BAT EMERGENCE SURVEY REPORT
at
St Christopher Trust
Redcourt/Hollin Cross Lane
Glossop
Derbyshire
SK13 8JH

Client:
Savills

Client Address:
Ground Floor
City Point
29 King Street
Leeds
LS1 2HL

Client Contact:
0113 2201274 (Tel)

JCA Ref:
10626d/DR

JCA Limited

Arboricultural Consultants

Contents

1. Background Information on UK Bats 3
1.1 Bat Ecology 3
1.2 Bats and the Law 4

2. Introduction 5
2.1 Purpose of the Report 5
2.2 Terms of Reference 5
2.3 Scope of the Report 5
2.4 Details of Proposed Development 5
2.5 Site Description 5

3. Desktop Study 6
3.1 Methodology 6
3.2 Results 6

4. Emergence Survey 8
4.1 Survey Details 8
4.2 Methodology 8
4.3 Results 9

5. Conclusions and Recommendations 10

Appendix 1: Site Plan 13

Appendix 2: Photographic Evidence 14

Appendix 3: Map of Surrounding Landscape 16

Appendix 4: Artificial Bat Box Designs 17

Appendix 5: Glossary 19

Appendix 6: References 20

© JCA Limited 2013

1. Background Information on UK Bats

1.1 Bat Ecology

1.1.1 In the UK there are thought to be 18 native species of bat (17 known to be breeding), nearly all of which have experienced serious decline over the last century.

1.1.2 All species are insectivorous and have evolved to hunt a different set of insects, present in different habitat types. Preferred bat habitat include: woodland, grassland, agricultural land, wetland and rivers.

1.1.3 Bats typically roost close to foraging sites, and use linear features, such as hedgerows, tree lines and rivers to navigate. Removal of these linear features is thought to have a significant impact on their movement, which could be contributing to their decline.

1.1.4 Bats will roost in a wide range of different sites including; built structures, underground sites and mature trees. Due to the bats ecology, different roost sites will be used at different times of the year. Known roost types include:

- Hibernacula: November through to March
- Temporary roosts: March to April and August to October
- Maternity roosts: May through to August
- Summer roosts (non-breeding): Used by males and immature females
- Mating roosts: Around September and October

1.1.5 The two main roosts to be considered, with respect to buildings and development, are the maternity roosts and hibernacula. Disturbance of these two roosts can have significant impacts on local bat populations.

1.1.6 Maternity roosts are colonised around late May to early June and usually consist of mature females and their young. Females typically give birth to only one pup a year and disturbance during this time can result in females abandoning the roost and their young. Many species will use the same maternity roost year after year; the loss of a maternity roost can therefore have an enormous impact on the local population.

1.1.7 Hibernacula typically consist of underground sites, such as caves and cellars, where temperatures are low and relatively constant. Bats will hibernate to conserve energy over the winter months when falling temperatures cause a drop in the abundance of insects. Disturbing bats whilst hibernating may cause them to wake, wasting a lot of the bats energy reserves, reducing their chance of surviving the winter.

© JCA Limited 2013

1.2 Bats and the Law

1.2.1 All bat species and their roosts in the UK are protected under European and UK law. The main piece of legislation protecting UK bats is the Conservation (Natural Habitats &C.) Regulations 1994 (better known as the Habitats Regulations).

1.2.2 In addition to this bats and their roosts are also protected in England and Wales under the Wildlife and Countryside Act 1981 and The Countryside and Rights of Way Act 2000.

1.2.3 Under these legislations, it is an offense to:

- Deliberately capture, injure or kill a bat.
- Deliberately disturb a bat in a way that would affect its ability to survive, breed or rear young (or hibernate or migrate in England, Wales and Northern Ireland) or (significantly in England, Wales and Scotland) affect the local distribution or abundance of the species.
- Damage or destroy a roost (this is an 'absolute' offence).
- Possess, control, transport, sell, exchange or offer for sale/exchange any live or dead bat or any part of a bat.
- Intentionally or recklessly disturb a bat at a roost.
- Intentionally or recklessly obstruct access to a roost.

1.2.4 If it is discovered that development may impact upon bat roosts (thus leading to an offence being committed) a **mitigation plan** should be devised and a **Habitat Regulations derogation licence** applied for from the relevant government department (i.e. Natural England). Gaining a licence will depend on many variables; such as species present, roost type, size and its local/regional/national importance.

© JCA Limited 2013

2. Introduction

2.1 Purpose of the Report

2.1.1 A report is required at **St Christopher Trust, Redcourt/Hollin Cross Lane** to assess the sites potential for supporting bat species, in the form of roosting sites, foraging habitat and/or commuting routes.

2.1.2 The aim of this report is investigate the potential impact that the proposed development may have on the local/ nation bat population.

2.2 Terms of Reference

2.2.1 I am instructed by **Savills** to visit the site and prepare my findings in a report. For this purpose I have been supplied with a site map and a description of the development.

