A38 Derby Junctions

TR010022

Volume 6

6.3 Environmental Statement Appendices

Appendix 8.9e: Bat Trapping and Radio Tracking Surveys at Markeaton in 2017

Regulation 5(2)(a)

Planning Act 2008

Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

April 2019

Infrastructure Planning

Planning Act 2008

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

A38 Derby Junctions Development Consent Order 202[ ]

6.3 Environmental Statement Appendices
Appendix 8.9e: Bat Trapping and Radio Tracking Surveys at Markeaton in 2017

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A38 Derby Junctions

Tracking Baseline Report and Evaluation

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Bat Trapping and Radio Tracking Baseline Report and Evaluation, A38 Derby Junctions For AECOM 25 October 2017

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1 Introduction

1.1 BACKGROUND

1.1.1 The A38 at Derby is being extended and improved under a major investment scheme by Highways England. As a result, a full Environmental Impact Assessment (EIA) is required to assess the potential impacts of the scheme, including impacts on local bat populations.

1.1.2 The proposed A38 Derby Junctions scheme i.e. the Site, concerns three junctions located along approximately 5.5km of the A38 to the north and north-west of Derby. These junctions are:

- A38/A5111 Kingsway junction
- A38/A52 Markeaton junction
- A38/A61 Little Eaton junction

1.1.3 The Site is bordered by residential areas and parkland/wood pasture (i.e. Markeaton and Kingsway junctions). Numerous mature trees, as well as wetlands, are located in the parkland areas (known as Markeaton Park) which will be directly affected by the scheme (Figure 1). To the north of the scheme is the River Derwent and agricultural land (i.e. Little Eaton junction).

1.1.4 The major development proposal requires an EIA and there are a number of significant ecological considerations, including the impact on protected and notable bat species. A desk study and surveys undertaken by AECOM in 2015, (lead ecologists and planning/design consultants for the overall development proposals and EIA) using records obtained from the local biodiversity record centre has shown that at least six bat species have been recorded using the Site and roosts nearby, including common pipistrelle (*Pipistrellus pipistrellus*), soprano pipistrelle (*P. pygmaeus*), brown long-eared bat (*Plecotus auritus*), Daubenton's bat (*Myotis daubentonii*), noctule (*Nyctalus noctula*), and whiskered bat (*Myotis mystacinus*) (AECOM, 2016). Advanced bat surveys in the general area during 2015 (Davidson-Watts Ecology Ltd, 2015)and acoustic and thermal imaging surveys during 2015 (AECOM, 2016), confirmed a range of bat species including; tree roosting Daubenton's, noctule and brown long-eared bats. Acoustic and thermal imaging surveys in 2015 by ecologists of AECOM, suspected bat roosts were also identified in Markeaton Park and around Earl of Harrington Lake, both locations within the zone of influence of the proposed scheme at Markeaton junction.

1.1.5 Given the potential importance of the area at Markeaton junction for use by foraging, tree roosting and commuting bats, AECOM highlighted the need for more detailed information on rare and tree roosting bat species that may be affected by the development proposals. Therefore, as part of a suite of further studies, including acoustic bat surveys, further detailed investigation of use of the Site by tree roosting bat populations at Markeaton junction are proposed to provide information to inform specific bat related impacts and mitigation measures.

1.1.6 Davidson-Watts Ecology Ltd have been commissioned by AECOM on behalf of Highways England, to undertake the advanced surveys of the Site and adjacent areas in 2017, targeting Markeaton junction, to achieve the following objectives:

1.1.7 The aims of this project are to:

- Investigate the status of bats at the Site with an emphasis on woodland/parkland habitat and tree lines at Markeaton junction, during the breeding season (May – August/September 2017);
- Radio-track key individuals using the Site to locate breeding colonies of tree roosting bat species, including, Natterers' (*Myotis nattereri*), noctule, Daubenton's, Leisler's (*Nyctalus leisleri*) Alcathoe (*Myotis alcathoe*)/whiskered/Brandt's (*Myotis brandtii*), and the brown long-eared bat (if present), and to determine activity patterns and habitat use; and

- Present a robust data set of the use of the Site and surrounding areas by roosting bats and other woodland bat species to further establish an ecological baseline, to inform the impact assessment, and develop an appropriate mitigation strategy, including European Protected Species Mitigation Licence (EPSML), where required

2 Methodology

2.1 OVERVIEW

2.1.1 Due to the difficult nature of locating bat roosts in trees and assessing the context of bat activity over large areas with bat detector/acoustic surveys, the primary approach to meeting the project aims was to trap free-flying bats and to radio-track individual bats to locate maternity and other roost types.

2.1.2 Two survey sessions of approximately one week each were undertaken, with one session in June 2017 and one session in September 2017. Each session began with the trapping of bats. Any radio-tagged bats were subsequently followed by radio-tracking for the remainder of the week to locate roost sites. Where access was possible, emergence counts were undertaken at identified roosts to determine the function of the roost and to provide an estimate of population sizes.

2.1.3 The following methods were undertaken in line with Chapter 9 (Advanced licensed bat survey methods) in Collins, 2016.

