

M25 junction 10/A3 Wisley interchange TR010030

6.5 Environmental Statement: Appendix 7.10 Bat trapping

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Planning Act 2008

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



Infrastructure Planning

Planning Act 2008

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

M25 junction 10/A3 Wisley interchange

The M25 junction 10/A3 Wisley interchange Development Consent Order 202[x]

6.5 ENVIRONMENTAL STATEMENT: APPENDIX 7.10 BAT TRAPPING

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Appendix 7.10 Bat trapping

7.1 Bat baseline desk study, bat trapping and radiotracking survey

7.1.1 Introduction

- 7.1.1.1 Bats are a European Protected species subject to full protection under the Conservation of Habitats and Species Regulations 2017 and the Wildlife and Countryside Act 1981 (as amended). A summary of the relevant legislation can be found in Appendix 7.1.
- 7.1.1.2 The M25 junction 10/A3 Wisley interchange Improvement Scheme (hereafter referred to as the Scheme) has undergone a number of bat activity surveys in 2016, 2017 and 2018, including activity transects, static monitoring, crossing point surveys, building and tree assessments, climbed tree inspections and evening emergence and dawn re-entry tree surveys (see Appendix 7.9 for details of surveys and results).
- 7.1.1.3 The desk study identified Special Areas of Conservation (SACs) that qualify for their Annex II bat species (namely Bechstein's and barbastelle bats) within 30 km of the Scheme (see appendix 7.2 for details on the SACs). In addition, a number of bat species records were provided, most notably barbastelle bat records 6 km to the south, Bechstein's bat and Alcathe bat records 4.5 km to the south-east, and records of nine additional bat species (common pipistrelle, Natterer's, brown long-eared, noctule, soprano pipistrelle, serotine, Daubenton's, Nathusius' pipistrelle and Leisler's) within the 4 x 4 km grid based Ordnance Survey National Grid reference around TQ 081 592 (taken as the central point of the Scheme).
- 7.1.1.4 Daniel Whitby of Animal Ecology Wildlife Consultants Ltd, a Natural England licensed bat worker, was commissioned by Atkins on behalf of their client, Highways England to conduct advanced bat surveys (i.e. trapping, radio tagging and radio tracking) in order to obtain information on the presence of bat species and populations, including rare and uncommon species, that have potential to be affected by the Scheme.
- 7.1.1.5 Advanced bat surveys were undertaken between July and August 2017 within the survey area (see Figure 7.14). These included trapping surveys using harp traps and acoustic lures to enable the identification of species, gender and breeding status, as well as radio tagging and radio tracking to confirm the location of maternity or tree roosts, where possible.

7.1.2 Objectives

- 7.1.2.1 The objective of the surveys was to collect baseline data for bat species and populations within accessible areas within and close to the Scheme, notably areas identified as having high potential suitability for foraging and commuting bats in habitats that are likely to be impacted by Scheme.
- 7.1.2.2 The trapping surveys aimed to determine bat species present within the survey area, notably to differentiate *Myotis* bat species and to record any rare or uncommon species including Barbastelle bat, Bechstein's bat and Alcathe bat.

- 7.1.2.3 The trapping surveys also aimed to determine the gender and breeding status of individual bats, which will help to inform an assessment of the importance of the survey area in supporting breeding populations, and, where possible, through the use of radio tagging and radio tracking, to locate roost sites, particularly for any rare, uncommon or tree-roosting species.
- 7.1.2.4 The data collected from these surveys will be used in conjunction with data collected from other bat surveys carried out to identify likely direct or indirect impacts on bat populations (particularly rare or uncommon species and at a landscape level) and provide measures to avoid or mitigate damage and disturbance to individual bats and bat populations relevant to the Scheme.
- 7.1.2.5 This report provides the results obtained from of the advanced bat surveys only.

