

Water House, Highgate

Project 54615

Nocturnal Bat Survey Report

2015

MKA Ecology Limited

The Chapman Building,
29 Station Road,
Shepreth,
Hertfordshire, SG8 6GB
Tel: 01763-262211
e-mail: info@mkaecology.co.uk
VAT Registration No 825137440
Registered in England no. 5858121
Registered office as above



www.mkaecology.co.uk

Submission Date: 21 August 2015	Author: James Aldridge	Checked by: Will O'Connor
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1. EXECUTIVE SUMMARY

MKA Ecology Ltd was commissioned to undertake dusk emergence surveys of the Main Building at the Water House in Highgate which was identified as having high potential to support roosting bats during a previous bat inspection survey (MKA Ecology Ltd, 2015). The surveys were undertaken in order to support a planning application for the development of the site.

MKA Ecology Ltd undertook three dusk emergence surveys at the Main Building at the Water House site in Highgate on 23 July 2015, 27 July 2015 and 3 August 2015 in accordance with best practice guidelines for buildings assessed as having a high risk of supporting roosting bats (BCT 2012). Moderate levels of bat activity were recorded at the site. Species diversity was considered low to moderate for the area and included Common Pipistrelle, Soprano Pipistrelle, Brown Long-eared Bat and Noctule.

No bat roosts were identified at the site during the nocturnal survey effort, and as such it is anticipated that the development can proceed without the need for a Natural England derogation licence.

A provisional mitigation scheme is proposed to ensure that, in the unlikely event of their presence, no bats are harmed during the works. The recommendations made in this report include removing features such as tiles and soffit boxes by hand.

Additionally, a bat enhancement strategy has been recommended with inclusion of a sensitive lighting scheme and bat boxes on the site post-development.

2. INTRODUCTION

2.1 Aims and scope of the survey and report

In July 2015 MKA Ecology Ltd was commissioned to undertake nocturnal bat surveys of the Main Building at the Water House in Highgate, which is proposed for demolition. The surveys were commissioned following recommendations set out within a Bat Inspection Survey report produced by MKA Ecology Ltd (2015). The aims and scope of the bat surveys and this subsequent report were to;

- Undertake dusk emergence surveys of the Main Building at the site (as per recommendations from the Bat Inspection Survey report) to confirm the presence/likely absence of roosting bats;
- Where roosting bats are present, identify the species using the roost, the population size, the type of roost and any access points used;
- Assess the need for a European Protected Species (EPS) Mitigation Licence; and
- Outline a suitable mitigation strategy for bats at the site, if required.

2.2 Site description and summary of previous survey effort

The site is located off Millfield Lane, which is approximately 10km north west of central London (site centred on OS grid reference TQ 27737 86994). The site itself is situated between Hampstead Heath, Highgate cemetery and Waterlow Park. Both Hampstead Heath and Waterlow Park are large, greenspace areas containing woodland, amenity grassland, scattered trees and lakes. Fitzroy Park Allotments are also located nearby to the north.

The site comprises naturalised areas of amenity grassland, introduced shrub, scattered trees and a pond, as well as areas of hardstanding, fences and buildings. The Hampstead Ponds, which are used for bathing, are situated just 75m west of the site. The wider landscape consists of a high density of residential buildings to the south, east and west, and to the north there are large areas of open, green space. To the east there are several reservoirs. The area is considered to be of high quality for foraging bats.

The scattered trees, pond, introduced shrub and grassland habitats on site provide foraging opportunities for bats. The Hampstead Ponds, to the west of the site as well as the green, open space to the north, west and east provide suitable foraging habitat for bats in the surrounding area. There is an abundance of trees to the south and west of the site and these provide commuting opportunities as well as possibly providing roosting opportunities for bats.

The Bat Inspection Survey undertaken at this site on the 30 June 2015 (MKA Ecology Ltd, 2015) identified the Main Building and two trees on site (the Apple and Pedunculate Oak tree) as having potential to support roosting bats. The Apple tree is referred to as Tree 1 and the Pedunculate Oak is referred to as Tree 2 in the Bat Inspection report (MKA Ecology Ltd, 2015). It was not necessary to undertake nocturnal bat surveys at these two trees because they are not to be directly impacted by works.

Additionally, the desktop study returned records of Pipistrelle *Pipistrellus sp.*, Common Pipistrelle *Pipistrellus pipistrellus*, Soprano Pipistrelle *Pipistrellus pygmaeus*, Nathusius's Pipistrelle *Pipistrellus nathusii*, unidentified *Plecotus sp.*, Brown Long-eared Bat *Plecotus auritus*, Noctule *Nyctalus noctula*, Leisler's Bat *Nyctalus leisleri*, Serotine *Eptesicus serotinus*, Natterer's Bat *Myotis nattereri*, Daubenton's Bat *Myotis daubentonii*, unidentified *Nyctalus sp.*, unidentified *Myotis sp.*, and unidentified Bat *Chiroptera sp.* within 2km of the site.

2.3 Proposed development

The proposed development concerns the demolition of the Main Building at the site for the creation of a new property with basements in two sections of the building. This demolition will require the removal of Ivy covering some of the walls on the Main Building, as well as the likely removal of a tree at the north west corner of the main building. The tree to be impacted was considered to have negligible potential to support roosting bats.

