

**THRAPSTON, A14 JUNCTION 13,  
NORTHAMPTONSHIRE**

**BAT ACTIVITY SURVEYS**

A Report to: IM Properties

Report No: RT-MME-154698-02 Rev C

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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”.

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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 be 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 IM Properties to undertake Bat Activity Surveys at a site in Thrapston by the A14 Junction 13 in Northamptonshire. These surveys are required to inform a planning application associated with a commercial development with associated soft and hard landscaping.

Ecological desk study data from Northamptonshire Biodiversity Records Centre and Northants Bat Group included records of at least five bat species of bat within a 2 km radius of the proposed development site, the most recent of which dated from 2017. All records were potentially located within 1 km of the site.

The site was subject to seasonal walked activity transects, completed between April and September 2021, in order to allow a profile of site usage by bats to be compiled. Automated surveys using a static detector were used to supplement the data collected from the walked transect surveys, as recommended by Bat Surveys: Good Practice Guidelines published by the Bat Conservation Trust (Collins, 2016). During the surveys, 11 species of bat (common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle, brown long-eared bat, noctule, Leisler's bat, Daubenton's bat, Natterer's bat, whiskered/Brandt's bat, serotine and barbastelle) were recorded using the site.

Common pipistrelle and soprano pipistrelle were the most frequently recorded species during the transect and automated surveys, and the boundary hedgerows and scattered trees across the site appear to provide an important foraging resource and commuting habitat for these species. The data obtained during the bat activity surveys indicates that roosts for common and soprano pipistrelle may be present in proximity to the site. The bat activity data also indicates that noctules may roost in close proximity to the site, although this species does not appear to utilise the site frequently and is instead considered to be commuting across the site to suitable foraging grounds elsewhere. Generally low levels of activity by other bat species were recorded.

Habitat loss or fragmentation as a result of the proposed development may reduce the available foraging resource for bats in the local area, and increases in illumination could disrupt foraging and commuting routes, particularly around the site boundaries. The following recommendations are made:

### **R1 Roosting Bats**

The recommendations made within the Bat Survey of Trees Report (Report RT-MME-154698-01 Rev C) must be adhered to.

### **R2 Landscaping**

The final layout of the proposed development should take into account the presence of valuable bat foraging and commuting features, particularly boundary hedgerows. Where feasible, important bat commuting and foraging features should be protected and incorporated into the layout of the site to maintain connectivity across the site and surrounding area.

Furthermore, it is recommended that a Landscape and Ecological Management Plan (LEMP) should be produced to ensure the features present at the site, which are of value to bats, are maintained to maximise their biodiversity potential. Where possible, retained habitats should be enhanced in order to minimise the potential impacts on foraging and commuting bats.

### **R3 Lighting**

In accordance with best practice guidance relating to lighting and biodiversity (Miles et al, 2018; Gunnell et al, 2012), any new lighting should be carefully designed to minimise potential disturbance and fragmentation impacts on sensitive receptors, such as bat species. Further details are provided in Chapter 6.

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## 1. INTRODUCTION

### 1.1 PROJECT BACKGROUND

IM Properties commissioned Middlemarch Environmental Ltd to undertake Bat Activity Surveys at Thrapston, A14 Junction 13 in Northamptonshire. This assessment is required to inform a planning application associated with a commercial development with associated soft and hard landscaping.

Middlemarch Environmental Ltd has also undertaken the following assessments:

- Preliminary Ecological Appraisal (RT-MME-154208-01 Rev C);
- Winter Bird Survey (RT-MME-154208-02);
- Bat Surveys of Trees (Report RT-MME-154698-01 Rev C);
- Great Crested Newt Survey (Report RT-MME-154698-03 Rev C);
- Breeding Bird Survey (Report RT-MME-154698-04 Rev B);
- Badger Survey (Report RT-MME-154698-05 Rev B);
- Hedgerow Regulations Assessment (Report RT-MME-154698-06 Rev B);
- Foraging Wetland Bird Survey (Report RT-MME-156071); and,
- Badger Bait Marking Survey (Report RT-MME-157073).

This report details the results of the bat activity surveys undertaken between April 2021 and September 2021.

All UK bat species are legally 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 survey area comprises an irregularly shaped block of farmland located approximately 1.3 km north-east of the town of Thrapston in Northamptonshire, adjacent to the A605. The site is centered at Ordnance Survey Grid Reference TL 0122 7908 and occupies a footprint of approximately 48 ha.

The site comprises a series of arable fields, with six large arable fields located to the east of the A605 and a smaller arable field and grassland situated to the west of the A605. The fields to the east of the A605 are situated on undulating land and total approximately 45 ha. These fields are bound by hedgerows and ditches with associated grassland verges of varying width. A small wet ditch with fringes of neutral grassland of varying width adjacent to the channel is a feature of the western and southern sections of this eastern parcel. The eastern boundary is formed by Islington, a single carriageway road.

The arable field to the west of the A605 is approximately 2 ha in size and bound by a hedgerow along the A605, a ditch adjacent to the Oundle Road and line of conifers separating the site from adjacent commercial unit. The grassland area is approximately 0.3 ha and bound by the line of conifers by the commercial unit, the A605 hedgerow and a fence line separating the site from adjacent residential properties.

To the south of the site, land use is dominated by a modern distribution park possessing extensive warehouses served by access roads and with formal landscaping and tree/shrub screening. To the north and east of the site are further arable fields with some sections of hedging also present. To the west of the site, beyond Oundle Road and the A605, is a strip of mixed farmland and a chain of wetland features and habitats further afield.

The wider landscape is occupied by a 'patchwork quilt' of farmed land with few roads and small scattered villages and farm complexes. The east/west aligned A14 is a major feature to the south, with Thrapston town the most significant area of habitation within the area.

## 2. METHODOLOGY

### 2.1 DESK STUDY

As part of the Preliminary Ecological Appraisal (Report RT-MME-154208-01 Rev C) an ecological desk study (which included a search for records of bats) was undertaken within a 2 km radius of the site. The consultees for the desk study were Northamptonshire Biodiversity Records Centre and Northants Bat Group.

Middlemarch Environmental Ltd then assimilated and reviewed the desk study data provided by these organisations. Relevant bat data are discussed in Chapter 3. In compliance with the terms and conditions relating to its commercial use, the full desk study data are not provided within this report.

The desk study also included a search for statutory nature conservation sites designated for bats within a 10 km radius of the site.

### 2.2 FIELD SURVEYS

#### 2.2.1 Manual Bat Activity Survey: Walkover Transect

The site was subject to a bat transect survey in order to allow a profile of site usage by bats to be compiled. Four transects were completed with one dusk survey completed per season (spring, summer and autumn). The summer survey comprised dusk and pre-dawn visits (or dusk to dawn) within one 24-hour period.

One transect was identified which allowed all features of potential value to bats to be assessed across the site. A total of 12 'Stop Points' were identified along each transect. At each 'Stop Point', the ecologist paused for a period of three minutes before continuing along the transect route. The direction in which the transect was walked was varied so that the surveyor was in different positions on the transect in relation to dusk/dawn to get a more complete representation of bat activity at the site.

The transect survey was conducted using electronic bat detectors (Echo Meter Touch and associated recording device) to facilitate the detection of bats and to aid in the determination of species of bats using the site. Subsequent computer analysis of recordings allowed all species of bats using the site to be identified.

#### 2.2.2 Automated Bat Activity Survey: Static Bat Detector

Automated surveys using a static detector were used to supplement the data collected from the walked transect surveys, as recommended by the Bat Conservation Trust (Collins, 2016). Data collected from walked transects can be flawed if used in isolation, as it only provides a brief snapshot of the overall bat activity throughout the active season. Automated surveys allow a static detector to be left in situ for a number of consecutive nights, allowing a larger sample of bat activity to be recorded.

One static bat detector (Song Meter SM3+ time expansion with inbuilt recording device) was installed on a suitable tree towards the centre of the site. The detector was left in place for a total of five consecutive nights for three survey periods between April and September 2021. The detector started recording half an hour before sunset and continued through to dawn. The recordings made by the static detector were subsequently subject to computer analysis in order to identify the number of passes made by each species.

### 3. DESK STUDY

#### 3.1 STATUTORY NATURE CONSERVATION SITES

The site is not located within 10 km of any statutory nature conservation sites designated for the presence of bats.

