Bat Survey Report

Sugar Street,
Rushton Spencer, Staffordshire

John Rose Associates

Report Reference: CL831/005/001

Prepared by
Clear Environmental Consultants Limited
October 2011

ENVIRONMENTAL DRAINAGE FLOOD RISK ECOLOGY

QUALITY ASSURANCE

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LIABILITY

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1 Executive Summary

Clear Environmental Consultants Ltd. was commissioned by John Rose Associates to undertake surveys in relation to the possible presence of bats, a group of European Protected Species, at a site off Sugar Street, Rushton Spencer, Staffordshire.

A bat building assessment was carried out in May 2011. Although no direct evidence of bats was discovered during the site visit, features suitable for roosting bats were noted such as gaps beneath roof tiles.

During dusk and dawn bat activity surveys carried out in July and August 2011, one common pipistrelle bat *Pipistrellus pipistrellus* was seen emerging from the gable end at the rear of building B1 (the house). A second common pipistrelle bat was seen exiting and entering gaps beneath roof tiles close to the skylight on building B2 (the garage).

Up to two brown long-eared bats *Plecotus auritus* were also observed light sampling within the lean-to at the rear of B2 before emerging at dusk and swarming close to the building before dawn.

Due to the presence of roosting bats in both buildings, bats pose a constraint on development at this site and mitigation will be required to offset impacts on these species. Proposed mitigation includes four main elements:

1. Rafter style roost box for pipistrelle bats to be constructed in the section of the existing cottage that will be retained. This is to be in place prior to any demolition works to this building.
2. Roosting habitat for pipistrelle bats such as rafter box, bat bricks, raised ridge tiles or access to gaps behind any features such as fascia boards or hanging tiles to be included on at least two new buildings, ideally houses 1 and 2, as identified on the mitigation plan.
3. Access to be provided for brown long-eared bats to use part of the roof void on at least 1 building, ideally house 7.
4. Demolition works will be scheduled to avoid peak periods of bat activity and appropriate working practices will be employed to minimise risks of harm to bats. Works will be supervised by a licensed ecologist where necessary.

A European Protected Species Licence will be required from Natural England once planning permission is secured.

Due to the transient nature of bat roosts, the bat building assessment and nocturnal activity surveys should be updated if works to the buildings have not been undertaken within 12 months of these surveys.

2 Introduction

2.1 Background

Clear Environmental Consultants Ltd. was commissioned to undertake ecological surveys in relation to the possible presence of bats, at a site off Sugar Street, Rushton Spencer, Staffordshire.

The findings from the surveys are presented in this report, in order to:

- identify any potentially significant ecological constraints that may affect the development proposal; and
- provide details from the nocturnal activity surveys and recommendations for the application of a European Protected Species Licence.

2.2 Scope of this report

The building assessment was based on standard methodologies set out by Natural England[1], the Bat Conservation Trust[2] (BCT) and the Joint Nature Conservation Committee[3] (JNCC) in order to identify the likelihood of bats using the building for roosting, foraging and commuting purposes.

The report has been augmented with nocturnal bat survey data and a proposed mitigation strategy to inform the forthcoming planning application.

2.3 Site context and status

The site is situated off Sugar Street in the village of Rushton Spencer, Staffordshire. The site is adjacent to the Rushton's Church of England Primary School and a watercourse flows along the south western boundary.

[1] *The Bat Mitigation Guidelines* English Nature (now Natural England) 2004
[2] *Bat Surveys – Good Practice Guidelines* Bat Conservation Trust 2007
[3] *The Bat Workers Manual 3rd Edition* JNCC 2004

3 Regulatory and Policy Framework

All UK species of bat are fully protected by *The Conservation of Habitats and Species Regulations* 2010[4].

(1) Under Regulation 41, an offence is caused by any person(s) who:

(a) deliberately captures, injures or kills any wild animal of a European protected species,
(b) deliberately disturbs wild animals of any such species,
(c) deliberately takes or destroys the eggs of such an animal, or
(d) damages or destroys a breeding site or resting place of such an animal,

(2) For the purposes of paragraph (1) (b), disturbance of animals includes in particular any disturbance which is likely:

(a) to impair their ability:
(i) to survive, to breed or reproduce, or to rear or nurture their young, or
(ii) in the case of animals of a hibernating or migratory species, to hibernate or migrate;
(b) to affect significantly the local distribution or abundance of the species to which they belong.

(3) It is an offence for any person

(a) to be in possession of, or to control,
(b) to transport,
(c) to sell or exchange, or
(d) to offer for sale or exchange,
any European Protected Species.

Bats are also protected under the *Wildlife and Countryside Act* 1981[5] (as amended by the *Countryside & Rights of Way Act* 2000) through their inclusion in Schedule 5. Under the Act, they are protected from:

- intentional or reckless disturbance whilst they are occupying a structure or place for shelter or protection;
- obstruction of access to any structure or place of shelter or protection; and
- selling, offering, advertising or exposing for sale any specimen of these species, or parts thereof.

If a bat roost is to be affected by development activities, a European Protected Species mitigation licence from Natural England will need to be applied for to mitigate any detrimental effects and, if granted, legitimise that which would otherwise be deemed an offence, as listed above.

[4] http://www.legislation.gov.uk/uksi/2010/490/contents
[5] http://www.legislation.gov.uk/ukpga/1981/69/contents

4 Methodology

4.1 Surveyors

Surveyors were appropriately experienced and licenced to undertake the surveys. Surveys were led by Carole Boon BSc MIEEM (Natural England (NE) Bat Survey Licence No. 20103227) who has held a bat licence for 1 year and has 6 years experience surveying for bats. The survey effort was augmented by assistants with a range of survey experience, from 1 year to 4 years. Survey and reporting work was carried out and overseen by Oliver Ramm BSc (Hons) MIEEM (NE Bat Licence No. 20110558) who is an experienced bat worker and has held Science & Education and Mitigation Licences with NE & the Countryside Council for Wales for the past 5 years.

4.2 Bat Building Assessment

An assessment of the building was undertaken in May 2011 to seek evidence of the presence of bat roosts and to determine the potential for bats to use the site for roosting, foraging and commuting.