The other areas this work will impact are limited to introduced shrub, amenity grassland and hardstanding. It is also likely that there will be noise disturbance associated with the development.

2.4 Legislation and policy relevant to British bat species

All British bats are listed on Schedule 2 of the Conservation of Habitats and Species Regulations (2010), which designates them as European Protected Species (EPS) and Schedule 5 of the Wildlife and Countryside Act (1981, as amended). Inclusion in these Schedules makes it an offence to:

- Intentionally kill, injure or capture a bat;
- Possess or control a bat (live or dead animal; whole, part or anything derived from);
- Damage, destroy or obstruct access to a bat roost;
- Disturb a bat while in a roost;
- Sell, offer for sale, possess or transport a bat for the purpose of sale (live or dead animal; whole, part or anything derived from); or
- Advertise for buying or selling a bat.

Disturbance is defined as an action which is likely to:

- Impair their ability to survive, to breed or reproduce, or to rear or nurture their young;
- Impair their ability to hibernate or migrate; or
- Affect significantly the local distribution or abundance of the species to which they belong.

Some species of bat are listed under Section 41 (for England) and Section 42 (for Wales) of the Natural Environment and Rural Communities Act 2006. These are known as Species of Principal Importance and are also priority species in the UK post-2010 Biodiversity Framework. For Section 41 (England) these species include:

- Barbastelle *Barbastella barbastellus*;
- Bechstein's Bat *Myotis bechsteinii*;
- Noctule;
- Soprano Pipistrelle;
- Brown Long-eared Bat;
- Greater Horseshoe Bat *Rhinolophus ferrumequinum*; and
- Lesser Horseshoe Bat *Rhinolophus hipposideros*.

Additionally, Brown Long-eared Bat, Common Pipistrelle, Daubenton's Bat, Leisler's Bat, Nathusius' Bat *Pipistrellus nathusii*, Natterer's Bat, Noctule, Serotine, Soprano Pipistrelle, Whiskered Bat *Myotis mystacinus* and Brandt's Bat *Myotis brandtii* are listed on the London local BAP as priority species.

3. METHODOLOGY

3.1 Dusk emergence survey

The dusk emergence surveys followed best-practice guidance described by the Bat Conservation Trust (2012) for buildings assessed as being of high risk for roosting bats.

During the surveys five surveyors were positioned around the Main Building to ensure all key aspects could be observed. The Main Building location is provided in Figure 1 below.

Any bats emerging from the building were recorded and the time and species noted. All bat activity observed on site was recorded and flight-lines were mapped. The start and finish time of the surveys was recorded, as was the date, wind direction and force, temperature, precipitation and cloud cover for each survey. A map of the habitat to be surveyed was drawn in order to show any bat emergence/re-entry locations.

The emergence surveys began 15 minutes before sunset and finished approximately 1.5 hours after sunset. Surveyors used broadband bat detectors (BatBox Duet) as well as Pettersson D240x time expansion detectors and Pettersson M500 ultra-sonic microphone with Linx Windows 8.1 tablet for supporting data. Edirol digital recorders and Anabat SD1 were used to collect bat call data which was later analysed using BatSound and Analook software. Infra-red video equipment comprised SONY HDR-SR5E Digital Camcorder (SONY Corporation) with infrared floodlights. Identification of bat calls was undertaken using the parameters set out by Russ (2012).

Table 1 shows the prevailing weather conditions during the survey.

Table 1: Survey date and weather conditions

Date	Start Temp (°C)	Precipitation	Cloud (Oktas/8)	Wind (Beaufort)
23/07/2015 PM (dusk 21:05)	17	None	7	0
27/07/2015 PM (dusk 20:59)	16	None	7	3 SW
3/08/2015 PM (dusk 20:46)	18	Light drizzle from 21:45 until end	4	1 S

Figure 1: Location of the Main Building at the Water House, Highgate



3.2 Surveyors

The surveys were undertaken by Will O'Connor (Natural England Bat Class Licence Number CLS0599, MKA Ecology Ltd), Steve Coyne (Natural England Bat Class Licence Number CLS02791), MKA Ecology Ltd), Madeleine Ryan (Natural England Bat Class Licence Number 2015-11570-CLS-CLS), MKA Ecology Ltd), Tamsyn Bridger (MKA Ecology Ltd), Charlotte Keightley (MKA Ecology Ltd), Zoe Phillips (MKA Ecology Ltd), James Aldridge (MKA Ecology Ltd), Gabrielle Horne (MKA Ecology Ltd), and Sophia Cooke.

Bat call analysis was undertaken by Madeleine Ryan (MKA Ecology Ltd) and Zoe Phillips (MKA Ecology Ltd).

3.3 Constraints on the methodology

The results taken from detector recordings are biased towards bats that use louder echolocation calls. Therefore quiet bats, such as Brown Long-eared Bat, may be under-recorded due to the limited recording range of the equipment. This was not considered to present a significant constraint as surveyors were vigilant to ensure that visual cues indicating the presence of quiet species were recorded.

