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Former Waitrose, Avon Road, Littlehampton, West Sussex

Bat Survey

December 2018



Former Waitrose, Avon Road, Littlehampton, West Sussex

Bat Survey

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The information, advice and opinions provided in this report are true and were prepared and provided in accordance with the Chartered Institute of Ecology and Environmental Management's <u>Code of Professional Conduct</u> . We confirm that the opinions expressed are our true and professional bona fide opinions.		

Contents

0	Executive Summary	i
0.1	Introduction	i
0.2	Results	i
0.3	Evaluation	i
0.4	Recommendations	ii
1	Introduction	1
1.1	Background	1
1.2	Objectives and Approach of the Study	1
1.3	Site Description	2
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	DNA Analysis	8
3.5	Presence/Absence Surveys	8
3.6	Evaluation	9
3.7	Limitations	10
3.8	Personnel	10
4	Results	11
4.1	Desk Study	11
4.2	Preliminary Roost Assessment	12
4.3	DNA Analysis	16



4.4	Presence/Absence Surveys	16
5	Evaluation	17
5.1	Introduction	17
5.2	Presence or Absence of Bats	17
5.3	Species Assemblage	17
5.4	Impact Assessment	17
5.5	Recommendations for Avoidance, Mitigation and Compensation of Impacts	18
5.6	Recommendations for Ecological Enhancement	18
6	Summary and Conclusions	21
6.1	Introduction	21
6.2	Results	21
6.3	Evaluation	21
6.4	Recommendations	22
	References and Bibliography	23
	Appendix I: Phase 1 Habitats Map	A
	Appendix II: Presence/Absence Survey Results	C
	Appendix III: Example Sonograms	E
	Appendix IV: Plant Species which encourage Bats	F
	Appendix V: Legal and Technical Limitations	H

List of Tables and Figures

<i>Table 0.1: Summary of recommendations</i>	<i>ii</i>
<i>Table 3.1: Survey dates and weather conditions</i>	<i>9</i>
<i>Table 4.1: Summary of bat records data within 1km of the site</i>	<i>11</i>
<i>Table 4.2: Summary of granted EPS mitigation licences within 2km of the site</i>	<i>11</i>
<i>Table 5.1: Status of recorded bat species (abundance and distribution)</i>	<i>17</i>
<i>Table 5.2: Recommended precautionary measures</i>	<i>18</i>
<i>Table 6.1: Summary of recommendations</i>	<i>22</i>
<i>Figure 1.1: Site location plan</i>	<i>3</i>
<i>Figure 1.2: Proposed block plan</i>	<i>4</i>

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 Records 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 development at the Former Waitrose, Avon Road, Littlehampton, West Sussex (Grid Reference: 502897,102199).
- 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. A single dusk emergence survey was undertaken in July 2018 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 The desk study data search returned eight records of two species of bat from within 1km of the survey area. 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 Habitats within the site include one building, hard-standing and small sections of ornamental planting, features with limited suitability for foraging and commuting bats and which are commonplace in the surrounding area. The internal/external inspections concluded that building B1 was of low suitability for roosting bats, with a range of external features that could provide preferred roosting conditions for crevice roosting species such as pipistrelles *Pipistrellus spp.*. No bats (dead or alive), bat droppings or other evidence of occupancy by bats were found inside the building during the inspection.
- 0.2.3 Building B1 was subject to one dusk emergence survey carried out on 4 July 2018. No bats were recorded emerging from the building during the survey. Very low levels of foraging and commuting activity were recorded within and around the survey area, limited to a short period of noctule *Nyctalus noctula* activity recorded by one surveyor only.

0.3 Evaluation

- 0.3.1 The survey results provide a good level of confidence that bats were absent from B1 during the summer months in 2018.

0.3.2 No designated sites notified for their bat populations will be affected by the proposals for the site. No bats roosts in buildings/structures or trees will be affected by the proposals for the site.

0.3.3 In conclusion, the survey results demonstrate that there are very unlikely to be any direct or indirect impacts to bats, their breeding/resting places or foraging/commuting habitats as a result of the proposed works. Bats are not considered to present a significant constraint to the current proposals for the site.

0.4 Recommendations

0.4.1 No specific avoidance, mitigation or compensation measures for bats are required to be implemented as part of the currently proposed scheme. However, precautionary measures are nevertheless recommended and are summarised in Table 0.1. In addition, a range of ecological enhancements are recommended to improve the overall value of the site for bats post-construction.

Table 0.1: Summary of recommendations

#	Summary of recommendations
R1	If commencement of the works is significantly delayed (e.g. by more than 24 months from the survey date), updated active season surveys should be undertaken to record any changes in the roosting status of B1.
R2	In the unlikely event that bats are encountered during the works, site operatives will be advised to cease activity in the vicinity while advice from an ecologist is sought.