7.1.3 Methodology

Desk study

- 7.1.3.1 In January 2016, a data search for bat records was requested from Surrey Bat Group within a 4 x 4 km area from the centre of the Scheme (TQ 081 592). In 2017 Surrey Biodiversity Information Centre (SBIC) were contacted for records of all bat species within 10 km of the Scheme. In addition in 2017, additional bat records were provided from Surrey Bat Group for species recorded in close proximity to the Site (Ross Baker¹ pers. comm.), including records of rare and uncommon species. Additional data was provided during the survey period, including bat roost records from Surrey Wildlife Trust and information on local species populations from Surrey Bat Group.
- 7.1.3.2 All records were evaluated to determine the habitat requirements of target species (particularly rare, uncommon and tree-roosting species), which in turn informed the location of advanced bat surveys within the Site. The identification of potential trapping areas was aided by a review of Scheme plans, aerial imagery, and existing Phase 1 survey data.

Walkover survey

- 7.1.3.3 In July 2017, a walkover survey of the Site was undertaken by Daniel Whitby during daylight hours to identify safe access, enable familiarisation of the Site, and determine areas of high potential suitability for foraging and commuting bats.
- 7.1.3.4 Due to the nature of the junction and intersecting M25 and A3, the Site is distinguished by four quadrants; south-west, south-east, north-east and north-west, see Figure 7.14. Potential trapping areas in each of the four quadrants were closely inspected to ensure that the ground conditions and surrounding vegetation were suitable for the placement of harp traps.
- 7.1.3.5 Consideration was taken to select areas where vegetation limited the space through which bats would be able to fly or manoeuvre, therefore increasing the chance that the bat will fly through the restricted space and into the harp trap.

¹ Chair of the Surrey Bat Group.

Trapping surveys

- 7.1.3.6 A total of eight trapping nights were conducted between 15 July and 21 August 2017, with two survey sessions in each quadrant. Surveys commenced at dusk and continued until approximately 2-3 am, depending on weather conditions, bat activity and capture success rate. Trapping survey weather conditions are provided in Table 7.1.1 in Annex A.
- 7.1.3.7 Trapping surveys were conducted using harp traps accompanied by acoustic lures (Sussex Autobat or Binary Acoustic Technology AT100) that played a range of bat species' social calls to attract any bats foraging in the area. Lures can increase the detection rate of quiet echolocating species, such as barbastelle bat, long-eared bat and *Myotis* bat species, which can be under-recorded during detector surveys.
- 7.1.3.8 Three harp traps and lures were used for each survey, and the locations of the harp traps were varied between survey visits to allow increased coverage of the survey area. All traps were checked regularly, approximately every 15-20 minutes, to ensure that no bats were trapped for an extended period of time that would otherwise cause distress and/or significantly alter night time activity. All bats caught were identified to species level, gender and age determined, and reproductive status ascertained. All bats were processed in a timely manner and released at the capture site on the same night following data collection.
- 7.1.3.9 The trapping nights were influenced by weather condition suitability.

Radio tagging

- 7.1.3.10 Upon capture, individuals of target bat species (i.e. rare, uncommon and tree-roosting species) were tagged to enable the identification of roosts.
- 7.1.3.11 Tagging was primarily aimed at tree-roosting roosting female bats² considered likely to be within a maternity roost. Tree-roosting bats were targeted due to the potential of the Scheme to directly impact a number of trees, which would require felling.
- 7.1.3.12 Not all females were radio tagged as this would be too costly, labour-intensive and invasive. Individuals were selected based on suitability for tagging, such as the weight and health of the individual, as well as the location of capture and number of individuals caught of the same species. Where harp traps caught a number of females and/or juveniles, this can indicate closer proximity to a maternity colony, depending on the species.
- 7.1.3.13 Additionally, proximity to other confirmed maternity colonies was taken into account, with the emphasis on tagging individuals from locations that are most likely to identify a previously unrecorded colony.
- 7.1.3.14 Radio tags (Biotrack UK) Pip and PicoPip (0.25-0.39 g tags) were fixed to an individual bat using a latex-based adhesive (Torbot bonding cement). The radio signal was then checked using radio telemetry equipment and the bat was released.

² Only female individuals of suitable weight, condition and breeding status were radio tagged.