2.1.4 All trapping and tracking were undertaken under a project licence from Natural England number: 2017-28584-SCI-SCI obtained by Dr Ian Davidson-Watts MCIEEM with 24 years bat survey experience, who designed and coordinated the field surveys and undertook the analysis of the results. Field surveys were undertaken by Dr Matt Zeale, David Kent and supported by ecologists from AECOM. Target tree roosting bat species included in the project licence were: Natterers', noctule, Daubenton's, Leisler's, Alcathoe, whiskered/Brandt's, and the brown long-eared bat (where present).

2.2 TRAPPING METHODS

2.2.1 Bats were caught using 6m or 18m mist nets and 4m^2 harp traps placed in woodland/treelines locations on the site (see Figure 2). Up to three acoustic lures (Sussex Autobats) were used to improve catch efficiency in woodland (Hill and Greenaway 2005). The lures emitted synthesised bat social calls. Lures were placed next to mist nets and harp traps and any bats captured were identified, sexed, aged and breeding status determined. The locations of the traps have been included in Figure 2 and were selected to maximise the chances of capturing bats.

2.3 TRACKING METHODS

2.3.1 Target bats were fitted with lightweight radio transmitter tags (Biotrack Ltd, Wareham, Dorset, United Kingdom) weighing <5% of the weight of the bat using Torbot skin bond adhesive. Tagging of female bats in advanced stages of pregnancy was avoided. Lactating bats were tagged if they met the target weight and were in good condition, although early lactating bats were not tagged for welfare reasons. Bats were processed quickly and released within 30 minutes of capture provided the glue attaching the transmitter had cured sufficiently.

2.3.2 All tagged bats were tracked using Sika receivers (Biotrack Ltd., Wareham, United Kingdom) and a 3-element Yagi antenna (Biotrack Ltd). Tagged bats were tracked predominantly during the day to find roost sites the day after initial capture, using a combination of the ''homing-in'' method (White and Garrott 1990) and triangulation method, either on foot or by vehicle. Radio-tracking fixes for each individual bat and associated roost were plotted in the field on digitised 1:25,000 scale Ordinance Survey maps in the MemoryMap mobile application. Aerial images in the Google Earth mobile application were used in the field as an additional visual guide when plotting fixes in MemoryMap.

2.4 ROOST EMERGENCE

2.4.1 Where tagged bats were tracked to roost sites and access was possible, subsequent roost exit counts were undertaken using infrared cameras (Canon XA25 or Canon XA10) with infrared illuminators to determine roost size and status (e.g. maternity roost). Roost attributes such as location, type of structure and other descriptors were recorded.

2.5 ADJUSTMENTS AND LIMITATIONS

2.5.1 Radio transmitters can fail for a variety of reasons due to weather and damage from the bats. In addition, certain species may travel large distances and rapidly fly out of range and in some case are not rediscovered.

2.5.2 Bats are mobile species and may use a variety of roosts, commuting routes and foraging areas during their yearly lifecycle, which is influenced by a range of factors such as breeding status, energetic requirements and the availability of prey. These surveys are considered suitable for providing a sufficient sampling effort (without disturbing the population adversely) to obtain information to assist the location of roosts potentially affected by the development proposals. The methods used are unable to provide a full account of all bat activity in the survey at all times and the sample size is too low to provide a sufficient baseline at other times of the year. The work is therefore confined to providing information for the summer (breeding) and early Autumn (mating) season and for roosting behaviour only. The only breeding target bat captured in June was Daubenton's bat. By the time this species was captured the maximum number of bats to be tagged under the licence had been reached. September results indicate breeding sites for this species were off site.

2.5.3 Access to some roost sites found through radio tracking was not possible to the roosts being off the development site and on private land, and where permission had not been obtained. Therefore, broad locations of roosts can be triangulated from publicly accessible areas but further data on roosts will be limited.

3 Results

3.1 BAT TRAPPING

3.1.1 Two bat trapping survey sessions were undertaken during mid-summer and early autumn of 2017. The primary aim of trapping was to capture tree roosting and/or breeding bats for radio tracking, therefore once sufficient bats had been captured (or the limits set out on the project licence had been met), trapping ceased. All trapping data is contained in Appendix A and locations of traps site are in Figure 2.

3.1.2 A total of 46 bats of seven species were captured during the 19th-21st June trapping survey session. Species included were common pipistrelle *Pipistrellus pipistrellus* (breeding females), soprano pipistrelle *Pipistrellus pygmaeus* (breeding females), whiskered bat *Myotis mystacinus* (males only), Brandt's bat *Myotis brandtii* (male only), Daubenton's *Myotis daubentonii* (breeding females), noctule bat *Nyctalus noctula* (males only) and serotine bat *Eptesicus serotinus* (breeding female).

