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The Steddles, North End Road, Yapton, West Sussex

Bat Survey

July 2020



The Steddles, North End Road, Yapton, West Sussex

Bat Survey

Client:	Elberry Properties Ltd	
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Contents

0	Executive Summary	i
0.1	Introduction	i
0.2	Results	i
0.3	Evaluation	ii
0.4	Recommendations	ii
0.5	Conclusions	iii
1	Introduction	1
1.1	Background	1
1.2	Objectives and Approach of the Study	1
1.3	Survey Area	1
1.4	Proposed Construction Activities	2
2	Bat Distribution, Ecology and Status	5
2.1	Distribution	5
2.2	Ecology	5
2.3	Status, Legislation and Policy	5
2.4	Guidance and Best Practice	6
3	Methods	7
3.1	Desk Study	7
3.2	Field Survey	7
3.3	Preliminary Roost Assessment	7
3.4	Presence/Absence Surveys	7
3.5	Evaluation	8
3.6	Limitations	9
3.7	Personnel	9
4	Results	10
4.1	Desk Study	10
4.2	Preliminary Roost Assessment	11
4.3	Presence/Absence Surveys	12

5	Evaluation	15
5.1	Introduction	15
5.2	Presence or Absence of Bats	15
5.3	Species Assemblage	15
5.4	Population Size Class Assessment	16
5.5	Impact Assessment	17
5.6	Recommendations for Avoidance, Mitigation and Compensation of Impacts	18
5.7	Recommendations for Ecological Net Gain	22
6	Summary and Conclusions	23
6.1	Introduction	23
6.2	Results	23
6.3	Evaluation	24
6.4	Recommendations	24
6.5	Conclusions	25
	References and Bibliography	26
	Appendix I: Surveyor Positions	A
	Appendix II: Presence/Absence Survey Results	C
	Appendix III: Example Sonograms	K
	Appendix IV: Plant Species which encourage Bats	M
	Appendix V: Bat Box Specifications	Q
	Appendix VI: Legal and Technical Limitations	U

List of Tables and Figures

<i>Table 3.1: Survey dates and weather conditions</i>	8
<i>Table 3.2: Survey personnel and qualifications</i>	9
<i>Table 4.1: Summary of bat records data within 2km of the site</i>	10
<i>Table 5.1: Summary of roosting bats</i>	15
<i>Table 5.2: Conservation status of recorded bat species (abundance and distribution)</i>	16
<i>Table 5.3: Population size class assessment</i>	16
<i>Figure 1.1: Survey area</i>	3
<i>Figure 1.2: Proposed site layout</i>	4
<i>Figure 5.1: Indicative locations for replacement bat roost features</i>	21

Abbreviations

BCT	Bat Conservation Trust
CHS	Conservation of Habitats and Species Regulations 2017 (as amended)
EPS	European Protected Species
LICL	Low Impact Class Licence
LNR	Local Nature Reserve
LWS	Local Wildlife Site
MAGIC	Multi-Agency Geographic Information for the Countryside
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 Records Centre
TN	Target Note
WCA	Wildlife and Countryside Act 1981 (as amended)

0 Executive Summary

0.1 Introduction

- 0.1.1 A Preliminary Ecological Appraisal (PEA) and Preliminary Roost Assessment (PRA) was carried out by ECOSA Ltd in October 2019 at the site of a proposed residential development at The Steddles, North End Road, Yapton, West Sussex (Grid Reference: 497830, 103840). It was recommended that further surveys for bats should be carried out due to potential roost features (PRF) and a bat dropping within the existing building.
- 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. One dusk emergence survey and two dawn re-entry surveys were undertaken in June to July 2020, with reference to current industry guidelines (Collins (ed.), 2016). The surveys were supplemented by an internal/external inspection of structures to assess their suitability for roosting bats.

0.2 Results

- 0.2.1 SxBRC returned 68 records of at least eleven species of bat from within 2km of the survey area, during a date range of 1984 to 2018. There are no granted mitigation licenses for bats within a 2km radius of the site. There are ten Sites of Special Scientific Interest and one Special Area of Conservation within 10km of the survey area; bat populations do not feature among the notified features of any of these sites.
- 0.2.2 Habitats within the site consisted of a residential dwelling with associated garage, hardstanding and gardens, including scattered trees, species-poor intact hedgerows and amenity grassland. The ECOSA (2019) PEA report assessed the habitat on site to be of moderate suitability for foraging and commuting bats. The building is set within a semi-rural landscape characterised by a patchwork of arable land and grazing pasture, villages and industrial estates. There is a low density of residential development within the wider area and therefore low levels of artificial lighting. The area supports some tree corridors and a network of hedgerows, although other habitats such as pockets of woodland are lacking. Due to the finding of one bat dropping indicative of a pipistrelle bat during the building inspection carried out by ECOSA, the building was concluded to be a confirmed roost. Full results and an evaluation can be seen in the report authored by ECOSA (2019).
- 0.2.3 Three presence/absence surveys of the building were carried out by Urban Edge Environmental Consulting Ltd using a five person team, one dusk emergence on 08 June 2020, and two dawn re-entry surveys on 24 June 2020 and 08 July 2020. One common pipistrelle was recorded returning to roost beneath the soffit on the north elevation during the second survey.

- 0.2.4 Low to moderate levels of foraging and commuting activity were recorded in the grounds around the property, the species assemblage including: serotine *Eptesicus serotinus*, noctule *Nyctalus noctula*, *Myotis* sp., common and soprano pipistrelle *Pipistrellus pipistrellus* and *P. pygmaeus*, and brown long-eared *Plecotus auritus* bats.

0.3 Evaluation

- 0.3.1 The survey results provide a good level of confidence that low numbers of common pipistrelle bats were roosting in the building during the 2020 breeding season. The roost on the north elevation is an occasionally used day roost for a single species (because it was only observed to be used once during the course of three surveys). This species is widespread and abundant in Sussex and has previously been recorded within 2km of the site.
- 0.3.2 In summary, without mitigation demolition of the existing building will result in a short-term risk of killing/injury/disturbance to low numbers of one common species of bat. The development will also result in low significance impacts from the destruction of one summer day roost used by low numbers of common pipistrelle bats. These impacts will require mitigation but are not considered to be detrimental to maintaining the local populations of common pipistrelle and soprano pipistrelle 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 or Low Impact Class Licence (LICL). 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;
 - ▶ 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 removal of roof tiles and soffit on and around the north elevation 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 nesting birds, if necessary;
 - ▶ Commencement of construction once the supervised roof / hanging tile 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 one common species of bat, however, detrimental effects on the conservation status of the 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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1 Introduction

1.1 Background

- 1.1.1 A Preliminary Ecological Appraisal (PEA) and Preliminary Roost Assessment (PRA) was carried out by ECOSA Ltd in October 2019 at the site of a proposed residential development at The Steddles, North End Road, Yapton, West Sussex (Grid Reference: 497830, 103840). It was recommended that further surveys for bats should be carried out due to potential roost features (PRF) and a bat dropping within the existing building.

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 (carried out by ECOSA Ltd), 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 survey area lies on the northern fringes of Yapton, a village in the Arun district of West Sussex. The site comprises c.0.4ha of previously developed land, primarily consisting of a

residential dwelling with associated garage, hardstanding and gardens, including scattered trees, species-poor intact hedgerows and amenity grassland.

- 1.3.2 The site is bounded to the north by an adjacent residential property, to the east by North End Road, to the south by horse paddocks, and to the west by stables and farmland beyond. The extent of the survey area is shown on Figure 1.1.
- 1.3.3 The wider area is characterised by a patchwork of arable land and grazing pasture, villages and industrial estates, with limited cover of woodland or hedgerow.

1.4 Proposed Construction Activities

- 1.4.1 Planning consent is being sought for demolition of the existing buildings and construction of eleven residential dwellings, together with access, hard and soft landscaping and associated facilities. Figure 1.2 illustrates the proposed site layout.