1 Introduction

1.1 Background

- 1.1.1 A Preliminary Ecological Appraisal (PEA) was carried out in April 2018 (Waterman, 2018) for the site of a proposed residential development at the Former Waitrose, Avon Road, Littlehampton, West Sussex (Grid Reference: 502897,102199). It was recommended that further surveys for bats should be carried out due to the presence of potential roost features.
- 1.1.2 The PEA concluded that habitats suitable for bats included building B1 which was considered to be of low suitability for roosting bats. The proposed development will result in demolition of the building 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 (1km radius from the centre of the proposed development site) and designated site citations;
 - ❖ A Preliminary Roost Assessment of structures and/or trees, including internal/external inspection to assess their suitability for roosting bats; and
 - ❖ Collection of bat droppings for DNA analysis; 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 Site Description

- 1.3.1 The site comprises c0.6ha of previously development land, currently comprising the vacant former Waitrose store on Avon Road, Littlehampton, together with hard-standing and areas of ornamental planting. It is bounded to the east by East Street, to the north by Franciscan Way, to the west by Dukes Street and adjacent retail/industrial buildings, and to the south by Anchor Springs.
- 1.3.1 The site location is outlined in red on Figure 1.1. The Phase 1 Habitats Map for the site is included for reference at Appendix I.

1.4 Proposed Construction Activities

- 1.4.1 Planning consent is being sought for demolition of the former Waitrose building and the erection of two new, predominantly residential, buildings situated to the north and south of Avon Road respectively, together with access, parking, landscaping and associated facilities. The southern part of the site will provide a new building of modern, flexible retail floorspace (Use Classes A1 and/or A2 and/or A3 and/or D1) at lower ground level, with part three and part four storeys of residential use (Use Class C3), comprising 49 apartments, above. To the north of Avon Road, a second building will comprise 34 high quality residential units. Figure 1.2 presents the proposed block plan following completion of the development.