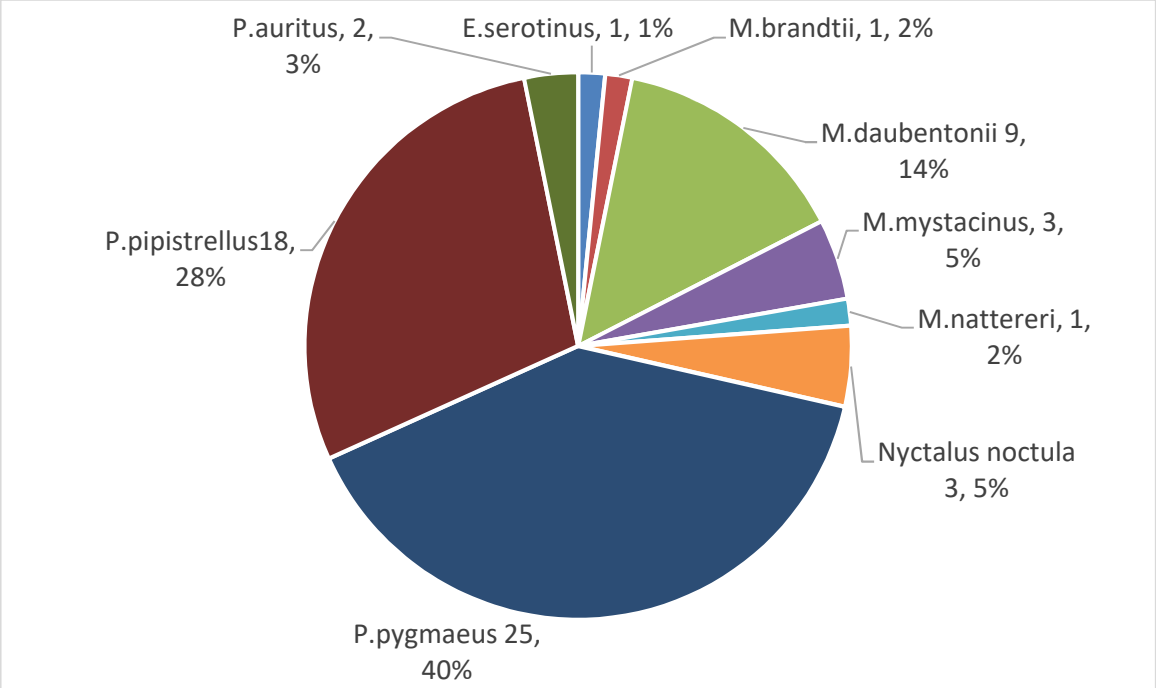
3.1.3 A total of 17 bats of six species were captured during the 11th–14th September trapping survey session. Brown long-eared *Plecotus auritus* (post breeding females), Natterer's bat *Myotis nattereri* (male only), common pipistrelle *Pipistrellus pipistrellus* (breeding females), soprano pipistrelle *Pipistrellus pygmaeus* (breeding females), whiskered bat *Myotis mystacinus* (males only) and Daubenton's *Myotis daubentonii* (breeding females) were confirmed using the Site. No noctule, serotine or Brandt's bats were captured during the September survey session.

3.1.4 In summary, a total of 63 bats were captured over four nights of trapping across two survey session and nine species confirmed using the site.

3.1.5 Chart 1 below shows the species proportions of the total bat captures. Soprano pipistrelle and common pipistrelle make up the largest proportion of captured bats. Daubenton's bat were captured more frequently than the remaining species making up 14% of the captures.

3.1.6 Noctule, whiskered/Brandt's and Natterer's bat capture were all male bats, with male and female bats being represented by: Daubenton's, both pipistrelle species and brown long-eared bat. The single serotine bat captured in June 2017 was a breeding female.

Chart 1 – Species proportions of the pooled capture data of June and September 2017



3.2 RADIO TRACKING AND ROOSTING PATTERNS

3.2.1 The trapping in June and September 2017 enabled the tagging and subsequent radio tracking/roost finding of six bats of five species. This led to the discovery of seven day roosts in both trees and houses/buildings. Table 1 details the individual bats that were tagged and Table 2 details the roosts discovered as a result of the radio tracking during each survey session. It should be noted that due to access restrictions, subsequent roost counts and confirmation of the actual roost features could not be undertaken on all roosts.

3.2.2 Figures 3 and 4 show the locations of roost sites found through radio tracking. No roosts were found within the proposed working area/redline boundary. However, two roosts (R3 noctule male and R6 brown long-eared female) are located within 150-200m from the red line/working area, and both roost sites are located in trees. The remaining roost sites were located further away, and included a possible maternity roost of brown long-eared bats (400m east), a male noctule roost (5.2km south west), and day roosts of male bats located in trees, between 300 and 800m to the west of the scheme in Markeaton Park.

Table 1 - Summary data of tagged bats (refer to Figure 2 and Appendix A)

ID	Species	Sex	Date captured	Location of capture
106	*M. daubentonii*	Male	19/06/17	Trap 5
206	*M. brandtii*	Male	19/06/17	Trap 2
306	*N. noctula*	Male	19/06/17	Trap 3
109	*P. auritus*	Female*	11/09/17	Trap 11
209	*M. daubentonii*	Female*	11/09/17	Trap 11
309	*M. nattereri*	Male	11/09/17	Trap 11

*Breeding adult

Table 2 – Roost locations and summary roost attributes of tagged bats (refer to Figures 3 and 4 and Appendix B).

