HOLLYBANK, MUSWELL HILL, GREATER LONDON

NOCTURNAL EMERGENCE AND DAWN RE-ENTRY BAT SURVEYS

A Report to: Crawford Partnership

Report No: RT-MME-115924

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REPORT VERIFICATION AND DECLARATION OF COMPLIANCE

This study has been undertaken in accordance with British Standard 42020:2013 "Biodiversity, Code of practice for planning and development".

Report Version	Date	Completed by:	Checked by:	Approved by:
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The information which we have prepared is true, and has been prepared and provided in accordance with the Chartered Institute of Ecology and Environmental Management's Code of Professional Conduct. We confirm that the opinions expressed are our true and professional bona fide opinions.

DISCLAIMER

The contents of this report are the responsibility of Middlemarch Environmental Ltd. It should be noted that, whilst every effort is made to meet the client's brief, no site investigation can ensure complete assessment or prediction of the natural environment.

Middlemarch Environmental Ltd accepts no responsibility or liability for any use that is made of this document other than by the client for the purposes for which it was originally commissioned and prepared.

VALIDITY OF DATA

The findings of this study are valid for a period of 12 months from the date of survey. If works have not commenced by this date, an updated site visit should carried out by a suitably qualified ecologist to assess any changes in the habitats present on site, and to inform a review of the conclusions and recommendations made.

NON-TECHNICAL SUMMARY

Middlemarch Environmental Ltd was commissioned by Crawford Partnership to undertake bat activity surveys of the site known as Hollybank in Muswell Hill, Greater London. The surveys are required to inform a planning application associated with the demolition of the existing buildings to enable the construction of several residential properties.

The surveys were completed in May and June 2014, and comprised two nocturnal emergence and one dawn re-entry surveys. The surveys identified a minimum of three species of bat using the site: common pipistrelle, soprano pipistrelle and whiskered/brandt's bat. Overall, the majority of activity was from bats commuting over the site with some foraging around the trees located in the northern and southern extents, as well as in the rear gardens of Hollybank cottage. No bats were identified emerging or re-entering any of the buildings, trees or features located on site. Therefore, it can be confirmed that there are no bat roosts currently on site. However, in order to ensure that the proposed development maintains and enhances the value of the site for bat species in the long-term, the following precautionary recommendations are made:

R1 Hollybank Cottage and Garages

Hollybank Cottage and three sets of garages have been subject to a full suite of activity surveys in line with Bat Surveys: Good Practice Guidelines, published by the Bat Conservation Trust (Hundt, 2012) and no bat roosts were identified. The survey data obtained for the site is valid for 12 months from the survey date. If development works to the surveyed building have not commenced within this timeframe it will be essential to update the survey effort to establish if bats have colonised the buildings in the interim. Updated daytime surveys can be undertaken at any time of year. Updated surveys requiring nocturnal or dawn assessment will need to adhere to the BCT Guidance with the surveys undertaken between April and September inclusive.

In the unlikely event that a bat is found during site works all works in that area must immediately cease and a suitably qualified ecologist should be contacted.

R2 Lighting of Boundary Features

The site is used as a commuting and foraging site for bats within the local area. Therefore, the design of the proposed development should take into account the need to preserve the permeability of the site for bats and other wildlife. Habitat fragmentation may be minimised through the provision of unlit areas of planting which will provide 'green' connectivity either through or around the site. As such, lighting should be kept to a minimum within the proposed development site.

R3 Native Planting and Bat Boxes

The landscaping scheme for the proposed development should incorporate native and wildlife friendly species where possible. In addition, the planting of night-flowering species such as honeysuckle *Lonicera periclymenum*, would provide habitat for a variety of moths and other invertebrates, which in turn will provide a valuable foraging resource for bat species. Furthermore, the proposed development should take advantage of other opportunities to enhance the site for bat species, such as through the installation of bat roost boxes on mature trees in unlit areas. A variety of roost units suitable for all species recorded on site is advised.