#### 3.2 SPECIES RECORDS

The data search was carried out in February 2021 and updated in October 2021 by Northamptonshire Biodiversity Records Centre and Northants Bat Group. Records of bat species within a 2 km radius of the survey area provided by the consultees 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?	Legislation
Pipistrelle <i>Pipistrellus sp.</i>	11	2017	Potentially within a 1 km radius*	†	ECH 4, WCA 5, WCA 6
Common pipistrelle <i>Pipistrellus pipistrellus</i>	3	2011	Potentially within a 1 km radius*	-	ECH 4, WCA 5, WCA 6
Soprano pipistrelle <i>Pipistrellus pygmaeus</i>	2	2011	Potentially within a 1 km radius*	✓	ECH 4, WCA 5, WCA 6
Brown long-eared bat <i>Plecotus auritus</i>	4	2011	Potentially within a 1 km radius*	✓	ECH 4, WCA 5, WCA 6
Noctule <i>Nyctalus noctula</i>	1	2011	Potentially within a 1 km radius*	✓	ECH 4, WCA 5, WCA 6
Barbastelle <i>Barbastella barbastellus</i>	1	2012	Potentially within a 1 km radius*	✓	ECH 2, ECH 4, WCA 5, WCA 6
<p><b>Key:</b>            *: Grid reference provided was four figures only.            †: Dependent on species.</p> <p>ECH 2: Annex II of the European Communities Council Directive on the Conservation of Natural Habitats and Wild Fauna and Flora. Animal and plant species of community interest whose conservation requires the designation of Special Areas of Conservation.            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.</p>					

**Table 3.1: Bat Species Records Within 2 km of Survey Area**

## 4. SURVEY RESULTS

### 4.1 MANUAL BAT ACTIVITY SURVEYS

#### 4.1.1 Personnel

The manual bat activity surveys were undertaken by the following personnel:

- Hannah Lewis MCIEEM (Senior Ecological Consultant);
- Liam Kelly (Ecological Project Officer); and,
- Dorothy Dunne (Ecological Project Officer).

#### 4.1.2 Weather

The weather conditions recorded at the time of the survey are detailed in Table 4.1. Sunrise and sunset times correspond to that provided by BBC Weather Centre Data for Thrapston.

Parameter	Conditions							
	Spring Dusk 26/04/21 (Sunset 20:19)		Summer Dusk 07/07/21 (Sunset 21:24)		Summer Dawn 08/07/21 (Sunrise 04:51)		Autumn Dusk 23/09/21 (Sunset 18:59)	
	Start	Finish	Start	Finish	Start	Finish	Start	Finish
Time	20:19	22:32	21:24	00:13	02:14	4:51	18.59	21:00
Temperature (°C)	10	7	16	15	16	15	19	16
Cloud Cover (%)	60	45	60	70	80	100	0	0
Precipitation	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Wind Speed (Beaufort)	F3	F3	F1-2	F1-2	F1-2	F1-2	F3	F2

**Table 4.1: Weather Conditions During Manual Bat Activity Survey**

#### 4.1.3 Transect Route

The transect route covered the majority of the habitats within the survey area. The transect commenced in the small field to the west of the A605 (Stop Point 1), heading north to the arable field (Stop Point 2). The route then crossed the A605 and followed the perimeter of each of the five fields to the east of the A605 so that one side of every field boundary was included. A further ten Stop Points were positioned throughout this area either at potentially important junction points or centrally along hedgerows to assess use of those hedgerows for commuting or foraging.

Drawing C154698-02-01 in Chapter 7 illustrates the transect route and the location of each Stop Point.

#### 4.1.4 Survey Results

Table 4.2 provides summary of the results obtained during the manual transect surveys. The raw data collected during the surveys is provided in Appendix 2.

Survey Visit	Species Recorded	Summary of Findings
<b>Spring (April)</b>	Common pipistrelle and soprano pipistrelle	Common pipistrelle and soprano pipistrelle activity was recorded in the southern part of the site, along the wet ditch (three common pipistrelle passes between Stop Points 5 and 6 and three soprano pipistrelle passes at Stop Point 6), followed by a single soprano pipistrelle pass between Stop Points 6 and 7. A soprano pipistrelle was detected along the eastern boundary (Stop Point 10).
<b>Summer (July): dusk</b>	Common pipistrelle, soprano pipistrelle, serotine and a <i>Nyctalus</i> sp.	Common pipistrelle was the most frequently recorded species with peaks of activity in the southern and central parts of the site (between Stop Points 5 and 9) and in the southernmost western field (Stop Point 1). Six passes of soprano pipistrelle were recorded, generally in the southern part of the site (between Stop Points 4 and 8). Single serotine and <i>Nyctalus</i> sp. passes were recorded between Stop Points 4 and 5.
<b>Summer (July): dawn</b>	Common pipistrelle, soprano pipistrelle and a <i>Nyctalus</i> sp.	Common pipistrelle was frequently recorded throughout the survey, with the majority of passes recorded in the southern and western parts of the site (between Stop Points 1 and 7). Soprano pipistrelle were recorded in similar areas, although less frequently. A single <i>Nyctalus</i> sp. pass was recorded in the south-western part of the site (between Stop Points 3 and 4).
<b>Autumn (September)</b>	Common pipistrelle, soprano pipistrelle and a <i>Myotis</i> sp.	Common pipistrelle was frequently recorded species in the southern and eastern parts of the site (between Stop Points 5 and 12). Soprano pipistrelle activity was largely recorded along the southern site boundary. A single <i>Myotis</i> sp. pass was recorded in the south-eastern corner of the site (Stop Point 7).

**Table 4.2: Summary of Species Recorded during Manual Transect Surveys**



## 4.2 AUTOMATED BAT ACTIVITY SURVEYS

### 4.2.1 Weather

The weather conditions and sunset/sunrise times for the local area throughout the automated monitoring periods are summarised in Table 4.2.

Season	Sunset / sunrise	Temperature Range (°C)	Humidity (%)	Wind Speed (Beaufort)	Precipitation
<b>Spring (April)</b>					
April					
26-27/04/2021	20:20 / 05:39	1-5	74-90	F2	Nil
27-28/04/2021	20:22 / 05:37	2-4	57-96	F3-4	Light rain
28-29/04/2021	20:23 / 05:35	0-3	84-95	F3	Light rain
29-30/04/2021	20:25 / 05:33	1-3	88-91	F1-2	Light rain
30/04-01/05/2021	20:27 / 05:31	2-4	90-92	F1-2	Light rain
<b>Summer (June/July)</b>					
28-29/06/2021	21:28 / 04:43	8-13	98-99	F3	Light rain
29-30/06/2021	21:28 / 04:43	11-13	78-84	F3	Nil
30/06-01/07/2021	21:27 / 04:44	8-14	85-92	F2	Nil
01-02/07/2021	21:27 / 04:45	11-14	75-97	F1	Nil
02-03/07/2021	21:26 / 04:45	14-15	88-95	F2	Light rain
<b>Autumn (September)</b>					
15-16/09/2021	19:17 / 06:38	12-14	77-89	F2	Nil
16-17/09/2021	19:15 / 06:40	12-19	64-93	F1-F1	Nil
17-18/09/2021	19:12 / 06:41	13-18	68-86	F2	Nil
18-19/09/2021	19:10 / 06:43	14-17	77-88	F2-F3	Light rain
19-20/09/2021	19:07 / 06:45	12-16	89-95	F2	Light rain

**Table 4.2: Survey Conditions during Automated Monitoring**

### 4.2.2 Survey Results

Table 4.3 provides an overview of species recorded during each season. The raw data collected during the automated survey is provided in Appendix 3.

Season	Dates	Species									
		Common pipistrelle	Soprano pipistrelle	Nathusius' pipistrelle	Brown long-eared bat	Noctule	Leisler' s bat	Daubenton' s bat	Natterer' s bat	Whiskered / Brandt' s bat	Barbastelle
Spring (April)	26-27/04/2021	5	6	0	0	1	0	0	0	0	0
	27-28/04/2021	0	6	0	0	15	0	0	0	2	0
	28-29/04/2021	0	1	0	0	5	0	0	0	0	0
	29-30/04/2021	0	2	0	1	1	0	0	0	0	0
	30/04-01/05/2021	0	0	0	0	0	0	0	0	0	0
	<b>Total Passes</b>	<b>5</b>	<b>15</b>	<b>0</b>	<b>1</b>	<b>22</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>0</b>
Summer (June-July)	28-29/06/2021	29	12	0	0	22	0	0	0	1	0
	29-30/06/2021	46	38	0	0	3	0	0	1	0	0
	30/06-01/07/2021	26	53	0	0	2	0	0	0	0	0
	01-02/07/2021	24	14	0	0	0	1	0	0	0	0
	02-03/07/2021	22	36	0	0	1	0	0	1	1	0
	<b>Total Passes</b>	<b>147</b>	<b>153</b>	<b>0</b>	<b>0</b>	<b>28</b>	<b>1</b>	<b>0</b>	<b>2</b>	<b>2</b>	<b>0</b>
Autumn (September)	15-16/09/2021	32	52	0	2	15	2	0	3	13	0
	16-17/09/2021	13	33	0	0	1	3	5	1	7	0
	17-18/09/2021	39	48	0	0	4	0	2	2	1	0
	18-19/09/2021	101	76	1	2	8	0	2	1	4	1
	19-20/09/2021	222	319	0	2	9	0	6	0	4	0
	<b>Total Passes</b>	<b>407</b>	<b>528</b>	<b>1</b>	<b>6</b>	<b>37</b>	<b>5</b>	<b>15</b>	<b>7</b>	<b>29</b>	<b>1</b>

Table 4.10: Summary of Species Recorded during Automated Transect Surveys

#### Spring (April-May) 2021

Five bat species (common pipistrelle, soprano pipistrelle, brown long-eared bat, noctule and whiskered/Brandt's bat) were recorded during the spring survey period. Noctule was the most frequently detected species, followed by soprano pipistrelle. Passes by these species were detected on four of the five nights that the static detector was in place. Passes by other species were limited to a small number of passes in a single night during the survey period.

