M3 Junction 9 Improvement

Scheme Number: TR010055

6.3 Environmental Statement Appendix 8.1b - Bat Activity Survey Report 2017

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6.3 ENVIRONMENTAL STATEMENT- APPENDIX 8.1b: BAT ACTIVITY SURVEY REPORT 2017

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M3 JUNCTION 9 IMPROVEMENT SCHEME

BAT ACTIVITY SURVEY REPORT

Highways England

First Issue

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EXECUTIVE SUMMARY

M3 Junction 9 has been highlighted as requiring redevelopment in order to help reduce congestion. This will be achieved by improving the flow of traffic, and three options are currently being considered for implementation (the 'Proposed Works').

In order to gather baseline data with regards to the bat community in the area, a suite of surveys were carried out between June and October 2017, which involved walked transects and deployment of static bat detectors. A 'Survey Area' was defined that encompassed the three options' maximum extent of works ('the Site') plus a 250m buffer.

This work has established that the Survey Area supports a range of species, dominated by largely common species, though rarer species do occur on occasion and several Species of Principal Importance as listed in Section 41 of the NERC Act 2016 were recorded. In particular, high level of activity from *Myotis* species bats was noted. This group, which cannot easily be identified to species level based on call parameters, includes some rare species. The static detectors revealed that much of the foraging activity is concentrated in and around the fields to the centre of the Site located between the A34 and M3, to the south of the River Itchen. The River Itchen is also likely to offer foraging habitat for a range of bat species.

Once the final route is selected, it is recommended that additional analysis of the call data and/ or additional surveys are carried out in order to obtain further information with regard to the use of the area by *Myotis* species. Indicatively, further surveys would involve two visits May-September inclusive, avoiding June to mid-July (when young bats are born).

The Proposed Works are likely to negatively affect bats to some degree and therefore it is advised that mitigation and compensation measures are included within detailed designs. These include the sensitive design of necessary lighting and including habitats within landscape design to benefit bats. It may be appropriate to consider provision of compensatory habitat in an off-site area.

1 INTRODUCTION

1.1 PROJECT BACKGROUND

1.1.1 Junction 9 of the M3 is a key transport interchange on the strategic road network which connects South Hampshire and the wider sub-region, with London via the M3 and the Midlands via the A34 (which also links to the principal east-west A303 corridor). A large volume of traffic currently uses the interchange (approximately 6,000 vehicles per hour during the peak periods), which acts as a bottleneck on the local and strategic highway network, causing significant delays. M3 Junction 9 has been proposed for redevelopment in order to help reduce congestion around this stretch of the road by improving the flow of traffic.

1.1.2 Three options have been taken forward to Project Control Framework (PCF) Stage 2 to be assessed within the Environmental Assessment Report (EAR), namely:

- Option 14: 100kph Three-Step Relaxation Under M3 Free Flow Design;
- Option 16B: Incremental Delivery – Northbound A34 Free Flow Link;
- Option 16C: Incremental Delivery – Southbound A34 Free Flow Link.

1.1.3 Further details of the Proposed Works are presented within the PCF Stage 2 EAR (HE551511-WSP-GEN-M3J9PCF2-RP-LE-00041). The anticipated maximum extent of the works for all options is shown on Figure 1-1, and is hereafter referred to as 'the Site'.

1.1.4 For the purposes of ecological assessment, in order to consider indirect effects on adjacent/nearby receptors, a Survey Area of 250m around the Site was defined.

1.2 ECOLOGICAL BACKGROUND

1.2.1 An ecological desk study was carried out with respect to the Proposed Works by WSP in 2016 to gain an ecological background of the surrounding area using a 5km search radius (WSP, 2016). No records of bats were found from within the Site. A total of seven species were however, identified within a 5km radius: Daubenton's bat *Myotis daubentonii*; Natterer's bat *Myotis nattereri*; noctule bat *Nyctalus noctula*; brown long-eared bat *Plecotus auritus*; common pipistrelle *Pipistrellus pipistrellus*; soprano pipistrelle *Pipistrellus pygmaeus* and serotine *Eptesicus serotinus*. The closest bat record represents a soprano pipistrelle, located 20m south-east from the Site, with all others more than 350m away from Site.

1.2.2 A broad suite of baseline ecological surveys are being undertaken by WSP during 2017, including a Phase 1 habitat survey, which was used to identify areas of potential value to foraging and commuting bats and inform the design of the bat activity surveys,

1.2.3 The Survey Area, which is traversed by several roads, includes a range of habitats. East of the M3, the landscape is dominated by arable land, with associated hedgerows and parcels of broadleaved woodland. The central area between the three major roads (A34, A33 and M3) also contains a variety of habitats, including grazed semi-improved pastures and several semi-natural and plantation broadleaved woodlands. The majority of woodland is located within the highway boundary. The River Itchen passes through the north and west of the Survey Area flowing in a south-westerly direction and is characterised by a number of interconnected channels with associated wetland and flood meadow grasslands.

1.3 BRIEF AND OBJECTIVES

1.3.1 Highways England commissioned WSP UK Ltd to complete bat activity surveys of the Survey Area. The brief was to:

- Complete a bat activity survey comprising repeated manual transect surveys and the deployment of automated bat detectors to identify the species of bat active on Site, and provide an indication of relative activity levels;
- Provide an initial appraisal of the likely conservation value of the bat assemblage present and make recommendations as to how proposals should account for bats with respect to legislation, planning and biodiversity policy.

1.3.2 The methods and results of this survey, and subsequent recommendations, are included within this report.

2 METHODOLOGY

2.1 WALKED TRANSECT SURVEY

2.1.1 The activity transect surveys were carried out with consideration of the relevant industry standard guidance (Collins, 2016). The Survey Area includes habitats which are of low suitability (arable land) and habitats which are of high suitability (River Itchen corridor) for foraging bats. The Survey Area overall therefore is likely to be of moderate suitability.

2.1.2 The walked transect surveys involved walking two transect routes. These were selected to sample a representative range of habitats within the Survey Area, which took in the Site and a buffer 250m around it. The transect routes are shown on Figure 2-1.

2.1.3 Monthly visits were made to these transects at dusk between late May and September 2017. An additional dawn transect was carried out in late August 2017. On each survey visit, the direction of travel and where possible, the starting points, were changed to ensure that different parts of the Survey Area were surveyed at different times of the night.

2.1.4 Bat activity was recorded using EM3 full spectrum detectors. These automatically record all bat passes detected, which significantly reduces the chances that bats could be missed due to human error. Wherever possible, surveyors recorded the observed behaviour and numbers of bats onto a standard field pro forma. This was to aid identification and also to provide additional detail on the behaviour of observed bats such as direction of flight and type of activity (e.g. foraging or commuting). Field notes included a record of the time of each bat encounter, allowing results to be cross-referenced with the recorded data.