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1. INTRODUCTION

1.1 PROJECT BACKGROUND

In April 2014 Crawford Partnership commissioned Middlemarch Environmental Ltd to undertake Nocturnal Emergence and Dawn Re-entry Bat Surveys at Hollybank in Muswell Hill, Greater London. These surveys are required to inform a planning application associated with the demolition of the existing garages to make way for the construction of several residential properties.

Middlemarch Environmental Ltd has previously carried out a Daytime Bat Survey and a Preliminary Ecological Appraisal for Crawford Partnership at this site. The findings of these surveys are detailed in Report RT-MME-115705-02 and RT-MME-115705-01, respectively.

The Daytime Bat Survey identified a number of features across the buildings on site that have the potential to support roosting bats. The features included gaps beneath the roof tiles, gaps between the roof and walls on the garages, lifted lead flashing at the base of chimneys and gaps in the brickwork on the southern elevation of Hollybank cottage. Many of the features could not be fully inspected due to their height and location, therefore the presence or absence of bats could not be confirmed at the time of the survey. The trees located on site were also assessed and resulted in three trees which were considered to be suitable to support roosting bats due to features such as rot holes, hollows and ivy cover.

Therefore, in line with the specifications detailed in the Bat Surveys - Good Practice Guidelines published by the Bat Conservation Trust (Hundt, 2012), two nocturnal and one dawn bat surveys were recommended to further assess the levels of bat activity on site. This report details the results of the surveys undertaken between the 14th May 2014 and the 11th June 2014.

All UK bat species are European protected species and they are capable of being material considerations in the planning process. A summary of the legislation protecting bats is included within Appendix 1. This section also provides some brief information on the ecology of British bat species.

1.2 SITE DESCRIPTION AND CONTEXT

The proposed development site known as Hollybank is situated off Muswell Hill in Greater London at National Grid Reference TQ 293 893. The site was flat, triangular in shape and measures approximately 0.16 ha in size. The site comprised three sets of one-storey garages and a two-storey residential house. The site also comprised a number of semi-mature trees, bare ground and hardstanding surfaces. The site was predominantly bound by wooden fencing to the north, south and west. The eastern boundary comprised an access road, providing access onto Muswell Hill.

The surrounding landscape is dominated by residential houses to the east and west with areas of open recreational ground. Allotments are located to the north-west of the site with a large area of woodland 500 m south-west.

2. METHODOLOGY

2.1 DESK STUDY

As a part of the Preliminary Ecological Assessment (RT-MME-115705-01) a desk study was undertaken to determine the presence of any bat species within a 1 km radius of the site. The consultee for the desk study data was Greenspace Information for Greater London (GiGl). Middlemarch Environmental Ltd then assimilated and reviewed the desk study data provided by this organisation. The results of the desk study are detailed within Table 3.1.

2.2 FIELD SURVEYS

2.2.1 Overview of Nocturnal Emergence and Dawn Re-entry Surveys

The buildings and trees were classed as having low to moderate potential to support roosting bats due to the numerous features of potential interest to roosting bats identified during the daytime survey. In line with The Bat Conservation Trust (Hundt, 2012) guidance, three bat surveys were carried out consisting of two nocturnal emergence bat surveys and one dawn re-entry bat survey. The aim of these surveys was to detect whether bats are roosting within the buildings, and to enable a profile of site utilisation by bats to be compiled.

2.2.2 Nocturnal Emergence Bat Surveys

In line with the specifications detailed Bat Surveys: Good Practice Guidelines (Hundt, 2012), two nocturnal emergence bat surveys were conducted on site. The surveys commenced 20 minutes prior to sunset and continued until 120 minutes after sunset. The nocturnal emergence surveys were conducted using electronic bat detectors (Pettersson D240x time expansion and Bat Box Duet) to facilitate the detection of bats and to aid in the determination of species of bat using the site. Subsequent computer analysis of recordings allowed all species of bat using the site to be identified.