- The surrounding area was assessed for potential bat commuting and foraging routes;
- The buildings were inspected internally and externally, using torches and endoscopes where applicable, to identify any characteristics of a potential bat roost such as cracks or holes in the brickwork or roofing, hanging tiles with gaps or entrances for bats to fly through.
- Any evidence of use by bats such as bat droppings, feeding remains and urine or fur oil stains was noted.

In accordance with the Bat Conservation Trust (2007), sites with increased likelihood of bats being present are:

- Pre 20th Century detached constructions
- Agricultural buildings of traditional brick, stone or timber
- Large (20cm diameter) roof timbers with mortise joins cracks and holes
- Entrances for bats to fly through
- Hanging tiles with gaps
- Sites adjacent to suitable foraging habitat, such as trees or waterbodies

4.3 Bat Activity Surveys

Dusk and dawn bat activity surveys were carried out on 26th July 2011, 2nd August 2011, 16th August and 17th August 2011 during clement and suitable prevailing weather conditions.

Each surveyor was equipped with a Bat Box Duet ultrasonic bat detector with a line-in MP3 recorder and surveyed from locations on the site that allowed for extensive coverage of the building.

The evening surveys commenced approximately 30 minutes before sunset and lasted for at least 1.5 hours after sunset. The dawn survey commenced 2 hours before dawn and lasted until sunrise.

Table 5.1 provides details of the dates, times and weather conditions of the activity surveys undertaken. Bat activity observed is illustrated on the activity maps which can be found in Appendix II and the raw data is provided in Appendix III.

Table 5.1: Survey Conditions		
Survey Date & Time	**Sunrise & Sunset times**	**Weather Conditions**
26.07.11 20.35 – 23.07	Sunset 21.14	Minimum temp.:18.5˚C. 4/8 cloud cover, slight breeze, no rain.
02.08.11 20.15 – 22.30	Sunset 20.45	Minimum temp.:16˚C. 2/8 cloud cover, no wind, no rain.
16.08.11 20.00 – 22.25	Sunset 20.35	Minimum temp.:16.5˚C. 2/8 cloud cover, no wind, no rain.
17.08.11 04.00 – 06.20	Sunrise 05.52	Minimum temp.:12˚C. 6/8 cloud cover, light breeze, no rain.

4.4 Data Analysis

MP3 recordings from each surveyor were analysed using BatSound sound analysis software to confirm identification of the species observed during the surveys.

5 Survey Results

5.1 Building B1: Terraced House

Building Assessment

B1 is a two storey brick built end of terrace residential dwelling, which is currently unoccupied. The roof was pitched with a number of single storey single-pitched extensions to the rear. A conservatory was also present to the rear. Skylights could be seen in the rear aspect of the roof implying part of the roof void had been converted. Wooden framed windows and uPVC guttering were also present, along with barge boards on the extensions. The northern elevation of the building has a gable end.

Potential access points for bats were identified through gaps in the mortar at the ridge and several slipped roof tiles.

Internally two roof voids were present which were separated by fire walls. Wooden beams and under-felting were present within both roof voids and insulation covered in carpet was also noted on the floor. No visible gaps were observed in the under-felting which would provide potential access points for bats into the main area of the roof void.

It was considered that there is potential for bats to roost between the roofing tiles and under-felt and due to the sealed nature of the under-felt any potential evidence may have been concealed.

Vent bricks were noted in the gable end of the second roof void which was present over the northernmost section of the building; however it was considered the ventilation holes were too small (~5mm diameter) to enable bat access.

No evidence of bats was recorded during the survey, but potential was noted for crevice dwelling bat species such as pipistrelles to be roosting in the building, using features such as crevices between the roofing tiles and under-felt.

Nocturnal Survey Results

During dusk surveys on two occasions a single common pipistrelle was observed emerging from the apex of the gable end on the western side of building B1, as indicated on Figure 2. No bats were seen entering this building during the dawn survey.

Common pipistrelles were also foraging and commuting around and past this building during both dusk and dawn visits, although there was very little activity on the road side (east) of this building. A single brown long-eared bat was also seen commuting over the ridge.

Figure 1: B1, eastern aspect.

Figure 2: B1, western aspect – approximate location of pipistrelle roost entrance indicated by yellow circle

5.2 Building B2: Garage

Building Assessment

B2 is a detached single storey, brick built double garage with a metal single pitched lean-to on the north western aspect. The garage had a pitched, clay tiled roof with overhanging eaves. Gables, barge boards and flashing were also present.

Potential access points for bats were identified under the overhanging eaves where there were gaps between the wooden frame and the wall plate. There were also several areas of missing mortar and gaps in the roof tiling.

Internally a roof void was present which had been used as part of the living accommodation. The roof void was boarded out with plasterboard and two skylights were present in the roof. Two storage areas were located running lengthways along the room within which Tyvek under-felting was present. This brand of under-felt is smooth to the touch and therefore does not enable bats to gain necessary purchase reducing the likelihood of bats roosting on the internal face of the felt.

Open access was available between the main roof void area and the storage areas in the eaves. Dead peacock *Aglais io* and tortoiseshell *Aglais urticae* butterflies were observed within the main (living accommodation) area however these were considered not to be associated with bats as they were intact on the floor, rather than showing signs of being bat foraging remains.

No evidence of bats was recorded during the survey, but as with B1, potential was noted for crevice dwelling bat species such as pipistrelles to use features including the gaps between roof tiles and under-felt.

The habitats surrounding the site provide suitable foraging opportunities for bats, particularly along the mature hedgerows, open grassland and the water course.

Nocturnal Survey Results

A single common pipistrelle bat was observed emerging from beneath a tile adjacent to the skylight during dusk surveys and observed in swarming behaviour before entering this same feature during the dawn survey.

1-2 pipistrelles were also observed foraging and commuting around this building, and particularly in the garden area to the rear. Calls were also heard from a noctule bat at approximately 1 hour after sunset, however this bat was not associated with either building on site.

During the dusk survey on 26.07.11 a bat was seen close to building B2 at approximately 40 minutes after sunset but no echolocation calls were detected. Two minutes later a second bat was seen to exit a gap beneath the ridge tiles and again no echolocation calls were detected. This is typical of brown long-eared bats, whose echolocation calls are very quiet and frequently not picked up on bat detectors unless the bat is within a few metres of the surveyor.