ID	Species	Date	Roost				
			ID (R)	Type	Location	Feature	Count
106	*M. daubentonii*	20/6/17	1	Oak tree	SK 32941 37646	Cavity	6
206	*M. brandtii*	22/6/16	2	Beech tree	SK 33396 37645	Bark	1
306	*N. noctula*	20/6/17	3	Oak tree	SK 33114 37079	Unknown	n/a
306	*N. noctula*	21/6/17	4	Poss tree	SK 28315 35969	Unknown	n/a
309	*M. nattereri*	12/9/17	5	Oak tree	SK 33160 37532	Split	1
209	*M. daubentonii**	Not found		-	-	-	-
109	*P. auritus**	12/9/17	6	Oak tree	SK 33918 37051	Unknown	n/a
109	*P. auritus**	13/9/17	7	House	SK 34258 37311	Roof void	n/a

Breeding bat*, NA – Access for roost count/confirmation not possible

4 Discussion and Evaluation

4.1 TRAPPING SURVEYS

4.1.1 Over four nights of trapping the surveys of 2017 captured 63 bats of nine species. Four species; common and soprano pipistrelle, Daubenton's and serotine, were confirmed as breeding following their capture in June 2017. Males and females from three of these species were also well represented in the trapping surveys of September, with no further capture of serotine bat.

4.1.2 The capture of a breeding serotine bat is a first in hand record for Derbyshire. There are very few records according to the Derbyshire Bat Conservation Group (DBCG). The closest and only known record of roosting serotine bats in Derbyshire is 6.5km north of the site recorded in January 2014 (*personal communication by AECOM with DBCG 20.10.17*).

4.1.3 Whilst post breeding brown long-eared bats were confirmed in September 2017, no brown long-eared bats were captured during the breeding season, and this bat may have been visiting the site for mating purposes.

4.1.4 Markeaton Park is therefore likely to provide an important resource for the breeding species recorded, and considered of Local importance to foraging and commuting breeding common and soprano pipistrelle bats and Daubenton's bats. In addition, the September surveys indicate a continued role of the site for mating bats of these species which is also considered of Local value.

4.1.5 The site also appears to have a role for breeding serotine bats and precautionary County value of the site to this species is given, due to the rarity of such records.

4.1.6 The remaining species, Brandt's, whiskered, noctule and Natterers were represented by male bats during both survey sessions; therefore it is likely that Markeaton Park is likely a mating area for such species and given the regular capture of these species and the 'rarer' nature of these species, the site is considered of Local importance.

4.1.7 Trapping also enabled the capture of certain bat species, which could be subsequently tagged with radio transmitters from which roost sites could be located.

4.2 ROOST FINDING

4.2.1 Six bats of five species were tagged, from which seven separate day roost sites in buildings or trees were located. Six of the roosts were in trees (R1-R6) and were predominantly used by male bats of noctule, Natterers, Brandt's and Daubenton's bat. Where emergence checks could be done, they often revealed just one bat. However, the male Daubenton's bat roost of June 2017 (R1) had six bats observed emerging. Male roosts of Daubenton's bats have been found with over 20 individual male bats being present (Davidson-Watts Unpublished data), therefore roost existing counts for certain species may not be a fully reliable indicator as to the breeding status of roosts.

4.2.2 As highlighted in Section 3, no roosts were found within the core development area. Breeding female Daubenton's bats were confirmed using the site during the June survey, and although no bats were tagged at that time (due to the limit of bats licensed to be tagged), a post breeding Daubenton's bat tagged in September was never found roosting on the site throughout the survey session, indicating the breeding colony roosting areas might be off site. Additionally although the post breeding brown long eared bat tagged in September was frequenting the site, both its roosts were also off site in buildings.

The results of the radio tracking suggest that the risk to breeding/maternity populations using trees from the proposed road scheme is relatively low. As the site appears to be dominated by male tree roosting bats. However, as bats move tree roosts regularly, there is a strong possibility that other trees in Markeaton Park, including those potentially affected by the proposed scheme could support small numbers of roosting bats. These would most likely be male bats of the species confirmed on the site and the site is considered of Local importance to these species.

5 References

Collins, J. (ed) (2016). Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd Edn). The Bat Conservation Trust. London.

Davidson-Watts, I.F. (2016). Radio tracking Daubenton's bat for a major development in Staffordshire. Unpublished Raw Data.

Hill, D. A. and Greenaway, F.G. (2005). Effectiveness of an acoustic lure for surveying bats in British woodlands. Mammal Review, 35, 116-122.

White, G. C. and Garrott, R.A. (1990). Analysis of wildlife radio-tracking data. Academic Press, San Diego, California.