2.3 Scope of the Report

2.3.1 This report is compiled in accordance with the Bat Conservation Trusts (BCT) '*Bat Surveys - Good Practice Guidelines*', the Joint Nature Conservation Committee (JNCC) '*Bat Workers Manual*' (3rd Edition) and Natural England's '*Bat Mitigation Guidelines*'.

2.4 Details of Proposed Development

2.4.1 The development proposed on this site is the removal of the existing buildings which are to be replaced with modern residential buildings and a modern care home facility.

2.5 Site Description

2.5.1 **St Christopher Trust, Redcourt/Hollin Cross Lane** is situated approximately 750m southwest of Glossop town centre, at grid reference SK030935.

2.5.2 The site is located within a residential setting, characterised by a mix of terrace and semi-detached housing with moderately sized garden plots. The surrounding gardens and streets support a large number of mature broadleaved trees, often forming strong linear features. A linear band of woodland extends from the site in a south-easterly direction for approximately 1.5km. The woodland ends at the western boundary of the Pennines, potentially acting as a green corridor from the survey site to this habitat. In the wider landscape, Glossop is surrounded by a mosaic of agricultural land, woodland copses, residential land, moorland and reservoirs.

© JCA Limited 2013

3. Desktop Study

3.1 Methodology

3.1.1 A desktop study has been undertaken in order to obtain any relevant records of bats within a 2km radius of the site. For this the Derbyshire Wildlife Trust (DWT) and Derbyshire Bat Conservation Group (DBCG) were contacted and the National Biodiversity Network (NBN) Gateway website utilised.

3.1.2 The National Biodiversity Network (NBN) Gateway website was used to obtain any bat records that were recorded within the last 10 years, relating to this site. The NBN gateway website holds ecological records collected across the UK from a variety of sources and is available for public use. The website operates by dividing the country into a series of 10km square grids, and so the records held for the 10km grid containing the survey site (Grid SK09) has been reviewed.

3.1.3 In addition to this, the head of grounds maintenance was asked whether any bat activity was known at the site. He confirmed that no bat roosts were known within any of the buildings; however we were informed that a single grounded bat was found on site within the last 10 years. This bat had flown into the far northern building and become grounded. The bat was not identified and was successfully released on site.

3.2 Results

3.2.1 Derbyshire Bat Conservation Group records: A summary of the DBCG records obtained for St Christopher Trust can be seen in the table below.

Table 1: Summary of DBCG data search results for St Christopher Trust.

Common Name	Latin Name	No. of records	Most recent record
Brown Long-eared	*Plecotus auritus*	4	2006
Common Pipistrelle	*Pipistrellus pipistrellus*	7	2008
Daubenton's	*Myotis daubentonii*	1	1997
Unknown bat species	*Chiroptera sp.*	12	2011
Unknown Pipistrelle species	*Pipistrellus sp.*	4	2003

A total of 28 bat records were uncovered for search area of up to 2km around the site, ranging from 1993 to 2011. A large number of these records related to sites very close to the survey site. The majority of these were records of 'No evidence of bat activity', however 2 related to possible bat droppings in bird boxes and 4 related to possible Brown Long-eared and Pipistrelle droppings.

3.2.2 Derbyshire Wildlife Trust records: A summary of the DWT records obtained for St Christopher Trust can be seen in table 2 on the following page.

© JCA Limited 2013

Table 2: Summary of DWT data search results for St Christopher Trust.

Common Name	Species Name	No. of Records	Most Recent Record
Bat	*Chiroptera*	2	2008
Pipistrelle bat	*Pipistrellus sp.*	6	2004
Common Pipistrelle bat	*Pipistrellus pipistrellus*	2	2003
Brown Long-eared bat	*Plecotus auritus*	2	2004

A total of 12 bat records were uncovered for a 2km radius around the site, ranging from 1999 to 2008. None of these records related to the survey site.

3.2.3 National Biodiversity Network Gateway records: The NBN Gateway records obtained for this site can be seen in the table below.

Table 3: Summary of NBN Gateway data search results for St Christopher Trust.

Common Name	Species Name	No. of Records	Most Recent Record
Bat	*Chiroptera*	6	2008
Common Pipistrelle bat	*Pipistrellus pipistrellus*	6	2008
Daubenton's bat	*Myotis daubentonii*	6	2008
Noctule bat	*Nyctalus noctula*	1	2005
Nyctalus/Eptesicus bat	*Nyctalus/Eptesicus* sp	1	2006
Pipistrelle bat	*Pipistrellus sp*	3	2007

3.2.4 Brandts and Whiskered bats (*Myotis brandtii / Myotis mystacinus*) have only recently been distinguished as two different species. Outside of DNA testing, physical identification requires analysis of the specimen's teeth or in the case of male bats there is a physical difference in the male reproductive organ. They are both crevice dwellers and found in all types of houses, particularly older stone and slate buildings. In the winter they are regularly found hibernating in underground sites.