2.2 STATIC DETECTOR SURVEYS

2.2.1 Static detectors were employed between early June and mid-October 2017. A total of six detectors were deployed in the Survey Area in representative locations. These are shown in Figure 2-1. A total of five deployment periods were covered, with two periods in June and monthly deployments thereafter. The early June deployment was considered a proxy for May data.

2.2.2 Each deployment was set to cover a minimum of five nights, though some technical malfunctions resulted in fewer nights being covered on some occasions. Where data gathering fell below the required amount, measures were undertaken to rectify the situation; these instances are outlined below (see Section 2.4).

2.2.3 The static detectors consisted of Wildlife Acoustics Song Meter 2 (SM2) bat detectors. These detectors are full spectrum detectors that are triggered automatically to record bat echolocation calls. These detectors can be deployed and left to remotely record bat activity for a period of several nights.

DATA ANALYSIS

2.2.4 Bat calls were analysed using Analook software to allow identification of the bat species present, where possible, and their relative levels of activity. For the purpose of the analysis a bat pass is defined as a single, uninterrupted sequence of echolocation calls lasting a maximum of 10 seconds (SM2 detectors).

2.2.5 For *Pipistrellus* species, the following criteria based on measurements of peak frequency are used to classify calls:

- Common pipistrelle *Pipistrellus pipistrellus* ≥ 42 and <49KHz
- Soprano pipistrelle *Pipistrellus pygmaeus* ≥ 51KHz
- Nathusius pipistrelle *Pipistrellus nathusii* < 39KHz
- Common / soprano pipistrelle ≥49 and <51KHz
- Common / Nathusius' pipistrelle ≥39 and <42KHz

2.2.6 In addition, the following categories are used for calls which cannot be identified with confidence due to the overlap in call characteristics between species or species groups:

- *Myotis sp.* (to include six possible species: Daubenton's bat *M. daubentonii*, Natterer's bat *M. nattereri*, whiskered *M. mystacinus*, Brandt's bat *M. brandtii*, alcathoe bat *M. alcathoe*, and/or Bechstein's bat *M. bechsteinii*)
- *Myotis / Plecotus* sp. (*Myotis* or brown long-eared bat *Plecotus auritus*. It is assumed that all *Plecotus* passes will be that of a brown long-eared bat rather than grey long-eared *Plecotus austriacus* because the Site is outside grey long-eared bat's known natural range (Harris & Yalden, 2008).
- *Nyctalus* sp. (either Leisler's bat *Nyctalus leisleri* or noctule *Nyctalus noctula*).
- Serotine *Eptesicus serotinus* / Leisler's bat.
- Serotine / *Nyctalus sp.*

DATES AND PERSONNEL

2.2.7 A total of five dusk visits were made to each transect and an additional dawn visit was undertaken in August (totalling six visits to each transect). Each transect was walked by a team of two ecologists. The dusk surveys started 15 minutes before sunset and finished two hours after sunset. The dawn transects were started two hours before sunrise and finished at sunrise. The survey dates, timings and weather conditions during the survey visits are detailed in Table 2-1.

Table 2-1 Survey dates, timings and weather conditions

DATE	TRANSECT	START TIME	END TIME	WEATHER CONDITIONS SUMMARY
31 May 2017	2	20:50	23:10	Light breeze, largely clear skies, dry conditions, temperature: 20° C.
1 June 2017	1	20:50	23:10	Light breeze, largely clear skies, dry conditions.
26 June 2017	1 & 2	21:09	23:24	Calm, largely clear skies, dry conditions, temperature: 16-14° C.
24 July 2017	1 & 2	20:50	23:28	Light breeze, clear skies, dry conditions, temperature: 16-15° C.
21 August 2017	1 & 2	19:59	22:14	Calm, light cloud cover, dry conditions, temperature: 22° C.
22 August 2017	1 & 2	04:00	06:05	Light breeze, overcast sky, dry conditions, light mist, temperature: 19° C
25 September 2017	1 & 2	18:45	20:59	Calm, overcast sky, dry conditions, temperature: 16° C.

2.2.8 The surveys were completed by experienced bat surveyors. They all have extensive consultancy experience and have undertaken bat survey work to inform the planning applications for a range of types of projects.

2.3 EVALUATION

2.3.1 The value of the Survey Area for bats was evaluated using the CIEEM guidance. This guidance recommends that valuation of site importance is made with reference to a geographical framework, for example a site is of local, regional, national value etc. To inform this assessment, the species assemblage and relative levels of activity recorded on Site were considered in the context of national abundance and geographical range of the species concerned. Consideration has also been given to which habitats/parts of the Survey Area are of highest value.

2.4 NOTES AND LIMITATIONS

2.4.1 On some occasions, the survey effort undertaken and the data gathered were either slightly short of five nights or were gathered in subsequent months to compensate for technical issues. In summary these were as follows:

- Locations 1, 2, 3, 4 and 6: Four nights of data was obtained in early June. This was compensated for by obtaining seven nights of data in late June with the exception of Location 4. At this location the late June deployment failed and five nights were gathered in mid-July. This is not likely to have resulted in any limitations with regards to the robustness of the data gathered.
- Location 6: four nights of data was gathered in July, however as an extra night of data was gathered in June, this is not likely to have resulted in any limitations with regards to the robustness of the data gathered.
- Location 1: A total of four nights of data was gathered in August. However eight nights of data was gathered for Locations 2-5 in August. An extra day of data was recorded for this location in September. Therefore, this is not likely to have resulted in any limitations with regards to the robustness of the data gathered.
- Locations 2 and 4: due to a technical malfunction, no data was gathered in September, however static detectors were redeployed at these locations in early October for five nights. Therefore, this is not likely to have resulted in any limitations with regards to the robustness of the data gathered.

2.4.2 Overall these variations are not likely to have resulted in a significant limitation to the survey as during the survey period, over 25 nights of data was gathered for all static detector locations.

3 RESULTS

3.1.1 WALKED TRANSECT SURVEYS

3.1.2 The transect surveys revealed the presence of several relatively common and widespread bat species, such as common pipistrelle, soprano pipistrelle and noctule. Very few recordings of other species such as serotine or Leisler's bat were noted during these surveys. The levels of activity recorded across the survey period showed little variation.