On the following dusk survey on 16.08.11, a single brown long-eared bat was seen light sampling within the lean-to at the rear of B2 before emerging at approximately 35 minutes after sunset (see figure 4) and during the dawn survey, two brown long-eared bats were observed swarming near B2 before dawn, although their precise entry point into the building was not seen on that occasion.

Figure 3: B2: double garage – common pipistrelle bats were seen entering and exiting gaps beneath roof tiles.

Figure 4: lean-to at rear of B2 – brown long-eared bats seen flying within before emerging after dusk indicating presence of a roost in this building.

Figure 5: roof of garage – pipistrelle roost adjacent to skylight identified by yellow circle, approximate entry point to brown long-eared bat roost identified in pink

6 Conclusions & Recommendations

6.1 Conclusions

During the initial bat building assessment, potential access points for bats were identified and highlighted on both buildings although no direct evidence of bats roosting was found at that stage.

The results of the nocturnal activity surveys confirm that small numbers or individual common pipistrelle bats are roosting in the gable end at the rear (western side) of building B1 and beneath roof tiles close to the skylight on building B2. The results also indicate that small numbers of brown long-eared bats are roosting at the rear of B2 and using the adjacent lean-to for light sampling prior to emergence.

Only one to two individuals of each bat species were observed at any one time and activity was not consistent on each survey visit, suggesting that the buildings support summer roosts of non-breeding individuals. A consistently higher level of activity would be expected if a maternity colony was present and the features present within the buildings are not considered likely to provide suitable conditions to be used by hibernating bats.

Both common pipistrelles and brown long-eared bats are using the habitats within and adjacent to the site for commuting and foraging.

6.2 Recommendations

All species of British bats and their resting places (roosts) are fully protected by UK and European wildlife legislation therefore due to the presence of roosting bats within both buildings on site it is considered that bats pose a statutory constraint to development.

It is therefore recommended that suitable mitigation is designed into the proposals so that the Local Planning Authority has sufficient information to determine the application favourably. Recommendations for mitigation are illustrated on the draft proposed layout in Appendix IV: Mitigation Design and described in section 6.3 below.

Once the planning application has been successfully determined, an application will be required to Natural England for a European Protected Species licence, who may take up to 7 weeks to process the application.

Due to the transient nature of bat roosts, the bat building assessment and nocturnal activity surveys should be updated if works to the building have not been undertaken within 12 months of these surveys.

6.3 Mitigation Strategy

The Bat Mitigation Guidelines (English Nature 2001) state that a small roost of a common bat species can be mitigated for by provision of replacement roosting habitat, such as bat boxes or features within new buildings. Ideally, replacement roost features should be on a "like for like" basis, to replicate as near as possible the environmental conditions of the roosts that would be lost.

A detailed mitigation strategy will need to be included as part of the bat licence application to Natural England on receipt of planning permission.

Proposed mitigation for the common pipistrelle and brown long-eared bat roosts at this site is illustrated on the mitigation plan Appendix IV and described in more detail below:

General Considerations

The lighting design for the development will be sensitive to bats. Light levels will be as low as reasonably possible and lighting will be directed where it is needed to avoid unnecessary light spillage. In particular, bat roost entrances will remain unlit as illumination of a roost entrance will discourage bats from using it. The use of units with timers, motion sensors or dimmer controls could help to minimise the impacts on bats. Clear would be happy to review and provide comment on the lighting specification to ensure impacts to bats are adequately taken into account.

The works will be timed to avoid peak bat activity periods. Demolition and/or any mechanical removal of building materials will take place during October to early December or mid March to late April of any given year.

Once the bat licence is in place and works have been scheduled, a pre-commencement (dawn) bat survey will be undertaken before any roof stripping commences to ensure that any roosting bats can be highlighted and appropriate measures taken to ensure the bats safety, for example soft strip of roof tiles in that location to prevent injury to bats.

Construction phase mitigation will be installed as early as possible to ensure continuity of provision of roosting habitat on site.

Specific Mitigation for Pipistrelle Roost in B1

The existing roost will be lost as that portion of the building is proposed to be demolished to facilitate access to the site. To offset this loss at least 1 internal rafter style bat box will be installed into the west facing eaves of the section of the building that will be retained. This will be done prior to demolition of the section containing the roost.

A "rafter box" is constructed by using wooden boards to create a sealed box between two rafters. A sloped base covered with lead flashing is added and a roof tile is omitted to provide a weather proof access point at the eaves. The back board of the rafter box should be covered with Bitumastic roof felt (grit side down) to provide a roughened surface on which bats can move easily. The box can extend from the eaves to the full height of the ridge or can be shorter, depending on the space available within the roof. An indicative design is provided in Appendix V.

Specific Mitigation for Pipistrelle Roost in B2

The existing roost will be lost as the building is proposed to be demolished to make way for new-build houses.

To offset this loss features will be incorporated into new buildings, for example bat bricks, raised ridge tiles, access for bats to gaps behind hanging tiles or weatherboarding. As a minimum, features will be installed on new house plots 1 and 2, as these are closest to the location of the existing roost. Additional features on any or all of the other new houses would further enhance the site for bats.

Two to three bat boxes will also be installed on an existing mature tree that will be retained along the site boundary, highlighted as a pink square on the mitigation plan, Appendix IV.

Specific Mitigation for Brown Long-eared Bat Roost in B2

The existing roost will be lost as the building is proposed to be demolished to make way for new-build houses.

Brown long-eared bats need roost sites with large uncluttered enclosed spaces in which to fly before they emerge, therefore to offset the loss of the existing roost access will be provided to a roof void in at least one new building. This need not be the full extent of the roof void, but should comprise a section at least 1.5m high and ideally at least 5m long.

An access door from the main loft area should be provided for monitoring / inspection purposes; however, the door should be clearly marked with a sign indicating that it is a bat roost and should not be disturbed.

Survey results indicate that the access point for bats to enter the existing roost is at the ridge. To replicate existing conditions, access to the new roost should ideally be along the ridge or at the apex of the gable end, as this is another typical access point used by bats (Mitchell Jones, 2004).

Care should be taken to ensure that when ridge tiles are laid that the space within at least some of the tiles is not filled with mortar. 100 x 30mm gaps should be provided beside the ridge boards to allow bats to enter these ridge tiles, as this is where most loft dwelling bats reside (Mitchell Jones, 2004).