3.2.5 Brown long-eared bats (*Plecotus auritas*) summer roosts are usually in older buildings, barns, churches and trees. Whilst winter roosts consist of caves, tunnels, mines, ice-houses and only occasionally trees and buildings.

3.2.6 Both Common and Soprano Pipistrelles (*Pipistrellus pipistrellus / Pipistrellus pygmaeus*) are crevice dwellers, found commonly in all types of building, including modern housing, and occasionally in trees and bat boxes.

3.2.7 Daubenton's bats (*Myotis daubentonii*) are found almost exclusively in underground sites, such as bridges and tunnels near to water.

3.2.8 Noctule bats (*Nyctalus noctula*) are naturally a forest species and they are most commonly found in trees and occasionally bat boxes. They have also found in buildings both old and new.

3.2.9 Natterer's bats (*Myotis Nattereri*) are rarely found in houses, but have been found in old stone buildings such as barns, castles and churches. In winter they hibernate in a wide range of underground sites.

© JCA Limited 2013

4. Emergence Survey

4.1 Survey Details

4.1.1 The first emergence survey was conducted on 15th May 2013, under the following weather conditions; 13.6 °C, with no precipitation, 20 - 40% cloud cover and a light westerly breeze. The survey was conducted by:

- David Ryder
- Jonathan Cocking
- Toby Thwaites
- Andy Bagshaw
- Simeon Haigh
- Scott Reid

4.1.2 The second emergence survey was conducted on 30th May 2013, under the following weather conditions; 15.2 °C, with no precipitation, less than 20% cloud cover and a light south-westerly breeze. The survey was conducted by:

- David Ryder
- Andy Bagshaw
- Simeon Haigh
- Scott Reid

4.1.3 Limitations: There were no perceived limitations to any of these surveys.

4.2 Methodology

4.2.1 Emergence surveys are conducted 20 minutes before sunset and up to 90 minutes after. Due to the lifecycle of bats, emergence surveys are conducted between the months of May through to August, and can occasionally run into September. All emergence surveys have at least one Natural England Bat Licensee and all surveyors used by JCA have experience in conducting bat emergence surveys, and an appropriate level of knowledge in bat ecology.

4.2.2 All surveyors present are equipped with a heterodyne bat detector, compass or printed site map, standardised data collection sheet and pen.

4.2.3 An initial Scoping survey conducted by JCA in July 2012 has identified three out of the six buildings on site as having evidence or potential of supporting bats. These buildings are identified on the plan at **Appendix 1** as buildings 1, 3 & 6.

- Building 1: The scoping survey identified a number of points where bats could enter the building. An interior inspection of the loft space identified a small number of old bat droppings towards the north end of the roof space. A discussion with the staff confirmed previous sightings of bats within the roof space over 2 years ago. Staff also confirmed that the building was no longer in use and that heating had been turned off.

© JCA Limited 2013

- Building 3: Bat droppings were found in three locations within the loft space of this building, this included old dropping and fresh droppings in two different locations. This building is still in active use by St Christopher's Trust.

- Building 6 had no evidence of occupation by bats, but was considered to have significant features to support roosting bats.

4.3 Results

4.3.1 Emergence Survey 1 results

- 21:12 Common Pipistrelle commuting SE to NW near building 6.
- 21:15 Soprano Pipistrelle commuting W to E south of building 6. Similar activity continued until 21:41.
- 21:15 Common Pipistrelle commuting over building 3 SW to NE repeated at 21:20.
- 21:22 Brandt's/Whiskered bat foraging around the trees west of building 3.
- 21:29 Common Pipistrelle observed feeding north of building 1 occasionally circling building 1. This activity ceased at 21:55.
- 21:45 Pipistrelle foraging to the west of building 6.

4.3.2 Emergence Survey 2 results

- 21:11 Soprano Pipistrelle foraging at canopy height to the north of building 6. 7 specimens visible at peak occasion. Activity continued until 21:38.
- 21:14 Brandt's/Whiskered bat foraging at canopy height north of building 6. 4 specimens visible at peak occasion. Activity continued until 21:32.
- 21:15 Common Pipistrelle over building 1 from N to S.
- 21:15 Common Pipistrelle from NW corner of building 4 commuting from S to N.
- 21:18 Common Pipistrelle foraging across south eaves of building 1.
- 21:20 Bat foraging over conservatory at building 4.
- 21:21 Common Pipistrelle commuting W to E south of building 1.
- 21:25 Soprano Pipistrelle commuting W to E south of building 1.
- 21:26 Brandt's/Whiskered bat foraging south of building 1.
- 21:30 Brandt's/Whiskered bat foraging south of building 1 with a second specimen joining at 21:35.
- 21:35 Bat commuting E to W over buildings 3&4
- 21:36 Common Pipistrelle bat foraging over apex of porch at SE of building 1.
- 21:45 Common Pipistrelle foraging west of building 6.
- 21:45 Bat foraging around building 4

© JCA Limited 2013

5. Conclusions and Recommendations

5.1 After conducting a thorough Bat Emergence survey we consider **St Christopher Trust** to have a low risk for disturbing bat roosting sites with the planned development.