In some circumstances it is not possible to confirm the species of bat with absolute confidence using sound analysis techniques. In particular some calls of Common Pipistrelle and Soprano Pipistrelle overlap making species identification difficult. In these circumstances the bat can be identified as a *Pipistrellus sp.* only. Within this report where *Pipistrellus sp.* is used this refers only to Common Pipistrelle and Soprano Pipistrelle. This should not be interpreted as other species of the *Pipistrellus* genus, such as Nathusius' Pipistrelle *Pipistrellus nathusii* which, although it occurs relatively frequently within the UK is not commonly recorded. Where Pipistrelle species other than Common or Soprano are suspected this will be directly referenced and discussed within the report. Similarly calls of *Myotis* species can demonstrate a large number of overlapping parameters making identification difficult. Where this is the case the bat call has been labelled as *Myotis sp.*

Although there was light drizzle in the survey on 27 July 2015, this began at 22:00, over one hour after sunset. The average emergence time of most bat species is generally within an hour of sunset (BCT, 2012), and therefore this drizzle is not considered to have hindered the confirmation of presence/likely absence of roosting bats in the Main Building on site.

4. RESULTS

The results of the survey are described below. Raw data are provided in Appendix 1. No bats were recorded emerging from the Main Building.

23 July 2015 – dusk emergence survey

Common Pipistrelle, Soprano Pipistrelle and Noctule, were recorded during this dusk emergence survey. In addition to these *Pipistrellus sp.* bats and unidentified bats were recorded. The first bat pass was a Common Pipistrelle recorded at 21.15, approximately 10 minutes after sunset, the timing of which suggests that this bat is roosting very close to the survey area.

Overall bat activity levels at the site were considered to be moderate. Common Pipistrelle activity was relatively frequent across the entire site, although particularly focussed around the south west, north west and south east of the site. There was moderate Soprano Pipistrelle activity throughout the site. Only one Noctule was recorded from the south east of the Main Building, but it was not seen. Many of the records were for bats foraging around the trees on and around the site.

There were no bat emergence events from the Main Building during this survey.

27 July 2015 – dusk emergence survey

Common Pipistrelle, Soprano Pipistrelle and Brown Long-eared Bat were all recorded during this dusk emergence survey. Unidentified *Pipistrellus sp.* bats and unidentified bats were also recorded. The first bat pass was a Common Pipistrelle recorded at 21.08, approximately nine minutes after sunset. This timing again suggests that there is a Common Pipistrelle roost near to the site.

Overall bat activity levels at the site were considered to be moderate. Common Pipistrelle activity was frequent throughout the site, although the activity of this species was focussed around the south west and south east of the site. There was moderate levels of Soprano Pipistrelle activity, which was focussed at the east and south east of the site. One Brown Long-eared Bat was recorded at 22:03 flying from the east of the site through the site and to the south. A large proportion of the bat activity was associated with foraging behaviour around the trees on site and around the site.

There were no bat emergence events from the Main Building during this survey.

3 August 2015 – dusk emergence survey

Common Pipistrelle, Soprano Pipistrelle and Brown Long-eared Bat were all recorded during this dusk emergence survey. Unidentified *Pipistrellus* sp. bats, an unidentified *Nyctalus/Eptesicus* sp. bat and unidentified bats were also recorded. The first bat pass was the unidentified *Nyctalus/Eptesicus* sp. bat recorded at 21.02, flying in the distance from the south east, approximately 16 minutes after sunset.

Overall bat activity levels at the site were considered to be moderate. Common Pipistrelle activity was frequent throughout the site, whilst there was moderate levels of Soprano Pipistrelle activity throughout the site. One Brown Long-eared Bat was recorded at 21:38 flying north around the east of the Main Building. Most of the bat activity was associated with foraging behaviour around the trees on site.

There were no bat emergence events from the Main Building during this survey.

5. EVALUATION AND RECOMMENDATIONS

The nocturnal surveys in July and August of 2015 revealed a moderate level of bat activity at the site with no bat roosts identified. Common Pipistrelle, Soprano Pipistrelle, *Pipistrellus sp.*, Brown Long-eared Bat, Noctule, unidentified *Nyctalus/Eptesicus sp.* bat and unidentified bats were recorded at the site.

Wray *et al.* (2010) evaluate the scarcity of bat species within England categorising each species as common, rarer or rarest. The categories for each species are shown in Table 2, below.

Table 2: Categorising bats by rarity (England only) (adapted from Wray *et al.*, 2010)

Rarity	Species
Rarest (population under 10,000)	Greater Horseshoe Bechstein's Bat <i>Alcathoe Myotis alcathoe</i> Greater Mouse-eared <i>Myotis myotis</i> Barbastelle Grey Long-eared <i>Plecotus austriacus</i>
Rarer (population 10,000 – 100, 000)	Lesser Horseshoe Whiskered Bat Brandt's Bat Daubenton's Bat Natterer's Bat Leisler's Bat Noctule Nathusius' Pipistrelle Serotine
Common (population over 100,000)	Common Pipistrelle Soprano Pipistrelle Brown Long-eared Bat

Table 3, below shows the bat species recorded at the Water House in Highgate, their perceived rarity and the frequency at which they were encountered during the survey effort. Common and Soprano Pipistrelle activity was the most dominant throughout the surveys accounting for the majority of all bat passes. Although Brown Long-eared Bat is a common species, the maximum number of passes by this species was one per survey. One Noctule pass was recorded on a survey. The less frequent occurrence of Noctule compared to the other three species recorded is unsurprising as this species is rarer.