The recommended location is house 7, as this is close to the site of the existing roost and also provides easy access to the tree line along the northern boundary, which is likely to be a good foraging/commuting corridor. House 3 would be a good location for a second (or alternative) roof void for this species.

7 References

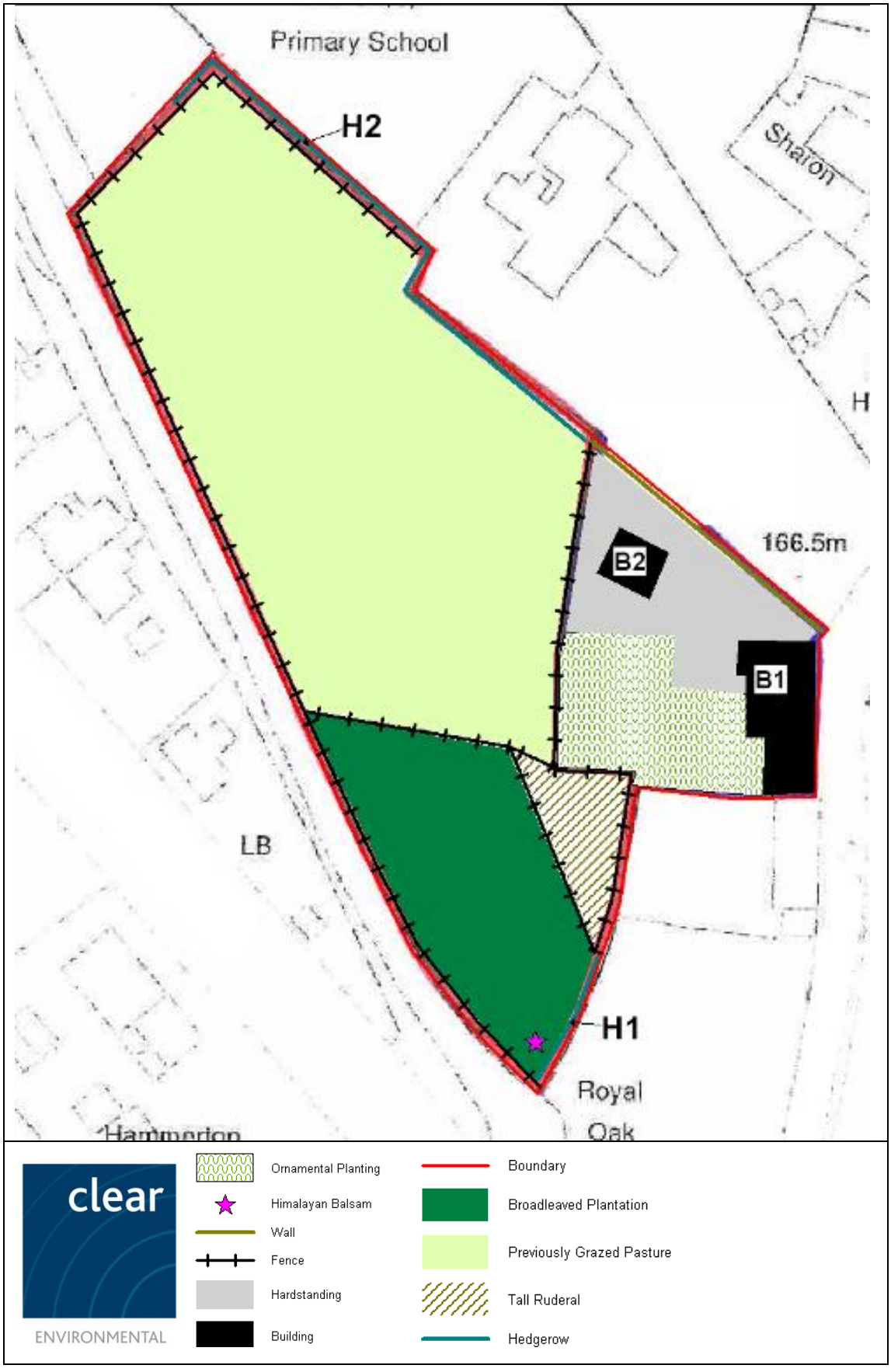
Bat Conservation Trust (2007). *Bat surveys – Good Practice Guidelines.* Bat Conservation Trust, London

Institute of Lighting Engineers & the Bat Conservation Trust (2005) Bats and Lighting, ILE, London