Radio tracking surveys

- 7.1.3.15 Once tagged and released, radio telemetry equipment was used to track the location of the bat to gauge its behaviour and allow identification of any roosts, where possible.
- 7.1.3.16 Night time radio tracking was undertaken to determine bat flight direction following release, identify roost location, and track movements following roost emergence and use of foraging areas within the Scheme. Based on the objectives of the survey, full night radio tracking was not considered necessary for the purposes of baseline data collection.
- 7.1.3.17 Once roost locations were identified, dusk emergence surveys were conducted (where safe and accessible) using professional night vision video cameras with infrared illuminators to identify and record the number of bats emerging from the roost. This enabled accurate roost counts to indicate colony size and provide detailed information on roost characterisation.

7.1.4 Limitations

- 7.1.4.1 Bats are highly mobile species and can make use of particular geographical locations and habitat types at different times of the year, depending on a range of factors including weather conditions and availability of prey. In particular, bats can move roost throughout the seasons, and there may be additional colonies, within the Site or in adjacent areas. Therefore, the absence of a particular bat species or roost from the Site cannot be taken as conclusive proof that the species/roost is not present, or that it will not be present in the future.
- 7.1.4.2 In 2017, bats were found to be breeding very early. Weather conditions during much of August 2017 were not optimal with what appeared to be colder than typical August temperatures, which appeared to suppress bat activity, and this was noticed to decrease notably during August. However, it is considered that this notable decrease in activity may also be partly due to an artefact of early breeding. Due to the lower than average temperatures during August 2017, bat activity levels may have been lower during the surveys compared to other years or other times of the year.
- 7.1.4.3 Species such as barbastelle bats have large, wide-ranging foraging areas and can be more difficult to target during trapping surveys. However, the likelihood of catching rare and uncommon species was improved by the use of an acoustic lure to attract individuals to the harp traps.
- 7.1.4.4 While advanced bat surveys cannot accurately confirm absence of a species, especially for rare, uncommon or wide-ranging species, such as barbastelle bats, the trapping surveys are considered to be good in identifying the likely absence of a species. If individuals are not caught during the trapping surveys, it is considered unlikely that a species is present regularly or in good numbers (e.g. a nearby maternity colony) within the Site and immediate area. This is especially true for some of the more easily caught rare and uncommon species including Bechstein's bats and Alcaethoe bats.

- 7.1.4.5 Trapping and radio tracking surveys across the Site did not commence until late July 2017, resulting in most of the survey season, including all of the pre-birth trapping period being missed. Bats were identified as breeding early during 2017 and juveniles were already flying and active by the time surveys started. As a result, all trapping surveys were conducted post-parturition with no pre-birth surveys. Therefore, it was not possible to identify seasonal variations in habitat use.
- 7.1.4.6 A large portion of the Site was not accessible during the surveys due to safety concerns, which included an area that may potentially be affected directly by the Scheme (identified as the area excluded from night surveys on Figure 7.14). However, the habitats present within the inaccessible area were not notably different to those where baseline data has been collected. Therefore, it is considered that the surveys conducted in adjacent habitats of similar composition are likely to have identified all species that would be regularly occurring in this area.

7.1.5 Results

Desk study

- 7.1.5.1 Surrey Bat Group provided 85 bat records from the last 10 years within a 4 x 4 km area from the centre of the Scheme (TQ 081 592). Noctule bat and soprano pipistrelle bat were confirmed as roosting within the Scheme within the Special Protection Area (SPA) enhancement area adjacent to Bolder Mere.
- 7.1.5.2 Species returned from the data search were:
- Daubenton's bat – *Myotis daubentonii*;
 - Natterer's bat – *Myotis nattereri*;
 - Brown long-eared bat – *Plecotus auritus*;
 - Nathusius' pipistrelle – *Pipistrellus nathusii*;
 - Common pipistrelle – *Pipistrellus pipistrellus*;
 - Soprano pipistrelle – *Pipistrellus pygmaeus*;
 - Noctule bat – *Nyctalus noctula*;
 - Leisler's bat – *Nyctalus leisleri*; and
 - Serotine bat – *Eptesicus serotinus*.
- 7.1.5.3 Records were provided for maternity colonies of three species: common and soprano pipistrelle, and brown long-eared bats.
- 7.1.5.4 SBIC provided records of bats within 10 km of the Scheme in the past 10 years. In total, 195 records formed of 12 species were identified. In addition to those species named above whiskered bats (*Myotis mystacinus*), Bechstein's bats (*Myotis bechsteinii*) and barbastelle bats (*Barbastella barbastellus*) were also recorded.