Table 3: Species recorded at the Water House their rarity and the frequency at which they were recorded

Species	Rarity	Frequency encountered
Common Pipistrelle	Common	Frequent
Soprano Pipistrelle	Common	Moderate
Brown long-eared	Common	Infrequent
Noctule	Rarer	Infrequent

The London Bat Group website (2015) states that 11 bat species are known to be present in Greater London. Some of these such as Leisler's Bat, Whiskered Bat and Brandt's Bat are rare in the county. A total of four species were recorded during the survey effort at the Water House in Highgate, and this is considered a low to moderate diversity for the area.

Although no roosts were identified at the site it is recommended that best-practice methodologies are employed to ensure that in the unlikely event of a bat being present they are not harmed during the development works. It is recommended that where removal of any potential bat roosting features is undertaken (e.g. tiles and soffit boxes), that this should be undertaken carefully by hand. If a bat is found during works MKA Ecology Ltd (01763 262211) or Natural England (0845 600 3078) should be consulted immediately for further advice.

Recommendation 1: Removal of features such as tiles and soffit boxes should be undertaken carefully by hand. All on site contractors should be made aware of the potential presence of bats. In the unlikely event of a bat being discovered at the site works should cease and advice be sought immediately either from Natural England (0845 600 3078) or MKA Ecology Ltd (01763 262211).

A sensitive lighting strategy should be incorporated in the final site design. The guidance provided by the ILP (2011) provides suitable designs of downward facing lighting and examples of cowls on lights. In addition to the use of downward facing lighting and fitting lights with cowls, lights should be also fitted with short timers.

Recommendation 2: Incorporate a sensitive lighting scheme on the site post-development. This should include using downward facing lighting, as well as fitting lights with hoods and short timers.

A minimum of six bat boxes should be included in the final site design. These should be integrated into the new building, or attached to trees. Examples of suitable bat boxes are provided in Appendix 2.

Recommendation 3: Include a minimum of six bat boxes in the final site design. Examples of suitable bat boxes are included in Appendix 2.

6. CONCLUSIONS

On 23 July 2015, 27 July 2015 and 3 August 2015 MKA Ecology Ltd undertook dusk emergence surveys to identify any roosting bats at the Main Building at the Water House in Highgate.

The three nocturnal surveys revealed moderate levels of bat activity at the site. No roosts were identified at the site. Species observed included Common and Soprano Pipistrelle, as well as Brown Long-eared Bat and Noctule, with bat activity being present throughout the site. This is thought to represent a low to moderate diversity of species for Greater London.

Best-practice methodologies have been recommended to ensure that no bats are harmed incidentally as a product of the development. These include removing any potential bat roosting features by hand. A bat enhancement strategy is recommended which incorporates a sensitive lighting strategy and bat boxes.

7. REFERENCES

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8. APPENDIX

Appendix 1: Nocturnal survey data

23 July 2015 – dusk emergence survey

Time	Species	Location	Notes
21:15	Common Pipistrelle	Facing south east side of Main Building	Not seen
21:17	Soprano Pipistrelle	Facing east side of Main Building	Flew from north to south
21:17	Common Pipistrelle	Facing south east side of Main Building	Not seen
21:18	Common Pipistrelle	Facing north side of Main Building	Flew from north to south along west side of Main Building
21:20	Common Pipistrelle	Facing east side of Main Building	Flew from north to south over roof of Main Building
21:31	Common Pipistrelle	Facing south west side of Main Building	Foraging. Flew from west to east over roof of Main Building
21:32	Common Pipistrelle	Facing south east side of Main Building	Not seen
21:33	Common Pipistrelle	Facing north side of Main Building	Flew from east to west
21:33	Soprano Pipistrelle	Facing north side of Main Building	Flew from west to south
21:33	Soprano Pipistrelle	Facing south west side of Main Building	Flew from south to north of site
21:33	Common Pipistrelle	Facing south east side of Main Building	Not seen
21:33	Common Pipistrelle	Facing north west side of Main Building	Flying from east over site
21:34	Common Pipistrelle	Facing south west side of Main Building	Flew around trees at south of site
21:35	Soprano Pipistrelle	Facing north side of Main Building	Not seen
21:35	Common Pipistrelle	Facing east side of Main Building	Not seen
21:38	Common Pipistrelle	Facing south east side of Main Building	Not seen
21:39	Common Pipistrelle	Facing south west side of Main Building	Two bats not seen
21:41	Soprano Pipistrelle	Facing south west side of Main Building	Two bats foraging around trees at south of site and trees to south of site
21:42	Common Pipistrelle	Facing south east side of Main Building	Flying from east over site and then southwards off site
21:43	<i>Pipistrellus sp.</i>	Facing east side of Main Building	Not seen
21:43	<i>Pipistrellus sp.</i>	Facing south west side of Main Building	Not seen
21:47	Soprano Pipistrelle	Facing south west side of Main Building	Two bats social calling around trees at south of site
21:47	Soprano Pipistrelle	Facing south east side of Main Building	Two bats social calling, not seen
21:49	Soprano Pipistrelle	Facing north side of	Foraging. Flew from south to north