Figure 1.1: Survey area



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 (as amended)) 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) directs 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 Records Centre (SxBRC) was consulted for records of bat species within a 2km search radius. 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:
- ▶ Preliminary Roost Assessment (undertaken by ECOSA Ltd.), including internal/external inspection of structures and trees;
 - ▶ Presence/absence surveys.

3.3 Preliminary Roost Assessment

- 3.3.1 Inspection of the structures to be affected was undertaken on 11 October 2019 by Hugh Turner, an ecologist of ECOSA Ltd. The main residential building and two outbuildings, consisting of a newly built car port and a tool shed, were subject to an external and where possible internal inspection for potential roost features. The report produced by ECOSA¹ following the PRA should be referred to for full details of the methodology and limitations applied.

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 and re-entry surveys were carried out by Urban Edge Environmental Consulting Ltd. The emergence surveys commenced at least a 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

¹ ECOSA Ltd (2019): The Steddles, North End Road, Yapton, West Sussex: Preliminary Ecological Appraisal.

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 full spectrum detectors. Recordings of bat calls were analysed using BatSound (v4) and Kaleidoscope Pro (v5.1.9) 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	Time	Weather conditions
08 June 2020	Dusk	13.1°C–12.6°C, 20 - 100% cloud cover, no wind, no precipitation
24 June 2020	Dawn	13.4°C–13.2°C, 0% cloud cover, no wind, no precipitation
08 July 2020	Dawn	15.6°C–15.2°C, 100% cloud cover, light wind, light drizzle

- 3.4.4 Current guidelines (Collins (ed.), 2016) recommend the minimum levels of presence/absence survey effort for structures, based on their overall suitability for roosting bats; see Box 2. The PRA undertaken by ECOSA concluded that the building is a confirmed roost. Therefore, three presence/absence surveys were recommended and were undertaken by Urban Edge Environmental Consulting using a five person survey team. Appendix I presents a map 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. Evaluation of the potential impacts on bats was undertaken with reference to Chapter 6 of English Nature (2004) and

Natural England Standing Advice, with predicted impacts to each feature noted as of Low, Medium or High significance.

3.6 Limitations

- 3.6.1 The presence/absence survey reported herein was instructed in June 2020 and carried out during June and July 2020, with at least 14 days between each survey. 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.
- 3.6.2 There were no difficulties in gaining access to the site to carry out the presence/absence surveys. All elevations were all viewed directly, except for the south where only an oblique view was available. Weather conditions were generally good and within acceptable parameters. There were no equipment malfunctions or other limitations of relevance to the methods applied. See Appendix VI for general Legal and Technical Limitations which apply.

3.7 Personnel

- 3.7.1 The personnel deployed on the surveys are listed in Table 3.2.

Table 3.2: Survey personnel and qualifications

Feature / Task	Personnel
Presence/absence survey 1	Nick Pincombe (Lead), Anna Douglas, Jeff Turton, Alexandra Weeks, Adrian Price
Presence/absence survey 2	Mark Vivian (Lead), Anna Douglas, Jeff Turton, Alexandra Weeks, Adrian Price
Presence/absence survey 3	Mark Vivian (Lead), Anna Douglas, Jeff Turton, Alexandra Weeks, Adrian Price
Personnel	Qualifications
Nick Pincombe BA(Hons) MSc CEnv MIEMA MCIEEM	Director with fifteen years' experience leading survey and impact assessment teams for a wide range of ecology and environmental planning projects. Natural England Class Licences to survey for bats (WML-CL18) and great crested newt (WML-CL08).
Mark Vivian BSc(Hons) MSc MCIEEM	Principal Ecologist with eleven years' professional consultancy experience. Licences to survey for bats (WML-CL18), great crested newt (WML-CL08) and hazel dormouse (WML-CL10a).
Anna Douglas BSc(Hons) MSc GradCIEEM	Ecologist with four years' professional consultancy experience. Licences to survey for bats (WML-CL17) and great crested newt (WML-CL09).
Jeff Turton BSc(Hons) GradCIEEM	Ecologist with four years' professional consultancy experience. Licence to survey for great crested newt (WML-CL09).
Adrian Price qCIEEM	Assistant with four seasons' bat survey experience, and BCT registered bat carer.
Alexandra Weeks BSc(Hons) MRes	Assistant with two seasons' bat survey experience.

4 Results

4.1 Desk Study

- 4.1.1 SxBRC returned 68 records of at least eleven species of bat from within 2km of the survey area, during a date range of 1984 to 2018, as summarised in Table 4.1. Twenty-seven of these were of roosting bats or of bat droppings indicative of a roost. Twenty-five roost records were of an unspecified type. No records labelled as maternity or hibernacula roosts were returned. However, the data search returned three records of over 220 bats, and two records of over 330 bats. Three of these counts are results of building inspection surveys and such high counts are indicative of hibernation roosts. The records of large numbers of bats are all located c.1.9km north-west of the site. The closest record to the survey area is of 1 juvenile serotine recorded during a bat rescue c.1.14km south in 2016.

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

Species	Protection
Western Barbastelle <i>Barbastella barbastellus</i>	Habs.Dir.Ax.2 and 4, CHS Sch.2, WCA Sch.5 full, NERC s41
Serotine <i>Eptesicus serotinus</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
Whiskered <i>Myotis mystacinus</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
Leisler's <i>Nyctalus leisleri</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
Nathusius' pipistrelle <i>Pipistrellus nathusii</i>	Habs.Dir.Ax.4, CHS Sch.2, WCA Sch.5 full
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.2/4 Habitats Directive 92/43/EEC Annex 2 and/or 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 no licenced sites. There are ten SSSI and one SAC within 10km of the survey area. Bat populations do not feature among the notified features of any of these sites.

4.2 Preliminary Roost Assessment

Landscape setting

- 4.2.1 The ECOSA (2019) PEA report assessed the habitat on site to be of moderate suitability for foraging and commuting bats. The building is set within a semi-rural landscape characterised by a patchwork of arable land and grazing pasture, villages and industrial estates. There is a low density of residential development within the wider area and therefore low levels of artificial lighting. The area supports some tree corridors and a network of hedgerows, although other habitats such as pockets of woodland are lacking.

Building assessment

- 4.2.2 The PEA report by ECOSA (2019) reported that there are three buildings on site, the main house, an open sided car port and a tool shed. The car port and tool shed are of timber clad construction and do not support any potential bat roosting features. Therefore, the car port and shed were assessed as being of negligible suitability for roosting bats.



Car port



Tool shed

- 4.2.3 The main house is of brick construction with a complex clay pan tile roof and wooden soffits. Internally, the roof void is of timber frame construction with a bitumen felt roof lining. During the survey, a single pipistrelle *Pipistrellus* sp. type bat dropping was recorded within the roof void. The main house supports a number of potential bat roosting features including raised tiles and gaps between the walls and soffits.

Conclusion

- 4.2.4 Due to the finding of one bat dropping indicative during the building inspection carried out by ECOSA, the building was concluded to be a confirmed roost. Full results and an evaluation can be seen in the report authored by ECOSA (2019).



North-east elevation of main house



South-east elevation



North-west elevation



South-west elevation



Raised tiles on north elevation



Roof void of main house

4.3 Presence/Absence Surveys

- 4.3.1 Three surveys of the building were carried out, one dusk emergence on 8 June 2020 and two dawn re-entry surveys on 24 June and 8 July 2020. Full survey results are detailed in Appendix III while sample sonograms recorded at the site are given at Appendix IV.

Survey 1

- 4.3.1.1 Sunset on 8 June was at 21.14; the survey started at 21.00 and ended at 23.00. No bats were recorded emerging from the building during the survey.
- 4.3.2 Moderate levels of foraging and commuting activity were recorded within and around the survey area. The calls were made by common and soprano pipistrelle, brown long-eared, *Myotis* sp. bats, noctule and serotine. Levels of activity were generally similar at all aspects of the property, except that an extensive period of serotine foraging (outside of the site to the north) was recorded by surveyor 1. The first bat recorded was a common pipistrelle at 21:25 (11 minutes after sunset) and the last bat recorded was a noctule at 22:53.

