrow	N	HP	C,F	Well drained	Sun	Y				
<i>Ajuga reptans</i>	Bugle	N	HP	C,F	Any	Sun / shade	Y				
<i>Anthyllis vulneraria</i>	Kidney vetch	N	HP	F	Well drained	Sun	Y				
<i>Aubrieta deltoidea</i>	Aubrieta		H	F	Well drained	Sun / shade		Y			
<i>Betula pendula</i>	Silver birch	N	T	C	Sandy / Acid	Sun				Y	
<i>Cardamine pratensis</i>	Cuckoo-flower	N	HP	F	Moist	Sun / shade					Y
<i>Carpinus betulus</i>	Hornbeam	N	T	C	Clay	Sun				Y	
<i>Centaurea nigra</i>	Common knapweed	N	HP	C,F	Dry, not acid	Sun	Y				Y
<i>Centranthus ruber</i>	Red valerian		HP	F	Well drained / alkaline	Sun	Y				Y
<i>Clematis vitalba</i>	Old man's beard	N	C	F	Well drained / alkaline	Sun				Y	
<i>Corylus avellana</i>	Hazel	N	S	C	Any dry	Sun / shade		Y		Y	
<i>Crataegus monogyna</i>	Hawthorn	N	S	S,C	Any	Sun / shade				Y	
<i>Daucus carota</i>	Wild carrot	N	Bi	S,C,F	Any	Sun	Y				Y
<i>Dianthus spp.</i>	Pinks	N	A-Bi	F	Well drained	Sun	Y	Y			Y
<i>Digitalis purpurea</i>	Foxglove	N	Bi	C	Well drained	Shade / partial shade				Y	Y
<i>Erica cineria</i>	Bell heather	N	S	F	Sandy	Full sun					Y
<i>Erysimum cheiri</i>	Wallflower		Bi-P	F	Well drained	Sun		Y			
<i>Eupatorium cannabinum</i>	Hemp agrimony	N	H	F	Moist	Sun / shade					Y
<i>Fagus sylvatica</i>	Beech	N	T	C,R	Well drained / alkaline	Sun / shade				Y	
<i>Foeniculum vulgare</i>	Fennel		H	F	Well drained	Sun					Y
<i>Fraxinus excelsior</i>	Common ash	N	T	C,R	Any	Sun / shade				Y	
<i>Hebe spp.</i>	Hebe species		S	F	Well drained	Sun / shade				Y	Y
<i>Hedera helix</i>	Ivy	N	C	F,C	Any	Sun / shade		Y		Y	Y
<i>Hesperis matronalis</i>	Sweet rocket		H	F	Well drained / dry	Sun / shade					Y
<i>Hyacinthoides non-scripta</i>	Bluebell	N	B	F	Loam	Shade / partial shade		Y		Y	Y
<i>Ilex aquifolium</i>	Holly	N	T	C	Any	Sun / shade				Y	
<i>Jasminum officinale</i>	Common jasmine		C	F	Well drained	Sun		Y			Y
<i>Lavandula spp.</i>	Lavender species		S	F	Well drained / sandy	Sun		Y			Y
<i>Linaria vulgaris</i>	Toadflax	N	HP	C	Well drained / alkaline	Sun	Y				Y
<i>Lonicera periclymenum</i>	Honeysuckle	N	C	F	Well drained	Sun		Y		Y	
<i>Lotus corniculatus</i>	Bird's foot trefoil	N	HP	F	Well drained / dry	Sun	Y				Y
<i>Lunaria annua</i>	Honesty		Bi	F	Any	Sun / partial shade	Y				
<i>Malus spp.</i>	Apple		T	C	Any	Sun				Y	
<i>Matthiola longipetala</i>	Night-scented stock		A	F	Well drained/ moist	Sun			Y		
<i>Myosotis spp.</i>	forget-me-not	N	A	F	Any	Sun	Y	Y			
<i>Nicotiana glauca</i>	Ornamental tobacco		A	F	Well drained/ moist	Sun / partial shade			Y		
<i>Oenothera spp.</i>	Evening primrose species		Bi	F	Well drained/ dry	Sun	Y				
<i>Origanum vulgare</i>	Marjoram	N	HP	F	Well drained/ dry	Sun	Y	Y			
<i>Populus alba</i>	White poplar	N	T	C	Clay loam	Sun				Y	
<i>Primula veris</i>	Cowslip	N	HP	F	Well drained/moist	Sun / partial shade	Y				
<i>Primula vulgaris</i>	Primrose	N	HP	F	Moist	Partil shade	Y	Y		Y	
<i>Prunus avium</i>	Wild cherry	N	T	C	Any	Sun				Y	