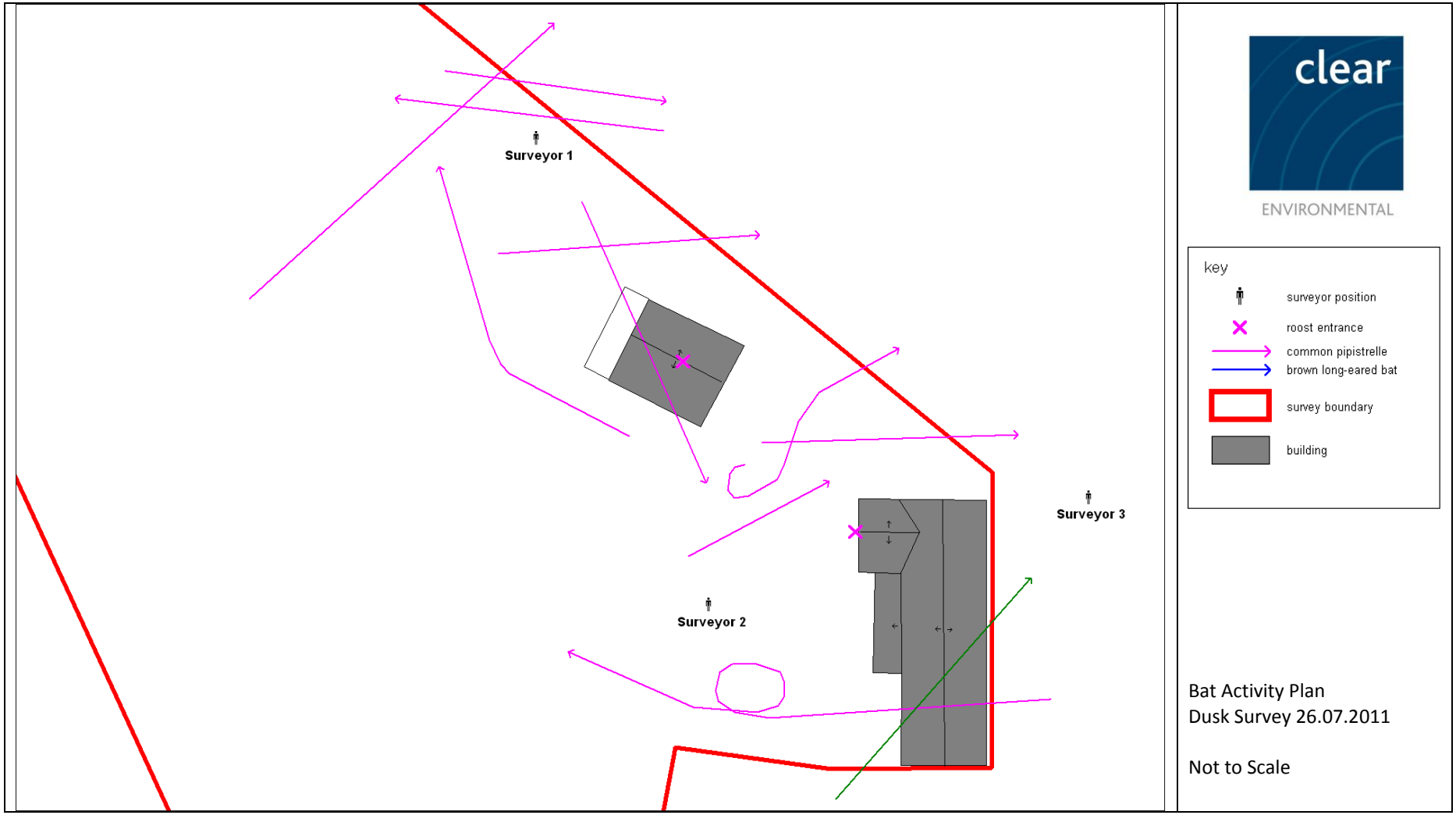
JNCC (2004) *Bat Workers Manual,* 3rd Edition

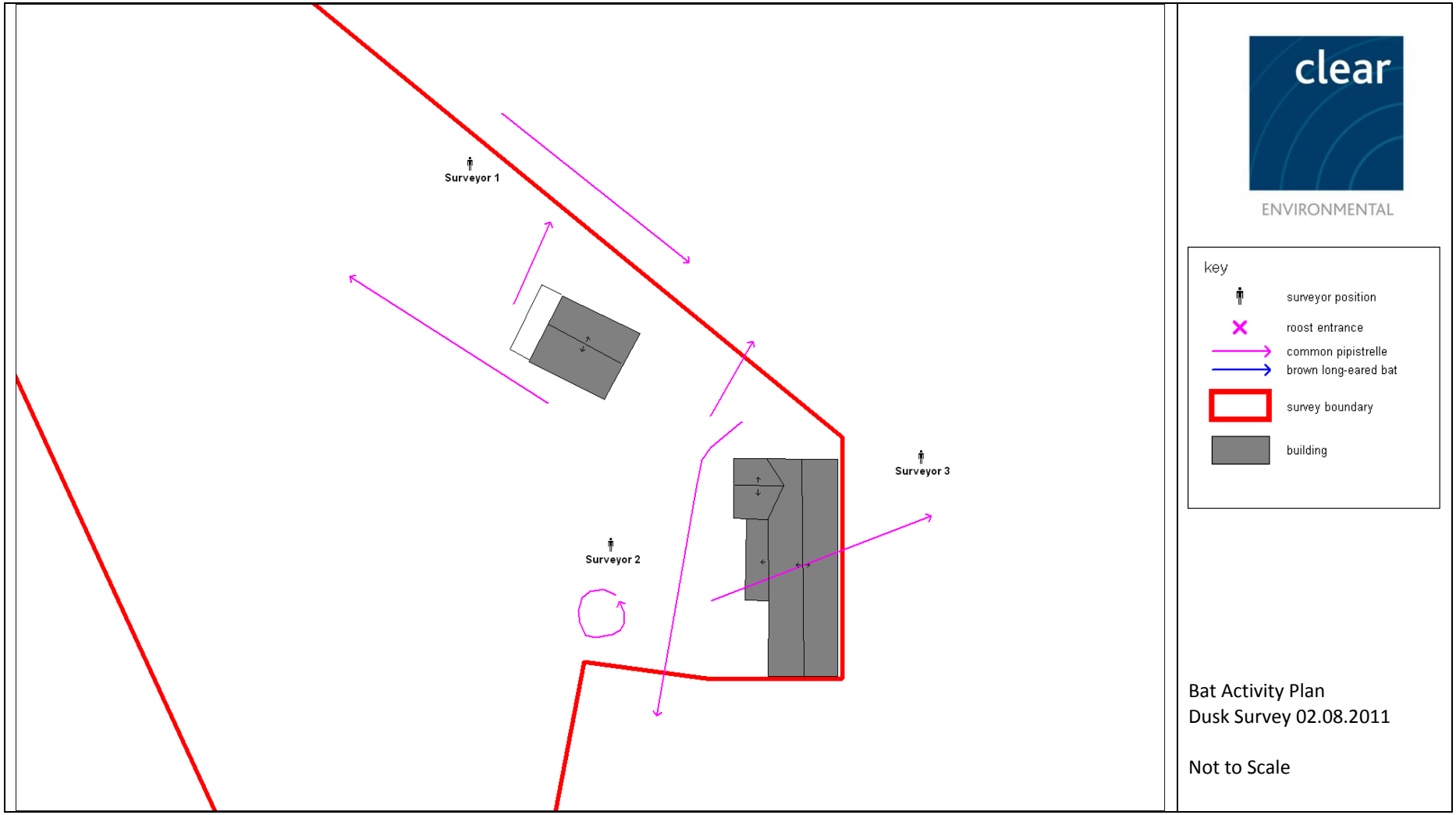
English Nature (2001) *Bat Mitigation Guidelines.* English Nature, Peterborough