2.2.3 Dawn Re-Entry Bat Survey

Bats swarm at their roost site 10-90 minutes prior to entering the roost at dawn (Mitchell-Jones & McLeish, 2004). Surveying for dawn swarming by bats is an efficient way of detecting new bat roosts. In line with the specifications detailed by Bat Surveys: Good Practice Guidelines (Hundt, 2012), the dawn survey commenced 120 minutes prior to sunrise and continued until sunrise. To facilitate the detection of bats and to aid in the determination of species of bat using the site, the dawn survey was conducted using electronic bat detectors (Pettersson D240x time expansion and Bat Box Duet). Computer analysis of bat detector information collected was utilised to identify all species recorded on the site.

3. DESK STUDY

3.1 BIOLOGICAL RECORDS

Records of bat species within a 1 km radius of the survey area provided by the local record centre are summarised in Table 3.1. It should be noted that the absence of records should not be taken as confirmation that a species is absent from the search area.

Species	No. of Records	Most Recent Record	Proximity of Nearest Record to Study Area	Species of Principal Importance?	Local BAP?	Legislation / Conservation Status
Mammals – Bats						
Long-eared bat species *Plecotus* sp.	2	2007	60 m south-east	*	✓	ECH 4, WCA 5, WCA 6
Pipistrelle bat species *Pipistrellus*	11	2005	380 m north-east	*	✓	*
Common pipistrelle *Pipistrellus pipistrellus*	10	2007	430 m north-west	-	✓	ECH 4, WCA 5, WCA 6
Soprano pipistrelle *Pipistrellus pygmaeus*	10	2007	860 m south	✓	✓	ECH 4, WCA 5, WCA 6
Daubenton's bat *Myotis daubentonii*	1	2007	960 m north	-	✓	ECH 4, WCA 5, WCA 6
Natterer's bat *Myotis nattereri*	1	2007	960 m north	-	✓	ECH 4, WCA 5, WCA 6
Noctule bat *Nyctalus noctula*	7	2009	960 m north	✓	✓	ECH 4, WCA 5, WCA 6

Key:
*: Species dependent
ECH 4: Annex IV of the European Communities Council Directive on the Conservation of Natural Habitats and Wild Fauna and Flora. Animal and plant species of community interest in need of strict protection.
WCA 5: Schedule 5 of Wildlife and Countryside Act 1981 (as amended). Protected animals (other than birds).
WCA 6: Schedule 6 of Wildlife and Countryside Act 1981 (as amended). Animals which may not be killed or taken by certain methods.

Species of Principal Importance: Species of principal importance for nature conservation in England.
Local BAP: London Biodiversity Action Plan

Note. These tables do not includes reference to the Berne Convention (Convention on the Conservation of European Wildlife and Natural Habitats), the Bonn Convention on the Conservation of Migratory Species of Wild Animals or the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

Table 3.1: Summary of Bat Species Records Within 1 km Radius of Study Site

4. SURVEY RESULTS

4.1 FIRST NOCTURNAL EMERGENCE SURVEY

The first nocturnal emergence survey was undertaken on the 14th May 2014 by:

- Joe Hamer (Ecological Consultant)
- Rafael de Pedro (Field Assistant)
- Morgane Coiquil (Field Assistant)
- Angel Fernandez (Field Assistant)

The weather conditions recorded at the time of the survey are detailed in Table 4.1.

Parameter	Conditions	
	Start	Finish
Temperature (°C)	16	14
Cloud Cover (%)	10	5
Precipitation	Dry	Dry
Wind Speed (Beaufort)	F0-1	F0-1

Table 4.1: Weather Conditions during First Nocturnal Emergence Survey

The first nocturnal emergence survey commenced 20 minutes prior to sunset and continued until 120 minutes after sunset. Sunset was at 20:44 hrs (BBC Weather Centre Data for Muswell Hill). Three species of bat; common pipistrelle *Pipistrellus pipistrellus*, soprano pipistrelle *Pipistrellus pygmaeus* and Whiskered/Brandt's bat *Myotis mystacinus/brandti* were recorded during the survey. Survey results are plotted on Drawing C115924-01 in Chapter 7.