Survey 2

- 4.3.3 Sunrise on 24 June was at 04:49; the survey started at 03:05 and ended at 05:05. One common pipistrelle was recorded re-entering the building at 04:15 at the soffit on the northern elevation (see photo below).
- 4.3.4 Low levels of foraging and commuting activity were recorded within and around the survey area. The calls were made by common pipistrelle only. The first common pipistrelle recorded was at 03:09 and the last common pipistrelle recorded was foraging over the garden at 04:25 (24 minutes before sunrise).

Survey 3

- 4.3.5 Sunrise on 08 July was at 04:56; the survey started at 03:10 and ended at 05:10. No bats were recorded re-entering the building during the survey.
- 4.3.6 Low levels of foraging and commuting activity were recorded within and around the survey area as no surveyor recorded more than ten bat passes throughout the survey. The calls were made by noctule, serotine, and common pipistrelle. Most activity was recorded to the western aspect of the house. The first bat recorded was a serotine at 03:36 and the last bat recorded was a common pipistrelle at 04:44 (12 minute before sunrise).
- 4.3.7 The location of the common pipistrelle bat roost recorded on survey 2 is shown in the photo below.



Survey 1, 24/06/20: 1x common pipistrelle returned to roost at 04.15 under the soffit on the north elevation

5 Evaluation

5.1 Introduction

- 5.1.1 This chapter presents 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 were roosting in the building during the 2020 breeding season, as summarised in Table 5.1. The roost on the north elevation is an occasionally used day roost for a single species (because it was only observed to be used once during the course of three surveys).

Table 5.1: Summary of roosting bats

Roost #	Aspect	Indiv.*	Species	Freq.**	Status
1	North	1	Common pipistrelle	1	Day roost, occasional

* Individuals: Number of bats recorded using the roost over three surveys

** Frequency: Number of surveys during which use of the roost was recorded

- 5.2.2 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 the building.

5.3 Species Assemblage

- 5.3.1 Species diversity recorded during the presence/absence surveys included six species. Their local and national conservation status is listed in Table 5.2 (BCT, 2010; Mathews *et al.*, 2018; Russ, 2012; Sussex Bat Group²). All six of these species have previously been recorded within 2km of the site, as confirmed during the desk study stage.
- 5.3.2 *Myotis* sp. call parameters overlap significantly and it is not normally possible to conclusively identify them to species level unless they are in the hand. The low number of *Myotis* sp. calls recorded within the survey area were most closely matched to the call parameters of Brandt's *M. brandtii*, Bechstein's *M. bechsteinii*, Daubenton's *M. daubentonii* and whiskered *M. mystacinus* bats. The survey area falls broadly within the known distribution of all four species, but Bechstein's bat is extremely rare and found almost exclusively within woodland habitat (e.g. Russ, 2012; Dietz & Kiefer, 2016) which is almost absent within the survey area; Bechstein's are hence unlikely to have been recorded.

² Sussex Bat Group website: Bats in Sussex. Accessed online [30/6/20] at: <http://www.sussexbatgroup.org.uk/batsinsussex>

Table 5.2: Conservation status of recorded bat species (abundance and distribution)

Species	Sussex abundance/distribution	UK abundance/distribution	UK status
Serotine	Uncommon, widespread	Uncommon, widespread, southern England	Vulnerable
Noctule	Uncommon, widespread	Uncommon, widespread, absent in Scotland	Least concern
Common pipistrelle	Abundant, widespread	Widespread, abundant	Least concern
Soprano pipistrelle	Fairly common, widespread	Fairly common, widespread	Least concern
Brown long-eared	Relatively abundant, widespread	Widespread, relatively abundant	Least concern

5.4 Population Size Class Assessment

- 5.4.1 Table 5.3 sets out a population size class assessment for each of the bat species using buildings B1 and B4 within the application site.

Table 5.3: Population size class assessment

Data	Common pipistrelle
Number of droppings	One
Pattern/extent of droppings	Single dropping in roof void (ECOSA, 2019)
Pattern/extent of feeding remains	n/a
Number of bats counted inside roost	n/a
Positions of bats in roost	Behind soffit on north elevation
Number of bat registrations*	1
Maximum count of bats per survey	1
Roost status	1x summer day roost for low numbers
Species rarity	Abundant
Conservation significance	<u>Low</u>

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

5.5 Impact Assessment

Designated sites

- 5.5.1 No designated sites notified for their bat populations will be affected by the proposals for the site.

Roosts – buildings/structures

Short-term impacts

- 5.5.2 Demolition of the existing building is likely to result in the following short-term impacts unless mitigated, which would constitute an offence under the Wildlife & Countryside Act 1981 (as amended) and Conservation of Habitats and Species Regulations 2017:

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

Long-term impacts

- 5.5.3 Unless mitigated, the demolition works will result in the following long-term impacts, which would constitute an offence under the Wildlife & Countryside Act 1981 (as amended) and Conservation of Habitats and Species Regulations 2017. 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 significance impact from the destruction of one summer day roost used by low numbers of common pipistrelle bats.

Foraging and commuting habitats

- 5.5.4 The treeline and hedgerow habitats on site provide good foraging and commuting opportunities for bats and the site has some connectivity to off-site habitats via adjacent treelines. Overall the site is assessed as having moderate suitability for foraging and commuting bats (ECOSA, 2019).
- 5.5.5 During the presence/absence surveys, low to moderate levels of foraging and commuting activity were recorded. However, the majority of bats observed were overflying the site and using boundary hedgerow/treeline and adjacent habitats for foraging and commuting. Taking account of the small size of the site and scale of proposed development, significant impacts to foraging and commuting bats are not expected, provided that measures are taken to prevent significant increases in artificial light during construction or operation.

Summary

- 5.5.6 In conclusion, without mitigation demolition of the existing building will result in a short-term risk of killing/injury/disturbance to low numbers of one common species of bat. The

³ Natural England (2016): *Standing Advice: Bats: surveys and mitigation for development projects*. Accessed online [25/09/19] at: <https://www.gov.uk/guidance/bats-surveys-and-mitigation-for-development-projects>

development will also result in low significance impacts from the destruction of one summer day roost used by low numbers of common pipistrelle bats. These impacts will require mitigation but are not considered to be detrimental to maintaining the local populations of common pipistrelle and soprano pipistrelle 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 or Low Impact Class Licence (LICL) 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 by ECOSA (2019) during the PRA. As there was no evidence of a maternity roost, there is no requirement to schedule the works to avoid the maternity period when they are most vulnerable. The works will be carried out under ecological supervision (as described below) in order to mitigate the risk of killing/injury/disturbance to individuals bats which may be present during the work.
- 5.6.4 An outline of the precautionary working methods to be followed under the EPSM licence / LICL 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.
 - ▶ **Creation of temporary replacement habitats:** Prior to any works to the building, one bat box will be installed on a nearby mature tree which is to be retained. This will provide a safe refuge for any bats which are found and moved during the works; 1no. Schwegler 1FF bat box (or another manufacturer's equivalent) will be suitable.
 - ▶ **Pre-commencement return-to-roost survey:** Prior to any works to the building, 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:** Demolition works will be preceded by a 'soft-strip' of the roof tiles and soffit on and around the north elevation 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 5.3 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.
- ▶ **Nesting birds:** 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/demolition 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 tile / soffit strip is complete it is likely that no bats will be present within the areas to be affected and demolition works can commence.

- 5.6.5 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 / LICL being issued. The current report is based on one emergence survey and two return-to-roost surveys during the 2020 active season. If a licence is not obtained within 12 months of the date of these surveys (i.e. by July 2021), 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

- 5.6.6 The destruction of one summer day roost used by low numbers of common pipistrelle bats 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. 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 Box 3 below, while bat box specifications are listed at Appendix V.

Crevice-roosting bats

5.6.7 It is recommended that the following replacement roosting habitat features are installed at a height of c.4-6m in similar positions to the existing roost. 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 / LICL:

- ▶ Plot 7, north elevation: 1no. Ibstock Enclosed Bat Box (or Schwegler Bat Tube 1FR) wall mounted or integrated just below eaves height: provides a self-contained bat box with a range of roosting zones; and
- ▶ Plot 11, north elevation: 1no. Ibstock Enclosed Bat Box (or Schwegler Bat Tube 1FR) wall mounted or integrated just below eaves height: provides a self-contained bat box with a range of roosting zones.