Rare or uncommon bat species records

- 7.1.5.5 In addition to the data provided above, records were provided from within 20 km of the Site central grid reference (TQ 096 607) for the following notably rare and Annex II species:
- Barbastelle bat – *Barbastella barbastellus* (Annex II species);
 - Bechstein's bat – *Myotis bechsteinii* (Annex II species); and
 - Alcathe bat – *Myotis alcathoe*.
- 7.1.5.6 There are no confirmed maternity colonies of barbastelle bats in Surrey, where they are considered to be locally rare and encountered infrequently. There are however, historical records for a number of barbastelle bats roosting within a barn approximately 6 km away from the Site in 2009. The barn has since been converted and the bats are no longer present.
- 7.1.5.7 Bechstein's bats are a rare Annex II species that is more common and widespread throughout wooded areas in southern Surrey. There are a number of known maternity roosts in Surrey. However, the species is nationally rare. There are records of Bechstein's bats from Bookham Common approximately 4.5 km south-east of the Scheme. There are larger areas of potentially suitable woodland approximately 2 km south of the Scheme and some areas around the Scheme periphery.
- 7.1.5.8 Alcathe bats are a more recently discovered species in the UK, discovered in Greece in 2001 and confirmed present in the UK in 2010³. The species has been found to be locally common in Surrey and Sussex, and largely absent from the rest of the UK. The species is classed as 'data deficient' and the UK status is unknown, but considered rare due to the limited known geographic distribution. There are records of this species at Bookham Common, approximately 4.5 km south-east of the site. Surveys conducted for research purposes independent to the Scheme are identifying that this species is a woodland specialist, that appears to prefer old broadleaved woodland, but habitat preferences are largely unconfirmed for this species.

Trapping

- 7.1.5.9 A total of eight trapping nights were conducted between 15th July and 21st August 2017, with two nights in each quadrant. Weather conditions for each survey are provided in Table 7.1.1 in Annex A. Three traps and lures were used for each survey, and the locations of the traps were varied where deemed appropriate, to allow increased coverage of the survey area. Trapping nights varied depending on weather conditions. All harp trap locations and survey results are provided on the Figure 7.14.
- 7.1.5.10 The trapping surveys caught a total of 189 bats of eight species:
- Brown long-eared bat – *Plecotus auritus* (12 no.);
 - Common pipistrelle – *Pipistrellus pipistrellus* (37 no.);
 - Soprano pipistrelle – *Pipistrellus pygmaeus* (68 no.);

³ Jan, C.M.I., Frith, K., Glover, A.M., Butlin, R.K., Scott, C.D., Greenway, F., Reudi, M., Dawson, D.A. & Altringham, J.D. (2010). *Myotis alcathoe* confirmed in the UK from mitochondrial and microsatellite DNA. *Acta Chiropterologica*, 12(2): 471–483, 2010.

- Daubenton's bat – *Myotis daubentonii* (11 no.);
- Natterer's bat – *Myotis nattereri* (15 no.);
- Whiskered bat - *Myotis mystacinus* (3 no.);
- Noctule bat – *Nyctalus noctula* (16 no.); and
- Serotine bat – *Eptesicus serotinus* (27 no.).

7.1.5.11 The trapping survey results are provided in Table 7.1.2 in Annex A.

15 July – south-west quadrant (traps 1, 2 and 3 on Figure 7.14)

7.1.5.12 Weather conditions were good with it being warm, mostly clear with a light breeze becoming still during the course of the survey. A total of 21 bats were caught of seven species (common pipistrelle, soprano pipistrelle, brown long-eared bat, Natterer's bat, whiskered bat, noctule bat and serotine bat). A total of 18 of these bats, primarily pipistrelle species, were located in the one trap near the waterbody (trap 1), further from the centre of the Scheme, and only three bats were caught in the two traps located in woodland closer to the centre of the Scheme. All three bats were caught in traps 2 and 3 later in the survey (i.e. after 01:30hrs).