5.2 The droppings discovered in building 1 are likely from a time when the building was in regular use by St Christopher's Trust, the building was heated and had a warmer core temperature.

5.3 The results from the first survey produced no evidence of use of building 6 by roosting or foraging bats. With this evidence and the notes from the scoping survey it was decided that building 6 was not a target for the second survey.

5.4 There is a single detection which has a small potential to be an emerging bat, this being 21:15 on the second survey, a Common Pipistrelle coming from the NW corner of building 4. It was not observed leaving the building and the occurrence was not repeated. The source of the activity came from building 4 in a similar alignment to droppings found in the northwest corner of the roof space in building 3, which is highlighted as target note 3 in the scoping survey. This is likely to be a solitary male. Occupation by a single male would produce a concentration of bat droppings over time.

5.5 Removal of a roosting site for solitary male bats is not considered vastly detrimental to the species. All bats have a selection of roost sites and choose their daily location based on the time of year, weather and ambient temperature.

5.6 Bat activity within this site is significant. The survey has produced evidence of foraging and commuting. From studying the time of sunset and the record of the first bats it is estimated that these feeding bats have commuted up to 1km to arrive at the site and the roosts are likely located to the south and east.

5.7 It is noted that bat activity commenced earlier on the second survey compared to the results from the first. It is worth noting that for three days prior to the second survey the weather was severe enough to deter bats from foraging and it is my opinion that foraging commenced earlier on this evening due to the improving conditions and the urgent requirement for the bats to find sustenance.

5.8 As the site has been considered to have a low risk of disturbing maternity roosts or hibernation sites, we recommend that the proposed development at St Christopher's Trust should go ahead, and that there is no requirement to licence the development. However, the work should be carried out with care and vigilance.

5.9 It is recommended that work to buildings 1 & 3 be undertaken between November & February given the evidence of previous occupation.

© JCA Limited 2013

5.10 The new development should offer new roosting and foraging potential to bat species. We recommend the use of bat boxes and bat tiles as found in Appendix 4 and a planting scheme to attract feeding bats. JCA can offer advice and supervision for the schemes. Please enquire if you require a quotation.

5.11 Should bats be found during any stage of development, all work must stop immediately and JCA or Natural England be contacted. It must be stated that this is a legal requirement, and that bats may only be handled and their roost disturbed by an experienced ecologist holding an appropriate licence. JCA have a licensed Natural England Bat Warden on staff that can provide advice on the best course of action.

5.12 The development of any building or structure has the potential risk of removing bat roosting habitat. Therefore JCA always recommended that alternative bat roosting opportunities should be provided to replace any that are lost due to building alterations. Should you like advice on putting up bat boxes, or on increasing your sites value to bats through carefully designed planting schemes and habitat creation, JCA can provide this service.

© JCA Limited 2013

Appendices

SITE PLAN

N
W E
S



Appendix 1: Site Plan

TITLE: St Christopher Trust, Redcourt,
Hollin Cross Lane, Glossop,
Derbyshire, SK13 8JH.
JCA Ref: 10626/B/CS

SCALE : 1:500	PAPER SIZE : A2

KEY

- Site boundary
- Position of surveyor (15/05/2013)
- Position of surveyor (30/05/2013)

JCA Limited

Arboricultural & Forestry Consultants

Appendix 2: Photographic Evidence

Photo 1: A view of building 1 from the west.