Computer analysis of sound recordings did not identify any further species of bat during the spring survey.

#### Summer (June-July) 2021

Six species of bat (common pipistrelle, soprano pipistrelle, noctule, Leisler's bat, Natterer's bat and whiskered/Brandt's bat) were recorded during the summer survey period. Common pipistrelle and soprano pipistrelle were detected most frequently during all five nights of the survey period. Noctule passes were also detected relatively frequently, while passes by the remaining species comprised single passes on one or two nights of the survey period.

Computer analysis of sound recordings did not identify any further species of bat during the summer survey.

#### Autumn (September) 2021

Ten species of bat (common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle, brown long-eared bat, noctule, Leisler's bat, Daubenton's bat, Natterer's bat, whiskered/Brandt's bat and barbastelle) were recorded during the autumn survey period. Common pipistrelle and soprano pipistrelle were frequently recorded during all five nights of the survey period. Occasional passes by noctule, Daubenton's bat and whiskered/Brandt's were recorded on four or five nights of the survey period. Very occasional passes were recorded on any given night for the remaining species. Activity by barbastelle, a very rare species, was limited to a single pass on the fourth night of the autumn survey period.

Computer analysis of sound recordings did not identify any further species of bat during the autumn survey.

## 5. DISCUSSION AND CONCLUSIONS

### 5.1 SUMMARY OF SITE PROPOSALS

The proposals for the site are as follows:

*Hybrid planning application comprising: Full planning application for the construction of a storage and distribution unit (Development Plot 1) (Use Class B8) with ancillary offices (Use Class E); creation of a principal estate road (including bus stop) and new access from the A605; construction and emergency access; highways improvements to Huntingdon Road and A605 roundabout and at Junction 13 of the A14; strategic green infrastructure; vehicular and cycle parking; pedestrian infrastructure; hardstanding; circulation areas; lighting infrastructure and all other ancillary, enabling and associated works including landscaping, drainage, earthworks, sub-station and boundary treatment.*

*Outline planning application with all matters reserved for an employment park comprising Class B2, B8 and E uses with ancillary offices; creation of a new access from Oundle Road; vehicular and cycle parking; pedestrian infrastructure; hardstanding; circulation areas; lighting infrastructure and all other ancillary, enabling and associated works including landscaping, drainage, earthworks and boundary treatment.*

### 5.2 SUMMARY OF BAT ACTIVITY SURVEYS

The manual transect surveys, undertaken seasonally (spring, summer and autumn) between April and September 2021, identified at least five species of bat (common pipistrelle, soprano pipistrelle, serotine, a *Nyctalus* species and a *Myotis* species) using the site. The automated surveys, also undertaken seasonally (spring, summer and autumn) between April and September 2021, identified a total of ten bat species (common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle, brown long-eared bat, noctule, Leisler's bat, Daubenton's bat, Natterer's bat, whiskered/Brandt's bat and barbastelle) using the site.

The foraging and commuting activity of each species identified on site is detailed below.

#### 5.2.1 Common pipistrelle

Common pipistrelle is one of the most common species of bat in England and Wales (Bat Conservation Trust, 2010b). It was the most frequently recorded species during the manual surveys, and second most frequently recorded species during the automated surveys (after soprano pipistrelle). During the transect surveys, passes by common pipistrelle were recorded across the majority of the survey area. Common pipistrelles emerge from their roost around 20-30 minutes after sunset. During the automated surveys, common pipistrelle was often recorded within the first hour after sunset and in the hour before sunrise (see Appendix 3), suggesting this species may roost in proximity to the site. The high number of passes recorded for common pipistrelle indicates that the site contains habitats that are suitable for common pipistrelles, with the boundary hedgerows and trees used frequently for foraging and as commute corridors.

#### 5.2.2 Soprano pipistrelle

The soprano pipistrelle is widely distributed across the UK, with the exception of the very northern parts of Scotland (Bat Conservation Trust, 2010b). Along with the common pipistrelle it is one of Britain's commonest bat species. During the transect surveys, passes by soprano pipistrelle were recorded fairly frequently, scattered across the site. The soprano pipistrelle was the most frequently recorded species during the automated surveys, occasionally recorded in the hour after sunset and in the hour before sunrise (see Appendix 3), which suggests that this species may roost in proximity to the site. The relatively high number of passes recorded for soprano pipistrelle suggests that this species regularly utilises the site for foraging and commuting purposes.

#### 5.2.3 Nathusius' pipistrelle

Nathusius' pipistrelles have been widely recorded throughout the British Isles but records are sparse (Bat Conservation Trust, 2010). A single Nathusius' pipistrelle pass was recorded during the fourth night of the autumn automated survey period. Due to the limited activity attributable to Nathusius' pipistrelle recorded during the surveys, the site is considered unlikely to provide a key habitat resource for this species.

#### 5.2.4 Brown long-eared bat

Brown long-eared bats have declined in Britain due to changing land use, including modern intensive agricultural practices, and the conversion of barns which have resulted in the loss of suitable feeding and roosting habitats (Bat Conservation Trust, 2010b). They do, however, remain a common and widespread species, although are often under recorded due to their quiet echolocation call (Bat Conservation Trust, 2010b). A single brown long-eared bat pass was recorded during the spring automated survey, whilst two passes by this species were recorded during three of the five nights of the autumn survey period. Brown long-eared bat emerges from its roost around 40-60 minutes after sunset. Passes by this species were recorded at varied times; only one pass was recorded within the first hour after sunset while the remaining passes were generally recorded at least three hours after sunset. Given the low levels of activity recorded, it is considered that overall, the site is unlikely to provide a particularly important foraging resource for this species, which is more likely to be commuting across the site to more valuable foraging grounds elsewhere.

#### 5.2.5 Noctule

Noctule is the largest species of bat resident in the UK. This high-flying species generally shows less of an affinity to field boundaries and other linear features than other bat species, and is largely encountered in open areas. It is a relatively common and widespread species in England and Wales, but has declined in recent years as a result of a lack of prey items resulting from intensive agricultural land use (Bat Conservation Trust, 2010b). Noctule was occasionally recorded during all three automated survey periods. Noctules generally emerge from their roost early in the evening after sunset. Passes by noctule were often recorded within the first hour after sunset (see Appendix 3), suggesting this species may roost in proximity to the site. However, overall activity by noctule was considerably lower than that recorded for common pipistrelle and soprano pipistrelle and as such, it is considered that this species uses the site for occasional foraging purposes, however is generally commuting across the site to more valuable foraging grounds in the wider landscape.

#### 5.2.6 Leisler's bat

Leisler's bat is found throughout the British Isles, with the exception of northern Scotland (Bat Conservation Trust, 2010b). Six passes by Leisler's bat were recorded during the automated survey periods; a single pass was recorded during spring and the remaining passes were recorded in autumn. Passes by this species were recorded at varied times; only one pass was recorded within the first hour after sunset while the remaining passes were recorded at least three hours after sunset. Based on the low level of activity recorded, this species is considered to utilise the site only very infrequently for foraging or commuting purposes.

#### 5.2.7 Daubenton's bat

Daubenton's bat is fairly widespread across Britain and favours lakes, rivers, ponds and other habitats associated with water. In England and Wales, the majority of roosting sites are in humid areas underground, close to water. They are mostly found roosting in caves, trees and mines. Infrequent passes by this species were recorded during the autumn automated survey period only. Peak emergence of a Daubenton's bat is generally around 40 to 50 minutes after sunset. During the automated surveys, passes by Daubenton's bat were generally recorded at least an hour after sunset (see Appendix 3). This species is therefore unlikely to be roosting in proximity to the site, using it for occasional foraging and commuting purposes only.

#### 5.2.8 Natterer's bat

Natterer's bat is a scarce yet widely distributed species in Britain (Bat Conservation Trust, 2010b). This species was not recorded during the transect surveys, and was recorded only very occasionally during the summer and autumn automated survey periods. These passes were all recorded at least two hours after sunset. Given that Natterer's bat generally emerges 40 to 60 minutes after sunset, it is considered unlikely that this species is roosting in close proximity to the site and only occasionally commutes across it to more valuable foraging grounds elsewhere.