Time	Species	Location	Notes
		Main Building	then across north side of building to west
21:49	Soprano Pipistrelle	Facing south west side of Main Building	One pass, not seen
21:49	Soprano Pipistrelle	Facing north west side of Main Building	Flying over surveyor
21:50	Soprano Pipistrelle	Facing east side of Main Building	Flew from east to west over roof of Main Building
21:56	Unidentified Bat	Facing south west side of Main Building	Faint call, not seen
22:01	Common Pipistrelle	Facing south west side of Main Building	Foraging around trees at south of site
22:02	Common Pipistrelle	Facing south east side of Main Building	Two passes, not seen
22:04	Common Pipistrelle	Facing north west side of Main Building	Flying over surveyor
22:05	<i>Pipistrellus sp.</i>	Facing north side of Main Building	Not seen
22:07	Soprano Pipistrelle	Facing east side of Main Building	Flew high across site
22:08	Common Pipistrelle	Facing south west side of Main Building	Foraging around trees at south of site for several minutes then flying over Main Building to north
22:09	Common Pipistrelle	Facing south east side of Main Building	Not seen
22:09	Soprano Pipistrelle	Facing south east side of Main Building	Not seen
22:10	Common Pipistrelle	Facing south east side of Main Building	Not seen
22:10	Common Pipistrelle	Facing south east side of Main Building	Not seen
22:10	Unidentified Bat	Facing north west side of Main Building	Not seen
22:11	Common Pipistrelle	Facing north side of Main Building	Not seen
22:11	Common Pipistrelle	Facing south west side of Main Building	Not seen
22:11	Soprano Pipistrelle	Facing south west side of Main Building	Not seen
22:11	Common Pipistrelle	Facing north west side of Main Building	Two passes, not seen
22:12	Common Pipistrelle	Facing south east side of Main Building	Not seen
22:13	Soprano Pipistrelle	Facing east side of Main Building	Not seen
22:14	Common Pipistrelle	Facing south west side of Main Building	Three passes, not seen
22:14	Common Pipistrelle	Facing south east side of Main Building	Foraging, not seen
22:14	Common Pipistrelle	Facing north west side of Main Building	Not seen
22:15	Common Pipistrelle	Facing north west side of Main Building	Not seen
22:19	Common Pipistrelle	Facing south east side of Main Building	Not seen
22:20	Common Pipistrelle	Facing south west side of Main Building	Foraging whilst flying west over Main Building

Time	Species	Location	Notes
22:22	<i>Pipistrellus sp.</i>	Facing north side of Main Building	Not seen
22:22	Common Pipistrelle	Facing south east side of Main Building	Not seen
22:22	Noctule	Facing south east side of Main Building	Not seen
22:23	Common Pipistrelle	Facing north west side of Main Building	Not seen
22:24	Unidentified Bat	Facing north side of Main Building	Not seen
22:24	Common Pipistrelle	Facing south west side of Main Building	Flying north over site
22:25	Common Pipistrelle	Facing north west side of Main Building	Foraging to north of Main Building
22:28	Common Pipistrelle	Facing south east side of Main Building	Not seen
22:29	Common Pipistrelle	Facing north west side of Main Building	Not seen
22:31	<i>Pipistrellus sp.</i>	Facing north side of Main Building	Not seen
22:33	Unidentified Bat	Facing east side of Main Building	Not seen
22:34	Common Pipistrelle	Facing north side of Main Building	Not seen
22:34	Common Pipistrelle	Facing south west side of Main Building	Not seen
22:34	Common Pipistrelle	Facing north west side of Main Building	Flying from west over site
22:35	<i>Pipistrellus sp.</i>	Facing east side of Main Building	Not seen

27 July 2015 – dusk emergence survey

Time	Species	Location	Notes
21:08	Common Pipistrelle	Facing north west side of Main Building	Not seen
21:09	Common Pipistrelle	Facing north west side of Main Building	Not seen
21:09	Soprano Pipistrelle	Facing east side of Main Building	Not seen
21:10	Soprano Pipistrelle	Facing east side of Main Building	Not seen
21:11	Common Pipistrelle	Facing north side of Main Building	Flying from north along east side of Main Building
21:11	Common Pipistrelle	Facing south east side of Main Building	Not seen
21:11	Common Pipistrelle	Facing east side of Main Building	Flying from north along east side of Main Building
21:12	Common Pipistrelle	Facing south east side of Main Building	Not seen
21:12	Soprano Pipistrelle	Facing east side of Main Building	Foraging, flying from north east over site
21:13	Soprano Pipistrelle	Facing south east side of Main Building	Not seen