3.1.3 On Transect 1 (T1), activity was recorded along much of the route. The results did not indicate pronounced concentrations of activity in any one location. Observations were more frequent along the boundaries of the two pasture fields sampled by the transect (north and south of static detector Location 5) than the narrow path along which the transect runs approximately parallel to the River Itchen through dense woodland habitats. Small numbers of noctule and serotine were recorded in the fields with six confirmed observations of noctule throughout the survey period and serotine being observed on one occasion in September, though multiple passes (at least three recorded to allow identification) were noted adjacent to the northern edge of the northern field. *Myotis* passes were also recorded occasionally, with several along the River Itchen or in its vicinity across the survey period. Common pipistrelle and soprano pipistrelle were observed more frequently. The activity within the fields appeared higher along the western and southern edges of the northern field and occasionally in the southern corner of the southern field adjacent to a block of woodland. Both these areas are more sheltered and are likely to offer better foraging opportunities than the more exposed eastern edge which is on higher ground and adjacent to the M3.

3.1.4 The surveys along Transect 2 (T2) revealed very limited bat activity north of Easton Lane. This area is dominated by open arable land with little or no set aside. It is therefore likely that the invertebrate community in this area is very limited and as a result, foraging resource for bats is limited. The exposed nature of the areas covered by this transect is also likely to be a contributing factor in the lower levels of foraging activity compared to other areas sampled. Low levels of activity were recorded along Easton Lane itself, despite supporting unlit hedgerows on both sides, which are relatively well screened from the artificial light originating from the junction of the M3 and A34 (located at the western end of the lane). The habitats south of this lane include larger areas of set aside and a young, sparse plantation woodland belt, though this is located along a ridge and therefore relatively exposed. From here the land drops away south into a small valley, along which the southern part of T2 runs. This includes an unpaved track with widely spaced patches of scrub and small trees. The majority of the recordings noted during the walked transect surveys on T2 were along this track and the western edge of this southern field. The species recorded included much the same community as recorded along T1. Common and soprano pipistrelle were the most frequently recorded species with small numbers of *Myotis* and noctule being recorded. Serotine was recorded more frequently than on T1 though still with no more than seven observations.

3.1.5 In terms of the timing of the earliest recordings, the September visit to T1 revealed that a soprano pipistrelle and a *Myotis* bat were present foraging under the eastern part of the two large bridges which span the Itchen at 6 minutes after sunset. During the August visit to T2, four common pipistrelles were recorded moving north into the Survey Area along the western edge of the southernmost field between 25 and 34 minutes after sunset. As this timing coincides with the period in which common pipistrelles are known to emerge from their roosts; it is assumed that a roost is present to the south of the Survey Area.

3.1.6 Other early recordings included noctule 18 minutes after sunset on T1 in the north-eastern corner of the northern field on the early June visit, and several common pipistrelles approximately 20 minutes after sunset recorded in the northern field of T1 in July.

3.1.7 Based on the data set out above, the more valuable areas for foraging activity identified as a result of the transect are the River Itchen and associated habitats along the northern part of T1, the western, southern and (potentially) the northern edges of the two fields covered by T1, the western edge of the southern field covered by T2 (also seemingly a commuting route for common pipistrelle) and the lane along the southern edge of T2.

3.2 STATIC DETECTOR SURVEYS

3.2.1 The following tables set out summaries of the data gathered between June and October 2017 through the use of static detectors. Table 3-1 sets out the number of passes by each species recorded at each static detector location. Table 3-2 sets out the number of passes by each species, across the whole Survey Area, in each period of the night. This shows how the activity within the Survey Area is distributed through the night and whether early or late recordings (close to sunset or sunrise) indicate the presence of nearby roosts. Table 3-3 details the number of passes per night for each species at each location.

Table 3-1 Number of passes per species at each location

SPECIES	LOCATION 1	LOCATION 2	LOCATION 3	LOCATION 4	LOCATION 5	LOCATION 6	TOTAL
Common pipistrelle	42	806	391	415	1878	257	**3789**
Soprano pipistrelle	33	120	69	626	2378	221	**3447**
Noctule	172	158	56	200	192	291	**1069**
Serotine	3	89	104	2	1092	71	**1361**
Greater horseshoe bat	0	0	0	0	2	0	**2**
Barbastelle bat	0	5	0	0	1	4	**10**
Leisler's bat	1	7	9	0	21	8	**46**
Long eared bat sp.	0	9	3	0	18	15	**45**
Myotis sp	8	24	982	92	274	381	**1761**
Nathusius' pipistrelle	0	1	0	0	2	0	**3**
Noctule / Leisler's bat	1	0	0	0	0	0	**1**
PI-40[1]		3	5	1	2	1	**12**
PI-50[1]	6	124	12	116	2808	50	**3116**
Plecotus / Myotis	0	0	0	0	0	1	**1**
Nyctalus sp	10	15	11	20	28	27	**111**
Common / Soprano pipistrelle	3	0	0	0	0	0	**3**
Serotine / *Nyctalus* sp	1	3	6	0	16	5	**31**
Grand Total	**280**	**1364**	**1648**	**1472**	**8712**	**1332**	**14808**

[1] These are recordings of pipistrelle which could not be attributed with certainty to a single species but that show a closer association to either 40 kHz (common pipistrelle / Nathusius' pipistrelle) or 50 kHz (soprano pipistrelle).

Table 3-2 Number of passes per species during the distinct night periods

Species	Between sunrise and sunset	Time after sunset						Night period	Time before sunrise					
		0 – 20 mins	21 – 40 mins	41-60 mins	61-80 mins	81-100 mins	101-120 mins		120-101 mins	100-81 mins	80-61 mins	60-41 mins	40-21 mins	0-20 mins
Common pipistrelle	0	17	103	503	490	202	221	1456	122	154	113	303	105	0
Soprano pipistrelle	0	4	97	376	347	117	122	1792	49	69	83	306	85	0
Noctule	6	52	206	173	64	30	7	313	10	12	10	45	82	59
Serotine	0	0	184	249	238	146	128	220	9	24	22	78	63	0
Greater horseshoe bat	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Barbastelle bat	0	0	0	0	0	0	1	9	0	0	0	0	0	0
Leisler's bat	0	4	4	5	7	5	7	12	1	0	0	0	1	0
Long eared bat sp.	0	0	0	1	1	3	2	38	0	0	0	0	0	0
Myotis sp	0	0	0	10	22	52	92	1268	54	74	144	44	1	0
Nathusius' pipistrelle	0	0	0	0	0	0	1	2	0	0	0	0	0	0
Noctule / Leisler's bat	0	0	0	0	0	0	0	1	0	0	0	0	0	0
PI-40	0	0	0	4	2	0	0	5	0	0	0	0	1	0
PI-50	0	2	108	229	152	152	228	2018	35	58	79	46	9	0
Plecotus / Myotis	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Nyctalus sp	0	3	2	10	12	8	7	51	5	2	5	1	4	0
Common / Soprano pipistrelle	0	0	0	0	1	0	0	2	0	0	0	0	0	1
Serotine / *Nyctalus* sp	0	0	0	5	5	3	4	12	0	0	0	1	1	0
Grand Total	**6**	**82**	**704**	**1565**	**1341**	**720**	**820**	**7200**	**285**	**393**	**456**	**824**	**352**	60