#### 5.2.9 Whiskered/Brandt's bat

Whiskered and Brandt's bats are both scarce in comparison to the more common pipistrelle species, but are widespread throughout England and Wales (Bat Conservation Trust, 2010b). An examination of physical characteristics is required to determine which of the two species is present. Whiskered bat is the more numerous of the two species. The ecology of both species is, however, very similar, and therefore splitting the two species is not of significance to the scope of this assessment. Just two passes were recorded during each of the spring and summer survey periods, with more frequent passes recorded during the autumn

period. Whiskered/Brandt's bat are considered to utilise the site infrequently for foraging and commuting purposes.

#### 5.2.10 Serotine

Serotine is a less common species, occurring mainly in southern England (Bat Conservation Trust, 2010b). A single serotine pass was recorded during the summer dusk transect survey, likely to be the result of a bat commuting over the site to foraging grounds elsewhere.

#### 5.2.11 Barbastelle

Barbastelle is rare in the UK, found in England and Wales only with a predominantly southern and central distribution. In England, roosts have been identified in cracks in trees in areas of high humidity. Barbastelles tend to forage over a wide area and in summer may emerge early from their roosts to forage amongst trees (Bat Conservation Trust, 2010).

A single pass for this species was recorded during the autumn automated survey period, over an hour after sunset, and it is considered very unlikely that this species is roosting in proximity to the site. Instead, barbastelle may very rarely commute across the site.

Table 5.1 provides a summary for all bat species identified on site.

Species	UK Status	Level of Activity	Site Use
Common pipistrelle	Common and widespread.	Moderate-high	Roost or roosts may be present in close proximity to site. Habitats within the site and surrounding landscape are likely to provide a valuable foraging resource.
Soprano pipistrelle	Common and widespread. S41.	Moderate-high	Roost or roosts may be present in close proximity to site. Habitats within the site and surrounding landscape are likely to provide a valuable foraging resource.
Nathusius' pipistrelle	Considered rare.	Very low	Infrequent foraging and/or commuting.
Brown long-eared bat	Widespread and relatively frequent. S41.	Very low	Infrequent foraging and/or commuting.
Noctule	Widespread, but relatively scarce. S41.	Low-moderate	Roost or roosts may be present in close proximity to site, although site itself does not appear to provide a valuable foraging resource.
Leisler's bat	Widespread, but relatively scarce.	Very low	Infrequent foraging and/or commuting.
Daubenton's bat	Widespread, relatively common.	Low	Infrequent foraging and/or commuting.
Natterer's bat	Widespread, but relatively scarce.	Very low	Infrequent foraging and/or commuting.
Whiskered/Brandt's bat	Widespread, but relatively rare.	Low	Infrequent foraging and/or commuting.
Serotine	Relatively rare, southern distribution.	Very low	Infrequent foraging and / or commuting.
Barbastelle	Very rare. S41.	Very low	Infrequent foraging and / or commuting.
S41 – Species of Principal Importance in England			

**Table 5.1: Summary of all Bat Species Identified during the Manual and Automated Surveys**

### 5.3 CONCLUSIONS AND SUMMARY OF POTENTIAL IMPACTS

Common pipistrelle and soprano pipistrelle are two of the most common species of bat in England and Wales (Bat Conservation Trust, 2010b) and were the most frequently recorded species during the manual and automated activity surveys. Given that common and soprano pipistrelles were recorded within the first hour after sunset and in the hour before sunrise, it is considered that a roost or roosts for these species are present in close proximity to the site, although Dusk Emergence and Dawn Re-Entry Surveys (Report RT-MME-154605 Rev A) have been completed and no roosts have been identified on site. The survey evidence indicates that the site is of moderate value to common and soprano pipistrelles, with the boundary hedgerows and scattered trees used frequently for foraging and commuting.

The bat activity data also indicates that noctules may roost in close proximity to the site, although this species does not appear to utilise the site frequently and is instead considered to be commuting across the site to suitable foraging grounds elsewhere. Due to the low or very low activity recorded on site for other species, it is not considered that the survey area provides a particularly valuable habitat resource.

Potential impacts on bat species as a result of the development may include:

- Loss of roost sites;
- Loss or fragmentation of foraging and commuting habitat; and,
- Fragmentation of habitat due to lighting.

Each of these factors is considered further below. This discussion is informed by the levels of bat activity recorded on site, and by Middlemarch Environmental Ltd's current understanding of the proposed development.

### **5.3.1 Loss of Roost Sites**

A suite of Dusk Emergence and Dawn Re-Entry Surveys of trees within the site has been completed, see Report RT-MME-154698-01 Rev C for further details. Recommendations given in this report should be taken into account.

### **5.3.2 Loss or Fragmentation of Foraging and Commuting Habitat**

The results of the seasonal bat activity surveys highlighted that habitats within the site are frequently utilised by common pipistrelle and soprano pipistrelle for foraging and commuting, and subject to generally low levels of use by other bat species. Although the boundary hedgerows and scattered trees across the site appear to provide an important foraging resource and commuting feature for bats, particularly common and soprano pipistrelles, suitable habitat is also present in the local area.

Reference to the current masterplan indicates that habitats around the site peripheries will be retained, with soft landscaping providing green buffers, particularly along the northern site boundary, which will ensure that suitable commuting and foraging features for bats are maintained, providing connectivity between the site and the wider landscape.

The creation of habitats such as attenuation features may also provide foraging opportunities for bats within the site. If all retained and created habitat is managed in accordance with a Landscape and Ecological Management Plan (LEMP) (see Chapter 6), this will ensure the maintenance of suitable foraging and commuting routes for the bat species found using the site and that the favourable conservation status of bats in the area is maintained.

### **5.3.3 Fragmentation of Habitat Due to Lighting**

Lighting is a key factor in determining the usage of a site by bat species. At present, the site is predominantly unlit and the proposed development will inevitably result in increased illumination at the site. Construction and operational phase lighting within the proposed development has the potential to generate light spill which could illuminate habitats used by bats. Insensitive lighting could disturb potential bat roosts, which could lead to delayed emergence or roost abandonment.

Illumination of bat foraging and commuting routes could result in reduced activity or habitat fragmentation and barrier effects. Furthermore, an increase in lighting which attracts insects to one area has the potential cause a reduction of insects elsewhere, for example in vegetated areas that bats may use for foraging (Gunnell et al, 2012).

Although an increase in lighting across the site would be unavoidable to accommodate the development, the lighting strategy should be designed to minimise the potential impact on bats utilising the site. Although other suitable habitat resources with connectivity to the site are present in the area, if any new lighting is proposed to illuminate the boundary features as part of the new development, this could impact local populations of bats by severing commute routes and reducing the suitability of potential foraging areas. A recommendation regarding lighting is made in Chapter 6.

## 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 Roosting Bats

The recommendations made within the Bat Surveys of Trees Report (Report RT-MME-154698-01 Rev C) must be adhered to.

### R2 Landscaping

The final layout of the proposed development should take into account the presence of valuable bat foraging and commuting features, particularly boundary hedgerows. Where feasible, important bat commuting and foraging features should be protected and incorporated into the layout of the site to maintain connectivity across the site and surrounding area.

Furthermore, it is recommended that a Landscape and Ecological Management Plan (LEMP) should be produced to ensure the features present at the site, which are of value to bats, are maintained to maximise their biodiversity potential. Where possible, retained habitats should be enhanced in order to minimise the potential impacts on foraging and commuting bats.

### R3 Lighting

In accordance with best practice guidance relating to lighting and biodiversity (Miles et al, 2018; Gunnell et al, 2012), any new lighting should be carefully designed to minimise potential disturbance and fragmentation impacts on sensitive receptors, such as bat species. Examples of good practice include:

- Avoiding the installation of new lighting in proximity to key ecological features, such as hedgerows.
- Using modern LED fittings rather than metal halide or sodium fittings, as modern LEDs emit negligible UV radiation.
- The use of directional lighting to reduce light spill, e.g. by installing bespoke fittings or using hoods or shields. For example, downlighting can be used to illuminate features such as footpaths whilst reducing the horizontal and vertical spill of light.
- Where the use of bollard lighting is proposed, columns should be designed to reduce horizontal light spill.
- Implementing controls to ensure lighting is only active when needed, e.g. the use of timers or motion sensors.
- Use of floor surface materials with low reflective quality. This will ensure that bats using the site and surrounding area are not affected by reflected illumination.
- For internal lights, recessed light fittings cause significantly less glare than pendant type fittings. The use of low-glare glass may also be appropriate where internal lighting has the potential to influence sensitive ecological receptors.