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

Box 3: Considerations & key requirements for crevice-dwelling bats (after Gunnell <i>et al.</i>, 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 or 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



Figure 5.1: Indicative locations for replacement bat roost features

Artificial lighting

5.6.9 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 (ILP/BCT, 2018):

- ▶ All luminaires should lack UV elements when manufactured. Metal halide, fluorescent sources should not be used.

- ▶ LED luminaires should be used where possible due to their sharp cut-off, lower intensity, good colour rendition and dimming capability.
- ▶ A warm white spectrum (ideally <2700Kelvin) should be adopted to reduce blue light component.
- ▶ Luminaires should feature peak wavelengths higher than 550nm to avoid the component of light most disturbing to bats (Stone, 2012).
- ▶ Internal luminaires can be recessed where installed in proximity to windows to reduce glare and light spill.
- ▶ The use of specialist bollard or low-level downward directional luminaires to retain darkness above should be considered. However, this often comes at a cost of unacceptable glare, poor illumination efficiency, a high upward light component and poor facial recognition, and their use should only be as directed by the lighting professional.
- ▶ Column heights should be carefully considered to minimise light spill.
- ▶ Only luminaires with an upward light ratio of 0% and with good optical control should be used (refer to ILP guidance for the reduction of obtrusive light).
- ▶ Luminaires should always be mounted on the horizontal, i.e. no upward tilt.
- ▶ Any external security lighting should be set on motion-sensors and short (1min) timers.
- ▶ As a last resort, accessories such as baffles, hoods or louvres can be used to reduce light spill and direct it only to where it is needed.

Monitoring

- 5.6.10 Any requirement to monitor the success of mitigation and compensatory habitats will be established by the EPSM licence / LICL.

5.7 Recommendations for Ecological Net Gain

- 5.7.1 The following ecological enhancements should be considered for the site to achieve an overall net gain for biodiversity in line with the requirements of local and national policy and guidance.

Plant species which encourage bats

- 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 IV 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 plant species are predominantly native to Britain, but not all species will be suitable in all situations.

6 Summary and Conclusions

6.1 Introduction

- 6.1.1 A Preliminary Ecological Appraisal (PEA) and Preliminary Roost Assessment (PRA) was carried out by ECOSA Ltd in October 2019 at the site of a proposed residential development at The Steddles, North End Road, Yapton, West Sussex. It was recommended that further surveys for bats should be carried out due to potential roost features (PRF) and a bat dropping within the existing building.
- 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. One dusk emergence survey and two dawn re-entry surveys were undertaken in June to July 2020, with reference to current industry guidelines (Collins (ed.), 2016). The surveys were supplemented by an internal/external inspection of structures to assess their suitability for roosting bats.

6.2 Results

- 6.2.1 SxBRC returned 68 records of at least eleven species of bat from within 2km of the survey area, during a date range of 1984 to 2018. There are no granted mitigation licenses for bats within a 2km radius of the site. There are ten SSSI and one SAC within 10km of the survey area; bat populations do not feature among the notified features of any of these sites.
- 6.2.2 Habitats within the site consisted of a residential dwelling with associated garage, hardstanding and gardens, including scattered trees, species-poor intact hedgerows and amenity grassland. The ECOSA (2019) PEA report assessed the habitat on site to be of moderate suitability for foraging and commuting bats. The building is set within a semi-rural landscape characterised by a patchwork of arable land and grazing pasture, villages and industrial estates. There is a low density of residential development within the wider area and therefore low levels of artificial lighting. The area supports some tree corridors and a network of hedgerows, although other habitats such as pockets of woodland are lacking. Due to the finding of one bat dropping indicative of a pipistrelle bat during the building inspection carried out by ECOSA, the building was concluded to be a confirmed roost. Full results and an evaluation can be seen in the report authored by ECOSA (2019).
- 6.2.3 Three presence/absence surveys of the building were carried out by Urban Edge Environmental Consulting Ltd using a five person team, one dusk emergence on 08 June 2020, and two dawn re-entry surveys on 24 June 2020 and 08 July 2020. One common pipistrelle was recorded returning to roost beneath the soffit on the north elevation during the second survey.

- 6.2.4 Low to moderate levels of foraging and commuting activity were recorded in the grounds around the property, the species assemblage including: serotine, noctule, *Myotis*, common and soprano pipistrelle, and brown long-eared bats.

6.3 Evaluation

- 6.3.1 The survey results provide a good level of confidence that low numbers of common pipistrelle bats were roosting in the building during the 2020 breeding season. The roost on the north elevation is an occasionally used day roost for a single species (because it was only observed to be used once during the course of three surveys). This species is widespread and abundant in Sussex and has previously been recorded within 2km of the site.
- 6.3.2 In summary, without mitigation demolition of the existing building will result in a short-term risk of killing/injury/disturbance to low numbers of one common species of bat. The development will also result in low significance impacts from the destruction of one summer day roost used by low numbers of common pipistrelle bats. These impacts will require mitigation but are not considered to be detrimental to maintaining the local populations of common pipistrelle and soprano pipistrelle 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 or Low Impact Class Licence (LICL). 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;
 - ▶ 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 removal of roof tiles and soffit on and around the north elevation 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 nesting birds, if necessary;
 - ▶ Commencement of construction once the supervised roof / hanging tile 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 one common species of bat, however, detrimental effects on the conservation status of the species are not predicted. Mitigation and compensatory methods are recommended to reduce and offset the predicted impacts on a proportionate basis.

References and Bibliography

Barataud M. (2015): *Acoustic Ecology of European Bats: Species Identification, Study of their Habitats and Foraging Behaviour*. Museum national d'Histoire naturelle.

Bat Conservation Trust websites: www.bats.org.uk and <http://roost.bats.org.uk/>

British Standards Institution (BSI; 2013): *BS42020:2013 Biodiversity – Code of practice for planning and development*. BSI Standards Limited, London.

Chartered Institute of Ecology and Environmental Management (CIEEM; 2017): *Guidelines for Ecological Report Writing*. 2nd Edition, CIEEM, Winchester.

Collins, J. (ed.) (2016): *Bat Surveys for Professional Ecologists: Good Practice Guidelines*. 3rd Edition, Bat Conservation Trust, London.

Dietz, D. & Kiefer, A. (2016): *Bats of Britain and Europe*. Bloomsbury Publishing, London.

English Nature (2004): *Bat Mitigation Guidelines*. Peterborough.

Greenaway, F. (2004): *Advice for the management of flightlines and foraging habitats of the barbastelle bat *Barbastella barbastellus**. English Nature Research Report, Number 657.

Greenaway, F. (2008): *Barbastelle bats in the Sussex West Weald 1997 – 2008*.

Gunnell K., Grant, G. and Williams, C. (2012): *Landscape and Urban Design for Bats and Biodiversity*. Bat Conservation Trust, London.

Gunnell K, Murphy B, Williams C (2013): *Designing for biodiversity: A technical guide for new and existing buildings*. RIBA Publishing and Bat Conservation Trust, London.

Institute of Lighting of Professionals (2018): *Guidance Note 08/18: Bats and artificial lighting in the UK*. Co-authored by the Bat Conservation Trust, September 2018.

Joint Nature Conservation Committee (2004): *Bat Workers Manual*. 3rd edition, Peterborough.

Mathews F, Kubasiewicz LM, Gurnell J, Harrower CA, McDonald RA, Shore RF (2018): *A Review of the Population and Conservation Status of British Mammals*. A report by the Mammal Society under contract to Natural England, Natural Resources Wales and Scottish Natural Heritage. Natural England, Peterborough.

Multi-agency Geographic Information for the Countryside (MAGIC) website: www.magic.gov.uk

Natural England: [Standing Advice](#) on bats.