Table 3-3 Average number of passes per night for each species at each location

Species	Location 1	Location 2	Location 3	Location 4	Location 5	Location 6	Average
Common pipistrelle	1.61	27.79	12.61	15.370	60.58	9.52	**21.25**
Soprano pipistrelle	1.27	4.14	2.23	23.19	76.71	8.19	**19.29**
Noctule	6.62	5.45	1.81	7.41	6.19	10.78	**6.38**
Serotine	0.12	3.07	3.35	0.07	35.23	2.63	**7.41**
Greater horseshoe bat	0.00	0.00	0.00	0.00	0.06	0.00	**0.01**
Barbastelle bat	0.00	0.17	0.00	0.00	0.03	0.15	**0.06**
Leisler's bat	0.04	0.24	0.29	0.00	0.68	0.30	**0.26**
Long eared bat sp.	0.00	0.24	0.10	0.00	0.52	0.56	**0.24**
Myotis sp	0.31	0.83	31.68	3.41	8.84	14.11	**9.86**
Nathusius' pipistrelle	0.00	0.03	0.00	0.00	0.06	0.00	**0.02**
Noctule / Leisler's bat	0.04	0.00	0.00	0.00	0.00	0.00	**0.01**
PI-40	0.00	0.10	0.16	0.04	0.06	0.04	**0.07**
PI-50	0.23	4.28	0.39	4.30	90.58	1.85	**16.94**
Plecotus / Myotis	0.00	0.00	0.00	0.00	0.00	0.04	**0.01**
Nyctalus sp	0.38	0.52	0.35	0.74	0.90	1.00	**0.65**
Common / Soprano pipistrelle	0.12	0.00	0.00	0.00	0.00	0.00	**0.02**
Serotine / *Nyctalus* sp	0.04	0.10	0.19	0.00	0.52	0.19	**0.17**
Grand Total	**10.78**	**46.96**	**53.16**	**54.53**	**280.96**	**49.36**	**82.63**

3.2.2 The data summarised in Table 3-1 shows that overall the highest number of recordings by all species was made at Location 5 (8,712 of the 14,808 - 58.8% of all calls across all locations and survey locations - with an average of 281 passes per night). At this location, the highest number attributed to any one species was 2,378 by soprano pipistrelle, though 2,808 calls which could only be identified as common or soprano pipistrelles were also recorded. Common pipistrelle accounted for a further 1,878 passes with serotine accounting for a further 1,092 passes. This was the highest total of passes by serotine at any of the locations, with the next highest peak being 104 at Location 3. This number was largely due to a large number of passes recorded during the late June deployment at Location 5, where 1,057 passes by serotine were recorded. This was not in any way reflected in the numbers recorded by the previous or subsequent deployments and the recordings were evenly spread through the late June deployment. This could suggest the presence of a locally available food source being used for a short period.

3.2.3 Activity levels at the other locations were much lower in comparison. Locations 2, 3, 4 and 6 seem to support broadly comparable levels of bat activity with between 1,332 and 1,648 (between 47.03 and 54.52 passes per night) passes of all species being recorded through the survey period. Location 1, located within the roundabout, had much lower levels of activity with only 280 passes (an average of 10.77 passes per night recorded throughout the survey period.

3.2.4 In terms of the relative levels of use by the various species, common and soprano pipistrelle accounted for the highest numbers of passes overall (with 25.5% and 23.3% of total passes respectively). Similarly to the trend identified above, both these species were recorded more often at Location 5 that at the other locations, with 1,878 of the 3,789 (49.5%) common pipistrelle passes at all locations and 2,378 of the 3,447 soprano pipistrelle passes (68.9%) recorded across all locations. A relatively high number of passes which could not be attributed with certainty to either common or soprano pipistrelle species (shown as PI-50 in the tables above) were also recorded. These showed a similar trend to common and soprano pipistrelles, with 2,808 of the 3116 passes (90%) recorded across all locations.

3.2.5 Noctule and serotine were the next most numerous in terms of numbers of passes recorded. The highest number of noctule passes was recorded at Location 6 (291 passes) and Location 4 (200 passes) with slightly lower numbers at Locations 1, 2 and 5 and only 56 passes at Location 3.

3.2.6 In total, 1,761 passes by *Myotis* sp. were recorded. Over half of these passes were from Location 3 with Locations 6 and 5 respectively recording the next highest numbers of passes of this species group.

3.2.7 Several species were recorded very infrequently. A total of ten Barbastelle bat *Barbastella barbastellus* passes was recorded, with five from Location 2, four from Location 6 and one at Location 5. Two Greater horseshoe bat *Rhinolophus ferrumequinum* were recorded at Location 5. These were within four minutes of each other on 25 August 2017.

3.2.8 The analysis of the timings of the passes recorded as shown in Table 3-2 highlights that six noctule passes were recorded at or just before sunset. A further 52 passes were recorded shortly after, between sunset and 20 minutes after sunset. Of these 58 passes, the majority were from Location 4 (24) and Location 2 (17). Noctule typically emerge in the early evening and occasionally emerge before sunset (University of Bristol, 2005), indicating the possibility of a roost in the vicinity of these detector locations.

3.2.9 Few early or late recordings of the other species were noted, though 17 passes of common pipistrelle and four of soprano pipistrelle were recorded between sunset and 20 minutes after sunset. All but two of these were from Location 3 on 21 August 2017 (with the remaining two passes at the same location the following night both at nine minutes after sunset). As this activity was not repeated on subsequent survey nights, it is likely that a single bat or a small number of bats were foraging in the vicinity of the detector, rather than using a habitual commuting route from a nearby roost.

3.2.10 Three of the four early soprano pipistrelle passes that were recorded at Location 3 on 28 June 2017 were within 19 and 20 minutes after sunset. The fourth was recorded at Location 6 on 26 September 2017, at 19 minutes after sunset. Again, this may suggest emergence from a nearby roost, though the first three may be the same individual foraging near the detector. A further two early passes attributed to pipistrelle species were recorded. Both were recorded on 28 June 2017 at Location 5, 19 minutes after sunset. The lack of regularly occurring passes by a given species at the times indicative of emergence or re-entry suggests that the static detectors were not located on regularly used commuting routes.