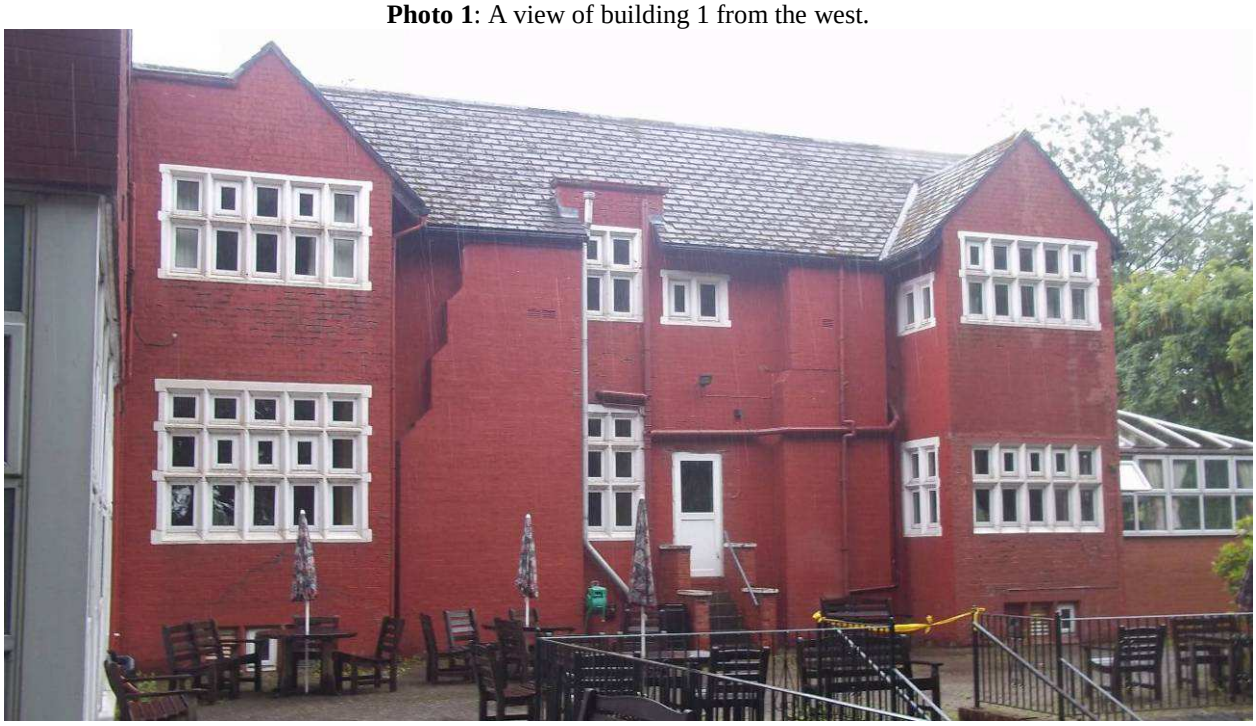


Photo 2: A view of building 3 from the east.



© JCA Limited 2013

Photo 3: A view of building 6 from the east.



© JCA Limited 2013

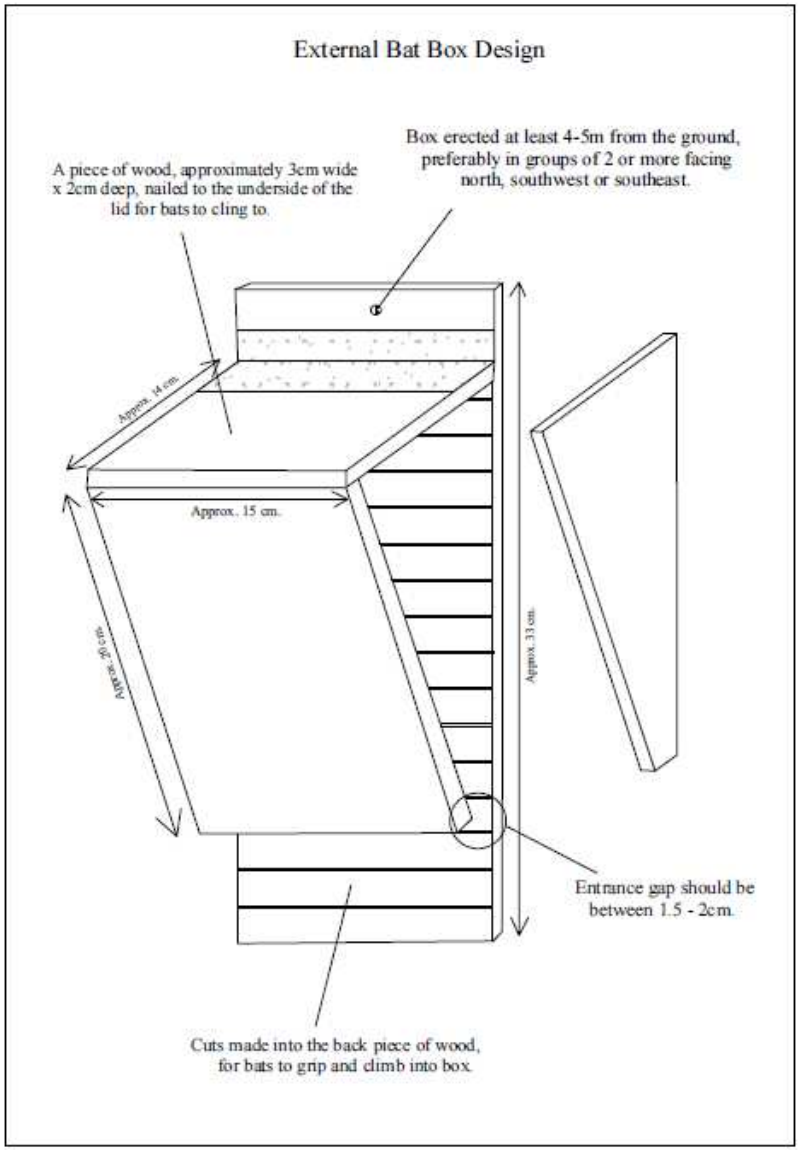
Appendix 3: Map of Surrounding Landscape