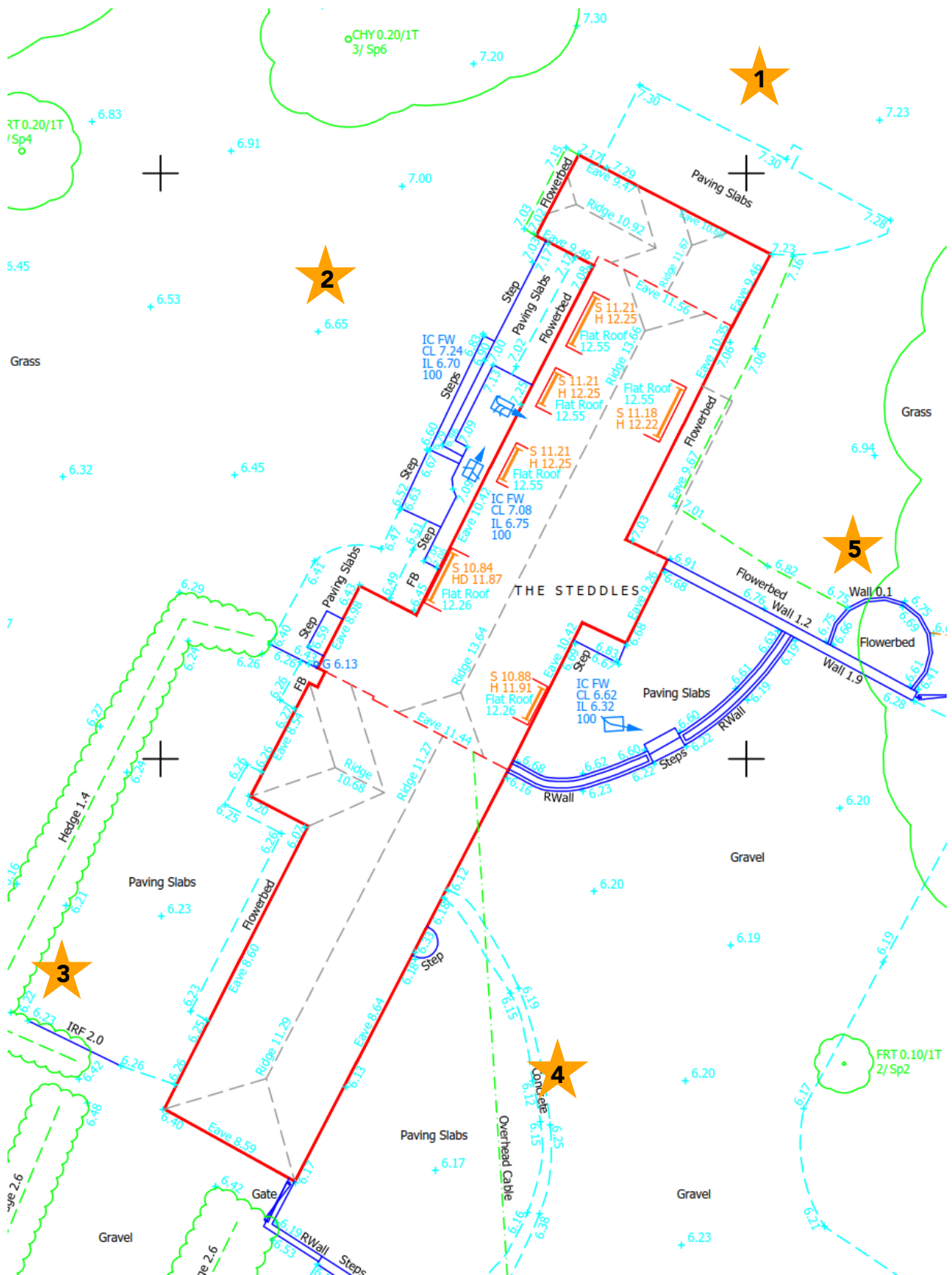
Russ, J. (2012): *British Bat Calls: A Guide to Species Identification*. Pelagic Publishing, UK.

Stone, E. L. (2013): *Bats and lighting: overview of current evidence and mitigation*. University of Bristol.

Underhill-Day N (2017): *The Bat Roost Trigger Index – A New Systematic Approach to Facilitate Preliminary Bat Roost Assessments*. *In Practice* **96**, pp.37-42.

Appendix I: Surveyor Positions

Please see following page.



Appendix II: 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		

Survey 1: Dusk, 08/06/20

Sunset/sunrise: 21.14	Start time: 21.00	End time: 23.00	Precipitation: None
Air temp start: 13.1°C	Air temp end: 12.6°C	Wind: 0	Cloud cover: 20 - 100%

Equipment:

Wildlife Acoustics EM3, Echo Meter Touch and EM Touch2 Pro full spectrum 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 aspect

TP	Time	Spp.	No.(I)	No.(P)	E/R	F/C	Soc.	S/NS	Comment
	21.25	PIPI	1	1	No	C	No	NS	
	21.33	PIPI	1	1	No	F	No	NS	
	21.34	PIPI	1	1	No	C	No	S	S – N past house
	21.34	PIPI	1	1	No	F	No	S	In garden around surveyor
	21.36	PIPI	1+	1	No	F	No	NS	
	21.36	PIPI	1	3	No	F	No	S	In garden around surveyor
	21.39	PIPI	1	1	No	F	No	S	S – N past house
	21.42	EPSE	1	1	No	F	No	S	Foraging in garden
	21.42	PIPI	3	2	No	F	No	S	In garden
	21.44 – 54	EPSE	1+	Many	No	F	No	S	Around larch in garden next door to E
	21.46 – 48	PIPI	1	4	No	F	No	S	In garden
	21.52	PIPI	1	1	No	C	No	NS	

Surveyor 1 (NP): north aspect									
TP	Time	Spp.	No.(I)	No.(P)	E/R	F/C	Soc.	S/NS	Comment
	21.54	PIPI	1	1	No	C	No	NS	
	21.56	PIPI	1	1	No	C	No	NS	
	21.57	EPSE	1	1	No	F	No	NS	
	22.02	PIPI	1	1	No	C	No	S	Around house from S – W but appeared in front of house
	22.22	EPSE	1	1	No	C	No	S	N – S past house
	22.24	BARN OWL	1	1	No		-	S	E – W over garden
	22.40	NYNO	1	1	No	C	No	NS	
	22.40	PIPY	1	1	No	C	No	NS	
	22.44	PIPY	1	1	No	C	No	NS	

Surveyor 2 (AD): north-west aspect									
TP	Time	Spp.	No.(I)	No.(P)	E/R	F/C	Soc.	S/NS	Comment
	21.33 – 36	PIPI	1	12	No	F	No	S	Over garden
	21.40	PIPI	1	3	No	F	No	S	Over garden
	21.42	PIPI	1	2	No	F	No	S	Over garden
	21.44 – 47	PIPI	1	13	No	F	No	S	Over garden
	21.42	EPSE	1	1	No	F	No	S	Overhead surveyor to N
	21.49	EPSE	1	2	No	C	No	NS	
	21.51 – 54	PIPI	1	12	No	F	No	S	Regular foraging around garden
	21.55	EPSE	1	1	No	C	No	NS	
	22.02	PIPI	1	1	No	C	No	S	Flew over from surveyor to N aspect
	22.04	PLAU	1	1	No	C	No	NS	Faint call
	22.09	PIPI	1	3	No	C	No	NS	
	22.22	EPSE	1	1	No	C	No	NS	
	22.40	NYNO	1	1	No	C	No	NS	

Surveyor 3 (JT): south-west aspect									
TP	Time	Spp.	No.(I)	No.(P)	E/R	F/C	Soc.	S/NS	Comment
	21.36	PIPI	1	1	No	C	No	NS	Distant
	21.43	PIPI	1	1	No	C	No	NS	Distant
	21.43	NYNO	1	1	No	C	No	NS	Distant