Time	Species	Location	Notes
21:16	Soprano Pipistrelle	Facing north side of Main Building	Flying from north along east side of Main Building
21:16	Pipistrellus sp.	Facing south east side of Main Building	Not seen
21:16	Soprano Pipistrelle	Facing east side of Main Building	Flying from north along east side of Main Building
21:20	Common Pipistrelle	Facing south east side of Main Building	Not seen
21:21	Unidentified Bat	Facing east side of Main Building	Not seen
21:22	Common Pipistrelle	Facing south east side of Main Building	Not seen
21:23	Common Pipistrelle	Facing south east side of Main Building	Not seen
21:23	Unidentified Bat	Facing east side of Main Building	Not seen
21:26	Common Pipistrelle	Facing south east side of Main Building	Not seen
21:27	Common Pipistrelle	Facing south west side of Main Building	Foraging in trees to south of site
21:28	Common Pipistrelle	Facing south west side of Main Building	Several passes, not seen
21:29	Common Pipistrelle	Facing south west side of Main Building	Commuting along tree line to south of site, from east to south
21:29	Common Pipistrelle	Facing south east side of Main Building	Flying from west over garden
21:37	Common Pipistrelle	Facing south east side of Main Building	Not seen
21:41	Common Pipistrelle	Facing south west side of Main Building	Flying north over site
21:41	Common Pipistrelle	Facing south east side of Main Building	Flying from west over garden, foraging
21:43	Unidentified Bat	Facing south west side of Main Building	Not seen
21:44	Soprano Pipistrelle	Facing east side of Main Building	Not seen
21:45	Common Pipistrelle	Facing south west side of Main Building	Flying around trees to south of site
21:45	Soprano Pipistrelle	Facing south east side of Main Building	Flying around south of building for several minutes, not seen
21:47	Common Pipistrelle	Facing south west side of Main Building	Foraging around trees to south of site for several minutes
21:47	Soprano Pipistrelle	Facing south east side of Main Building	Flying from west over garden, foraging
21:47	Soprano Pipistrelle	Facing east side of Main Building	Flying from north along east side of Main Building
21:50	Common Pipistrelle	Facing south east side of Main Building	Two passes, not seen
21:52	Common Pipistrelle	Facing south east side of Main Building	Not seen
21:53	Common Pipistrelle	Facing south west side of Main Building	Flying from east over Main Building
21:54	Common Pipistrelle	Facing south west side of Main Building	Flying from east over Main Building
21:54	Common Pipistrelle	Facing south east side of Main Building	Foraging, not seen

Time	Species	Location	Notes
21:55	Common Pipistrelle	Facing south west side of Main Building	Foraging over garden at south of site then foraging around trees to south of site
21:55	Soprano Pipistrelle	Facing south east side of Main Building	Four passes, not seen
21:57	Common Pipistrelle	Facing south east side of Main Building	Foraging, not seen
21:59	Common Pipistrelle	Facing south west side of Main Building	Flying from west over site, then flying around trees to south of site
21:59	Soprano Pipistrelle	Facing south east side of Main Building	Foraging in garden
22:01	Common Pipistrelle	Facing south east side of Main Building	Two bats, foraging and social calls, not seen
22:03	Unidentified Bat	Facing north side of Main Building	Not seen
22:03	Brown Long-eared Bat	Facing south east side of Main Building	Flying from east through garden then to south of site
22:04	Common Pipistrelle	Facing north west side of Main Building	Flying around north side of building
22:04	Common Pipistrelle	Facing north west side of Main Building	Flying around north side of building
22:04	Soprano Pipistrelle	Facing east side of Main Building	Not seen
22:06	Common Pipistrelle	Facing south west side of Main Building	Not seen
22:06	Common Pipistrelle	Facing south east side of Main Building	Foraging for several minutes, not seen
22:09	Pipistrellus sp.	Facing south west side of Main Building	Flying north over site
22:09	Common Pipistrelle	Facing south east side of Main Building	Foraging whilst flying from west over site
22:13	Soprano Pipistrelle	Facing south east side of Main Building	Flying around garden for several minutes
22:15	Common Pipistrelle	Facing south west side of Main Building	Flying around trees to south of site
22:16	Soprano Pipistrelle	Facing south west side of Main Building	Flying from east over building then flying over garden for several minutes
22:16	Soprano Pipistrelle	Facing south east side of Main Building	Foraging whilst flying from west over site
22:16	Soprano Pipistrelle	Facing east side of Main Building	Not seen
22:19	Soprano Pipistrelle	Facing north side of Main Building	Not seen
22:19	Soprano Pipistrelle	Facing east side of Main Building	Not seen
22:20	Common Pipistrelle	Facing south east side of Main Building	Two passes
22:21	Common Pipistrelle	Facing south west side of Main Building	Flying over garden for several minutes, the flying around trees at south of site
22:23	Common Pipistrelle	Facing south east side of Main Building	Flying north over site
22:23	Soprano Pipistrelle	Facing south east side of Main Building	Two passes
22:24	Common Pipistrelle	Facing north side of Main Building	Not seen

Time	Species	Location	Notes
22:24	Soprano Pipistrelle	Facing south east side of Main Building	Foraging for several minutes, not seen
22:25	Unidentified Bat	Facing north west side of Main Building	Not seen
22:25	Unidentified Bat	Facing north west side of Main Building	Not seen
22:27	Soprano Pipistrelle	Facing south east side of Main Building	Foraging above Main Building
22:29	Common Pipistrelle	Facing east side of Main Building	Not seen