16 July – south-east quadrant (traps 4,5 and 6 on Figure 7.14)

7.1.5.13 Weather conditions were suitable, with it being warm and overcast with a light breeze. However, there was some light rain at one point during the survey. A total of 26 bats were caught of six species (common pipistrelle, soprano pipistrelle, brown long-eared, Natterer's, noctule and serotine). A high proportion of the bats caught (10 of the 26), were identified as serotine bats, including four lactating females and two juveniles, indicating there may be a maternity roost nearby. Additionally, a number of Natterer's bats and brown long-eared bats were caught, and one brown long-eared bat was radio tagged.

23 July – north-west quadrant (traps 7, 8 and 9 on Figure 7.14)

7.1.5.14 Weather conditions at the start of the survey were good with it being warm, still and clear. There had been rain showers during the afternoon and it was damp, with it quickly becoming cool during the survey followed by light rain shower after midnight. A total of 11 bats of five species were caught (soprano pipistrelle, brown long-eared, Natterer's, noctule and serotine). A female Natterer's bat was identified as having very swollen mammary glands having given birth recently. Only two bats were caught after midnight.

27 July – north-east quadrant (traps 10, 11 and 12 on Figure 7.14)

7.1.5.15 The weather had been poor during the day with a heavy rain shower in the late afternoon, and as a result it was damp within the woodland in the evening. During the survey, it was warm and partly overcast with a light breeze. A total of 13 bats were caught of six species (common pipistrelle, brown long-eared, whiskered, Daubenton's, noctule and serotine). A high proportion of these (eight of the 13 bats caught) were serotine bats and seven were caught early (i.e. before 2300hrs).

4 August – south-west quadrant (traps 1, 13 and 14 on Figure 7.14)

7.1.5.16 The weather conditions were good with it being warm and partly overcast with a light breeze. A total of 47 bats were caught of eight species (common pipistrelle, soprano pipistrelle, brown long-eared, Natterer's, whiskered, Daubenton's, noctule and serotine). As with the last survey in this area, the majority of bats, 38, were caught in the one trap adjacent to the water body, and 24 bats were identified as soprano pipistrelle. A single Natterer's bat was radio tagged.

5 August – north-east quadrant (traps 15, 16 and 17 on Figure 7.14)

7.1.5.17 The weather had been poor during the day but warm with a heavy, short thunderstorm. The evening was warm, still and clear, but becoming cool by 20:00hrs and notably colder than forecast by 23:00hrs and suboptimal. Only four bats of three species were caught (Daubenton's, noctule and serotine bats), and trapping stopped at 02:00hrs after it became too cold and conditions were considered unsuitable to survey.

6 August – south-east quadrant (traps 18, 19 and 20 on Figure 7.14), Bolder Mere

7.1.5.18 Weather conditions were good with it being warm, still and clear, becoming cool and damp later on. It was notably colder after midnight, no bats were caught after 01:00hrs and traps were packed up at 02:30 hrs with cold weather. A total of 48 bats were caught of five species (common pipistrelle, soprano pipistrelle, brown long-eared, Natterer's and Daubenton's). As would be expected when trapping next to a large waterbody, the majority of bats caught, 29, were soprano pipistrelle. Only six Daubenton's bats were caught, one of which was a breeding female. One Daubenton's bat and one Natterer's bat were radio tagged.

21 August – north-west quadrant (traps 21, 22 and 23 on Figure 7.14)

7.1.5.19 Weather conditions were good with it being warm, still and overcast. There was very light rain around 2200-2300hrs and there were foggy areas forming later in the night. A total of 19 bats of five species were caught (common pipistrelle, soprano pipistrelle, brown long-eared, Daubenton's and noctule), with a notably higher number of noctule bats present accounting for half of all bats caught.

Radiotracking

7.1.5.20 During the eight trapping nights in 2017, a total of four bats of three species were radio tagged:

- 1 x Daubenton's bat – *Myotis daubentonii*;
- 2 x Natterer's bat – *Myotis nattereri*; and
- 1 x brown long-eared bat – *Plecotus auritus*.

7.1.5.21 Two individual Natterer's bats were radio-tagged once trapped, on opposite sides of the A3. Prior to advanced bat surveys, crossing point surveys conducted at a bridge over the A3 had not identified Natterer's bats to be crossing this feature. Therefore, it was determined that tagging an individual the opposite side to a maternity colony would either locate a new roost, or help to identify a crossing location that is being used over the A3.