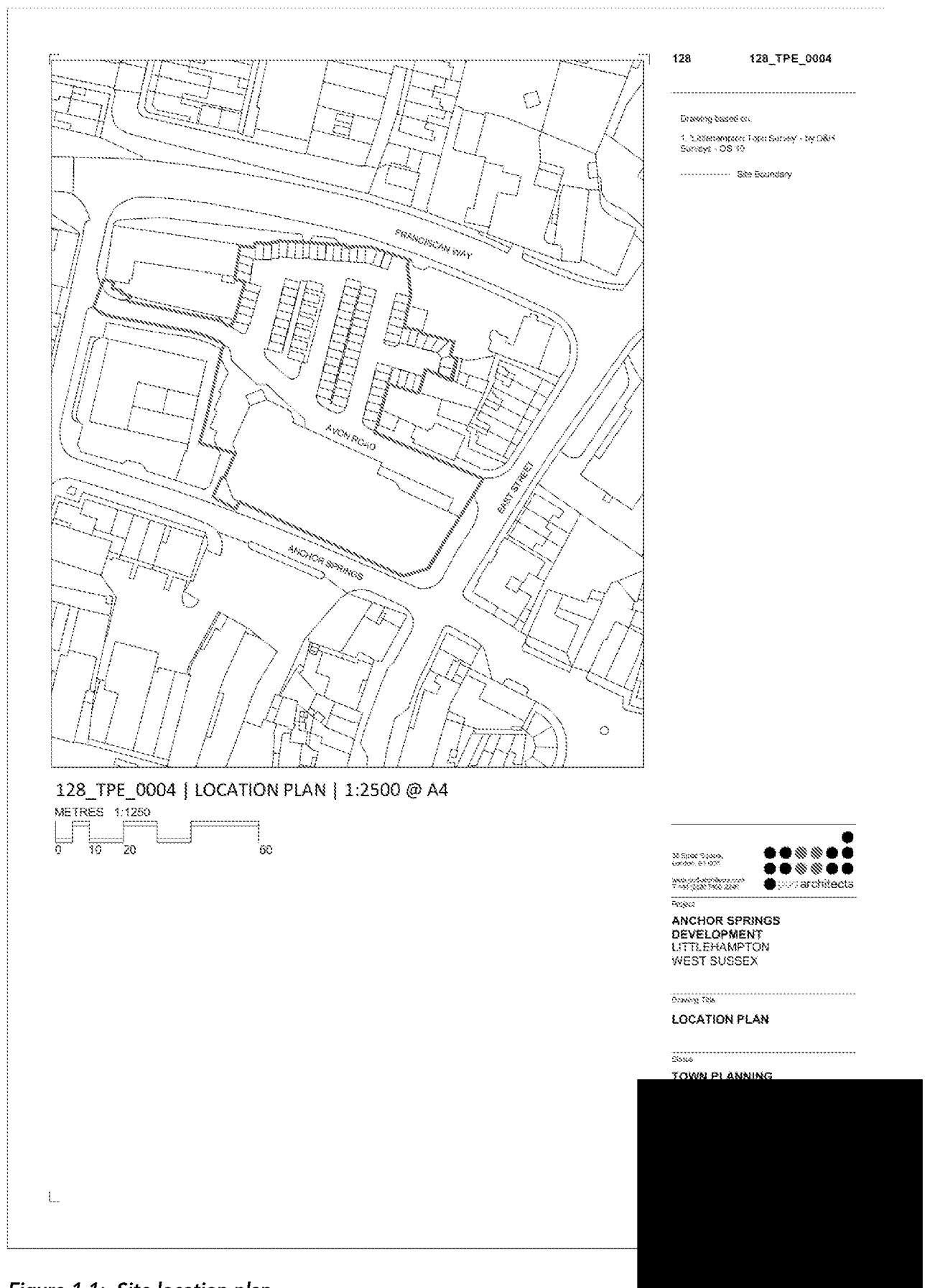


Figure 1.1: Site location plan

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 11: Conserving and enhancing the natural environment) is clear that planning decisions should be “minimising impacts on biodiversity and providing net gains in biodiversity where possible, contributing to the commitment to halt the overall decline in 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 1km search radius. The desk-study data search was carried out as part of the Preliminary Ecological Appraisal (Waterman, 2018). 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;
 - ❖ DNA analysis; and
 - ❖ Presence/absence surveys.

3.3 Preliminary Roost Assessment

- 3.3.1 External inspection of the structures to be affected was undertaken on 6 April 2018 during the PEA (Waterman, 2018). The internal inspection was undertaken by Nick Pincombe (BA(Hons) MSc CEnv MIEMA MCIEEM), who has over twelve years' experience in leading survey and impact assessment teams for a wide range of ecology and environmental planning projects. Nick holds a Natural England Level 2 Class Licence WML-CL18 to disturb and handle bats. Nick was assisted by Anna Douglas (BSc(Hons) MSc qCIEEM), a Graduate Ecologist with two years' professional consultancy experience.
- 3.3.2 Two surveyors undertook the inspection over a period of approximately three 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. The inspection was mainly undertaken from ground level but access to the flat roof section of the building was also possible.

- 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 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 (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 DNA Analysis

- 3.4.1 The structures inspection included a search for bat droppings which would be collected in accordance with BCT protocols (Collins (ed.), 2016) to be sent for DNA analysis by the ecological forensics team within the School of Life Sciences at the University of Warwick.

3.5 Presence/Absence Surveys

- 3.5.1 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).

- 3.5.2 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 at least 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).
- 3.5.3 Detection equipment included Wildlife Acoustics Echo Meter Touch, EM Touch2 Pro and EM3, and Elekon Batlogger-M handheld detectors. Recordings of bat calls were analysed using BatSound (v4) and Kaleidoscope UK (v3.1.8) 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
4 July 2018	Dusk	17°C – 14°C, 30% cloud cover, Beaufort 3 south-westerly, no precipitation

- 3.5.4 Current guidelines (Collins (ed.), 2016) recommend reasonable 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 had low suitability for roosting bats and one presence/absence survey was undertaken. A six person survey team was deployed; Appendix I shows a plan of surveyor positions.

Box 2: Recommended 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

3.6 Evaluation

- 3.6.1 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.

- 3.6.2 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.

3.7 Limitations

- 3.7.1 The presence/absence survey reported herein was instructed on 20 June 2016 and carried out on 4 July. The survey was hence undertaken in accordance with the BCT's recommended timings for presence/absence surveys (Collins (ed.), 2016).
- 3.7.2 There were no difficulties in gaining access to the site to carry out the structures inspections or subsequent presence/absence survey. However, it was not possible to gain a clear view of the west aspect of the central north-south roof pitch during the emergence surveys, meaning that bats emerging/re-entering there may not have been observed. However, any bats would have been sighted by a surveyor at the building perimeter had they roosted in features on that part of the structure. Weather conditions were good and within acceptable parameters. There were no equipment malfunctions or other limitations of relevance to the methods applied.
- 3.7.3 See Appendix V for general Legal and Technical Limitations which apply to this document.