Figure 1 Survey area

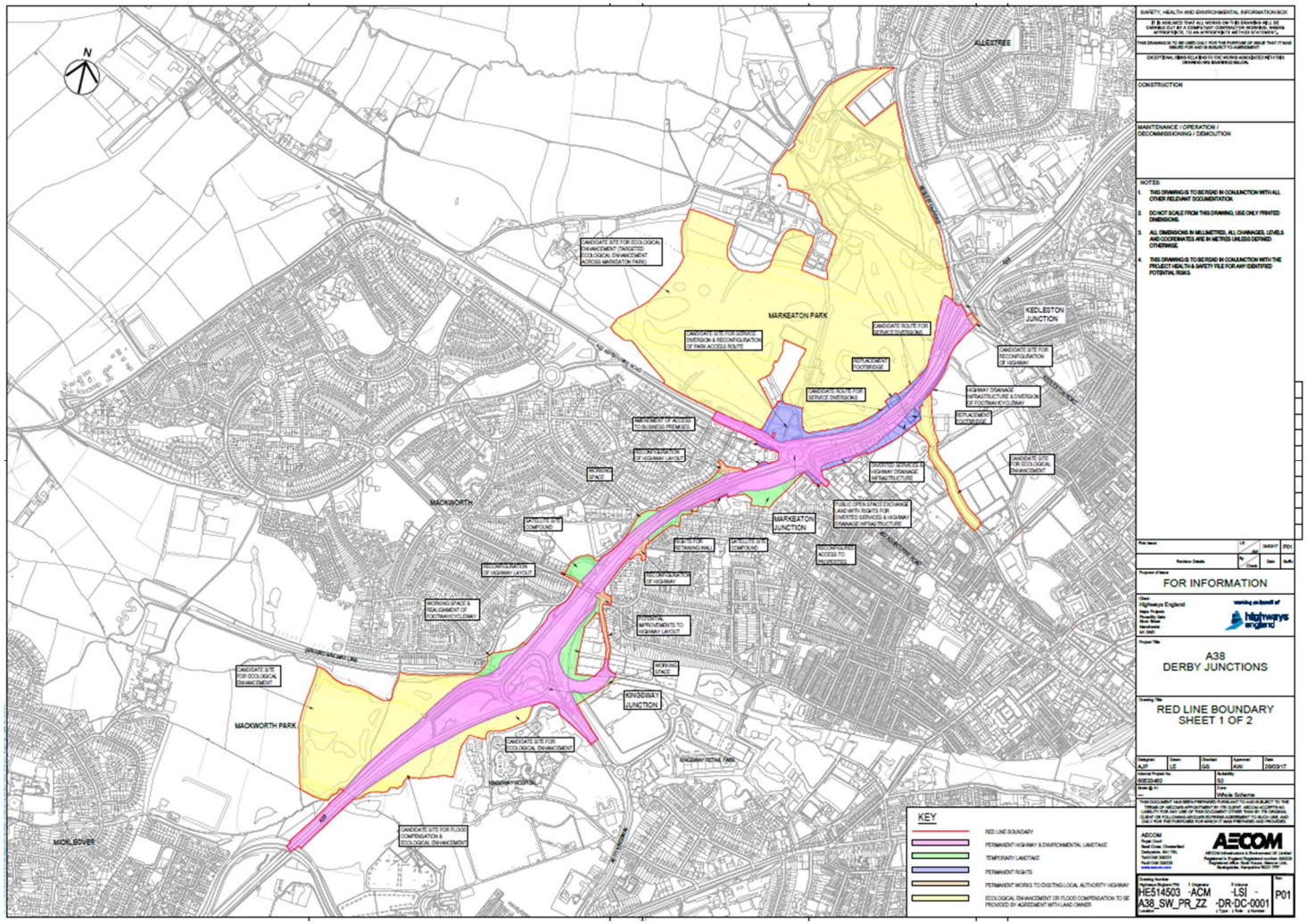


Figure 2 Combined trapping locations 2017