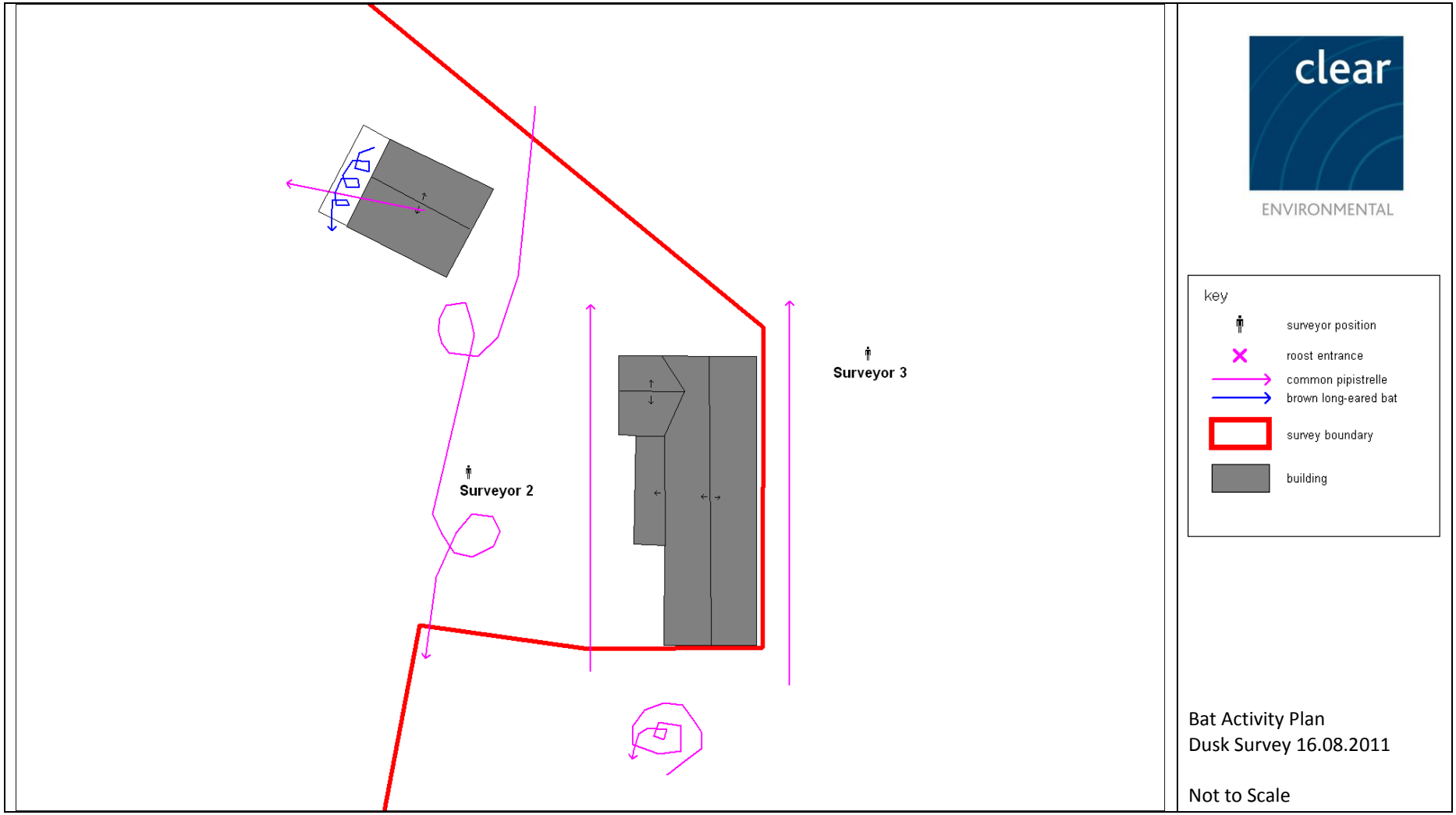
Appendix I: Site Plan


Primary School
H2
Sharon
H
166.5m
B2
B1
LB
H1
Royal
Oak
Hammerton
clear
ENVIRONMENTAL
Ornamental Planting
Himalayan Balsam
Wall
Fence
Hardstanding
Building
Boundary
Broadleaved Plantation
Previously Grazed Pasture
Tall Ruderal
Hedgerow

Appendix II: Bat Activity Plans


Surveyor 1
Surveyor 2
Surveyor 3
clear
ENVIRONMENTAL
key
surveyor position
roost entrance
common pipistrelle
brown long-eared bat
survey boundary
building
Bat Activity Plan
Dusk Survey 26.07.2011
Not to Scale


Surveyor 1
Surveyor 2
Surveyor 3
clear
ENVIRONMENTAL
key
surveyor position
roost entrance
common pipistrelle
brown long-eared bat
survey boundary
building
Bat Activity Plan
Dusk Survey 02.08.2011
Not to Scale