3.8 Personnel

- 3.8.1 The surveys were led by Nick Pincombe BA(Hons) MSc CEnv MIEMA MCIEEM, director of Urban Edge Environmental Consulting, who has over twelve 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). Nick was assisted by: Mark Vivian BSc(Hons) MSc MCIEEM who has ten years' professional consultancy experience and holds Natural England Class Licences to survey for bats (WML-CL18), dormouse (WML-CL10a) and great crested newt (WML-CL08); Olly Edmonds BSc(Hons) MSc who has over five seasons' bat survey experience and holds Natural England Class Licences to survey for bats (WML-CL17) and great crested newt (WML-CL08); Georgina Baulcomb BSc(Hons) MSc GradCIEEM who has four seasons' professional bat survey experience; Adrian Price GradCIEEM who 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 Anna Douglas BSc MSc qCIEEM who has two seasons' professional bat survey experience and is currently working towards gaining a bat licence.

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>

4 Results

4.1 Desk Study

- 4.1.1 SxBRC returned eight records of two species of bat from within 1km of the survey area during a date range of 2006 to 2011, as summarised in Table 4.1.

Table 4.1: Summary of bat records data within 1km of the site

Species	Protection
Serotine <i>Eptesicus serotinus</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
Habs.Dir.Ax.2/4	Habitats Directive 92/43/EEC Annex 2 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 three licenced sites, summary details of which are listed in Table 4.2. There are six SSSI and no SAC within 10km of the survey area. Bat populations do not feature among the notified features of any of these sites.

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
2015-10184-EPS-MIT	c.1,700m north-east	Common pipistrelle <i>Destruction of a resting place</i>	22/05/2015	31/05/2020
EPSM2012-4965	c.1,450m north-east	Common pipistrelle Brown long-eared Natterer's <i>Destruction of a resting place</i>	05/11/2012	31/08/2014
EPSM2009-946	c.1,390m north-east	Common pipistrelle Soprano pipistrelle Brown long-eared <i>Destruction of a breeding site</i> <i>Destruction of a resting place</i>	04/06/2010	31/12/2011

4.2 Preliminary Roost Assessment

Landscape setting

- 4.2.1 The site is located within an area of limited suitability habitat for bats sited within a densely developed town centre with high levels of artificial light and little semi-natural habitat. The immediate landscape setting is dominated by the urban settlement of Littlehampton and its associated commercial properties, car parks, roads and residential buildings. There are scattered trees associated with private gardens located to the north-east of the site; these may provide some opportunity for roosting and foraging bats. The closest significant area of green space is Littlehampton golf course located approximately c.550m to the south-east of the site.

Building B1

- 4.2.2 Building B1 is a large moderately well maintained brick built structure, formerly in use as a Waitrose supermarket and currently vacant. It is the only building on site.

Exterior

- 4.2.3 Building B1 had a hipped half-pitched roof with a tile covering running all the way around its perimeter, at the top of which the roof was flat and to be covered in felt. The western part of the building comprised one level internally, whilst the eastern part had two levels, with dormer windows on the upper storey housing former office space. The first floor office space and associated roof voids were inspected, however, there was no internal access to the half-pitched void spaces at the western end.
- 4.2.4 A clock tower protrudes from the north-west corner of the roof. This clock tower had a pitched roof with a tile covering and clay hanging tiles at its base where it adjoins the roof, and walls constructed from brick. At the top of the brick walls was a soffit box around the building perimeter. Either side of the dormer windows on the south facing side of the building clay hanging tiles were present. On the eastern façade of the building another dormer window and a large glass window adjacent to the internal staircase were present. Clay hanging tiles were present either side and below the large window on the eastern façade.
- 4.2.5 The external inspection concluded that B1 had low potential to support roosting bats based on the following features:
- ❖ Gaps present amongst the clay hanging tiles on the clock tower;
 - ❖ Gaps present beneath the clay hanging tiles on the eastern elevation;
 - ❖ Gaps present beneath the clay hanging tiles either side of the dormer windows on the southern elevation;
 - ❖ Gaps present beneath lead flashing around the windows;
 - ❖ A missing section of fascia board providing an access point into the soffit box at the south-west corner of the building; and
 - ❖ Several raised/missing tiles on the hipped roof pitches recorded on the south and western aspects.

- 4.2.6 These features provide a range of opportunities for crevice roosting species such as pipistrelles *Pipistrellus spp.* or provide access to the roof space for roof void dwelling bats such as serotine *Eptesicus serotinus*.

Building interior

- 4.2.7 A thorough inspection of all habitable areas of the building (rooms, corridors, etc.) was undertaken as part of the internal inspection on 4 July 2018. The building was not in use and the possibility existed that habitable rooms could provide roosting opportunities for bats.