Surveyor 3 (JT): south-west aspect									
TP	Time	Spp.	No.(I)	No.(P)	E/R	F/C	Soc.	S/NS	Comment
	21.46	EPSE	1	1	No	C	No	S	Appeared suddenly and flew low past surveyor. Probably came around house. Flew NW.
	21.55	MYSP	1	1	No	C	No	NS	Distant
	22.04	EPSE	1	1	No	C	No	NS	
	22.09	PIPI	1	1	No	C	No	NS	Distant
	22.12	MYSP	1	1	No	C	No	NS	Distant / quiet
	22.22	NYNO	1	1	No	C	No	NS	
	22.31	PLAU / EPSE	1	1	No	C	No	NS	
	22.36	PIPI	1	1	No	C	No	NS	
	22.40	NYNO	1	1	No	C	No	NS	
	22.40	PIPY	1	1	No	C	No	NS	

Surveyor 4 (AW): south-east aspect									
TP	Time	Spp.	No.(I)	No.(P)	E/R	F/C	Soc.	S/NS	Comment
	21.38	PIPI	1	1	No	C	No	NS	
	21.42	EPSE	1	1	No	C	No	S	Flew SW – NE along tree line
	21.48	EPSE	2	1	No	F	No	S	Two flying around tall tree in back garden behind house, could see over roof
	21.51	EPSE	1	1	No	C	No	S	Flew around top of same tree to tree line in front of house
	21.57	EPSE	1	1	No	C	No	NS	
	22.12	MYSP	1	1	No	C	No	NS	
	22.16	NYNO	1	1	No	C	No	NS	
	22.22	EPSE	1	1	No	C	No	S	Flew NE – SW along tree line
	22.23	NYNO	1	1	No	C	No	NS	
	22.30	PIPI	1	1	No	C	No	NS	
	22.34	PIPI	1	1	No	C	No	NS	
	22.36	PIPI	1	1	No	C	No	NS	
	22.42	MYSP	1	1	No	C	No	NS	

Surveyor 4 (AW): south-east aspect									
TP	Time	Spp.	No.(I)	No.(P)	E/R	F/C	Soc.	S/NS	Comment
	22.51	PIPI	1	1	No	C	No	NS	
	22.53	NYNO	1	1	No	C	No	NS	

Surveyor 5 (AP): north-east aspect									
TP	Time	Spp.	No.(I)	No.(P)	E/R	F/C	Soc.	S/NS	Comment
	21.26	PIPI	1	1	No	C	No	NS	
	21.34	PIPI	1	1	No	C	No	S	
	21.37	PIPI	1	2	No	C	No	S	Came and went over extension roof
	21.42	EPSE	1	1	No	C	No	S	
	21.43	PIPI	1	1	No	C	No	NS	
	21.50	PIPI	1	1	No	C	No	NS	
	21.58	PIPI	1	1	No	C	No	S	
	22.02	PIPI	1	1	No	F	No	S	
	22.18	PIPI	1	2	No	F	No	NS	
	22.23	PIPI	1	1	No	C	No	S	
	22.37	EPSE	1	1	No	C	No	NS	
	22.44	PIPI	1	1	No	C	No	NS	
	22.51	PIPI	1	1	No	C	No	NS	

Survey 2: Dawn, 24/06/20			
Sunset/sunrise: 04:49	Start time: 03:05	End time: 05:05	Precipitation: None
Air temp start: 13.4°C	Air temp end: 13.2°C	Wind: 0	Cloud cover: 0%
Equipment: Wildlife Acoustics EM3, Echo Meter Touch and EM Touch2 Pro full spectrum 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 2 (AD): north-west aspect									
TP	Time	Spp.	No.(I)	No.(P)	E/R	F/C	Soc.	S/NS	Comment
	03.49	PIPI	1	3	No	F	No	S	Over garden
	03.52 - 53	PIPI	2	7	No	F	No	S	Over garden
	03.59	PIPI	2	5	No	F	No	S	Over garden

Surveyor 2 (AD): north-west aspect									
TP	Time	Spp.	No.(I)	No.(P)	E/R	F/C	Soc.	S/NS	Comment
	04.01 - 02	PIPI	1	10	No	F	No	S	Over garden
	04.05	PIPI	1	2	No	F	No	S	Over garden
	04.15	PIPI	1	1	No	C	No	S	Flew out to field behind
	04.18	PIPI	1	2	No	F	No	S	Over garden
	04.20 - 25	PIPI	1	20	No	F	No	S	Over garden

Surveyor 3 (JT): south-west aspect									
TP	Time	Spp.	No.(I)	No.(P)	E/R	F/C	Soc.	S/NS	Comment
	03.39	PIPI	1	1	No	C	No	NS	Distant
	03.51	PIPI	2	1	No	C	No	S	Both flew over top of house, headed SW
	03.59	PIPI	1	1	No	C	No	NS	Loud. Probably around vegetation behind surveyor.
	04.20	PIPI	1	1	No	C	No	NS	Distant
	04.22	PIPI	1	1	No	C	No	NS	Distant

Surveyor 4 (AW): south-east aspect									
TP	Time	Spp.	No.(I)	No.(P)	E/R	F/C	Soc.	S/NS	Comment
	03.10	PIPI	1	1	No	C	No	NS	
	03.39	PIPI	1	1	No	C	No	NS	
	03.47	PIPI	1	1	No	C	No	S	Flew S to N overhead towards house
	03.52	PIPI	1	1	No	C	No	NS	
	03.59	PIPI	1	1	No	C	No	S	Flew E to W over roof
	04.15	PIPI	1	1	No	C	No	NS	
	04.20	PIPI	1	1	No	C	No	NS	

Surveyor 5 (AP): north-east aspect									
TP	Time	Spp.	No.(I)	No.(P)	E/R	F/C	Soc.	S/NS	Comment
	03.09	PIPI	1	1	No	C	No	NS	
	03.47	PIPI	1	3	No	F	No	S	Flying along trees
	03.49	PIPI	1	1	No	C	No	S	Along side of house
	04.00	PIPI	1	3	No	F	No	NS	
	04.10 – 15	PIPI	1	5+	R	-	No	S	Circled several times then re-entered at soffit on north elevation

Surveyor 5 (AP): north-east aspect									
TP	Time	Spp.	No.(I)	No.(P)	E/R	F/C	Soc.	S/NS	Comment
	04.15	PIPI	1	1	No	C	No	S	
	04.20	PIPI	1	1	No	C	No	S	Around edge of garden
	04.23	PIPI	1	2	No	F	No	S	

Survey 3: Dawn, 08/07/20			
Sunset/sunrise: 04.56	Start time: 03:10	End time: 05:10	Precipitation: Light drizzle
Air temp start: 15.6°C	Air temp end: 15.2°C	Wind: Light breeze (B3)	Cloud cover: 100%
Equipment: Wildlife Acoustics EM3, Echo Meter Touch2 Pro & Elekon Batlogger-M full spectrum 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 (MV): north aspect									
TP	Time	Spp.	No.(I)	No.(P)	E/R	F/C	Soc.	S/NS	Comment
	04.26	PIPI	1	1	No	C	No	NS	
	04.32	PIPI	1	1	No	C	No	NS	

Surveyor 2 (AD): north-west aspect									
TP	Time	Spp.	No.(I)	No.(P)	E/R	F/C	Soc.	S/NS	Comment
	03.36	EPSE	1	1	No	C	No	NS	
	04.22	NYNO	1	1	No	C	No	NS	
	04.25	PIPI	1	1	No	C	No	NS	
	04.32	PIPI	1	1	No	C	No	NS	
	04.34	PIPI	1	1	No	C	No	NS	
	04.36	PIPI	1	1	No	C	No	NS	
	04.41	PIPI	1	3	No	F	No	NS	
	04.44	PIPI	1	1	No	C	No	NS	

Surveyor 3 (JT): south-west aspect									
TP	Time	Spp.	No.(I)	No.(P)	E/R	F/C	Soc.	S/NS	Comment
	03.36	EPSE	1	1	No	C	No	NS	
	04.22	NYNO	1	1	No	C	No	NS	
	04.36	PIPI	1	1	No	C	No	NS	Distant