Bat 1 – Brown long-eared bat

7.1.5.22 This bat was caught in the south-east quadrant on the 16 July 2017. Following release, the bat's signal was checked periodically and identified in an easterly direction. On the 17 July 2017, the bat was radio tracked to a medium-sized sweet chestnut tree with scar damage and a number of holes present, which was considered likely to be a maternity roost (see Figure 7.14 and Annex B, Plate G.1). Following this, the tag was found dropped as the bat had moulted.

Bat 2 – Natterer's bat

7.1.5.23 This bat was caught in the south-west quadrant on the 4 August 2017. Following release, the bat was radio tracked and found to spend time foraging in the woodland closer to the south-west corner of the M25 junction 10 roundabout (see Figure 7.14).

7.1.5.24 The bat was radio tracked at dawn to locate the roost, which was identified in an oak tree at TQ 07394 58531 (see Figure 7.14). An emergence survey conducted on the 5 August 2017 identified 41 Natterer's bats emerge, which will have included adults and juveniles in the maternity roost. See Annex B, Plate G.2 for a photograph of the roost site.

7.1.5.25 The bat was identified using the same roost on the 6th and 8th August 2017.

Bat 3 – Daubenton's bat

7.1.5.26 This bat was caught at Bolder Mere, in the south-east quadrant on the 6 August 2017. Following release, the bat was identified commuting in a northerly direction before moving east. The signal was last heard faintly in a north-easterly direction moving out of range.

7.1.5.27 The roost was searched for during the day on the 7 and 9 August 2017 in an approximate 3 km range concentrating on the south to north-east range following watercourses and larger waterbodies.

7.1.5.28 In addition, the bat was searched for at night on the 7 August 2017, when an active bat may be more easily detected, and again during the evening of the 8 August 2017, while conducting an emergence survey in the eastern area, and finally on the 9 August 2017, when Bolder Mere and the local area were checked and the bat was not identified present.

Bat 4 – Natterer's bat

7.1.5.29 This bat was caught at Bolder Mere, in the south-east quadrant on the 6 August 2017. Following release, the bat was identified commuting in a northerly direction from the lake before spending time foraging in close proximity to, and just north of, Ockham Bites Café. The bat was radio tracked periodically during the night of the 7 August 2017, and was consistently identified in close proximity to, and north of, Ockham Bites Café. The exact location of the bat could not be identified due to health and safety concerns associated with night time surveys at this location (see Figure 7.14).

7.1.5.30 On the 7 August 2017, the roost was located in a sweet chestnut tree at TQ 09111 58477, see roost 1 on Figure 7.14. An emergence survey was conducted on the 8 August 2017, which identified 46 Natterer's bats emerge. See Annex B, Plate G.3 for a photograph of the tree roost site.

7.1.5.31 On the 13 August 2017, the bat was identified as having moved roost to a sweet chestnut tree at TQ 08981 58466, see roost 2 on Figure 7.14. The bat was roosting in a lower hole and a dusk emergence survey identified 97 bats emerge. See Annex B, Plate G.4 for a photo of the tree roost site.