Ground floor

- 4.2.8 The ground floor predominantly consisted of the large open main store accommodation. The room had a suspended ceiling, plaster board walls and a concrete floor, all in generally sound condition and provided no potential roosting features for bats. A number of the ceiling tiles were broken or had been removed to gain access to the roof void. No evidence of roosting bats was found within this room.
- 4.2.9 The remainder of the lower floor consisted of number of corridors and small rooms, these areas had the same character as the main store space, consisting of suspended ceilings, concrete floors and painted brick walls. All doors in this section were closed. A number of the ceiling tiles had also been removed in these rooms for access into the roof void. There were no features in these sections that would typically be exploited by roosting bats. No observable evidence of bat activity was noted.
- 4.2.10 The loading bay was at the north-east corner of the building and accessed from the main store space by a small set of stairs. The loading bay and storage rooms were of brick construction, with high ceilings and concrete floors. No evidence of roosting bats was found within this area.
- 4.2.11 The cellar was accessed through a locked and sealed door next to the service entrance in the north of the building. It consisted of a brick lined stairwell and a single small electrical room. The cellar was dark, had brick walls, a concrete floor and ceiling and a ventilation shaft. No evidence of roosting bats was found within this room.
- 4.2.12 There were two large commercial lift shafts connecting the lower and upper floors, these were sealed off at the time of the survey.

First floor

- 4.2.13 The first floor predominantly consisted of a large open main storage room. The room had a corrugated metal ceiling, concrete floor and a mix of tile, plasterboard and brick walls. The construction was sound and provided no potential roosting features for bats. No evidence of roosting bats was found within this room.
- 4.2.14 The remainder of the upper floor was made up of a number of interconnected rooms, including cleaning stores, offices, corridors, and a CCTV room. These areas were located behind closed doors, they had a mixture of concrete and carpeted floors, painted brick walls, and suspended ceilings. No evidence of roosting bats was found within any of these spaces.

Roof void 1

- 4.2.15 Two roof voids were accessed during the assessment. The void within the clock tower was not accessible. Roof void 1 was a large space, covering most of the western section of the building, and was approximately c.2m in height. It was accessed from three locations on the ground floor in the western section of the building via broken/removed tiles in the suspended ceiling. The void had a flat metal corrugated roof. No lining was present and there was considerable pipe work and many steel joists present within the void, making it heavily cluttered and unsuitable for species which prefer internal flight space. There was no observable evidence of bats within this roof void.

Roof void 2

- 4.2.16 The second void was accessed from the first floor storage space through the plant room in the eastern part of the building, which also gave access to the flat section of roof over the westerly section. The plant room had breezeblock walls, a concrete floor, gridded windows and ventilation units. It was open into the roof void in the north eastern aspect of the room. The roof structure in this area comprised rough wooden roof joists and timbers which could be utilised by roosting bats, and was lined with gappy sarking felt which could provide access from the external roof tiles to the void interior. The void was a half pitch and measured approximately c.5x3m and was c.2.5m in height. There was no observable evidence of bats within this roof void.

Conclusion

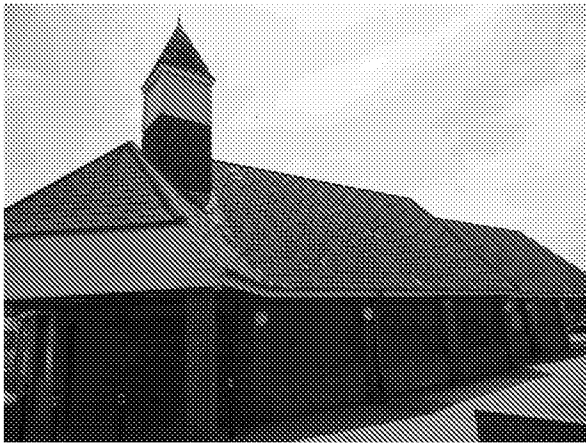
- 4.2.17 Overall it was concluded that the building is of low suitability for roosting bats.