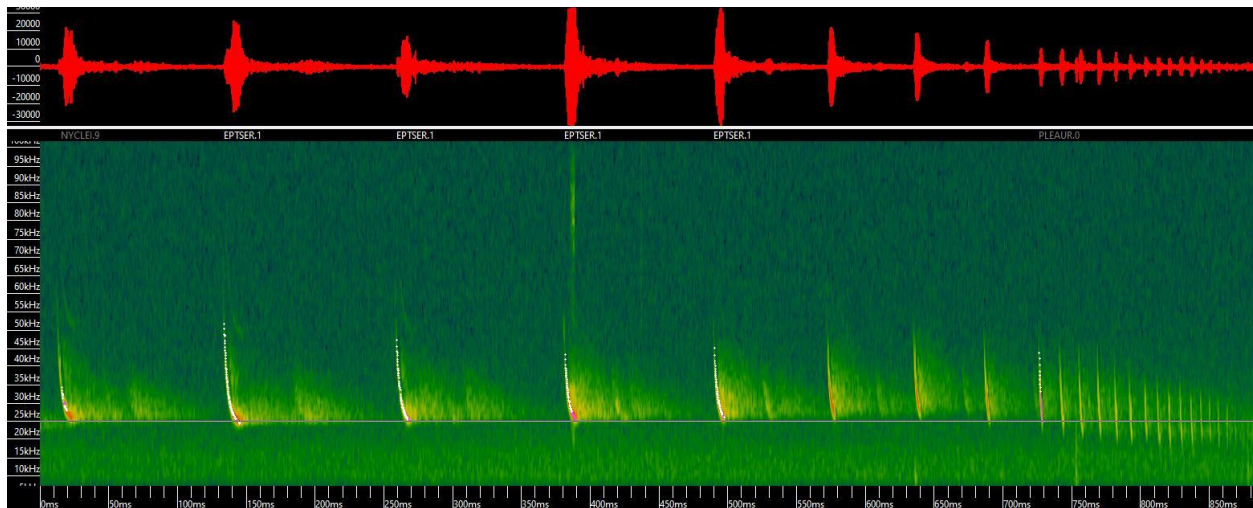
Surveyor 3 (JT): south-west aspect									
TP	Time	Spp.	No.(I)	No.(P)	E/R	F/C	Soc.	S/NS	Comment
	04.38	PIPI	1	1	No	C	No	NS	Louder and closer
	04.41	PIPI	1	1	No	C	No	S	Flew overhead travelling NW – SE and went around building

Surveyor 4 (AW): south-east aspect									
TP	Time	Spp.	No.(I)	No.(P)	E/R	F/C	Soc.	S/NS	Comment
	03.36	NYNO	1	1	No	C	No	NS	
	04.22	NYNO	1	1	No	C	No	NS	
	04.36	PIPI	1	1	No	C	No	NS	
	04.41	PIPI	1	1	No	C	No	NS	

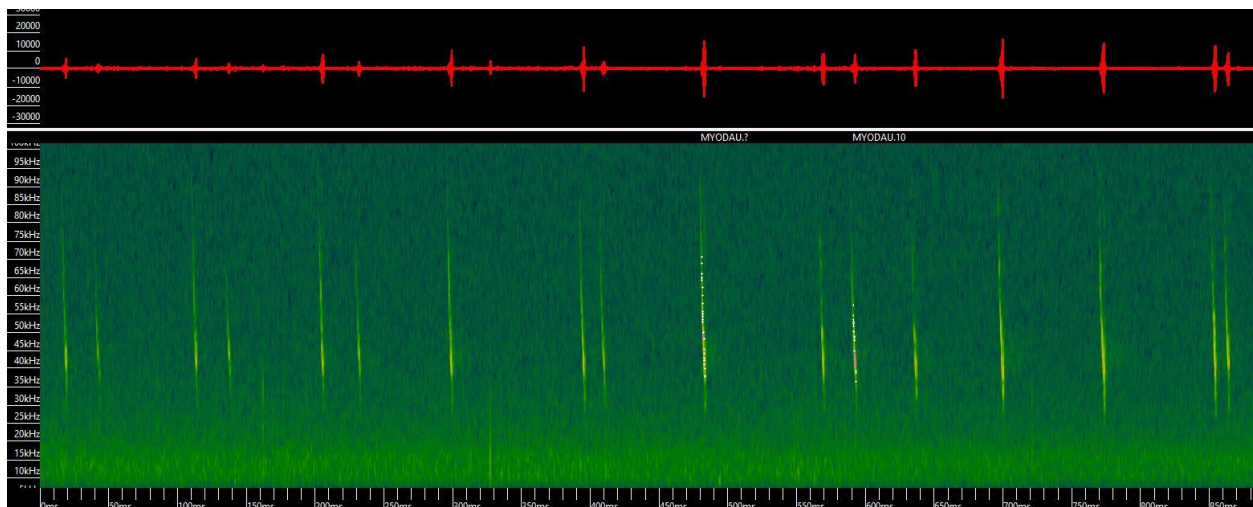
Surveyor 5 (AP): north-east aspect									
TP	Time	Spp.	No.(I)	No.(P)	E/R	F/C	Soc.	S/NS	Comment
	03.50	PIPI	1	1	No	C	No	NS	
	03.59	PIPI	1	2	No	C	No	NS	
	04.37	PIPI	1	1	No	C	No	NS	

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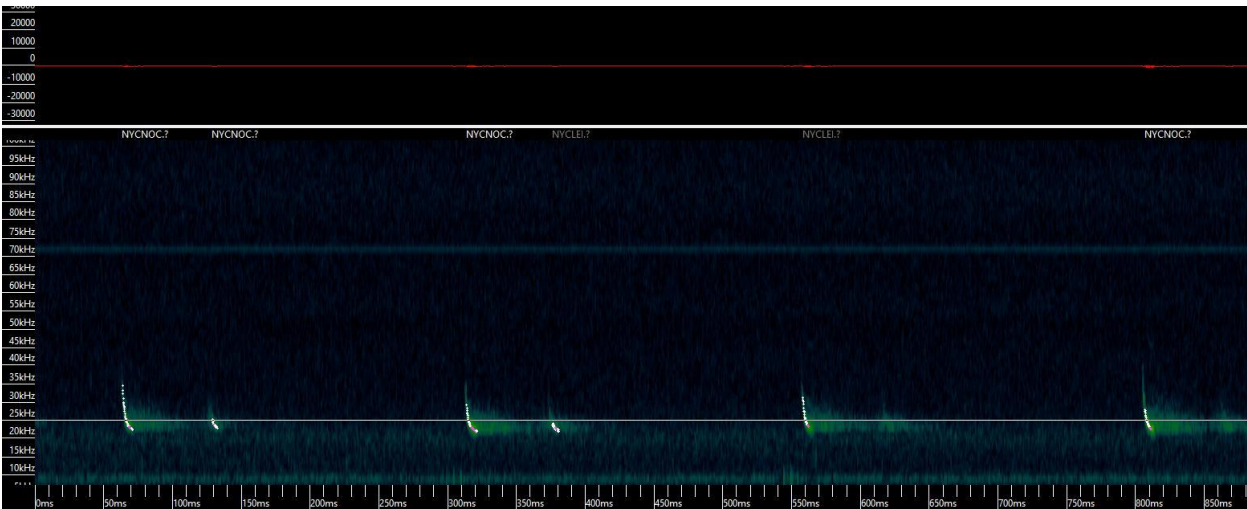
Appendix III: Example Sonograms