3 August 2015 – dusk emergence survey

Time	Species	Location	Notes
21:02	Unidentified <i>Nyctalus/Eptesicus</i> <i>sp.</i>	Facing south aspect of building	Flying in distance from south east
21:08	<i>Pipistrellus sp.</i>	Facing south aspect of building	Brief distant pass
21:09	Soprano Pipistrelle	Facing the east aspect of the Main Building	Flew from north along east edge of house at eaves level
21:09	Unidentified Bat	Facing the south west of the Main Building	Not seen
21:10	Soprano Pipistrelle	Facing the north aspect of the Main Building	Flying south along eastern edge of Main Building
21:10	Soprano Pipistrelle	Facing south aspect of building	Flying from north around south east corner of Main Building into garden
21:12	<i>Pipistrellus sp.</i>	Facing the south west of the Main Building	Flying from north along west side of Main Building
21:14	<i>Pipistrellus sp.</i>	Facing the north east of the Main Building	Flying from north down west side of Main Building
21:15	Common Pipistrelle	Facing south aspect of building	Not seen
21:17	Unidentified	Facing the south west of the Main Building	Not seen
21:19	Common Pipistrelle	Facing the east aspect of the Main Building	Flew from south along east edge of house at eaves level
21:20	Common Pipistrelle	Facing the north aspect of the Main Building	Flying around garden at north of site
21:20	Common Pipistrelle	Facing the south west of the Main Building	Foraging for several minutes, not seen
21:20	<i>Pipistrellus sp.</i>	Facing south aspect of building	Brief pass
21:22	<i>Pipistrellus sp.</i>	Facing the north east of the Main Building	Flying from north east
21:24	Common Pipistrelle	Facing south aspect of building	Foraging, flying from west
21:26	Common Pipistrelle	Facing the north aspect of the Main Building	Flying north over Main Building
21:27	Soprano Pipistrelle	Facing the east aspect of the Main Building	Flew from north along east edge of house at eaves level

Time	Species	Location	Notes
21:27	Soprano Pipistrelle	Facing south aspect of building	Flying from north around south east corner of Main Building into garden
21:27	Common Pipistrelle	Facing south aspect of building	Foraging by mature Pedunculate Oak at south of site
21:28	Common Pipistrelle	Facing the south west of the Main Building	Foraging around trees to south of site
21:28	Common Pipistrelle	Facing the south west of the Main Building	Commuting from east along trees to south of site
21:29	<i>Pipistrellus sp.</i>	Facing the east aspect of the Main Building	Flew from south
21:29	Common Pipistrelle	Facing the north aspect of the Main Building	Flying north over Main Building
21:29	Soprano Pipistrelle	Facing the south west of the Main Building	Foraging around trees to south of site
21:29	Common Pipistrelle	Facing the south west of the Main Building	Foraging around trees to south of site
21:29	Common Pipistrelle	Facing south aspect of building	Flying around garden at south of site
21:29	Soprano Pipistrelle	Facing south aspect of building	Flying around garden at south of site
21:31	Soprano Pipistrelle	Facing the north aspect of the Main Building	Flying north over Main Building
21:31	Soprano Pipistrelle	Facing the north east of the Main Building	Flying towards north east
21:31	Common Pipistrelle	Facing south aspect of building	Foraging in garden then flying towards west of site
21:32	Common Pipistrelle	Facing the south west of the Main Building	Three bats flying from east and then foraging around trees to south of site for 15 minutes
21:32	Soprano Pipistrelle	Facing the south west of the Main Building	Foraging around garden to east of Main Building
21:33	Soprano Pipistrelle	Facing the north east of the Main Building	Flying over surveyor
21:33	Common Pipistrelle	Facing south aspect of building	Foraging in garden
21:38	Brown Long-eared Bat	Facing south aspect of building	Flying from north around south east corner of Main Building into garden
21:39	Common Pipistrelle	Facing the east aspect of the Main Building	Not seen
21:40	Common Pipistrelle	Facing the east aspect of the Main Building	Flew from south along east edge of house at eaves level
21:40	Common Pipistrelle	Facing the north aspect of the Main Building	Not seen
21:41	Soprano Pipistrelle	Facing the north east of the Main Building	Not seen
21:42	Common Pipistrelle	Facing the north aspect of the Main Building	Flying south over Main Building
21:43	Common Pipistrelle	Facing south aspect of building	Two bats foraging whilst flying south over building
21:45	Common Pipistrelle	Facing the north aspect of the Main Building	Flying north over Main Building
21:45	Common Pipistrelle	Facing the north east	Flying from south to north

Time	Species	Location	Notes
		of the Main Building	
21:45	Common Pipistrelle	Facing south aspect of building	Foraging and social calling, not seen
21:46	Soprano Pipistrelle	Facing south aspect of building	Foraging, not seen
21:47	Common Pipistrelle	Facing the north east of the Main Building	Flying from south to north
21:49	Common Pipistrelle	Facing south aspect of building	Not seen
21:49	Soprano Pipistrelle	Facing south aspect of building	Flying overhead
21:50	Soprano Pipistrelle	Facing the east aspect of the Main Building	Not seen
21:50	Soprano Pipistrelle	Facing the north aspect of the Main Building	Not seen
21:52	Common Pipistrelle	Facing the south west of the Main Building	Not seen
21:53	Unidentified Bat	Facing the east aspect of the Main Building	Not seen
21:53	Common Pipistrelle	Facing the north aspect of the Main Building	Not seen
21:53	Common Pipistrelle	Facing south aspect of building	Two bats foraging, not seen
21:54	Common Pipistrelle	Facing the south west of the Main Building	Flying around trees to south of site
21:55	Common Pipistrelle	Facing the north east of the Main Building	Not seen
21:56	Common Pipistrelle	Facing the east aspect of the Main Building	Not seen
21:56	Common Pipistrelle	Facing south aspect of building	Foraging, not seen
21:57	Common Pipistrelle	Facing the north aspect of the Main Building	Flying north over Main Building
21:57	Common Pipistrelle	Facing the north aspect of the Main Building	Flying around at north edge of Main Building
21:57	Soprano Pipistrelle	Facing the south west of the Main Building	Flying around garden at south east of site
21:58	Common Pipistrelle	Facing the north east of the Main Building	Foraging around north east of Main Building
22:00	Common Pipistrelle	Facing the north east of the Main Building	Foraging around north east of Main Building
22:02	Unidentified Bat	Facing the north east of the Main Building	Not seen
22:05	Common Pipistrelle	Facing the east aspect of the Main Building	Not seen
22:05	Common Pipistrelle	Facing the south west of the Main Building	Foraging around over roof
22:05	Soprano Pipistrelle	Facing the south west of the Main Building	Foraging around over roof
22:05	Common Pipistrelle	Facing south aspect of building	Two bats flying overhead, social call
22:06	Soprano Pipistrelle	Facing the north	Not seen