Exterior view north elevation



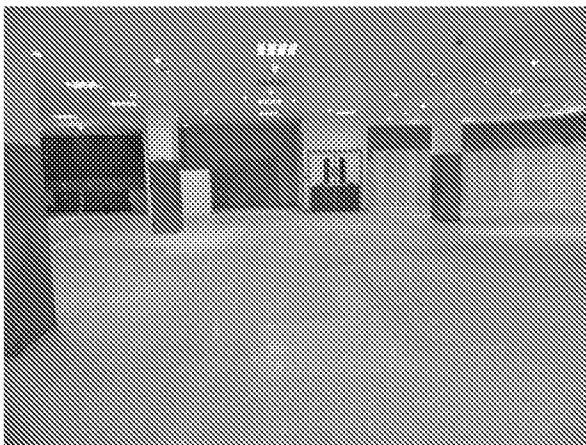
Lifted lead flashing around windows



Exterior view western elevation



Clock tower, western aspect, missing/slipped hanging tiles



Main ground floor shop space



Connecting stairwell



Upper floor, main internal storage room



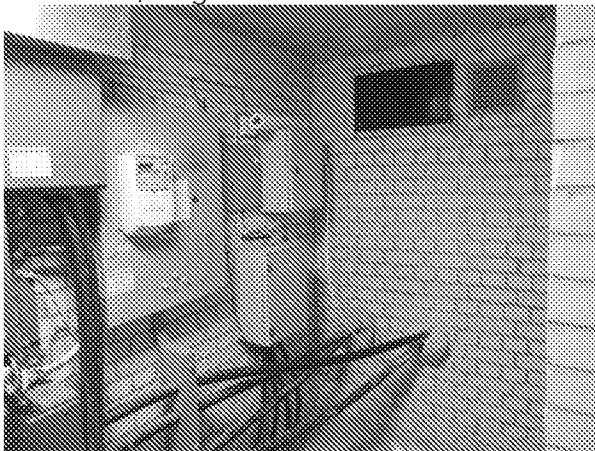
Roof void 1, very cluttered



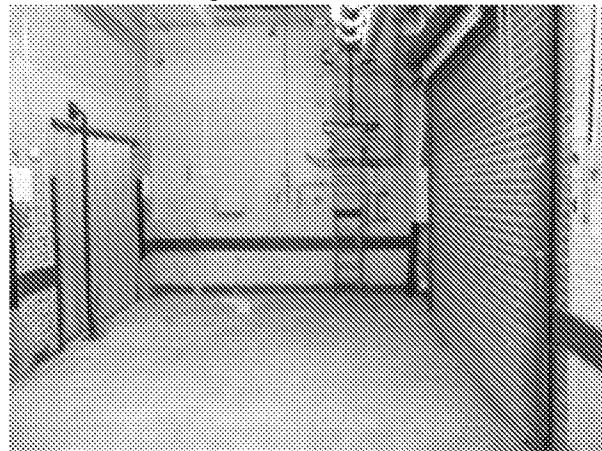
Roof void 2, rough timbers



Roof void 2, lining



Basement 1



Loading bay

4.3 DNA Analysis

- 4.3.1 No bat droppings were found during the internal or external inspections despite extensive searching; no DNA analysis was undertaken.

4.4 Presence/Absence Surveys

- 4.4.1 One dusk emergence survey of building B1 was undertaken on 4 July 2018. Full survey results are detailed in Appendix II while sample sonograms recorded at the site are given at Appendix III.
- 4.4.2 Sunset on 4 July was at 21.18; the survey started at 21.00 and ended at 22.45. No bats were recorded emerging from the building during the survey.
- 4.4.3 Very low levels of foraging and commuting activity were recorded within and around the survey area, limited to a short period of noctule *Nyctalus noctula* activity recorded by surveyor 4 only.

5 Evaluation

5.1 Introduction

- 5.1.1 This chapter presents an assessment of likely impacts to roosting and foraging 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 bats were absent from building B1 during the summer months in 2018.
- 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 building B1.

5.3 Species Assemblage

- 5.3.1 Species diversity recorded during the presence/absence survey was limited to one species (foraging/commuting only). Its local and national conservation status is listed in Table 5.1 (BCT, 2010; Mathews *et al.*, 2018; Russ, 2012; Sussex Bat Group²).

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

Species	Sussex abundance/distribution	UK abundance/distribution	UK status
Noctule	Uncommon, widespread	Uncommon, widespread, absent in Scotland	Least concern

5.4 Impact Assessment

Designated sites

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

Roosts – buildings/structures

- 5.4.2 No bats roosts in buildings/structures will be affected by the proposals for the site.

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

Roosts – trees

- 5.4.3 No bats roosts in trees will be affected by the proposals for the site.

Foraging and commuting habitats

- 5.4.4 Habitats within the site include one building, hard-standing and small sections of ornamental planting, features with limited suitability for foraging and commuting bats and which are commonplace in the surrounding area. No impact to foraging and commuting bats are predicted.

Summary

- 5.4.5 In conclusion, the survey results demonstrate that there are very unlikely to be any direct or indirect impacts to bats, their breeding/resting places or foraging/commuting habitats as a result of the proposed development. Bats are not considered to present a significant constraint to the current proposals for the site.

5.5 Recommendations for Avoidance, Mitigation and Compensation of Impacts

- 5.5.1 No specific avoidance, mitigation or compensation measures for bats are required to be implemented as part of the currently proposed scheme. However, precautionary measures are nevertheless recommended and are listed in Table 5.2.