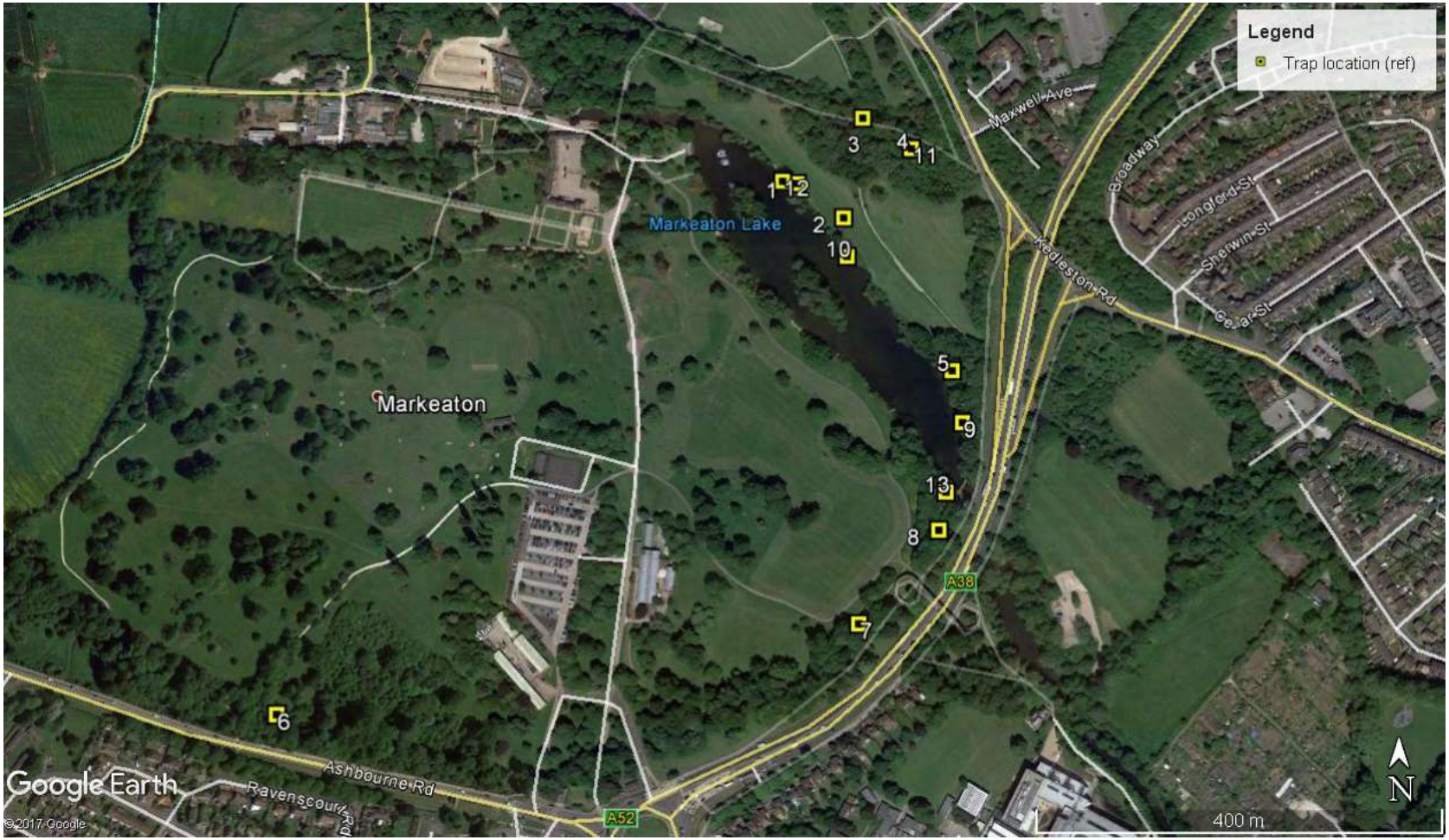
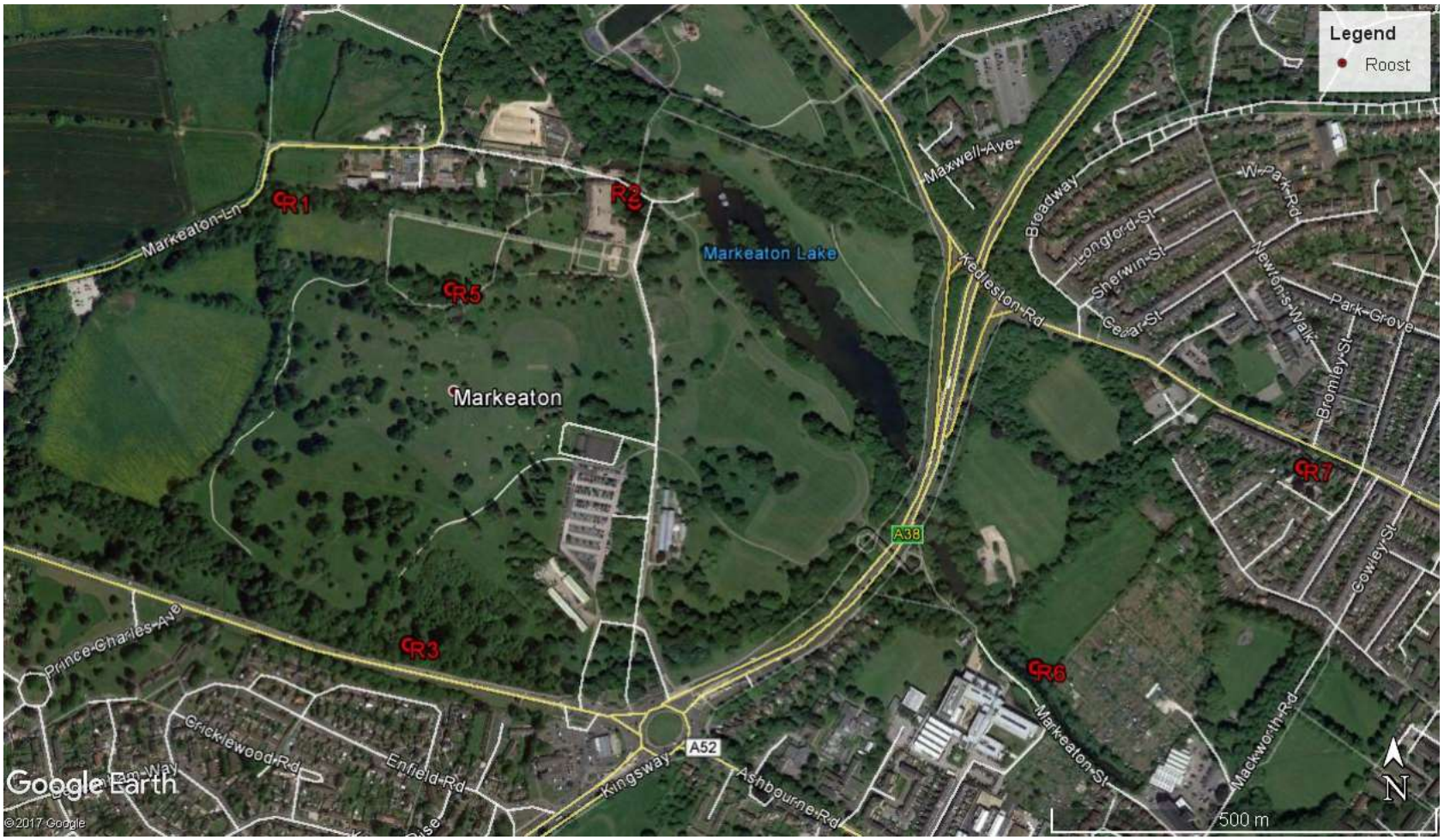