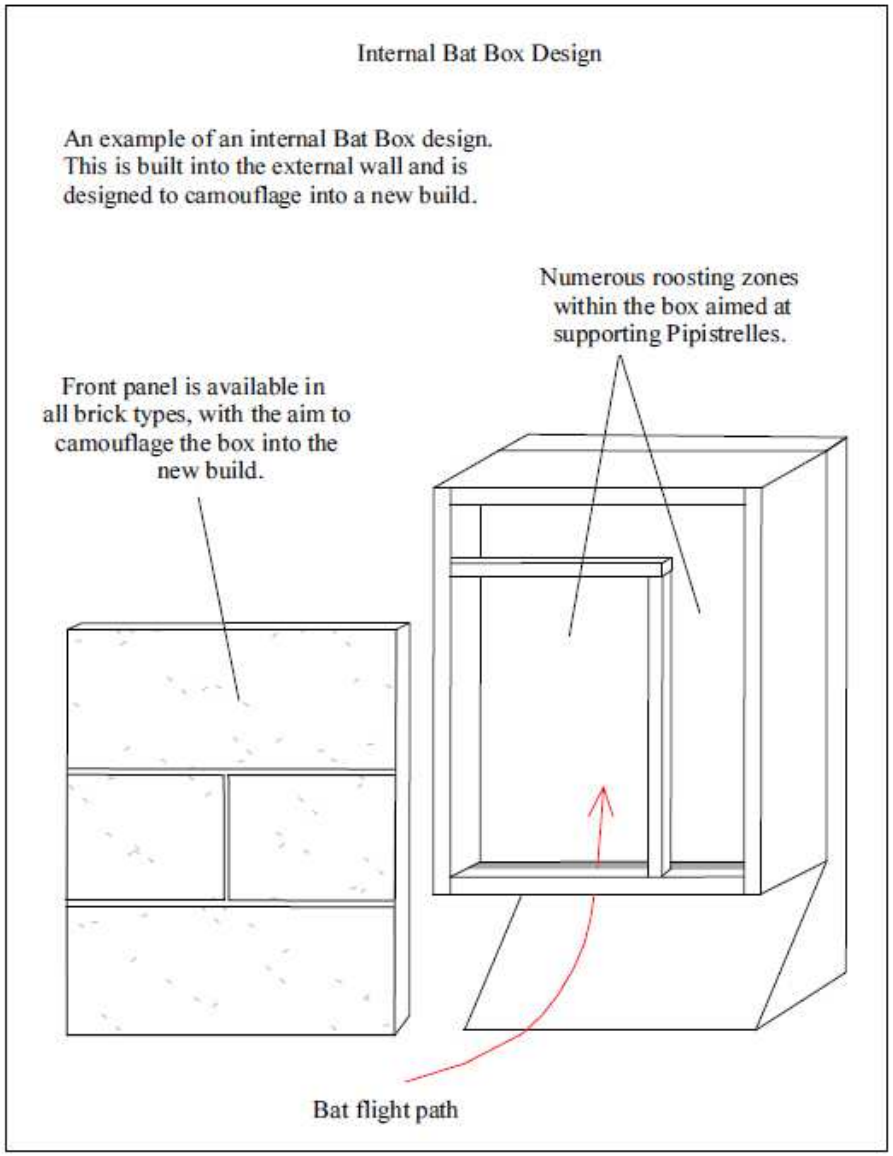
Figure 1: Google Maps image showing the site within the surrounding landscape.