Common pipistrelle
Two common pipistrelle bats were detected at 21:02 (18 minutes after sunset). These bats were seen commuting over the garages on site, coming from the south-west and flying off site towards the north-east. Two more common pipistrelles commuted through the middle of the site at 21:20 and 21:31 (36 and 47 minutes after sunset). These bats were also seen commuting from the south-west and flying off site towards the north-east. A further two common pipistrelles flew onto the site from the south-west at 21:33 (49 minutes after sunset) and headed towards the trees located within the northern extent of the site. These bats foraged for approximately 2 minutes before heading off site, towards the north. Another visual and recording of a common pipistrelle was detected at 21:55 (71 minutes after sunset). This bat was seen commuting from the north of the site, passing over Hollybank cottage and foraging in the trees located off site, to the south within the adjacent residential gardens. The last recordings of common pipistrelle were between 22:02 and 22:04 (80 minutes after sunset). These recordings could not be matched with visual sightings from the surveyors due to loss of light.

No common pipistrelle bats were observed emerging from the buildings or trees located on site.

All of the recordings of common pipistrelle bats were not observed emerging from any features associated with the site.

Soprano pipistrelle
A soprano pipistrelle was recorded at 21:22 (38 minutes after sunset) commuting over the garages on site. The bat commuted from the north-east, flying off site towards the south-west. This species was also detected at 21:37 and 21:39 (53 and 55 minutes after sunset). However, the recordings were very faint and the bats were not observed by the surveyors, which may suggest that the location of the bats was situated off site. A faint social call by a soprano pipistrelle was also recorded at 21:53 (69 minutes after sunset). The last recording of soprano pipistrelle was at 22:01 (77 minutes after sunset) and was observed foraging around the trees located along the southern site boundary.

No soprano pipistrelle bats were observed emerging from the buildings or trees located on site.

Whiskered/Brandt's bat
A whiskered/brandt's bat was recorded at 21:32 (48 minutes after sunset). This bat was not seen by the surveyors, however a faint recording was picked up by the recording device used which may suggest that the

bat was located off site. A whiskered/brandt's bat was also recorded at 21:41 and 21:53 (57 and 69 minutes after sunset). These recordings were thought to have been from bats foraging around the trees located in the south-west of the site, however no bats were observed. An additional recording of a whiskered/brandt's bat was detected at 22:04 and was observed passing over the site from the south-west towards the north-east.

No whiskered/brandt's bat species were observed emerging from the buildings or trees located on site.

No other species of bat were detected or observed during this survey.

4.2 DAWN RE-ENTRY SURVEY

The dawn return bat survey was undertaken on the 29th May 2014 by:

- Joe Hamer (Ecological Consultant)
- Amy Finnegan (Ecological Project Officer)
- Frances High (Ecological Project Officer)
- Rafael de Pedro (Field Assistant)

The weather conditions recorded at the time of the survey are detailed in Table 4.2.

Parameter	Conditions	
	Start	Finish
Temperature (°C)	14	12
Cloud Cover (%)	100	90
Precipitation	Dry	Dry
Wind Speed (Beaufort)	F0	F0

Table 4.2: Weather Conditions during Dawn Re-entry Survey

The dawn re-entry survey commenced 120 minutes prior to sunrise and continued until sunrise. Sunrise was at 04:50 hrs (BBC Weather Centre Data for Muswell Hill). Two species of bat were detected and recorded during the survey. These were common pipistrelle *Pipistrellus pipistrellus* and whiskered/brandt's *Myotis mystacinus/brandti* bat. Survey results are plotted on Drawing C115924-01 in Chapter 7.

Common pipistrelle
Two common pipistrelles were detected at 03:32 foraging until 03:33 (78 and 77 minutes before sunrise), however there was no visual of these bats due to the lack of light. A common pipistrelle was also detected at 03:51 until 03:53 (55 and 57 minutes before sunset), foraging around the car parking area in between the garages. An additional common pipistrelle bat was detected and recorded foraging around the two trees situated in between Hollybank cottage and the set of garages located within the north-eastern corner of the site. This bat was foraging from 04:03 to 04:10 (47 and 40 minutes before sunrise). Foraging activity from a common pipistrelle commenced within the same area again at 04:21 (29 minutes before sunrise). The last common pipistrelle to be detected was at 04:31 (19 minutes before sunrise) and was observed commuting over the site from the north-east towards the south-west.