Surveyor 3
Surveyor 2
clear
ENVIRONMENTAL
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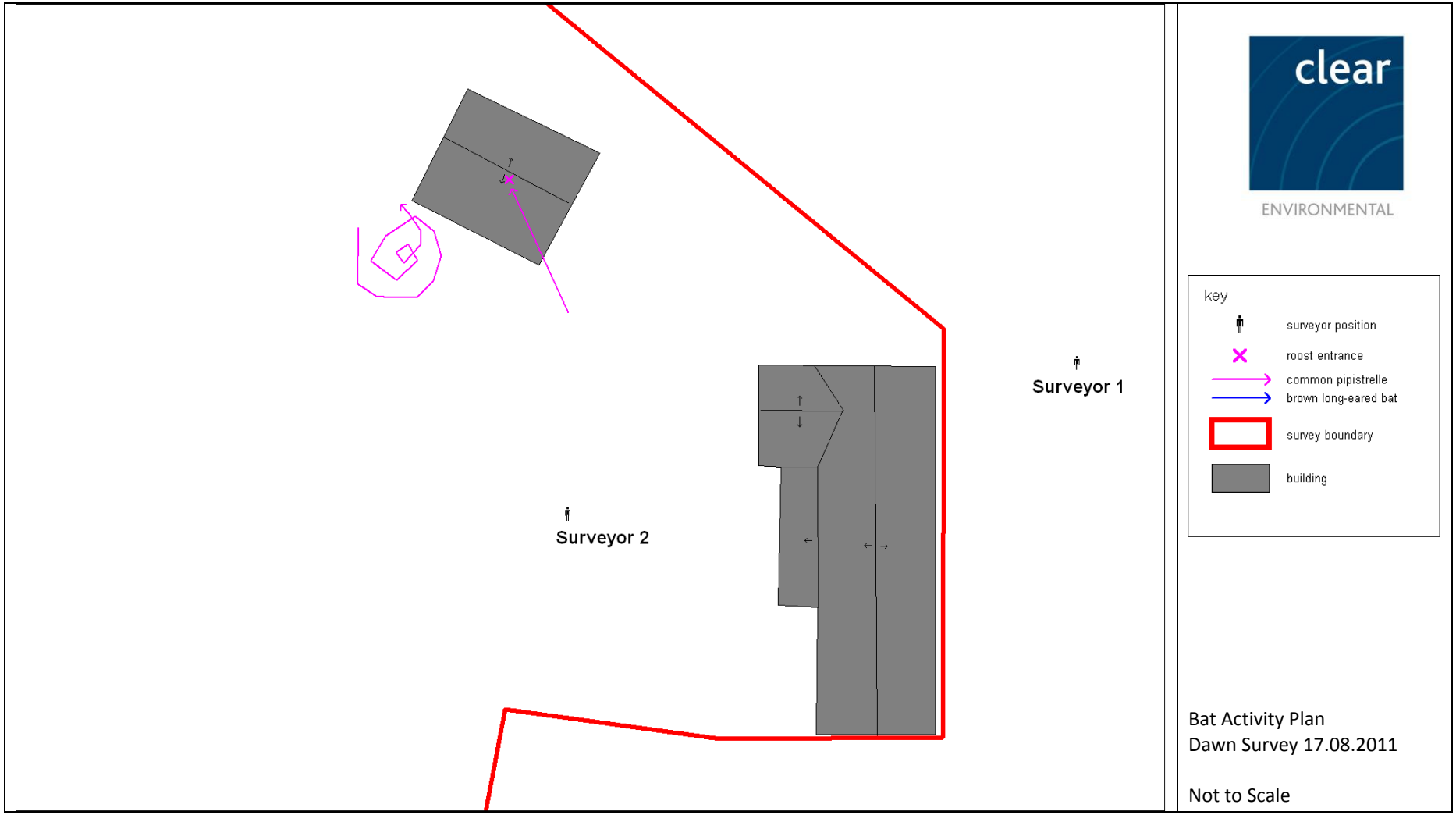
roost entrance
common pipistrelle
brown long-eared bat
survey boundary
building
Bat Activity Plan
Dusk Survey 16.08.2011
Not to Scale


Surveyor 1
Surveyor 2
clear
ENVIRONMENTAL
key
surveyor position
roost entrance
common pipistrelle
brown long-eared bat
survey boundary
building
Bat Activity Plan
Dawn Survey 17.08.2011
Not to Scale

Appendix III: Bat Activity Result Tables

Survey 1

Ecologist(s):	OR, HE, PW	**Project Name:**	Sugar St	**Date:**	26.07.11
Start time:	20.35	**Temp:**	18.5°C	**Wind:**	SLIGHT BREEZE
Finish time:	23.07	**Temp:**			
Sunset time:	21.14	**Cloud cover:**	4/8		

Surveyor	Time	Species	Activity	No. passes	Comments
PW	21.35-37	Common pipistrelle	Forage / commute	three	
OR	21.30	Common pipistrelle	Emerge		From gable end of B1
OR	21.35	Common pipistrelle x 2	Forage	Two	
HE	21.35	Common pipistrelle	Emerge?		Possible emergence from gable end of B1
HE	21.37	Common pipistrelle	Forage / commute	One	Flew towards road
HE	21.40	Common pipistrelle	Foraging	Multiple	Within garden
OR	21.41	Common pipistrelle	Forage / commute	One	
PW	21.42	brown long-eared	Forage / commute	One	No echolocation calls heard
PW	21.44	Brown long-eared	Emerge		Flew out of ridge on B2, no echolocation calls heard
PW	21.48	Common pipistrelle	Forage / commute	One	
PW	21.55	Noctule	Commute	one	
PW	21.58	Common pipistrelle			
PW	21.59	Common pipistrelle			
PW	22.00	Common pipistrelle			
HE	22.01	Common pipistrelle	Foraging	Multiple	Within garden
PW	22.05	Common pipistrelle x 2			
PW	22.06	Common pipistrelle			
OR	22.06	Brown long-eared	Forage / commute	one	Passing over building
OR	22.08	Common pipistrelle	Forage / commute	One	
PW	22.10	Common pipistrelle			
PW	22.14	Myotis	Forage / commute	One	
PW	22.15	Common pipistrelle	Commute	One	Flew high over B2

Survey 2

Recorders Name(s):	NS, CB	**Project Name:**	Sugar St	**Date:**	02.08.11
Start time:	20.15	**Temp:**	16°C	**Wind:**	none
Finish time:	22.30	**Temp:**			
Sunset time:	20.45	**Cloud cover:**	4/8		

Surveyor	Time	Species	Activity	No. passes	Comments
PW	21.31	Common pipistrelle	Forage / commute	One	
PW	**21.35**	Common pipistrelle	Forage / commute	One	
CB	21.35	Common pipistrelle	Foraging	Multiple	Around tree in garden then over roof of house
PW	21.37		Forage / commute	One	
PW	21.38		Forage / commute	One	
NS	21.45		Forage / commute		Only faint calls heard
NS	21.47		Forage / commute		Only faint calls heard
CB	21.47		Commuting		
PW	21.49	Common pipistrelle	Forage / commute	One	
NS	21.50	Common pipistrelle	Forage / commute		Only faint calls heard
PW	21.52	Common pipistrelle	Forage / commute	One	
NS	21.52	Common pipistrelle	Forage / commute		Only faint calls heard
PW	21.55	Common pipistrelle	Forage / commute	One	
NS	21.58	Common pipistrelle	Forage / commute		Only faint calls heard
NS	22.07	Common pipistrelle	Commuting		Only faint calls heard
NS	22.10	Common pipistrelle	Forage / commute		Only faint calls heard
PW	22.11	Common pipistrelle	Forage / commute	One	
NS	22.10	Common pipistrelle	Forage / commute		Only faint calls heard
NS	22.13	Common pipistrelle	Commuting		Only faint calls heard