© JCA Limited 2013

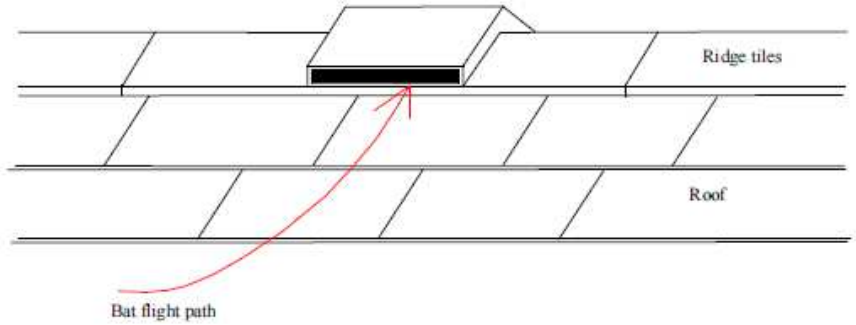
Appendix 4: Artificial Bat Box Designs



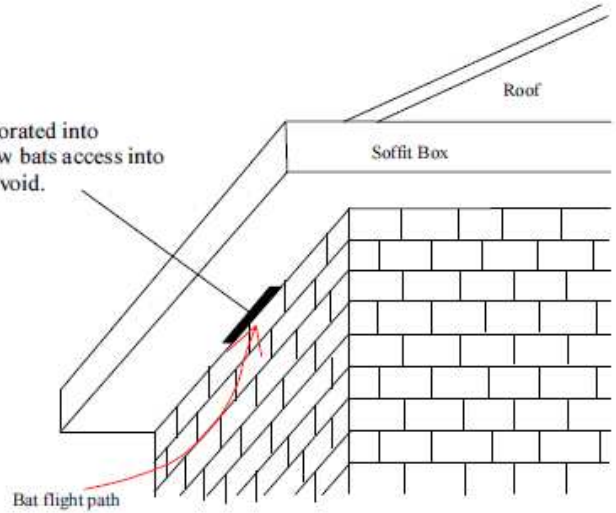


© JCA Limited 2013

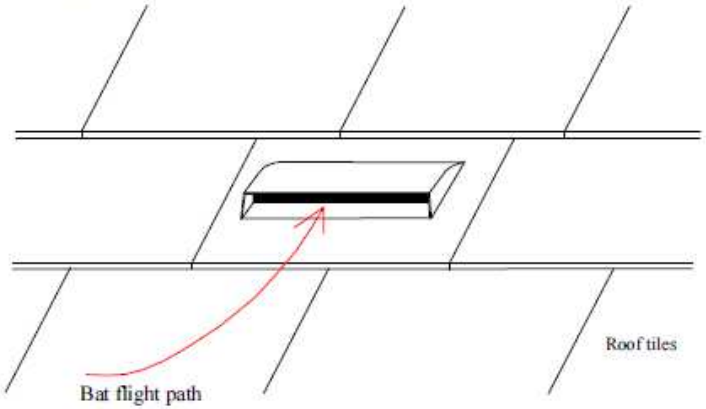
An example design for an artifical bat access point along the rigde tiles, allowing access into the loft space or roof insukation



Access slits incorporated into soffit boxes to allow bats access into the soffits internal void.

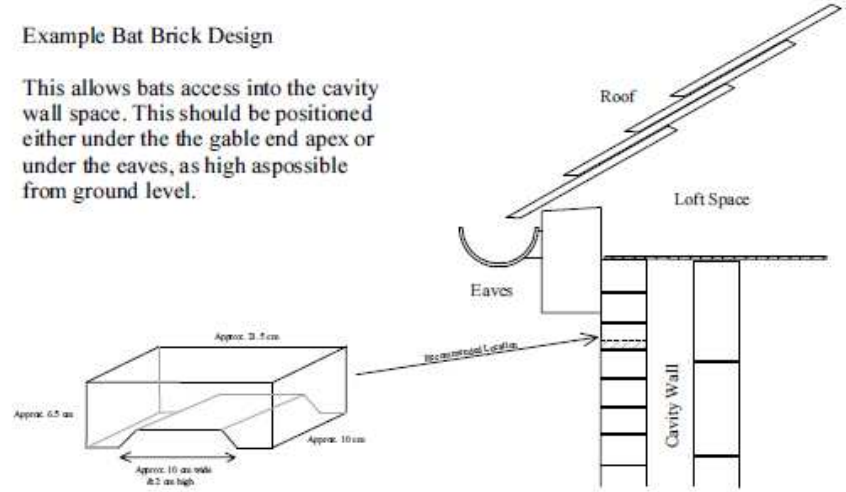


An example design for an aritifical bat access point in the roof tiles. This typically consists of lead saddle and allows access into the loft space or insulation.



Example Bat Brick Design

This allows bats access into the cavity wall space. This should be positioned either under the the gable end apex or under the eaves, as high aspossible from ground level.



© JCA Limited 2013

Appendix 5: Glossary

Activity surveys - are used to assess the level of bat activity at a site. This can be done either by using equipment such as an AnaBat device, or manually walking around a site, with a heterodyne detector, documenting the number of bat passes and interceptions.

Dawn surveys - begin around 2 hours before and up to sunrise, when bats are returning to their roosts from foraging and swarming behaviour can be seen close to roost entrances.

Dusk surveys - begin around 30 minutes before sunset and up to 2 hours afterwards. These are done in order to see bats emerging from their roost sites at night.

Echolocation – is a system similar to sonar, and allows bats to travel and forage even in total darkness. Bats make a call and then listen to the returning echoes in order to build up a map of their surrounding area. This allows bats to gauge what an object is and how far away it is, by how long sound takes to return to them.

Habitat - the ecological or environmental area that is inhabited by a particular species of animal, plant or other type of organism.

Hibernation - is a state of inactivity and metabolic depression characterized by lower body temperature, slower breathing, and lower metabolic rate. Hibernating animals conserve food, especially during winter when food is short, tapping energy reserves, body fat, at a slow rate.

Hibernation roost - typically consist of underground sites, such as caves and cellars, which remain relatively cold and humid. Bats will hibernate to conserve energy over the winter months when falling temperatures cause a drop in the abundance of insects. These will typically be colonised around November to around March.

Insectivorous – is when an organism feeds exclusively on insects.

Nocturnal - a behaviour characterized by being active during the night and sleeping during the day.

Maternity roosts – colonised around late May early June and consist of mature females and their young. These roosts need to be warm and quiet, and are used up until around August, with females typically leaving first and then the young.