## 7. DRAWINGS

Drawing C154698-02-01 – Transect Route

Drawing C154698-02-02 – Transect Results, Spring 2021

Drawing C154698-02-03 – Transect Results, Summer Dusk 2021

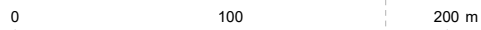
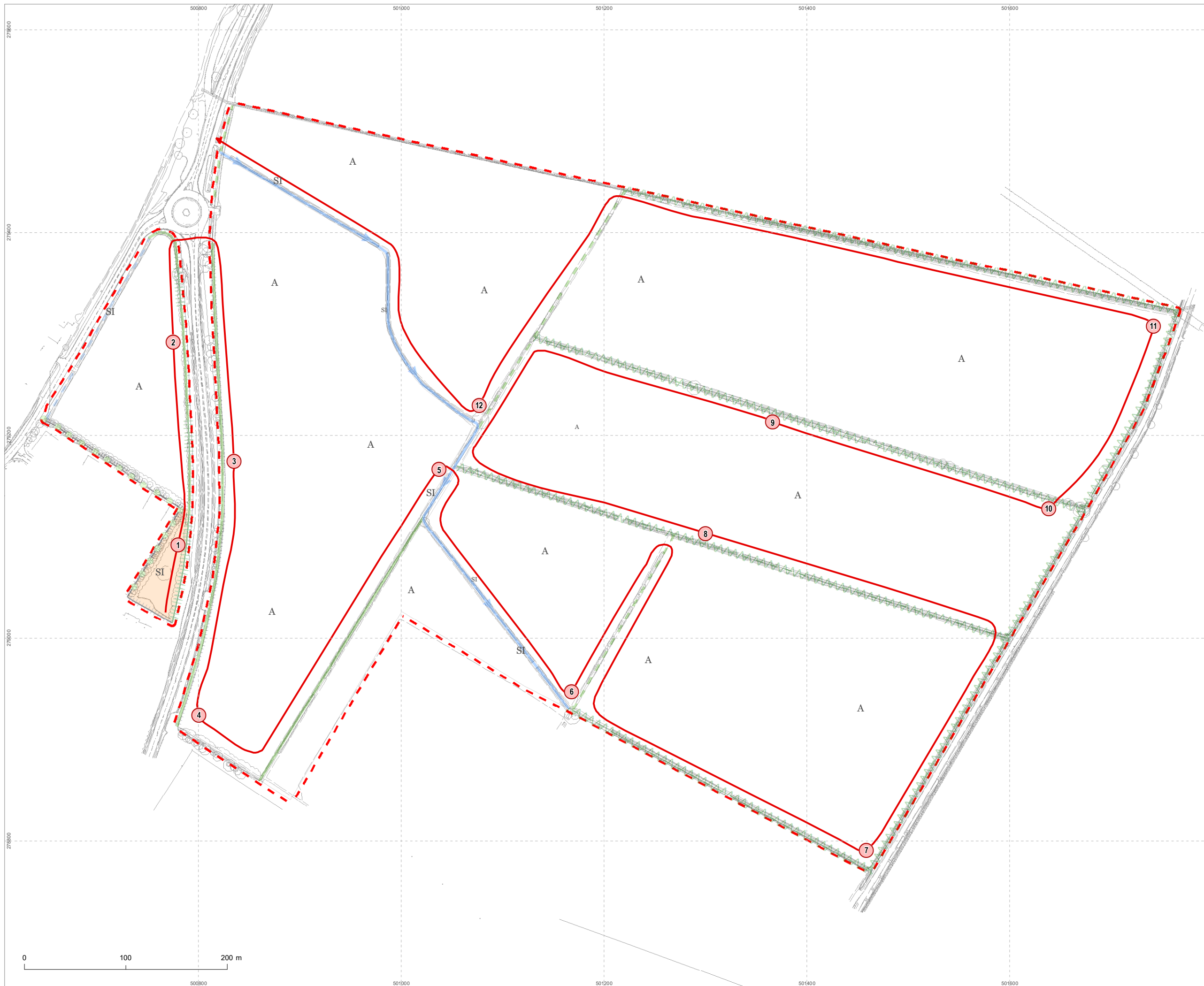
Drawing C154698-02-04 – Transect Results, Summer Dawn 2021

Drawing C154698-02-05 – Transect Results, Autumn 2021



**Legend**

- - - Site boundary
- # Stop Point
- Transect route
- Phase 1 Habitats:**
- Dry ditch
- Fence
- Line of coniferous trees
- Running water
- Species-poor defunct hedgerow
- Species-poor hedgerow with trees
- Species-poor intact hedgerow
- Species-rich defunct hedgerow
- A Arable
- SI Poor semi-improved grassland
- SI Semi-improved neutral grassland



Project		Thrapston, A14 Junction 13, Northamptonshire	
Drawing		Bat Activity Surveys	
Client		IM Properties	
Drawing Number	C154698-02-01	Revision	00
Scale @ A3	1:3,500	Date	November 2021
Approved By	HT	Drawn By	RP



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**Legend**

- Stop Point
- Transect route
- Static detector location
- Common pipistrelle
- Soprano pipistrelle
- Site boundary

**Total number of passes per spp on transect route:**  
 Common pipistrelle 3  
 Soprano pipistrelle 5

**Total number of passes per spp recorded on static detector:**  
 Common pipistrelle 5  
 Soprano pipistrelle 15  
 Brown long-eared bat  
 Noctule 22  
 Whiskered/Brandt's bat 2



Project  
 Thrapston, A14 Junction 13, Northamptonshire

Drawing  
**Bat Activity Surveys - Spring 2021**

Client  
**IM Properties**

Drawing Number C154698-02-02	Revision 00
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Scale @ A3 1:3,500	Date September 2022
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Approved By HT	Drawn By CD
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**Legend**

- Transect route
- # Stop Point
- Static detector location
- Common pipistrelle
- Nyctalus sp
- Serotine
- Soprano pipistrelle
- Site boundary

**Total number of passes per spp on transect route:**  
 Common pipistrelle 66  
 Soprano pipistrelle 6  
 Nyctalus sp 1  
 Serotine 1

**Total number of passes per spp recorded on static detector Dusk/Dawn:**  
 Common pipistrelle 147  
 Soprano pipistrelle 153  
 Noctule 28  
 Leisler's bat 1  
 Natterer's bat 2  
 Whiskered/Brandt's bat 2



Project Thrapston, A14 Junction 13, Northamptonshire	
Drawing Bat Activity Surveys - Summer Dusk 2021	
Client IM Properties	
Drawing Number C154698-02-03	Revision 00
Scale @ A3 1:3,500	Date September 2022
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**Legend**

-  Transect route
-  Stop Point
-  Static detector location
-  Common pipistrelle
-  Nyctalus sp
-  Soprano pipistrelle
-  Site boundary

**Total number of passes per spp on transect route:**  
 Common pipistrelle 56  
 Soprano pipistrelle 14  
 Nyctalus sp 1

**Total number of passes per spp recorded on static detector Dusk/Dawn:**  
 Common pipistrelle 147  
 Soprano pipistrelle 153  
 Noctule 28  
 Leisler's bat 1  
 Natterer's bat 2  
 Whiskered/Brand's bat 2



Project  
 Thrapston, A14 Junction 13, Northamptonshire

Drawing  
 Bat Activity Surveys - Summer Dawn 2021

Client  
 IM Properties

Drawing Number C154698-02-04	Revision 00
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Scale @ A3 1:3,500	Date September 2022
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**Legend**

-  Transect route
-  Stop Point
-  Static detector location
-  Common pipistrelle
-  Myotis sp
-  Soprano pipistrelle
-  Site boundary

**Total number of passes per spp on transect route:**  
 Common pipistrelle 41  
 Soprano pipistrelle 15  
 Myotis sp 1

**Total number of passes per spp recorded on static detector:**  
 Common pipistrelle 407  
 Soprano pipistrelle 528  
 Nathusius' Pipistrelle 1  
 Brown long-eared bat 6  
 Noctule 37  
 Leisler's bat 5  
 Daubenton's at 15  
 Natterer's bat 7  
 Whiskered/Brandt's bat 29  
 Barbastelle 1



Project  
Thrapston, A14 Junction 13, Northamptonshire

Drawing  
Bat Activity Surveys - Autumn 2021

Client  
IM Properties

Drawing Number C154698-02-05	Revision 00
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Scale @ A3 1:3,500	Date September 2022
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Approved By CW	Drawn By CD
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The Conservation of Habitats and Species Regulations 2017.

## APPENDICES

- APPENDIX 1: Overview of Relevant Legislation and Policy  
APPENDIX 2: Number of Bat Passes Recorded During the Manual Surveys (Tables A2.1-A2.4)  
APPENDIX 3: Number of Bat Passes Recorded During the Automated Surveys (Tables A3.1-A3.5)

## APPENDIX 1

### LEGISLATION

Bats and the places they use for shelter or protection (i.e. roosts) receive legal protection under the Conservation of Habitats and Species Regulations 2017 (Habitats Regulations 2017) and the Conservation of Habitats and Species Regulations (Amendment) (EU Exit) Regulations 2019 (Habitats Regulations 2019). 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 2017, 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 2017 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.

Changes have been made to parts of the Habitats Regulations 2017 so that they operate effectively from 1st January 2021. The changes are made by the Habitats Regulations 2019, which transfer functions from the European Commission to the appropriate authorities in England and Wales.

All other processes or terms in the 2017 Regulations remain unchanged and existing guidance is still relevant.