No common pipistrelle bats were observed entering the buildings or trees located on site.

Whiskered/Brandt's Bat
A whiskered/brandt's bat was first detected at 04:03 (47 minutes before sunrise) and was observed foraging around the trees situated adjacent to Hollybank cottage within the south-eastern corner of the site. This bat continued foraging until 04:15 (35 minutes before sunrise) and commuted off site towards the south.

No whiskered/brandt's bat species were observed entering the buildings or trees located on site.

No other species of bat were detected or observed during this survey. Analysis of the sound recordings did not identify any further species of bat.

4.3 SECOND NOCTURNAL EMERGENCE SURVEY

The second nocturnal emergence survey was undertaken on the 11th June 2014 by:

- Joe Hamer (Ecological Consultant)
- Frances High (Ecological Project Officer)
- Rafael de Pedro (Field Assistant)
- Angel Fernandez (Field Assistant)

The weather conditions recorded at the time of the survey are detailed in Table 4.3.

Parameter	Conditions	
	Start	Finish
Temperature (°C)	21	20
Cloud Cover (%)	10	10
Precipitation	Dry	Dry
Wind Speed (Beaufort)	F0	F0

Table 4.3: Weather Conditions during Second Nocturnal Emergence Survey

The second nocturnal emergence survey commenced 20 minutes prior to sunset and continued until 120 minutes after sunset. Sunset was at 21:17 hrs (BBC Weather Centre Data for Muswell Hill). One species of bat, common pipistrelle *Pipistrellus pipistrellus* was recorded during the survey. Survey results are plotted on Drawing C115924-01 in Chapter 7.

Common pipistrelle
A common pipistrelle was first detected at 21:30 (13 minutes after sunset) and was observed commuting over the site from the south-west to the north-east. The second common pipistrelle to be detected was at 21:42 (35 minutes after sunset) and flew from the north to then forage for a short time before commuting off site towards the south. An additional common pipistrelle was detected and recorded at 21:48 which was observed commuting from off site and foraging around the trees within the north-eastern corner until 21:54 (37 minutes after sunset). The last common pipistrelle was observed and recorded foraging from 22:07 to 22:13 (50 and 56 minutes after sunset) before commuting off site towards the north.

No common pipistrelle bats were observed emerging from the buildings or trees located on site.

No other species of bat were detected or observed during this survey. Analysis of the sound recordings did not identify any further species of bat.

5. DISCUSSION AND CONCLUSIONS

5.1 DISCUSSION

5.1.1 Summary of Bat Activity Surveys

The bat activity surveys identified a minimum of three species of bat using the site and its peripheries, comprising; common pipistrelle, soprano pipistrelle and whiskered/brandt's bat. A summary of all bat activity and key commuting/foraging routes identified during the nocturnal and dawn surveys can be found on Drawing No. C115924-01, provided in Chapter 7.

Nocturnal Surveys

Three species of bat were identified during the first nocturnal emergence survey; common pipistrelle, soprano pipistrelle and whiskered/brandt's bat. Only common pipistrelle was identified during the second nocturnal emergence survey. The majority of bats identified during the two nocturnal surveys were commuting over the site, from either a north-eastern or south-western direction. Foraging activity from all three bat species was concentrated around the trees located in the north-eastern corner, the central car park in between the garages and around the trees located within the rear gardens of Hollybank cottage. No bats were observed emerging from the buildings and trees located on site.

Dawn Swarm Survey

Only two species of bat were identified during the dawn swarm survey; common pipistrelle and whiskered/brandt's bat. Both species foraged around the trees located between Hollybank cottage and the garages within the north-eastern corner of the site. The main commuting route was from the north-east towards the south-west, flying over the garages within the centre of the site. No bats were observed re-entering the buildings and trees located on site.