Figure 3 Roost locations (all) 2017

Figure 4 All bat roost locations close to the scheme



Appendix A Trapping results

#	Date (at start)	Time	Species	Sex	Age	Breeding status	Trap location	Ring No.	Bat ref	Weather (for survey date)
Survey Visit 1 – June 2017										
1	19/06/2017	02:00	*Eptesicus serotinus*	Female	Adult	Pregnant	2			10% cloud, calm (0[1]), 24°C
2	19/06/2017	23:44	*Myotis brandtii*	Male	Adult	-	2	J5551	Bat 206	10% cloud, calm (0), 24°C
3	19/06/2017	02:00	*Myotis mystacinus*	Male	Adult	-	2			10% cloud, calm (0), 24°C
4	19/06/2017	22:05	*Pipistrellus pipistrellus*	Female	Adult	Pregnant	2			10% cloud, calm (0), 24°C
5	19/06/2017	23:44	*Pipistrellus pipistrellus*	Female	Adult	Pregnant	2			10% cloud, calm (0), 24°C
6	19/06/2017	23:44	*Pipistrellus pipistrellus*	Female	Adult	Pregnant	2			10% cloud, calm (0), 24°C
7	19/06/2017	00:15	*Pipistrellus pipistrellus*	Male	Adult	-	2			10% cloud, calm (0), 24°C
8	19/06/2017	01:30	*Pipistrellus pipistrellus*	Female	Adult	Non breeding	2			10% cloud, calm (0), 24°C

[1] Beaufort wind force scale (0 No wind, 1 Light air smoke drifts, 2 Light Breeze leaves rustle, 3 Gentle Breeze small twigs move, 4 Moderate Breeze small branches move, 5 Fresh Breeze small trees sway, 6 Strong Breeze large branches move, 7 Mod Gale whole trees in motion)

#	Date (at start)	Time	Species	Sex	Age	Breeding status	Trap location	Ring No.	Bat ref	Weather (for survey date)
9	19/06/2017	02:00	*Pipistrellus pipistrellus*	Male	Adult	-	2			10% cloud, calm (0), 24°C
10	19/06/2017	23:44	*Pipistrellus pygmaeus*	Male	Adult	-	2			10% cloud, calm (0), 24°C
11	19/06/2017	02:00	*Nyctalus noctula*	Male	Adult	-	3	No ring	Bat 306	10% cloud, calm (0), 24°C
12	19/06/2017	22:25	*Myotis daubentonii*	Male	Adult	-	5	J5600	Bat 106	10% cloud, calm (0), 24°C
13	19/06/2017	01:55	*Myotis daubentonii*	Male	Adult	-	5			10% cloud, calm (0), 24°C
14	19/06/2017	22:00	*Pipistrellus pygmaeus*	Female	Adult	Lactating	5			10% cloud, calm (0), 24°C
15	19/06/2017	22:00	*Pipistrellus pygmaeus*	Female	Adult	Lactating	5			10% cloud, calm (0), 24°C
16	19/06/2017	22:00	*Pipistrellus pygmaeus*	Female	Adult	Lactating	5			10% cloud, calm (0), 24°C
17	19/06/2017	22:25	*Pipistrellus pygmaeus*	Female	Adult	Lactating	5			10% cloud, calm (0), 24°C
18	19/06/2017	01:55	*Pipistrellus pygmaeus*	Male	Adult	-	5			10% cloud, calm (0), 24°C
19	19/06/2017	21:50	*Pipistrellus pipistrellus*	Male	Adult	-	6			10% cloud, calm (0), 24°C

#	Date (at start)	Time	Species	Sex	Age	Breeding status	Trap location	Ring No.	Bat ref	Weather (for survey date)
20	19/06/2017	21:40	*Pipistrellus pygmaeus*	Female	Adult	Lactating	6			10% cloud, calm (0), 24°C
21	19/06/2017	21:48	*Pipistrellus pygmaeus*	Female	Adult	Lactating	6			10% cloud, calm (0), 24°C
22	19/06/2017	22:08	*Pipistrellus pygmaeus*	Female	Adult	Lactating	6			10% cloud, calm (0), 24°C
23	19/06/2017	22:15	*Pipistrellus pygmaeus*	Female	Adult	Lactating	6			10% cloud, calm (0), 24°C
24	19/06/2017	22:25	*Pipistrellus pygmaeus*	Female	Adult	Lactating	6			10% cloud, calm (0), 24°C
25	19/06/2017	22:26	*Pipistrellus pygmaeus*	Male	Adult	-	6			10% cloud, calm (0), 24°C
26	19/06/2017	22:46	*Pipistrellus pygmaeus*	Female	Adult	Lactating	6			10% cloud, calm (0), 24°C
27	19/06/2017	23:10	*Pipistrellus pygmaeus*	Male	Adult	-	6			10% cloud, calm (0), 24°C
28	19/06/2017	23:55	*Pipistrellus pygmaeus*	Female	Adult	Lactating	6			10% cloud, calm (0), 24°C
29	19/06/2017	23:05	*Myotis daubentonii*	Female	Adult	Pregnant	8			10% cloud, calm (0), 24°C
30	19/06/2017	22:41	*Pipistrellus pipistrellus*	Female	Adult	Pregnant	8			10% cloud, calm (0), 24°C