The obligations of a competent authority in the 2017 Regulations for the protection of species do not change. A competent authority is a public body, statutory undertaker, minister or department of government, or anyone holding public office.

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

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*. Species of Principal Importance for Nature Conservation in England are material considerations in the planning process. The list of species is derived from Section 41 list of the Natural Environment and Rural Communities (NERC) Act 2006.



## 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.

## APPENDIX 2

### MANUAL BAT ACTIVITY SURVEY RESULTS – RAW DATA

Stop Point	Time Band	Number of passes*	
		Common pipistrelle	Soprano pipistrelle
1	20:19-20:23	-	-
1-2	20:23-20:27	-	-
2	20:27-20:30	-	-
2-3	20:30-20:39	-	-
3	20:39-20:42	-	-
3-4	20:42-20:50	-	-
4	20:50-20:53	-	-
4-5	20:53-20:59	-	-
5	20:59-21:02	-	-
5-6	21:02-21:09	3	-
6	21:09-21:12	-	3
6-7	21:12-21:27	-	1
7	21:27-21:30	-	-
7-8	21:30-21:42	-	-
8	21:42-21:45	-	-
8-9	21:45-21:56	-	-
9	21:56-21:59	-	-
9-10	21:59-22:04	-	-
10	22:04-22:07	-	1
10-11	22:07-22:11	-	-
11	22:11-22:14	-	-
11-12	22:14-22:25	-	-
12	22:25-22:32	-	-
<b>Total</b>		<b>3</b>	<b>5</b>

\* Number of times a bat was detected passing a location, or the number of recordings on an Echometer. This could be a number of bats passing separately or a single bat passing a number of times.

**Table A2.1: Summary of Bat Passes Recorded during Manual Activity Survey, Spring 2021**

Stop Point	Time Band	Number of passes*			
		Common pipistrelle	Soprano pipistrelle	Nyctalus sp.	Serotine
12	21:25 – 21:37	-	-	-	-
12-11	21:37-21:52	-	-	-	-
11	21:52-21:55	-	-	-	-
11-10	21:55-22:03	-	-	-	-
10	22:03-22:06	-	-	-	-
10-9	22:06-22:10	-	-	-	-
9	22:10-22:13	-	-	-	-
9-8	22:13-22:32	5†	3	-	-
8	22:32-22:35	2	1	-	-
8-7	22:35-22:49	2	-	-	-
7	22:49-22:52	3	-	-	-
7-6	22:52-23:00	2	-	-	-
6	23:00-23:03	15	-	-	-
6-5	23:03-23:20	21†	1	-	-
5	23:20-23:23	-	-	-	-
5-4	23:23-23:36	-	1	1	1
4	23:36-23:39	1	-	-	-
4-3	23:39-23:45	-	-	-	-
3	23:45-23:48	-	-	-	-
3-2	23:48-00:00	-	-	-	-
2	00:00-00:03	-	-	-	-
2-1	00:03-00:07	4	-	-	-
1	00:07-00:13	11	-	-	-
<b>Total</b>		<b>66</b>	<b>6</b>	<b>1</b>	<b>1</b>

\* Number of times a bat was detected passing a location, or the number of recordings on an Echometer. This could be a number of bats passing separately or a single bat passing a number of times.

† Including social calls

**Table A2.2: Summary of Bat Passes Recorded during Manual Activity Survey, Summer (Dusk) 2021**

Stop Point	Time Band	Number of passes*		
		Common pipistrelle	Soprano pipistrelle	<i>Nyctalus</i> sp.
12	02:14-02:26	1	-	-
12-11	02:26-02:41	2	-	-
11	02:41-02:44	-	-	-
11-10	02:44-02:49	-	-	-
10	02:49-02:52	-	-	-
10-9	02:52-02:56	-	-	-
9	02:56-02:59	-	-	-
9-8	02:59-03:12	1	-	-
8	03:12-03:15	-	-	-
8-7	03:15-03:27	-	1	-
7	03:27-03:30	-	-	-
7-6	03:30-03:38	1	4	-
6	03:38-03:41	6	-	-
6-5	03:41-03:53	4	1	-
5	03:53-03:56	2	-	-
5-4	03:56-04:05	-	-	-
4	04:05-04:08	2	-	-
4-3	04:08-04:15	6	-	1
3	04:15-04:18	1	-	-
3-2	04:18-04:32	2	2	-
2	04:32-04:35	-	-	-
2-1	04:35-04:44	8	6	-
1	04:44-04:47	2	-	-
1 – End	04:47-04:51	18	-	-
<b>Total</b>		<b>56</b>	<b>14</b>	<b>1</b>

\* Number of times a bat was detected passing a location, or the number of recordings on an Echometer. This could be a number of bats passing separately or a single bat passing a number of times.

**Table A2.3: Summary of Bat Passes Recorded during Manual Activity Survey, Summer (Dawn) 2021**

Stop Point	Time Band	Number of passes*		
		Common pipistrelle	Soprano pipistrelle	<i>Myotis</i> sp.
Start – 1	18:59-19:00	-	-	-
1	19:00-19:03	-	-	-
1-2	19:03-19:06	-	-	-
2	19:06-19:09	-	-	-
2-3	19:09-19:19	-	-	-
3	19:19-19:22	-	-	-
3-4	19:22-19:26	-	-	-
4	19:26-19:29	-	-	-
4-5	19:29-19:39	-	1	-
5	19:39-19:42	-	-	-
5-6	19:42-19:49	3	-	-
6	19:49-19:52	-	2	-
6-7	19:52-20:05	10	5	-
7	20:05-20:08	2	2	1
7-8	20:08-20:23	9	3	-
8	20:23-20:26	-	-	-
8-9	20:26-20:37	1	-	-
9	20:37-20:40	1	-	-
9-10	20:40-20:47	4 <sup>†</sup>	-	-
10	20:47-20:50	2 <sup>†</sup>	-	-
10-11	20:50-20:56	6 <sup>†</sup>	-	-
11	20:56-20:59	-	-	-
11-12	20:59-21:08	1	2	-
12	21:08-21:11	2	-	-
12 – End	21:11-21:15	-	-	-
<b>Total</b>		<b>41</b>	<b>15</b>	<b>1</b>

\* Number of times a bat was detected passing a location, or the number of recordings on an Echometer. This could be a number of bats passing separately or a single bat passing a number of times.

<sup>†</sup> Including social calls

**Table A2.4: Summary of Bat Passes Recorded during Manual Activity Survey, Autumn 2021**

## APPENDIX 3

### AUTOMATED BAT ACTIVITY SURVEY RESULTS – RAW DATA

Date	Time	am / pm	Species				
			Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Noctule	Whiskered / Brandt's Bat
26-27/04/21	20:00	pm	4	2	0	1	0
	20:30		0	1	0	0	0
	21:00		0	0	0	0	0
	21:30		0	0	0	0	0
	22:00		0	3	0	0	0
	22:30		1	0	0	0	0
	23:00		0	0	0	0	0
	23:30		0	0	0	0	0
	00:00	am	0	0	0	0	0
	00:30		0	0	0	0	0
	01:00		0	0	0	0	0
	01:30		0	0	0	0	0
	02:00		0	0	0	0	0
	02:30		0	0	0	0	0
	03:00		0	0	0	0	0
	03:30		0	0	0	0	0
	04:00		0	0	0	0	0
	04:30		0	0	0	0	0
05:00	0	0	0	0	0		
05:30	0	0	0	0	0		
06:00	0	0	0	0	0		
			<b>5</b>	<b>6</b>	<b>0</b>	<b>1</b>	<b>0</b>
27-28/04/21	20:00	pm	0	0	0	0	0
	20:30		0	3	0	15	0
	21:00		0	0	0	0	0
	21:30		0	0	0	0	1
	22:00		0	1	0	0	0
	22:30		0	1	0	0	0
	23:00		0	1	0	0	0
	23:30		0	0	0	0	0
	00:00	am	0	0	0	0	1
	00:30		0	0	0	0	0
	01:00		0	0	0	0	0
	01:30		0	0	0	0	0
	02:00		0	0	0	0	0
	02:30		0	0	0	0	0
	03:00		0	0	0	0	0
	03:30		0	0	0	0	0
	04:00		0	0	0	0	0
	04:30		0	0	0	0	0
05:00	0	0	0	0	0		
05:30	0	0	0	0	0		
06:00	0	0	0	0	0		
			<b>0</b>	<b>6</b>	<b>0</b>	<b>15</b>	<b>2</b>
28-29/04/21	20:00	pm	0	0	0	0	0
	20:30		0	0	0	1	0
	21:00		0	1	0	3	0
	21:30		0	0	0	1	0
	22:00		0	0	0	0	0
	22:30		0	0	0	0	0
	23:00		0	0	0	0	0
	23:30		0	0	0	0	0
	00:00	am	0	0	0	0	0
	00:30		0	0	0	0	0
	01:00		0	0	0	0	0
	01:30		0	0	0	0	0
	02:00		0	0	0	0	0
	02:30		0	0	0	0	0
	03:00		0	0	0	0	0
	03:30		0	0	0	0	0
	04:00		0	0	0	0	0
	04:30		0	0	0	0	0
05:00	0	0	0	0	0		
05:30	0	0	0	0	0		
06:00	0	0	0	0	0		
			<b>0</b>	<b>1</b>	<b>0</b>	<b>5</b>	<b>0</b>