3.2.11 Late returning bats were recorded on a number of occasions, with 59 passes of noctule recorded between 20 minutes before sunrise and sunrise. Of these, 29 were at Location 4 and 23 were at Location 5. Of the remaining seven passes, six were recorded at Location 6 and one at Location 3. Of the 29 passes at Location 4, 14 were from the 26 July 2017 and the remaining passes were from three other dates in July and two in June. Of the 23 passes at Location 5, 13 were from the 2 July 2017, with the remaining passes being from 26 July 2017 (nine passes) and 3 July 2017 (one pass). No clear trend in this occurrence is immediately obvious. The lack of regular occurrence again suggests that the static detectors were located on routes used occasionally by commuting bats. It is however likely that roosts of this species are present in the vicinity of the Survey Area.

3.3 EVALUATION OF THE SURVEY AREA FOR BATS

3.3.1 The evaluation uses the CIEEM geographic frames of reference as set out in Section 2.3. Relative frequency of each species based on the bat call data generated during the activity surveys is considered in the context of their UK status and population estimates (using the categories set out in Section 2.3) and is shown in Table 3-4 below.

3.3.2 The status of *Myotis* species varies according to the species, therefore given the uncertainty as to the identification of species present the statuses are not given here. However, the Survey Area is likely to be of at least local level importance for some *Myotis* species given the comparatively high levels of activity encountered and because all *Myotis* species are relatively uncommon and some are very rare.

Table 3-4: Evaluation of Importance of Survey Area to Bat Species Recorded

SPECIES	UK STATUS[2]	COUNTY STATUS[3]	EST. UK POP[4]	RELATIVE FREQUENCY IN THE SURVEY AREA	LIKELY VALUE OF SURVEY AREA TO POPULATIONS OF BAT SPECIES
Barbastelle	Rare	Rare but widespread	5,000	Infrequent with 10 passes only.	Zone of Influence
Brown long-eared	Common	Common and widespread	245,000	Infrequent	Zone of Influence
Greater horseshoe	Rare	Very rare	6,600	Very infrequent with two passes only	Zone of Influence

[2] UK Status is based on the National Bat Monitoring Programme (NBMP) Population Trends 2016 (BCT, 2017)
[3] County Status based on information gained from the Hampshire Bat Group website
[redacted]
[4] Estimated UK Population based on Battersby (2005) or Harris *et al* (1995)

SPECIES	UK STATUS[2]	COUNTY STATUS[3]	EST. UK POP[4]	RELATIVE FREQUENCY IN THE SURVEY AREA	LIKELY VALUE OF SURVEY AREA TO POPULATIONS OF BAT SPECIES
Noctule	Uncommon	Uncommon and mostly present in the southern part of the County.	50,000	Regular	Local
Leisler's	Scarce	Scarce	10,000	Very infrequent	Zone of Influence
Serotine	Uncommon	Uncommon but widespread	15,000	Infrequent and largely limited to a peak of activity of very short duration in one location	Local
Common pipistrelle	Common	Common	2.43 million	Very frequent	Local
Soprano pipistrelle	Common	Common	1.3 million	Very frequent	Local

4 IMPLICATIONS FOR DEVELOPMENT

4.1 OVERVIEW

4.1.1 The bat surveys carried out in 2017 concentrated on identifying the areas or linear features likely to be most important for bats in terms of foraging and commuting.

4.1.2 Based on the information gathered and set out above, the areas which have been identified as most important for foraging and commuting are shown in Figure 4-1 and listed below:

- The linear features (hedgerow and scrub) along the western and southern parts of the fields covered by T1. The gateway between these two fields is also covered by the static detector placed at Location 5. These were mostly foraging areas for pipistrelle species as well as noctule and serotine. The data obtained from the static detector at Location 5 also suggests that this area is of importance to the above species and is where the majority of the *Myotis* activity was recorded.
- The western edge of the southernmost field covered by T2 (a linear feature formed by planted woodland on the roadside) which was used by foraging individuals of pipistrelle species, as well as commuting common pipistrelle.
- The track along the southern edge of the southern field covered by T2 which was also used by foraging pipistrelles.
- The river corridor habitats along the Itchen.

4.1.3 The Proposed Works have potential to affect all of these areas to some degree. Legislation and planning policy pertaining to bats is set out below. Recommendations, including for further survey and detailed design, is provided within Section 5.

4.2 LEGAL COMPLIANCE

4.2.1 Bats and their roosts are afforded a high level of protection under the Conservation of Habitats and Species Regulations 2010 (as amended) (the 'Habitat Regulations'), the legislation means that it is an offence to:

- *deliberately capture, injure or kill a wild bat;*
- *deliberately disturb wild bats; 'disturbance of animals includes in particular any disturbance which is likely:*
  - *(a) to impair their ability —*
    - *(i) to survive, to breed or reproduce, or to rear or nurture their young; or*
    - *(ii) in the case of animals of a hibernating or migratory species, to hibernate or migrate; or*
  - *(b) to affect significantly the local distribution or abundance of the species to which they* belong'
- *damage or destroy a breeding site or resting place used by this species.*

4.2.2 Protection is also afforded under the Wildlife and Countryside Act 1981 (as amended) with respect to disturbance of animals when using places of shelter, and obstruction of access to places of shelter.

4.2.3 Certain species of bats including the noctule bat, brown long-eared bat and soprano pipistrelle bat recorded during these surveys are also listed as a Species of Principal Importance (SPI) for the Conservation of Biodiversity in England under Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006. Under Section 40 of the NERC Act (2006) public bodies (including planning authorities) have a duty to have regard for the conservation of SPI when carrying out their functions, including determining planning applications.

4.3 PLANNING POLICY COMPLIANCE

4.3.1 As the project qualifies as a Nationally Significant Infrastructure Project (NSIP), it must adhere to the National Policy Statement (NPS) for National Networks (Department for Transport 2014). This states inter alia that the principals and objectives of the government's 2012 Natural Environment White Paper (NEWP) and Biodiversity 2020 strategy should be adhered to. These promote moving progressively from net biodiversity loss to net gain by supporting healthy, well-functioning ecosystems and establishing more coherent ecological networks that are more resilient to current and future pressures. The NPS also states that the likely significant effects on internationally, nationally and locally designated sites of ecological conservation importance, on protected species and on habitats, on other species identified as being of principal importance for the conservation of biodiversity and that potential impacts on ecosystems should be clearly set out.