#	Date (at start)	Time	Species	Sex	Age	Breeding status	Trap location	Ring No.	Bat ref	Weather (for survey date)
31	19/06/2017	23:05	*Pipistrellus pipistrellus*	Female	Adult	Pregnant	8			10% cloud, calm (0), 24°C
32	19/06/2017	23:05	*Pipistrellus pipistrellus*	Female	Adult	Pregnant	8			10% cloud, calm (0), 24°C
33	19/06/2017	23:05	*Pipistrellus pipistrellus*	Female	Adult	Pregnant	8			10% cloud, calm (0), 24°C
34	20/06/2017	01:00	*Pipistrellus pipistrellus*	Male	Adult	-	1			100% cloud, light breeze (3), 18°C
35	21/06/2017	22:10	*Myotis daubentonii*	Female	Adult	Pregnant	4			5% cloud, light air (1), 25°C
36	21/06/2017	22:10	*Myotis daubentonii*	Female	Adult	Pregnant	4			5% cloud, light air (1), 25°C
37	21/06/2017	22:10	*Myotis daubentonii*	Female	Adult	Pregnant	4			5% cloud, light air (1), 25°C
38	21/06/2017	22:10	*Pipistrellus pipistrellus*	Female	Adult	Pregnant	4			5% cloud, light air (1), 25°C
39	21/06/2017	23:05	*Pipistrellus pipistrellus*	Female	Adult	Pregnant	4			5% cloud, light air (1), 25°C
40	21/06/2017	22:36	*Pipistrellus pygmaeus*	Male	Adult	-	4			5% cloud, light air (1), 25°C
41	21/06/2017	22:52	*Myotis mystacinus*	Male	Adult	-	7			5% cloud, light air (1), 25°C

#	Date (at start)	Time	Species	Sex	Age	Breeding status	Trap location	Ring No.	Bat ref	Weather (for survey date)
42	21/06/2017	23:35	*Nyctalus noctula*	Male	Adult	-	9			5% cloud, light air (1), 25°C
43	21/06/2017	00:50	*Nyctalus noctula*	Male	Adult	-	9			5% cloud, light air (1), 25°C
44	21/06/2017	22:16	*Pipistrellus pipistrellus*	Male	Adult	-	9			5% cloud, light air (1), 25°C
45	21/06/2017	00:20	*Pipistrellus pipistrellus*	Male	Adult	-	9			5% cloud, light air (1), 25°C
46	21/06/2017	00:25	*Pipistrellus pipistrellus*	Male	Adult	-	9			5% cloud, light air (1), 25°C
Survey Visit 2 – September 2017										
1	11/09/2017	20:20	*Pipistrellus pygmaeus*	Male	Adult	-	10			40% cloud, moderate breeze (4), 13°C no rain during September surveys
2	11/09/2017	20:20	*Pipistrellus pygmaeus*	Female	Adult	post-lactating	10			40% cloud, moderate breeze (4), 13°C
3	11/09/2017	20:20	*Pipistrellus pygmaeus*	Male	Adult	-	10			40% cloud, moderate breeze (4), 13°C
4	11/09/2017	20:20	*Pipistrellus pygmaeus*	Female	Adult	post-lactating	10			40% cloud, moderate breeze (4), 13°C
5	11/09/2017	21:00	*Pipistrellus pygmaeus*	Female	Adult	post-lactating	11			40% cloud, moderate breeze (4), 13°C

#	Date (at start)	Time	Species	Sex	Age	Breeding status	Trap location	Ring No.	Bat ref	Weather (for survey date)
6	11/09/2017	21:00	*Plecotus auritus*	Female	Adult	post-lactating	11	No ring	Bat 109	40% cloud, moderate breeze (4), 13°C
7	11/09/2017	21:30	*Pipistrellus pygmaeus*	Male	Adult	-	12			40% cloud, moderate breeze (4), 13°C
8	11/09/2017	22:05	*Myotis daubentonii*	Female	Adult	post-lactating	11	No ring	Bat 209	40% cloud, moderate breeze (4), 13°C
9	11/09/2017	22:30	*Myotis daubentonii*	Male	Adult	-	12			40% cloud, moderate breeze (4), 13°C
10	11/09/2017	22:30	*Myotis nattereri*	Male	Adult	-	11	No ring	Bat 309	40% cloud, moderate breeze (4), 13°C
11	11/09/2017	23:00	*Myotis mystacinus*	Male	Adult	-	11			40% cloud, moderate breeze (4), 13°C
12	11/09/2017	23:00	*Plecotus auritus*	Male	Adult	-	11			40% cloud, moderate breeze (4), 13°C
13	14/09/2017	19:50	*Pipisrellus pygmaeus*	Male	Juvenile	-	12			10% cloud, gentle breeze (3), , 11°C, no rain
14	14/09/2017	20:15	*pipisrellus pygmaeus*	Female	Adult	post-lactating	12			10% cloud, gentle breeze (3), , 11°C, no rain
15	14/09/2017	20:20	*Pipistrellus pipistrellus*	Female	Adult	post-lactating	13			10% cloud, gentle breeze (3), , 11°C, no rain
16	14/09/2017	21:05	*Pipisrellus pygmaeus*	Female	Adult	post-lactating	12			10% cloud, gentle breeze (3), , 11°C, no rain
17	14/09/2017	22:10	*Myotis daubentonii*	Female	Adult	post-lactating	11			10% cloud, gentle breeze (3), , 11°C, no rain

Appendix B Roost plates (where access available)

R1		**R2**	

R5