Survey 3

Recorders Name(s):	NS, CG	**Project Name:**	Sugar Street	**Date:**	16.08.11
Start time:	20.20	**Temp:**	16.5°C	**Wind:**	None
Finish time:	22.25	**Temp:**			
Sunset time:	20.35	**Cloud cover:**	2/8		

Surveyor	Time	Species	Activity	No. passes	Comments
NS	20.52	Common pipistrelle	Emerged		From gable end of B1
CG	20.56	Common pipistrelle	Emerged		From tile ext to skylight on roof of B2
NS	20.57	Common pipistrelle	Commuting		
CG	21.07	Brown long-eared	Emerged		Light testing within lean-to at rear of B2 before emerging
NS	21.07	Common pipistrelle	Foraging		
CG	21.26	Common pipistrelle	Forage / commute		Calls heard, bat not seen

Survey 4

Recorders Name(s):	NS, CG	**Project Name:**	Sugar Street	**Date:**	17.08.11
Start time:	04.00	**Temp:**	12°C	**Wind:**	LIGHT BREEZE
Finish time:	06.00	**Temp:**			
Sunrise time:	05.52	**Cloud cover:**	6/8		

Surveyor	Time	Species	Activity	No. passes	Comments
CG	04.54	Brown long-eared	Foraging		Calls heard, bat not seen
CG	04.56	Brown long-eared	Foraging	Multiple	
CG	04.59	Brown long-eared	Swarming		Entry point to roost on B2 not seen
CG	05.30	Common pipistrelle	swarming		Entered tile next to skylight on B2

Appendix IV: Mitigation Plan

clear
ENVIRONMENTAL

Key

Mitigation for pipistrelle roost in house

rafter box in eaves

mitigation for pipistrelle roost in garage

bat boxes in existing tree

features on new buildings

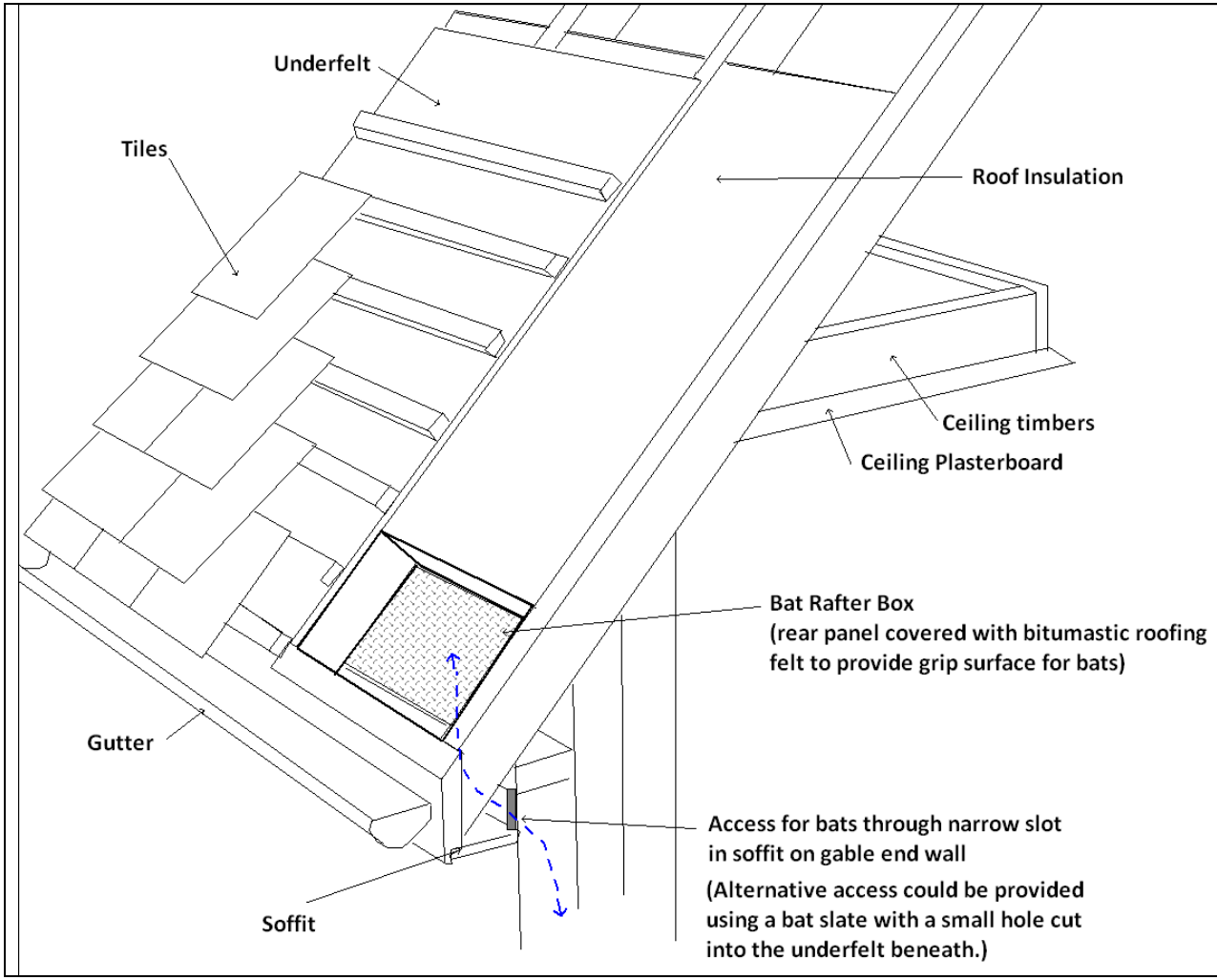
mitigation for brown long-eared bats

access to roof void

Proposed Bat Mitigation Plan
Drawn by: HR
Date: October 2011
Not to Scale

(Based on Simples Design Solutions drawing RS-004 Revision G dated August 11 “Landscape Masterplan”)

Appendix V: Rafter Roost Box Design



Illustrative design for rafter roost box.

Roost cavity created within roof structure by boarding out section within eaves and providing access for bats at soffit or via bat slate.

Not to Scale