Table A3.1: Summary of Bat Passes Recorded during Spring (April) 2021 Automated Activity Survey (continues)

Date	Time	am / pm	Species				
			Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Noctule	Whiskered / Brandt's Bat
29-30/04/21 Sunset: 20:25 Sunrise: 05:33	20:00	pm	0	0	0	0	0
	20:30		0	0	0	1	0
	21:00		0	0	0	0	0
	21:30		0	0	1	0	0
	22:00		0	0	0	0	0
	22:30		0	2	0	0	0
	23:00		0	0	0	0	0
	23:30		0	0	0	0	0
	00:00	am	0	0	0	0	0
	00:30		0	0	0	0	0
	01:00		0	0	0	0	0
	01:30		0	0	0	0	0
	02:00		0	0	0	0	0
	02:30		0	0	0	0	0
	03:00		0	0	0	0	0
	03:30		0	0	0	0	0
	04:00		0	0	0	0	0
	04:30		0	0	0	0	0
	05:00		0	0	0	0	0
	05:30		0	0	0	0	0
06:00	0	0	0	0	0		
			<b>0</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>0</b>
30/04-01/05/2021 Sunset: 20:27 Sunrise: 05:31	20:00	pm	0	0	0	0	0
	20:30		0	0	0	0	0
	21:00		0	0	0	0	0
	21:30		0	0	0	0	0
	22:00		0	0	0	0	0
	22:30		0	0	0	0	0
	23:00		0	0	0	0	0
	23:30		0	0	0	0	0
	00:00	am	0	0	0	0	0
	00:30		0	0	0	0	0
	01:00		0	0	0	0	0
	01:30		0	0	0	0	0
	02:00		0	0	0	0	0
	02:30		0	0	0	0	0
	03:00		0	0	0	0	0
	03:30		0	0	0	0	0
	04:00		0	0	0	0	0
	04:30		0	0	0	0	0
	05:00		0	0	0	0	0
	05:30		0	0	0	0	0
06:00	0	0	0	0	0		
			<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

Table A3.1 (continued): Summary of Bat Passes Recorded during Spring (April) 2021 Automated Activity Survey

Date	Time	am / pm	Species					Whiskered / Brandt's Bat
			Common Pipistrelle	Soprano Pipistrelle	Noctule	Leisler's Bat	Natterer's Bat	
28-29/06/21	21:00	pm	0	0	0	0	0	0
	21:30		0	0	10	0	0	0
	22:00		8	3	11	0	0	1
	22:30		7	2	0	0	0	0
	23:00		4	3	0	0	0	0
	23:30		1	1	0	0	0	0
	00:00	am	1	0	0	0	0	0
	00:30		1	0	0	0	0	0
	01:00		2	0	0	0	0	0
	01:30		1	1	0	0	0	0
	02:00		0	0	0	0	0	0
	02:30		0	0	0	0	0	0
	03:00		0	0	1	0	0	0
	03:30		4	2	0	0	0	0
	04:00		0	0	0	0	0	0
	04:30		0	0	0	0	0	0
05:00	0	0	0	0	0	0		
<b>Total</b>			<b>29</b>	<b>12</b>	<b>22</b>	<b>0</b>	<b>0</b>	<b>1</b>
29-30/06/21	21:00		0	0	0	0	0	0
	21:30		0	0	0	0	0	0
	22:00		0	1	3	0	0	0
	22:30		3	6	0	0	0	0
	23:00		5	9	0	0	0	0
	23:30		1	13	0	0	1	0
	00:00	am	1	3	0	0	0	0
	00:30		0	0	0	0	0	0
	01:00		1	1	0	0	0	0
	01:30		0	1	0	0	0	0
	02:00		0	0	0	0	0	0
	02:30		0	2	0	0	0	0
	03:00		0	1	0	0	0	0
	03:30		32	1	0	0	0	0
	04:00		3	0	0	0	0	0
	04:30		0	0	0	0	0	0
05:00	0	0	0	0	0	0		
<b>Total</b>			<b>46</b>	<b>38</b>	<b>3</b>	<b>0</b>	<b>1</b>	<b>0</b>
30/06-01/07/21	21:00		0	0	0	0	0	0
	21:30		0	0	0	0	0	0
	22:00		2	7	2	0	0	0
	22:30		18	27	0	0	0	0
	23:00		4	10	0	0	0	0
	23:30		0	6	0	0	0	0
	00:00	am	1	2	0	0	0	0
	00:30		0	0	0	0	0	0
	01:00		1	0	0	0	0	0
	01:30		0	0	0	0	0	0
	02:00		0	1	0	0	0	0
	02:30		0	0	0	0	0	0
	03:00		0	0	0	0	0	0
	03:30		0	0	0	0	0	0
	04:00		0	0	0	0	0	0
	04:30		0	0	0	0	0	0
05:00	0	0	0	0	0	0		
<b>Total</b>			<b>26</b>	<b>53</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>

Table A3.2: Summary of Bat Passes Recorded during Summer (June-July) 2021 Automated Activity Survey (continues)



Date	Time	am / pm	Species					Whiskered / Brandt's Bat
			Common Pipistrelle	Soprano Pipistrelle	Noctule	Leisler's Bat	Natterer's Bat	
01-02/07/21  Sunset: 21:27  Sunrise: 04:45	21:00		0	0	0	0	0	0
	21:30		0	0	0	0	0	0
	22:00		1	1	0	0	0	0
	22:30		6	0	0	0	0	0
	23:00		3	5	0	0	0	0
	23:30		1	2	0	0	0	0
	00:00	am	0	1	0	0	0	0
	00:30		0	0	0	0	0	0
	01:00		0	1	0	0	0	0
	01:30		1	0	0	0	0	0
	02:00		0	0	0	1	0	0
	02:30		0	0	0	0	0	0
	03:00		2	0	0	0	0	0
	03:30		10	4	0	0	0	0
	04:00		0	0	0	0	0	0
	04:30		0	0	0	0	0	0
	05:00		0	0	0	0	0	0
<b>Total</b>			<b>24</b>	<b>14</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>
02-03/07/2021  Sunset: 21:26  Sunrise: 04:45	21:00		0	0	0	0	0	0
	21:30		0	0	0	0	0	0
	22:00		2	5	1	0	0	0
	22:30		1	3	0	0	0	0
	23:00		4	8	0	0	0	0
	23:30		4	5	0	0	0	0
	00:00	am	0	3	0	0	0	0
	00:30		0	4	0	0	0	0
	01:00		0	2	0	0	0	0
	01:30		0	3	0	0	0	1
	02:00		0	1	0	0	1	0
	02:30		1	1	0	0	0	0
	03:00		3	0	0	0	0	0
	03:30		7	1	0	0	0	0
	04:00		0	0	0	0	0	0
	04:30		0	0	0	0	0	0
	05:00		0	0	0	0	0	0
<b>Total</b>			<b>22</b>	<b>36</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>1</b>

Table A3.2 (continued): Summary of Bat Passes Recorded during Summer (June-July) 2021 Automated Activity Survey