Mating roosts – mating begins around late October to November; with males of most species using special mating calls to attract females. These can include purrs, clicks and buzzing.

Roost – a site where bats live during the day, rear young and hibernate. These can be in man made structures, such as buildings, bridges, tunnels, cellars and mines, or natural features such as mature trees and caves.

Roost in buildings – many types of buildings will be used by bats, the most likely sites are agricultural buildings (e.g. farmhouses and barns), buildings with exposed wooden beams (greater than 20cm thick), buildings with weather boarding and/or hanging tiles, and buildings close to woodland and/or water.

Roost in trees – these are typically in mature trees with deep sheltered cracks, under loose sections of bark, or in woodpecker holes.

Species – a group of organisms in which all members can interbreed and produce viable offspring.

Summer roosts (non-breeding) - these are generally occupied by groups of males and immature females during the summer, and are usually only occupied for a short period before the group moves to another location.

Swarming – a behaviour exhibited by bats returning to their roost sites at dawn. Bats can be seen repeatedly flying to and from the roost entrance, making it much easier for consultants to identify where roosts are on a building or structure.

Temporary/Transitory roosts – These are used after hibernation (March – April) before mature females disperse to maternity roosts and male/ immature females colonise summer (non-breeding) roosts. Similarly, temporary roosts form before hibernation (August -October).

Underground Roosts – these are typically used during the winter and can be mines, caves, tunnels or cellars.

© JCA Limited 2013

Appendix 6: References

Bat Mitigation guidelines (Jan. 2004). A. J. Mittchell-Jones. English Nature.

Bat Survey Guidelines: Good Practice Guidelines (2007). Bat Conservation Trust (BCT).

Bat Workers Manual (3rd Edition 2004). A. J. Mitchell-Jones& A. P. McLeish. Joint Nature Conservation Committee (JNCC).

Websites:

Bat Conservation Trust (BCT). <http://www.bats.org.uk/>

Google Maps. <http://maps.google.co.uk/>

Multiple-Agency Geographic Information for the Countryside (MAGIC). <http://www.magic.gov.uk/>

National Biodiversity Network (NBN) Gateway. <data.nbn.org.uk>

Natural England. < http://www.naturalengland.org.uk/>

Nature on the Map. Natural England. <www.natureonthemap.org.uk>

Relevant Legislation:

Wildlife and Countryside Act 1981 <http://jncc.defra.gov.uk/page-3614>

Conservation (Natural Habitats, &c.) Regulations 1994 (The Habitats Directive) (Amended 2010) <http://www.legislation.gov.uk/uksi/2010/490/contents/made>

Countryside and Rights of Way Act 2000 <http://www.legislation.gov.uk/ukpga/2000/37/pdfs/ukpga_20000037_en.pdf?view=interweave>

© JCA Limited 2013

I hope that this report provides all the necessary information, but should any further advice be needed please do not hesitate to contact the author.

Signed



.....

David Ryder, Ecologist

17th June 2013

For and on behalf of ***JCA Ltd***

Registered Office:

Unit 80
Bowers Mill
Branch Road
Barkisland
Halifax
HX4 OAD

Tel. 01422 376335
Fax. 01422 376232
Email: jon@jcaac.com

www.jcaac.com

Report printed on recycled paper

© JCA Limited 2013

JCA Ltd. Arboricultural Consultants
Professional Tree Advice • Nationwide Service

Tree Advice for Architects and Developers

- British Standard 5837 Tree Surveys
- Arboricultural Implication Studies
- Arboricultural Method Statements
- TPO/Planning advice/project management

Tree Advice for Engineers, Loss Adjusters and Insurers

- Tree surveys for subsidence
- Heave assessment
- Tree root identification

Tree Advice for Landowners, Homeowners, and Homebuyers

- Tree Safety/health surveys
- Tree surveys for mortgage purposes
- Planting advice/scheme design
- Garden tree and shrub maintenance plans

Tree Advice for Local Authorities and Estate Managers

- Tree Inventories and Risk Assessments
- TPO re-surveys
- Trees in Historic Parks and Gardens
- Veteran trees
- Woodland Management Plans
- Ancient woodland
- Tree planting schemes

Tree Advice for the Legal Profession

- Litigating subsidence claims
- Personal Injury cases
- Expert witness for planning inquiries and appeals

Registered Office:
Unit 80 Bowers Mill Branch Road Barkisland Halifax HX4 0AD
Tel: 01422 376335 Fax: 01422 376232 Mobile: 07778 391986
Email: jon@jcaac.com Website: www.jcaac.com
Company Reg No. 05005041 VAT No. 686 4674 78

Directors:

Jonathan Cocking
F. R. E. S., Tech. Cert. (Arbor A), P. Dip. Arb.
(R. F. S.), F. Arbor. A., CBiol, MIBiol

Catherine Cocking
RGN RM

Photo front cover: Sluice at Bowers Mill

Printed on recycled paper

Arboricultural Association