Table 5.2: Recommended precautionary measures

#	Recommended precautionary measures
R1	The current report is based on one presence/absence survey during the 2018 active season, which is proportionate to building B1's low suitability for roosting bats. If commencement of the works is significantly delayed (e.g. by more than 24 months from the survey date), updated active season surveys should be undertaken to record any changes in the roosting status of B1.
R2	The survey results indicate that bats are likely to be absent from building B1. In the unlikely event that bats are encountered during the works, site operatives will be advised to cease activity in the vicinity while advice from an ecologist is sought. The ecologist will then assess the most appropriate course of action before works continue.

5.6 Recommendations for Ecological Enhancement

- 5.6.1 The following ecological enhancements could be considered to improve the overall value of the site for bats post-construction, each of which is described in further detail below:
- ✦ Within the site's landscaping plans, use plant species which encourage bats by providing additional food sources or roosting opportunities; and
 - ✦ Increase roosting opportunities by installing a range of bat boxes at the site.

Plant species which encourage bats

- 5.6.2 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. The aim is to encourage a diverse range of invertebrate food sources and increased roost potential.

Roosting opportunities

- 5.6.3 The value of the site for bats could be enhanced by installing a range of artificial roost boxes. It is recommended that these are placed on retained mature trees within the development or woodland/hedgerows at the site boundaries, or incorporated within buildings facades. Boxes suitable for a wide range of species should be used, for instance:

- ✧ New buildings: integral bat tubes could be installed within buildings which face vegetated areas, particularly towards the south-west. Bat tubes can be incorporated into the design of the building so that only the access holes are visible from the exterior of the building. The Schwegler 1FR or 2FR Bat Tube is designed to meet the characteristic requirements of the types of bats that inhabit buildings such as pipistrelles *Pipistrellus spp.* or serotines *Eptesicus serotinus*. It is designed to be installed on the external walls of buildings, either flush or beneath a rendered surface.
- ✧ Noctules *Nyctalus spp.* and brown long eared bats *Plecotus auritus* will also use bat boxes installed on mature trees either within or at the edges of the development. Suitable boxes include the Schwegler 2F General Purpose Bat Box or the 2FN Woodland Bat Box which is designed specifically for species such as noctules.

- 5.6.4 General considerations for installation of bat boxes are listed in Boxes 3 and 4 below.

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 of individual bats
Access dimensions	20mm–50mm (w) x 15mm–20mm (h)

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

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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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.1m² 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

6 Summary and Conclusions

6.1 Introduction

- 6.1.1 A bat survey was carried out for the site of a proposed residential development at the Former Waitrose, Avon Road, Littlehampton, 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. A single dusk emergence survey was undertaken in July 2018 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 The desk study data search returned eight records of two species of bat from within 1km of the survey area. 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 Habitats within the site include one building, hard-standing and small sections of ornamental planting, features with limited suitability for foraging and commuting bats and which are commonplace in the surrounding area. The internal/external inspections concluded that building B1 was of low suitability for roosting bats, with a range of external features that could provide preferred roosting conditions for crevice roosting species such as pipistrelles. No bats (dead or alive), bat droppings or other evidence of occupancy by bats were found inside the building during the inspection.
- 6.2.3 Building B1 was subject to one dusk emergence survey carried out on 4 July 2018. No bats were recorded emerging from the building during the survey. Very low levels of foraging and commuting activity were recorded within and around the survey area, limited to a short period of noctule activity recorded by one surveyor only.

6.3 Evaluation

- 6.3.1 The survey results provide a good level of confidence that bats were absent from B1 during the summer months in 2018.
- 6.3.2 No designated sites notified for their bat populations will be affected by the proposals for the site. No bats roosts in buildings/structures or trees will be affected by the proposals for the site.

- 6.3.3 In conclusion, the survey results demonstrate that there are very unlikely to be any direct or indirect impacts to bats, their breeding/resting places or foraging/commuting habitats as a result of the proposed works. Bats are not considered to present a significant constraint to the current proposals for the site.

6.4 Recommendations

- 6.4.1 No specific avoidance, mitigation or compensation measures for bats are required to be implemented as part of the currently proposed scheme. However, precautionary measures are nevertheless recommended and are summarised in Table 6.1. In addition, a range of ecological enhancements are recommended to improve the overall value of the site for bats post-construction.

Table 6.1: Summary of recommendations

#	Summary of recommendations
R1	If commencement of the works is significantly delayed (e.g. by more than 24 months from the survey date), updated active season surveys should be undertaken to record any changes in the roosting status of B1.
R2	In the unlikely event that bats are encountered during the works, site operatives will be advised to cease activity in the vicinity while advice from an ecologist is sought.

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Appendix I: Phase 1 Habitats Map

Please see following page.