4.3.2 At the national level the National Planning Policy Framework (NPPF) (2012) forms the basis for planning system decisions with respect to conserving and enhancing the natural environment, including reptile species. The Office of the Deputy Prime Minister circular 06/2005 also provides supplementary guidance, including confirmation that '*the presence of a protected species is a material consideration when a planning authority is considering a development proposal'.*

4.3.3 The NPPF sets out, amongst other points, how at an overview level the '*planning system should contribute to and enhance the national and local environment by:*

- recognising the wider benefits of ecosystem services;
- minimising impacts on biodiversity and providing net gains in biodiversity where possible, contributing to the Government's commitment to halt the overall decline in biodiversity,

including by establishing coherent ecological networks that are more resilient to current and future pressures…'

4.3.4 A list of principles which local planning authorities should follow when determining planning applications is included in the NPPF, and includes the following:

- *' if significant harm resulting from a development cannot be avoided…adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused;*
- *opportunities to incorporate biodiversity in and around developments should be encouraged;*
- *planning permission should be refused for development resulting in the loss or deterioration of irreplaceable habitats, including ancient woodland…unless the need for, and benefits of, the development in that location clearly outweigh the loss…'*

4.3.5 At a local level, Winchester City Council and the South Downs National Park have adopted the Winchester District Local Plan Part 1 (Adopted 2013). Chapter 9 is entitled 'High Quality Environment' with policy CP16 entitled Biodiversity. This states '*The Local Planning Authority will support development which maintains, protects and enhances biodiversity across the District, delivering a net gain in biodiversity, and has regard to the following:*

- *Protecting sites of international, European, and national importance, and local nature conservation sites, from inappropriate development.*
- *Supporting habitats that are important to maintain the integrity of European sites.*
- *New development will be required to show how biodiversity can be retained, protected and enhanced through its design and implementation, for example by designing for wildlife, delivering BAP targets and enhancing Biodiversity Opportunity Areas.*
- *New development will be required to avoid adverse impacts, or if unavoidable ensure that impacts are appropriately mitigated, with compensation measures used only as a last resort.*
- *Development proposals will only be supported if the benefits of the development clearly outweigh the harm to the habitat and/or species.*
- *Maintaining a District wide network of local wildlife sites and corridors to support the integrity of the biodiversity network, prevent fragmentation, and enable biodiversity to respond and adapt to the impacts of climate change.*
- *Supporting and contributing to the targets set out in the District's Biodiversity Action Plan (BAP) for priority habitats and species.*
- *Planning proposals that have the potential to affect priority habitats and/or species or sites of geological importance will be required to take account of evidence and relevant assessments or surveys'.*

4.3.6 The Biodiversity Action Plan for Hampshire (2000) lists four species/ species groups recorded within the survey area: Barabastelle, serotine, Bechstein's bat, Greater horseshoe and Pipistrelle bats.

5 RECOMMENDATIONS

5.1 FURTHER SURVEY

5.1.1 Comparatively high levels of *Myotis* activity was recorded to the centre of the Site, in particular at static detector Location 3. As this species group includes some rare species and much of this area will be affected by the Proposed Works, it is recommended that further investigative work is undertaken to help establish the likely composition of the *Myotis* fauna using this area. This would allow a more robust impact assessment to be made and would inform requirements for avoidance, mitigation and compensation measures.

5.1.2 Initially, this could involve further analysis on the existing call data[5] which may provide an indication of species composition. This could be supported by an updated desk study to search for new records. In addition, consideration should be given to undertaking bat trapping surveys, which is the only way to reliably identify *Myotis* bats. Such surveys require suitable expertise (*i.e.* surveyors with class 3 or 4 bat licences) and can be undertaken between May and October (indicatively, two visits, avoiding June to mid-July when young bats are born).

5.2 LANDSCAPE DESIGN

5.2.1 New planting (trees, hedgerows and shrubs) to compensate for lost commuting and foraging habitat should be included in the scheme. Planting adjacent to the road should be set back from the road with an appropriate buffer in order to ensure that the road corridor itself does not become an attractive feature to foraging and commuting bats which could increase the risk of collision with motor vehicles. Ideally, hedgerows should be allowed to grow as tall as possible and be a mix of native woody species.

5.2.2 Drainage designs should seek to include areas of wet ground vegetated with native species which would attract invertebrates upon which bats forage.

5.2.3 Dependent upon the outcome of detailed landscape design (and the net balance of habitat loss and gain), it may be appropriate to provide compensatory habitat in an off-Site area.

5.2.4 Further recommendations with respect to landscape design are provided in Section 5.4 below.

5.3 LIGHTING DESIGN

5.3.1 Lighting both during the construction phase and operational phase of the Proposed Works could have a negative effect upon bat activity. Whilst some lighting occurs in the area already and illumination of new carriageways is likely to be necessary for road safety reasons, it is recommended that lighting should be sensitively designed to minimise potential effects upon wildlife in general and bats in particular. The following recommendations are made:

- → Use the minimum light levels necessary for the relevant task / function, this may equate to reducing light intensity, and/or using the minimum number or light sources or minimum column height;

[5] Whilst it is not always possible to identify individual *Myotis* species based on calls alone, analysis by an expert should be able to provide an indication of species composition.

- Use hoods, louvres or other luminaire design features to avoid light spill onto retained and newly created areas of vegetation likely to be used by foraging and commuting bats;
- Use narrow spectrum light sources where possible to lower the range of species affected by lighting, specifically avoiding shorter wavelength blue light, using instead warm/neutral colour temperature <4,200 kelvin lighting (BCT, 2014b); and
- Use light sources that emit minimal ultra-violet light to avoid attracting night-flying invertebrate species which in turn may attract bats to the light.

5.3.2 Where possible, consideration should also be given to varying the lighting levels in particularly ecologically valuable areas. For example, it may be possible to reduce lighting levels or perhaps even switch installations off after certain times, e.g. between 00:00 and sunrise in the vicinity of tree lines of proposed landscaping. This use of “adaptive lighting” can tailor the installation to suit human health and safety as well as wildlife needs (BCT, 2014b).

5.4 ECOLOGICAL ENHANCEMENT

5.4.1 Ecological enhancement measures to benefit bats present in the local landscape should be designed into the Proposed Works. These should include the provision of new roosting opportunities (i.e. bat boxes) and the use of a range of native plant and shrub species in landscaping to maximise structural diversity (and value as foraging habitat for bats) and botanical species selected to be beneficial to night flying insects to improve foraging opportunities for bats in the landscape surrounding the road route. The following species could also be included within any soft-landscaping proposals to encourage night flying insects, thus improving foraging opportunities on site for bats: ox-eye daisy *Leucanthemum vulgare*, common mallow *Malva sylvestris*, elder *Sambucus nigra*, hawthorn *Crataegus monogyna*, and honeysuckle *Lonicera periclymenum*. (BCT, 2012a).