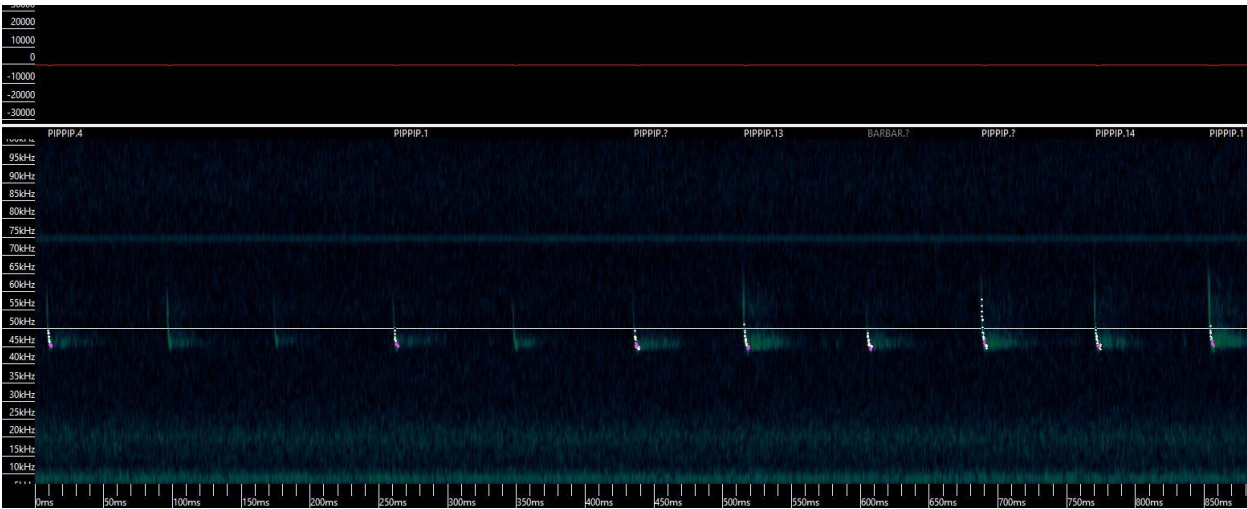
Foraging serotine recorded on 08/06/20 at 21.41



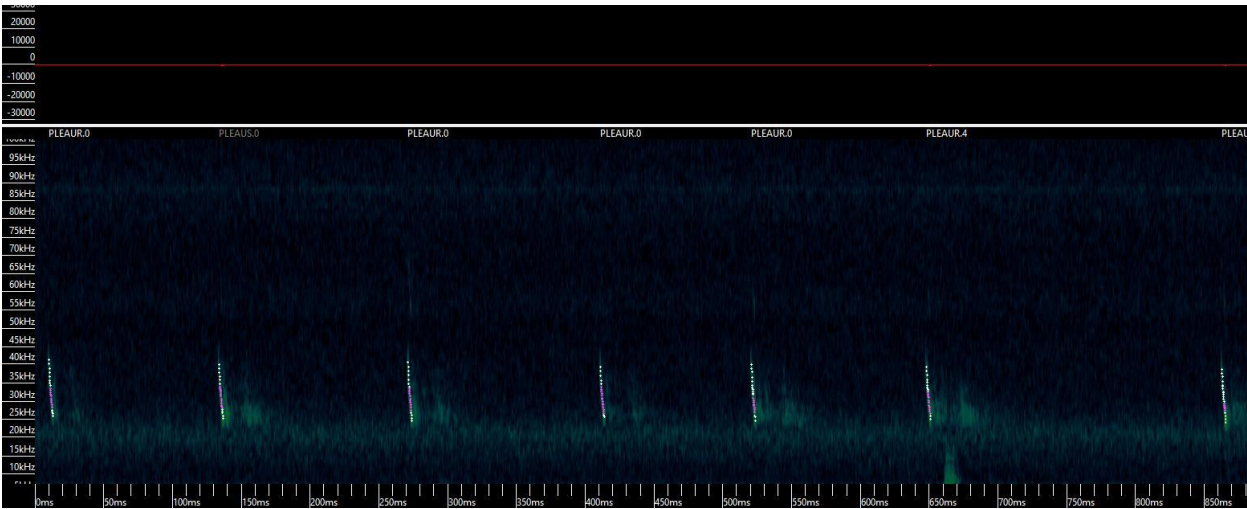
Myotis bat recorded on 08/06/20 at 22.11



Noctule bat recorded on 08/06/20 at 22.40



Common pipistrelle bat recorded on 08/06/20 at 21.36



Brown long eared bat recorded on 08/06/20 at 22.31

Appendix IV: 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>Anthrills vulneraria</i>	Kidney vetch	N	HP	F	Well drained	Sun	Y				
<i>Aubrieta deltoidea</i>	Aubrieta	N	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
<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	N	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				
<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>Organum vulgare</i>	Marjoram	N	HP	F	Well drained/ dry	Sun	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	Parti shade	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					
<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</i> spp.	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>Symphoricarum</i> spp.	Michaelsmas daisies			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</i> spp.	Clover species	N	HP	F	Any	Sun	Y				
<i>Valeriana</i> spp.	Valerian species	N	HP	F	Moist	Sun / partial shade			Y		
<i>Verbascum</i> spp	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 V: 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.



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.



Improved Cavity Bat Box:

Suitable for the British cavity-dwelling bats - including the Brown Long-Eared, Daubenton's, Natterer's, Bechstein's, Grey Long-Eared, Whiskered, Brandt's and Nathusius' Pipistrelle bats. These species together make up about 20% of UK bats.

External panels precision cut from 12mm Exterior Grade FSC plywood, for improved heat insulation. Exterior surface stained black with water based woodstain for improved thermal input, whilst avoiding any possibility of deterring the bats due to vapour from the stain.

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

Overhanging apex roof for protection from UK weather.

Single large cavity inside, with varying temperature characteristics.

Wide entrance with accurately sized opening. Ideal for cavity dwelling bats and deters unwelcome birds etc.

Internal ceramic heat sink ensures improved temperature stability.

Improved "Bat Ladder" at base of box facilitates bats landing and climbing into box.

Ladder continues inside box, while textured internal surfaces ensure bats find it easy to move around inside box and on the walls.

Ladder acts as "convector heater" for box - when sun shines on ladder, warm air rises into the box, but does not come out when the outside cools.

Easy and safe to erect box on walls or trees - relatively light weight, with 1 keyhole mounting hole and 2 extra screw holes for secure fixing.

Floor slides out (after removing 1 screw) for cleaning or inspection where permitted.

Improved draught-proofing enhances temperature stability inside box.

paint. Birds will not occupy this box.

Cleaning:

Maintenance-free

Entrance hole:

Height: 20mm

Width: 150mm

Occupants:

Bats

Material:

SCHWEGLER
wood-concrete

Kit includes:

1 x Bat Tube

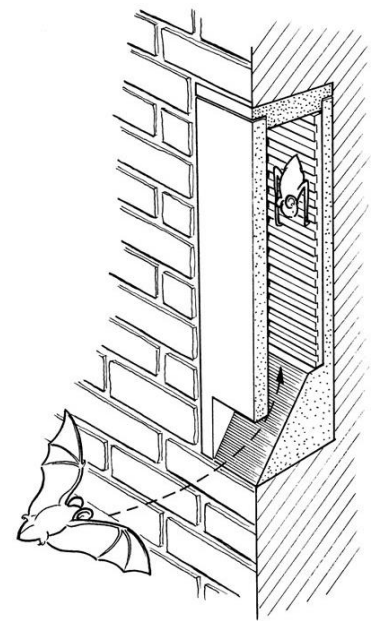
Colour:

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 VI: Legal and Technical Limitations

- This report has been prepared by Urban Edge Environmental Consulting Ltd (UEEC Ltd) with all reasonable skill, care and diligence within the terms of the contract made with the Client to undertake this work, and taking into account the information made available by the Client. No other warranty, expressed or implied, is made as to the professional advice included in this report or any other services provided by us.
- UEEC Ltd disclaims any responsibility to the Client and others in respect of any matters outside the scope of this contract. This report is confidential to the Client and is not to be disclosed to third parties. If disclosed to third parties, UEEC Ltd accepts no responsibility of whatsoever nature to third parties to whom this report, or any part thereof, is made known. Any third party relies upon the contents of this report at their own risk and the report is not to be relied upon by any party, other than the Client without the prior and express written agreement of UEEC Ltd.
- 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.
- All work carried out in preparing this report has utilised and is based upon UEEC Ltd's current professional knowledge and understanding of current relevant UK standards and codes, technology and legislation. Changes in this legislation and guidance may occur at any time in the future and may cause any conclusions to become inappropriate or incorrect. UEEC Ltd does not accept responsibility for advising the Client or other interested parties of the facts or implications of any such changes;
- 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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