Given that no bats emerged or re-entered any of the buildings and minimal bat activity on site during the surveys, it is concluded that there are no bat roosts present in the building/s on site.

5.2 CONCLUSIONS

Following the suite of survey work undertaken on site it can be confirmed that no bat roosts currently exist on site. However, the site provides suitable foraging and commuting habitat for bats, in the form of trees along the peripheries of the site. The foraging activity from all three surveys was concentrated around the trees located within the rear gardens of Hollybank cottage, around the trees situated between the cottage and the garages and around the trees located at both the north-eastern and south-western extent. The commuting activity from all three surveys indicated that there is a commuting path from the north-east and south-west.

6. RECOMMENDATIONS

All recommendations provided in this section are based on Middlemarch Environmental Ltd's current understanding of the site proposals, correct at the time the report was compiled. Should the proposals alter, the conclusions and recommendations made in the report should be reviewed to ensure that they remain appropriate.

R1 Hollybank Cottage and Garages

Hollybank Cottage and three sets of garages have been subject to a full suite of activity surveys in line with Bat Surveys: Good Practice Guidelines, published by the Bat Conservation Trust (Hundt, 2012) and no bat roosts were identified. The survey data obtained for the site is valid for 12 months from the survey date. If development works to the surveyed building have not commenced within this timeframe it will be essential to update the survey effort to establish if bats have colonised the buildings in the interim. Updated daytime surveys can be undertaken at any time of year. Updated surveys requiring nocturnal or dawn assessment will need to adhere to the BCT Guidance with the surveys undertaken between April and September inclusive.

In the unlikely event that a bat is found during site works all works in that area must immediately cease and a suitably qualified ecologist should be contacted.

R2 Lighting of Boundary Features

The site is used as a commuting and foraging site for bats within the local area. Therefore, the design of the proposed development should take into account the need to preserve the permeability of the site for bats and other wildlife. Habitat fragmentation may be minimised through the provision of unlit areas of planting which will provide 'green' connectivity either through or around the site. As such, lighting should be kept to a minimum within the proposed development site.

R3 Native Planting and Bat Boxes

The landscaping scheme for the proposed development should incorporate native and wildlife friendly species where possible. In addition, the planting of night-flowering species such as honeysuckle *Lonicera periclymenum*, would provide habitat for a variety of moths and other invertebrates, which in turn will provide a valuable foraging resource for bat species. Furthermore, the proposed development should take advantage of other opportunities to enhance the site for bat species, such as through the installation of bat roost boxes on mature trees in unlit areas. A variety of roost units suitable for all species recorded on site is advised.

7. DRAWINGS

Drawing C115924-01 – Summary of Bat Activity during all three surveys



C115924-01

Legend

Site boundary

Bat Activity

Common pipistrelle

Soprano pipistrelle

Whiskered/Brandt's bat

PEA

Scattered tree

Fence

Amenity grassland

Bare ground

Building

Hardstanding

Introduced shrub

Target notes:

1 Garages
2 Two-storey cottage
3 Mature Oak with bat roosting features
4 Sycamore trees with medium ivy cover
5 Bare ground colonized with short perennial species
6 Pile of brash
7 Ornamental planters

N

Project	Hollybank, Muswell Hill, Greater London
Drawing	Bat Activity Summary
Client	Crawford Partnership
Drawing Number: C115924-01	Revision: 00
Scale @ A4: 1:600	Date: June 2014
Approved By: JH	Drawn By: RP

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APPENDIX 1

LEGISLATION

Bats and the places they use for shelter or protection (i.e. roosts) receive European protection under The Conservation of Habitats and Species Regulations 2010, as amended (Habitats Regulations 2010, as amended). They receive further legal protection under the Wildlife and Countryside Act (WCA) 1981, as amended. This protection means that bats, and the places they use for shelter or protection, are capable of being a material consideration in the planning process.