6 CONCLUSIONS

6.1.1 From the data gathered, it is reasonable to conclude that in general, the Survey Area supports a fairly typical assemblage of widespread bat species, with the exception of a small number of rarer species (such as greater horseshoe and barbastelle bats). However, high levels of *Myotis* activity were observed from an area which will be directly affected by the Proposed Works, and for this reason further investigative work is recommended to allow a robust impact assessment and to inform mitigation requirements.

7 REFERENCES

7.1 PROJECT REFERENCES

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7.2 TECHNICAL REFERENCES

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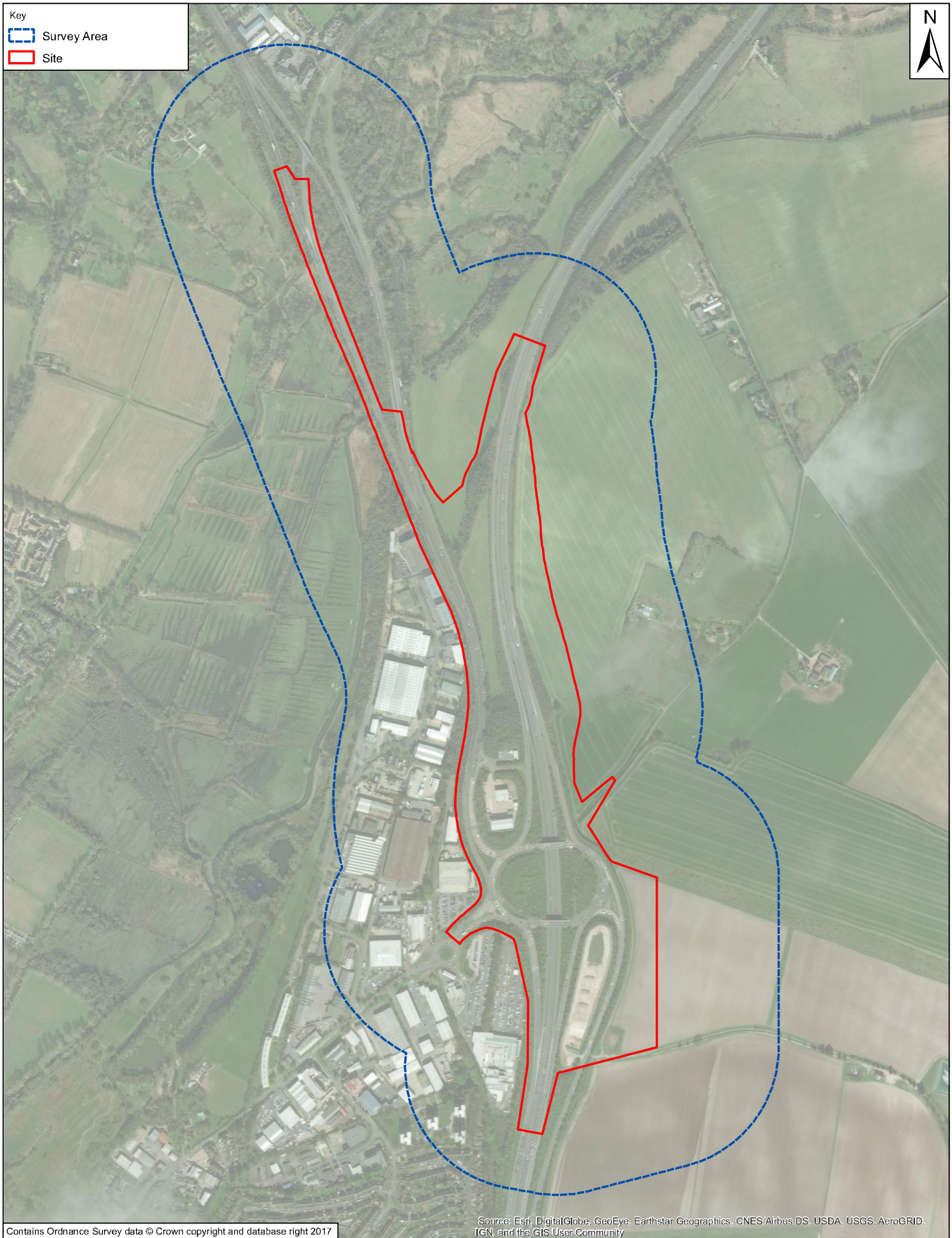
8 FIGURES