Plant Species	Common name	Native	Type	Benefit	Soil	Light	Extensive green roofs	Living walls	Rain Gardens	Hedges/trees	Beds/borders
<i>Prunus domestica</i>	Plum		T	C	Well drained/ moist	Sun				Y	
<i>Prunus spinosa</i>	Blackthorn	N	S	C	Any	Sun / partial shade				Y	
<i>Quercus petraea</i>	Sessile oak	N	T	C,R	Sandy loam	Sun / shade				Y	
<i>Quercus robur</i>	Common oak	N	T	C,R	Clay loam	Sun / shade				Y	
<i>Rosa canina</i>	Dog rose	N	S	C	Any	Sun			Y	Y	
<i>Salix spp.</i>	Willow species	N	S	S,C	Moist	Sun / shade			Y	Y	
<i>Sambucus nigra</i>	Elder	N	T	C	Clay loam	Sun				Y	
<i>Saponaria officinalis</i>	Soapwort	N	HP	F	Any	Sun					
<i>Saxifraga oppositifolia</i>	Saxifrage	N	HP	C	Well drained	Sun	Y	Y			
<i>Scabiosa columbaria</i>	Small scabious	N	HP	F	Well drained/ alkaline	Sun	Y				
<i>Sedum spectabile</i>	Ice plant		HP	F	Well drained/ dry	Sun	Y				
<i>Silene dioecia</i>	Red campion	N	HP	F	Any	Shade / partial shade		Y	Y	Y	
<i>Sorbus aucuparia</i>	Rowan	N	T	C	Well drained	Sun				Y	
<i>Stachys lanata</i>	Lamb's ears		HP	F	Well drained/dry	Sun	Y				
<i>Symphotrichum spp.</i>	Michaelmas daisies		HP	F	Any	Sun					
<i>Tegetes patula</i>	French marigold		A	F	Well drained/moist	Sun					
<i>Thymus serpyllum</i>	Creeping thyme	N	HP/S	F	Well drained/dry	Sun	Y	Y			
<i>Tilia x europaea</i>	Common lime		Type	C	Any	Sun / shade				Y	
<i>Trifolium spp.</i>	Clover species	N	HP	F	Any	Sun	Y				
<i>Valeriana spp.</i>	Valerian species	N	HP	F	Moist	Sun / partial shade			Y		
<i>Verbascum spp</i>	Mulleins	N	Bi,HP	C	Well drained	Sun	Y				
<i>Verbena bonariensis</i>	Verbena		HP	F	Well drained/moist	Sun					
<i>Viburnum lantana</i>	Wayfaring tree	N	S	C	Any	Sun / shade				Y	
<i>Viburnum opulus</i>	Guelder rose	N	S	C	Moist	Sun / shade			Y	Y	
<i>Viola tricolor</i>	Pansy	N	A	F	Well drained/moist		Y	Y			

The table above is derived from the BCT publication Landscape and Urban Design for Bats and Biodiversity (Gunnell et al., 2012) and lists suggested plant species that can provide benefit for bats either by providing a food source for insects or roost potential. The plants listed are predominately native to Britain. The small group of non-native plants is included for their documented value for wildlife. This list has been checked against Natural England's list of invasive non-native plants.

HP: Herbaceous perennial	T: Tree	A: Annual	Benefit:				
Bi: Biennial	S: Shrub	B: Bulb	C: Moth caterpillar food plant	F: Flowers attract adult moths			
BiP: Biennial perennial	H: Herb	C: Creeper/climber	S: Sap sucking insects (e.g. whiteflies)	R: Good roost potential			

Appendix VIII: Legal and Technical Limitations

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- The advice provided in this report does not constitute legal advice. As such, the services of lawyers may also be considered to be warranted.
- Unless otherwise stated in this report, the assessments made assume that the sites and facilities that have been considered in this report will continue to be used for their current planned purpose without significant change.
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- Where this report presents or relies upon the findings of ecological field surveys (including habitat, botanical or protected/notable species surveys), its conclusions should not be relied upon for longer than a maximum period of two years from the date of the original field surveys. Ecological change (e.g. colonisation of a site by a protected species) can occur rapidly and this limitation is not intended to imply that a likely absence of, for instance, a protected species will persist for any period of time;
- This report has been prepared using factual information contained in maps and documents prepared by others. No responsibility can be accepted by UEEC Ltd for the accuracy of such information;
- Every effort has been made to accurately represent the location of mapped features, however, the precise locations of features should not be relied upon;
- Populations of animals and plants are often transient in nature and a single survey visit can only provide a general indication of species present on site. Time of year when the survey was carried out, weather conditions and other variables will influence the results of an ecological survey (e.g. it is possible that some flowering plant species which flower at other times of the year were not observed). Every effort has been made to accurately note indicators of presence of protected, rare and notable species within and adjacent to the site but the possibility nonetheless exists for other species to be present which were not recorded or otherwise indicated by the survey;
- Any works undertaken as a consequence of the recommendations provided within this report should be subjected to the necessary health & safety checks and full risk assessments.

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Urban Edge Environmental Consulting Ltd

Unit 5 | Westergate Business Centre | Brighton | BN2 4QN

T: 01273 68 67 66 | E: enquiries@ueec.co.uk

www.ueec.co.uk |  [@UrbanEdgeEnviro](https://twitter.com/UrbanEdgeEnviro)

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Urban Edge Environmental Consulting Ltd

Unit 5 | Westergate Business Centre | Brighton | BN2 4QN

T: 01273 68 67 66 | E: enquiries@ueec.co.uk

www.ueec.co.uk |  @UrbanEdgeEnviro

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