 Surveyor position
 Line of sight



Project Details	PR014236-100: Pioneer Materials, Lubbock, Texas
Figure Title	Figure 1: 30 extended Phase 1 Manual Survey Stop
Figure File Date	PR014236-100_300_P86_5A April 2019
File Location	\\s-chemstation1\pr014236\100\manual\pioneer\pioneer_300
	www.willbrosengroup.com

Appendix II: Presence/Absence Survey Results

Abbreviations:

EPSE	Serotine	MYBR	Brandt's	MYDA	Daubenton's
MYMY	Whiskered	MYNA	Natterer's	MYsp	Myotis sp.
NYNO	Noctule	PINA	Nathusius' pipistrelle	PIPI	Common pipistrelle
PIPY	Soprano pipistrelle	Plsp	Pipistrelle sp.	PLAU	Brown long-eared

Survey 1: Dusk, 04/07/2018			
Sunset/sunrise:	Start time:	End time:	Precipitation:
21.18	21.00	22.45	None
Air temp start:	Air temp end:	Wind:	Cloud cover:
17°C	14°C	Beaufort 3 south-west	30%
Equipment:			
Wildlife Acoustics Echo Meter Touch, EM Touch2 Pro and EM3, and Elekon Batlogger-M 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): south-east aspect									
TP	Time	Spp.	No.(I)	No.(P)	E/R	F/C	Soc.	S/NS	Comment
									No bats recorded

Surveyor 2 (OE): north-east aspect									
TP	Time	Spp.	No.(I)	No.(P)	E/R	F/C	Soc.	S/NS	Comment
									No bats recorded

Surveyor 3 (AD): north aspect									
TP	Time	Spp.	No.(I)	No.(P)	E/R	F/C	Soc.	S/NS	Comment
									No bats recorded

Surveyor 4 (MV): north-west aspect									
TP	Time	Spp.	No.(I)	No.(P)	E/R	F/C	Soc.	S/NS	Comment
	21.33- 21.36	NYNO	2	Many		F		S	Over gardens to north-east

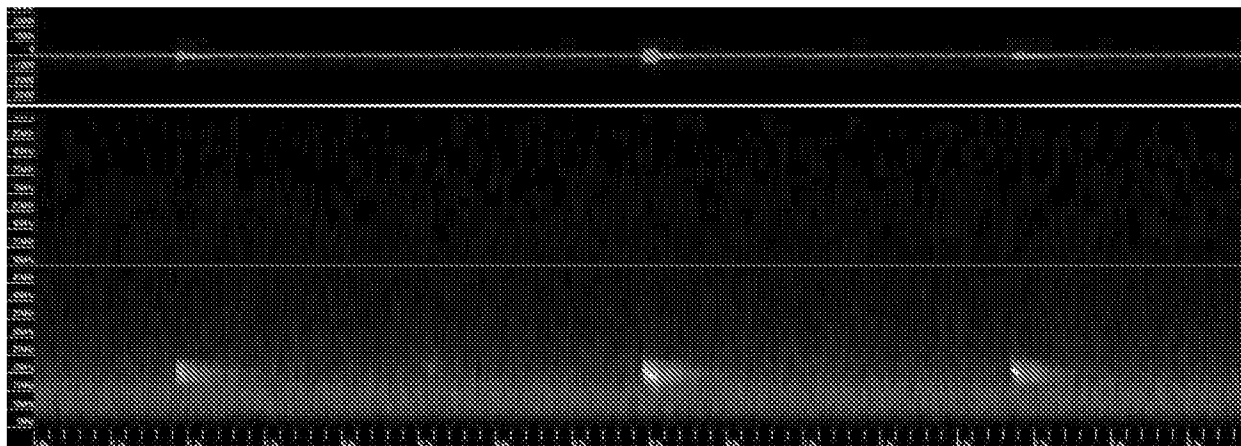
Surveyor 5 (AP): south-west aspect

TP	Time	Spp.	No.(I)	No.(P)	E/R	F/C	Soc.	S/NS	Comment
									No bats recorded

Surveyor 6 (GB): south aspect

TP	Time	Spp.	No.(I)	No.(P)	E/R	F/C	Soc.	S/NS	Comment
									No bats recorded

Appendix III: Example Sonograms



NYNO recorded commuting to north-east of site at 21.34 on 04/07/2018

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>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 cinerea</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	Partial 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			

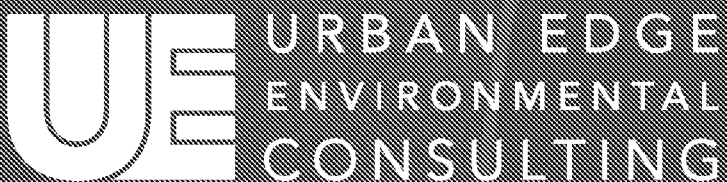


Appendix V: Legal and Technical Limitations

- 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.
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- 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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NATURAL PROGRESSION