8.1 FIGURE 1-1 SITE LOCATION PLAN



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PROJECT: M3 Junction 9

TITLE: Site Location Plan

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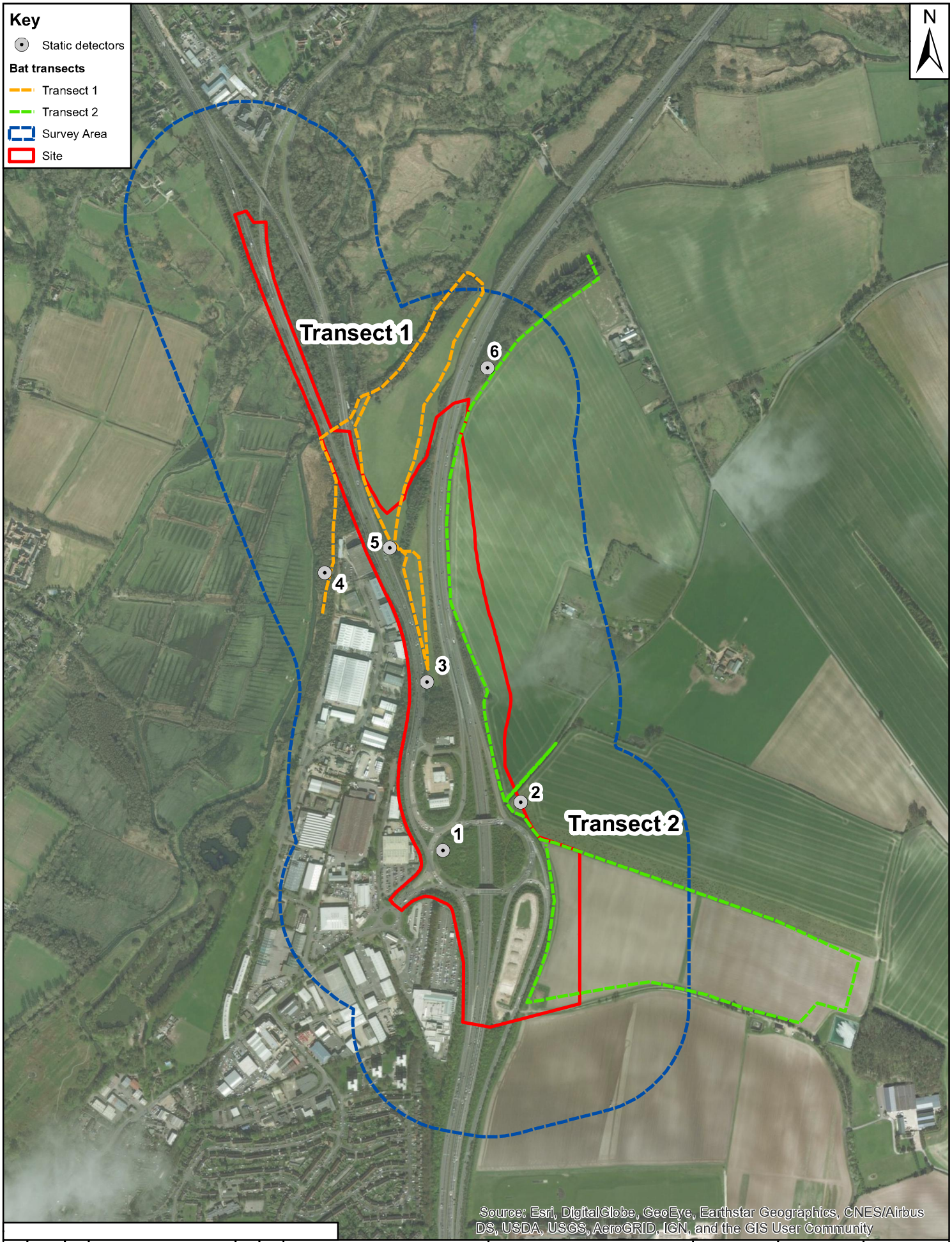
FILE:	**DRAWN:**	**DATE:**
A3 Template	BW	August 2017
PROJECT No:	**DRAWING No:**	**REV:**
70016638	1.1	A

8.2 FIGURE 2-1 BAT ACTIVITY SURVEY RESULTS



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PROJECT: M3 Junction 9

TITLE: Bat Activity Survey Results

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11,000	LR	AH
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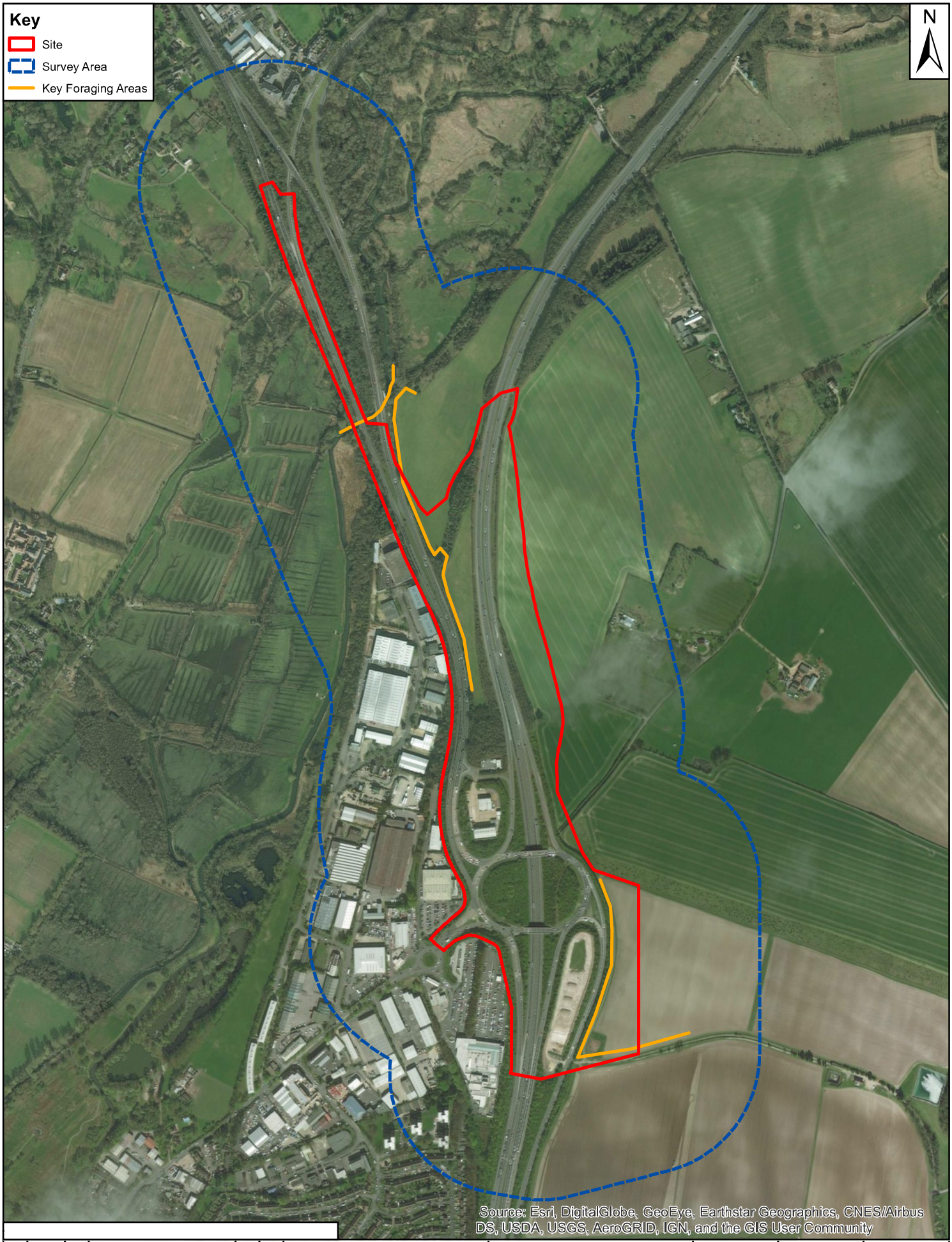
Bat Results	SC	November 2017
PROJECT No:	DRAWING No:	REV:
70016638	2-1	A

8.3 FIGURE 4-1 KEY FORAGING AREAS



REV	DATE	BY	DESCRIPTION	CHK	APP

DRAWING STATUS: DRAWING STATUS

wsp

highways england

PROJECT: M3 Junction 9

TITLE: Key Foraging Areas

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Bat Results	BW	November 2017

PROJECT No:	DRAWING No:	REV:
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