Regulation 41 of the Habitats Regulations 2010 (as amended), states that a person commits an offence if they:

- deliberately capture, injure or kill a bat;
- deliberately disturb bats; or
- damage or destroy a bat roost (breeding site or resting place).

Disturbance of animals includes in particular any disturbance which is likely to impair their ability to survive, to breed or reproduce, or to rear or nurture their young, or in the case of animals of a hibernating or migratory species, to hibernate or migrate; or to affect significantly the local distribution or abundance of the species to which they belong.

It is an offence under the Habitats Regulations 2010 (as amended) for any person to have in his possession or control, to transport, to sell or exchange or to offer for sale, any live or dead bats, part of a bat or anything derived from bats, which has been unlawfully taken from the wild.

Whilst broadly similar to the above legislation, the WCA 1981 (as amended) differs in the following ways:

- Section 9(1) of the WCA makes it an offence to *intentionally* (rather than deliberately) kill, injure or take any protected species.
- Section 9(4)(a) of the WCA makes it an offence to *intentionally or recklessly** damage or destroy, *or obstruct access to*, any structure or place which a protected species uses for shelter or protection.
- Section 9(4)(b) of the WCA makes it an offence to *intentionally or recklessly** disturb any protected species *while it is occupying a structure or place which it uses for shelter or protection*.

*Reckless offences were added by the Countryside and Rights of Way (CRoW) Act 2000.

As bats re-use the same roosts (breeding site or resting place) after periods of vacancy, legal opinion is that roosts are protected whether or not bats are present.

The following bat species are Species of Principal Importance for Nature Conservation in England: barbastelle bat *Barbastella barbastellus*, Bechstein's bat *Myotis bechsteinii*, noctule *Nyctalus noctula*, soprano pipistrelle *Pipistrellus pygmaeus*, brown long-eared bat *Plecotus auritus*, greater horseshoe bat *Rhinolophus ferrumequinum* and lesser horseshoe bat *Rhinolophus hipposideros*.

The following bat species are listed on the London local BAP: noctule *Nyctalus noctula*, soprano pipistrelle *Pipistrellus pygmaeus*, brown long-eared bat *Plecotus auritus*, common pipistrelle *Pipistrellus pipistrellus*, whiekered/brandt's bat *Myotis mystacinus*, *M.brandtii,* nathusius' pipistrelle *Pipistrellus nathusii,* natterer's bat *Myotis nattereri* and Leisler's bat *Nyctalus leisleri.*

The reader should refer to the original legislation for the definitive interpretation.

ECOLOGY

At present, 18 species of bats are known to live within the United Kingdom, of which 17 species are confirmed as breeding. All UK bat species are classed as insectivorous, feeding on a variety of invertebrates including midges, mosquitoes, lacewings, moths, beetles and small spiders.

Bats will roost within a variety of different roosting locations, included houses, farm buildings, churches, bridges, walls, trees, culverts, caves and tunnels. At different times of the year the bats roosting requirements alter and they can have different roosting locations for maternity roosts, mating roosts and

hibernation roosts. Certain bat species will also change roosts throughout the bat activity season with the bat colony using the site to roost for a few days, abandoning the roost and then returning a few days or weeks later. This change can be for a variety of reasons including climatic conditions and prey availability. Bats are known live for several years and if the climatic conditions are unfavourable at a particular roost, they may abandon it for a number of years, before returning when conditions change. Due to the matriarchal nature of bat colonies, the locations of these roosts can be passed down through the generations.

Bats usually start to come out of hibernation in March and early April (weather dependent), when they start to forage and replenish the body weight lost during the hibernation period. The female bats then start to congregate together in maternity roosts prior to giving birth and a single baby is born in June or July. The female then works hard to feed her young so that they can become independent and of a sufficient weight to survive the winter before the weather gets too cold and invertebrate activity reduces. Males generally live solitary lives, or in small groups with other males, although in some species the males can be found living with the females all year. The mating season begins in the autumn. During the winter bats hibernate in safe locations which provide relatively constant conditions, although they may venture outside to forage on warmer winter nights.