Date	Time	am / pm	Species										
			Common Pipistrelle	Soprano Pipistrelle	Nathusius' Pipistrelle	Brown Long-eared Bat	Noctule	Leisler' s Bat	Daubenton' s Bat	Natterer' s Bat	Whiskered / Brandt' s Bat	Barbastelle	
15-16/09/21	19:00	pm	0	0	0	0	0	0	0	0	0	0	0
	19:30		1	7	0	0	5	0	0	0	0	0	
	20:00		20	15	0	0	4	0	0	0	2	0	
	20:30		5	13	0	0	0	1	0	0	0	0	
	21:00		4	4	0	0	0	0	0	0	1	0	
	21:30		2	4	0	0	2	0	0	0	1	0	
	22:00		0	1	0	1	0	0	0	0	0	0	
	22:30		0	0	0	0	1	0	0	0	2	0	
	23:00		0	1	0	0	0	0	0	0	2	0	
	23:30		0	0	0	1	0	0	0	0	0	0	
	00:00	am	0	2	0	0	0	0	0	0	1	0	
	00:30		0	0	0	0	0	0	0	0	0	0	
	01:00		0	1	0	0	0	1	0	0	2	0	
	01:30		0	0	0	0	3	0	0	0	0	0	
	02:00		0	0	0	0	0	0	0	0	1	0	
	02:30		0	0	0	0	0	0	0	3	0	0	
	03:00		0	2	0	0	0	0	0	0	0	0	
	03:30		0	0	0	0	0	0	0	0	0	0	
	04:00		0	0	0	0	0	0	0	0	0	0	
	04:30		0	0	0	0	0	0	0	0	0	0	
	05:00	0	0	0	0	0	0	0	0	1	0		
05:30	0	2	0	0	0	0	0	0	0	0			
06:00	0	0	0	0	0	0	0	0	0	0			
06:30	0	0	0	0	0	0	0	0	0	0			
07:00	0	0	0	0	0	0	0	0	0	0			
<b>Total</b>			<b>32</b>	<b>52</b>	<b>0</b>	<b>2</b>	<b>15</b>	<b>2</b>	<b>0</b>	<b>3</b>	<b>13</b>	<b>0</b>	
16-17/09/21	19:00	pm	0	0	0	0	0	0	0	0	0	0	
	19:30		0	0	0	0	0	0	0	0	0	0	
	20:00		7	18	0	0	0	0	0	0	4	0	
	20:30		4	0	0	0	0	0	0	0	0	0	
	21:00		0	1	0	0	0	0	0	0	0	0	
	21:30		0	2	0	0	0	0	0	0	0	0	
	22:00		0	4	0	0	0	0	0	0	0	0	
	22:30		1	1	0	0	0	2	1	0	0	0	
	23:00		0	0	0	0	0	0	0	0	0	0	
	23:30		0	0	0	0	0	1	1	0	0	0	
	00:00	am	1	0	0	0	0	0	2	0	0	0	
	00:30		0	0	0	0	0	0	0	0	2	0	
	01:00		0	0	0	0	0	0	0	0	0	0	
	01:30		0	1	0	0	0	0	0	0	0	0	
	02:00		0	0	0	0	0	0	0	0	0	0	
	02:30		0	0	0	0	1	0	0	0	0	0	
	03:00		0	0	0	0	0	0	0	1	0	0	
	03:30		0	0	0	0	0	0	1	0	0	0	
	04:00		0	0	0	0	0	0	0	0	0	0	
	04:30		0	0	0	0	0	0	0	0	1	0	
	05:00	0	0	0	0	0	0	0	0	0	0		
05:30	0	6	0	0	0	0	0	0	0	0			
06:00	0	0	0	0	0	0	0	0	0	0			
06:30	0	0	0	0	0	0	0	0	0	0			
07:00	0	0	0	0	0	0	0	0	0	0			
<b>Total</b>			<b>13</b>	<b>33</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>3</b>	<b>5</b>	<b>1</b>	<b>7</b>	<b>0</b>	

Table A3.3: Summary of Bat Passes Recorded during Autumn (September) 2021 Automated Activity Survey (continues)

Date	Time	am / pm	Species										
			Common Pipistrelle	Soprano Pipistrelle	Nathusius' Pipistrelle	Brown Long-eared Bat	Noctule	Leisler' s Bat	Daubenton' s Bat	Natterer' s Bat	Whiskered / Brandt' s Bat	Barbastelle	
17-18/09/21	19:00	pm	0	0	0	0	0	0	0	0	0	0	0
	19:30		2	8	0	0	0	0	0	0	0	0	0
	20:00		33	8	0	0	0	0	1	0	0	0	0
	20:30		1	7	0	0	1	0	0	0	0	0	0
	21:00		2	0	0	0	0	0	0	0	0	0	0
	21:30		0	3	0	0	0	0	0	0	0	0	0
	22:00		0	2	0	0	0	0	0	0	0	0	0
	22:30		0	2	0	0	0	0	0	1	0	0	0
	23:00		0	2	0	0	0	0	0	0	0	0	0
	23:30		0	4	0	0	0	0	1	0	1	0	0
	00:00	am	0	0	0	0	0	0	0	0	0	0	0
	00:30		1	1	0	0	0	0	0	0	0	0	0
	01:00		0	0	0	0	0	0	0	0	0	0	0
	01:30		0	0	0	0	0	0	0	0	0	0	0
	02:00		0	0	0	0	2	0	0	0	0	0	0
	02:30		0	0	0	0	0	0	0	0	0	0	0
	03:00		0	0	0	0	0	0	0	1	0	0	0
	03:30		0	0	0	0	0	0	0	0	0	0	0
	04:00		0	0	0	0	0	0	0	0	0	0	0
	04:30		0	1	0	0	0	0	0	0	0	0	0
	05:00	0	0	0	0	0	0	0	0	0	0	0	
05:30	0	10	0	0	1	0	0	0	0	0	0		
06:00	0	0	0	0	0	0	0	0	0	0	0		
06:30	0	0	0	0	0	0	0	0	0	0	0		
07:00	0	0	0	0	0	0	0	0	0	0	0		
<b>Total</b>			<b>39</b>	<b>48</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>0</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>0</b>	
18-19/09/21	19:00	pm	0	0	0	0	0	0	0	0	0	0	
	19:30		17	7	0	0	2	0	0	0	0	0	
	20:00		27	7	0	1	1	0	0	0	1	0	
	20:30		46	8	0	0	0	0	0	0	0	0	
	21:00		0	14	0	0	0	0	0	0	0	0	
	21:30		0	1	0	0	1	0	0	0	0	1	
	22:00		0	1	0	0	0	0	0	0	0	0	
	22:30		1	4	0	0	0	0	0	0	0	0	
	23:00		1	0	0	0	0	0	1	0	0	0	
	23:30		1	0	0	0	0	0	0	1	0	0	
	00:00	am	0	2	0	0	0	0	0	0	0	0	
	00:30		0	2	0	0	0	0	0	0	0	0	
	01:00		0	1	0	1	0	0	0	0	0	0	
	01:30		0	3	0	0	2	0	0	0	0	0	
	02:00		0	3	0	0	0	0	0	0	0	0	
	02:30		0	1	0	0	2	0	0	0	0	0	
	03:00		0	2	0	0	0	0	0	0	0	0	
	03:30		5	0	0	0	0	0	1	0	2	0	
	04:00		1	0	1	0	0	0	0	0	0	0	
	04:30		0	7	0	0	0	0	0	0	0	0	
	05:00	0	6	0	0	0	0	0	0	1	0		
05:30	1	7	0	0	0	0	0	0	0	0			
06:00	1	0	0	0	0	0	0	0	0	0			
06:30	0	0	0	0	0	0	0	0	0	0			
07:00	0	0	0	0	0	0	0	0	0	0			
<b>Total</b>			<b>101</b>	<b>76</b>	<b>1</b>	<b>2</b>	<b>8</b>	<b>0</b>	<b>2</b>	<b>1</b>	<b>4</b>	<b>1</b>	

Table A3.3 (continued): Summary of Bat Passes Recorded during Autumn (September) 2021 Automated Activity Survey (continues)

Date	Time	am / pm	Species										
			Common Pipistrelle	Soprano Pipistrelle	Nathusius' Pipistrelle	Brown Long-eared Bat	Noctule	Leisler' s Bat	Daubenton' s Bat	Natterer' s Bat	Whiskered / Brandt' s Bat	Barbastelle	
19-20/09/21	19:00	pm	0	0	0	0	2	0	0	0	0	0	
	19:30		11	31	0	0	0	0	0	0	0	0	
	20:00		63	40	0	0	2	0	3	0	2	0	
	20:30		17	70	0	0	0	0	0	0	0	0	
	21:00		19	21	0	0	0	0	0	0	0	0	
	21:30		55	41	0	0	0	0	1	0	0	0	
	22:00		13	17	0	0	0	0	0	0	0	0	
	22:30		13	11	0	0	2	0	0	0	1	0	
	23:00		5	9	0	0	0	0	0	0	0	0	
	23:30		0	12	0	0	0	0	0	0	1	0	
	00:00	am	8	35	0	0	0	0	0	0	0	0	
	00:30		1	16	0	1	2	0	1	0	0	0	
	01:00		8	7	0	0	0	0	0	0	0	0	
	01:30		7	5	0	0	0	0	1	0	0	0	
	02:00		0	2	0	0	0	0	0	0	0	0	
	02:30		2	1	0	0	0	0	0	0	0	0	
	03:00		0	0	0	0	0	0	0	0	0	0	
	03:30		0	1	0	0	0	0	0	0	0	0	
	04:00		0	0	0	0	0	0	0	0	0	0	
	04:30		0	0	0	0	1	0	0	0	0	0	
	05:00	0	0	0	1	0	0	0	0	0	0		
	05:30	0	0	0	0	0	0	0	0	0	0		
	06:00	0	0	0	0	0	0	0	0	0	0		
	06:30	0	0	0	0	0	0	0	0	0	0		
	07:00	0	0	0	0	0	0	0	0	0	0		
	<b>Total</b>			<b>222</b>	<b>319</b>	<b>0</b>	<b>2</b>	<b>9</b>	<b>0</b>	<b>6</b>	<b>0</b>	<b>4</b>	<b>0</b>

Table A3.3 (continued): Summary of Bat Passes Recorded during Autumn (September) 2021 Automated Activity