Time	Species	Location	Notes
		aspect of the Main Building	
22:08	Common Pipistrelle	Facing the north east of the Main Building	Not seen
22:09	Common Pipistrelle	Facing the south west of the Main Building	Foraging above Main Building and at south east of site
22:10	Common Pipistrelle	Facing the north east of the Main Building	Not seen
22:12	Soprano Pipistrelle	Facing the north aspect of the Main Building	Not seen
22:12	Soprano Pipistrelle	Facing the south west of the Main Building	Foraging above Main Building and at south east of site
22:15	Soprano Pipistrelle	Facing the north east of the Main Building	Not seen
22:17	Common Pipistrelle	Facing the south west of the Main Building	Three bats flying around garden at south east of site
22:19	Common Pipistrelle	Facing the north east of the Main Building	Flying around over roof of Main Building

Appendix 2: Proposed bat boxes for use in the development

Bat boxes

A wide variety of bat boxes are available to suit a variety of species and design requirements. Bat boxes can be mounted externally on buildings or built directly into the wall structure. In addition bat roosting provisions can be provided within the building with the creation of bat lofts and wall cavities with suitable access holes. Bat boxes are simple to incorporate into building designs or mount on trees in surrounding habitat.

Access to any bat roosting features should not be lit and should also be at a reasonable height to avoid predation (at least 2m if possible). The access should also be reasonably close to features such as trees, green space and hedgerows in order to provide immediate cover for bats leaving the roost. For larger roosting provisions suitable for maternity colonies of bats the roosting area should be facing south or west to provide maximum solar heating. If providing roosts for hibernating bats then these should be positioned facing north. When mounting boxes on trees it is often more effective to mount three boxes to a tree. All three boxes should be at the same height but facing in different directions, usually south east, south and south west. This provides different conditions for the bats throughout the day. Boxes on trees should be mounted as high as possible (c 4 -5 m).

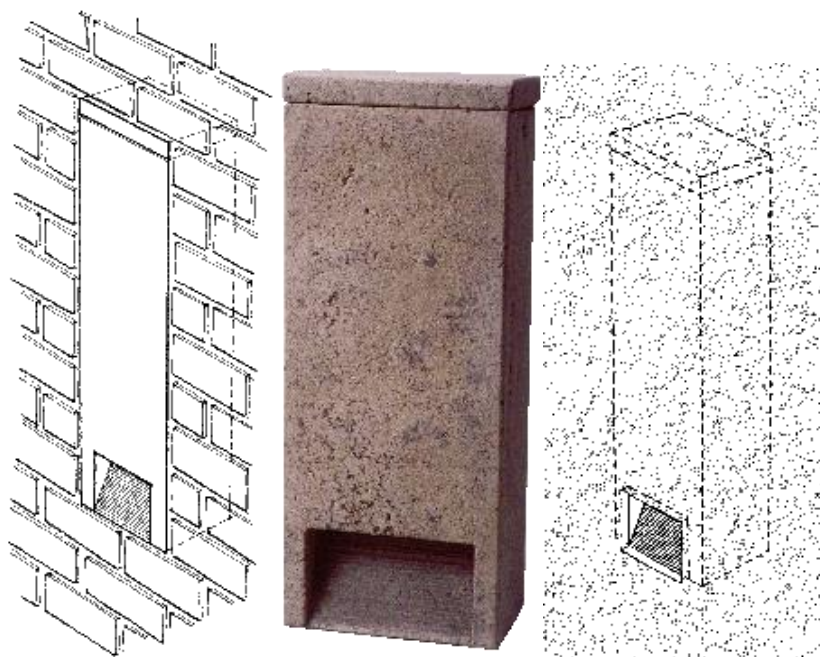
Bat bricks

These can be designed into the structure and many can be rendered in a similar manner to surrounding surfaces to minimise visual impacts.

Bat Brick Example 1

The Schweglar Bat Tube 1FR can be installed on external wall and can be set flush with a rendered surface and therefore only leaving the entrance hole visible. It is considered suitable for bat species that inhabit buildings.

Schweglar Bat Tube 1FR (www.schwegler-nature.com)



1FR built in brickwork

1FR in rendered surface

Bat boxes

These types of boxes can be attached to external structures such as trees or buildings or installed internally within bat lofts to provide suitable roosting locations. This provision should be considered at all sites where suitable structures are present to support the boxes.

Example 1: Schweglar General Purpose Bat Box 2F (www.schwegler-nature.com)

This box is a good all round standard box which is suitable for hanging on trees. It can be particularly successful for Pipistrelle and Long-eared bats and would therefore be appropriate at the site.



Schweglar General Purpose Bat Box 2F