7.1.6 Discussion

- 7.1.6.1 There are 17 species of bat found breeding in the UK, 14 of which are known to be present in Surrey. The desk study returned records for nine species within a 4 x 4 km area from the centre of the Scheme (TQ 081592), the majority of which were from bats in flight or hibernation roosts. Records were provided for maternity colonies of three species: common pipistrelle, soprano pipistrelle and brown long-eared bats. Noctule bat and soprano pipistrelle bat were confirmed as roosting within the Scheme within the Special Protection Area (SPA) enhancement area adjacent to Bolder Mere.
- 7.1.6.2 Records exist in the wider area for other more notably rare species: barbastelle bats and Bechstein's bats, both Annex II species, and Alcahloe bats, a more recently discovered rare UK species which is 'data deficient'.
- 7.1.6.3 Trapping surveys caught a total of 189 bats of eight species (brown long-eared, common pipistrelle, soprano pipistrelle, Daubenton's, Natterer's, whiskered, noctule and serotine) over the eight nights. Although some nights became suboptimal with less suitable unforecast weather conditions, the trapping rate overall was considered to be good, with an average trap rate of 23.6 bats per night.
- 7.1.6.4 Bechstein's bats, barbastelle bats and Alcahloe bats were not caught during the surveys. Although there is some oak woodland present, the majority of the Scheme is considered suboptimal for Bechstein's bats and Alcahloe bats, with a predominance of conifer species present. Although barbastelle bats forage over a wider variety of habitats, they do show a preference for broadleaved woodland, floodplain meadows and riparian habitats, which are largely absent from this area, making the Scheme and its immediate surrounds less suitable for this species.
- 7.1.6.5 During the trapping surveys a number of bat species' calls were played on the acoustic lure, which included Bechstein's bat social calls, a range of *Myotis* bat species' social calls and barbastelle bat calls. No Bechstein's bats, Alcahloe bats, or barbastelle bats were caught throughout the surveys, which indicates that these species are unlikely to be present within the Scheme regularly, or in any notable population locally.
- 7.1.6.6 Due to the lack of local records, absence of any captures of these species during trapping surveys, and suboptimal quality of the majority of habitats within the survey area for barbastelle bats, Bechstein's bats and Alcahloe bats, it is considered reasonable to conclude that these species are likely absent from the Scheme, and highly unlikely to be present regularly or breeding nearby.
- 7.1.6.7 The majority of the species caught during the trapping surveys (common and soprano pipistrelle, brown long-eared bats, Natterer's bats, Daubenton's bats, whiskered bats and noctule bats) are considered common and widespread in the local area.

- 7.1.6.8 Common and soprano pipistrelle bats are common and widespread throughout the UK and Surrey. Both species were caught in good numbers, with a high number of soprano pipistrelle bats caught near waterbodies in the south west quadrant, where they are more commonly encountered. A total of 105 common and soprano pipistrelle bats were caught during the surveys, which comprise over half (55%) of the bats caught.
- 7.1.6.9 Whiskered bats are common and widespread nationally, and common in Surrey, but only three individuals were caught within the Scheme. This species does appear to prefer broadleaved woodland and denser scrub habitats and the habitat is not considered optimal for this species. Two juveniles were caught in the south-west quadrant (trap 1), both next to the pond and further from the Scheme. Juveniles are known to explore further from roosts and while there may be a maternity roost locally, it is unlikely to be near the Scheme.
- 7.1.6.10 Noctule bats are common and widespread nationally, and common in Surrey. These were caught regularly throughout the surveys, with a notably increased number caught on the last survey in the north-west quadrant on the 21 August 2017. The majority of these were caught late in the survey, with seven of the eight noctule bats being caught after midnight. It is considered that this may have indicated mating behaviour, with a number of adult males and females turning up in one area. No juveniles were caught and if a maternity roost was close to this area, a higher number of bats would have been caught early in the survey, and juveniles are more likely to have been present.
- 7.1.6.11 Daubenton's bats are common and widespread throughout the UK and Surrey. Only 11 Daubenton's bats were caught, six on the 6 August adjacent to Bolder Mere in the south-east quadrant. Individuals were caught intermittently in other quadrants, commonly late in the survey and on cold nights. Daubenton's bats commonly feed over open water. However, they regularly switch foraging areas to woodland habitats, especially on cold, misty or foggy nights, where foraging in open habitats becomes less suitable.
- 7.1.6.12 One Daubenton's bat was radio tagged from Bolder Mere, which was identified commuting away from this location in a north-eastern and then easterly direction until it was out of range. This was searched for during both daytime and night time where it was not heard within the Scheme again. It appears most likely that this was an occasional visitor to the area and it is not a main area used by a Daubenton's bat colony. The lake itself is not large enough to support a colony on its own, and isolated, with no good water courses connecting it to other nearby waterbodies.
- 7.1.6.13 It is unlikely that Daubenton's bats are present in high numbers in the survey area or that there is a maternity colony near the Scheme, as only low numbers of Daubenton's bats were observed and caught around the lake. The evidence suggests that there are a low number of individuals that may use Bolder Mere and some of the wooded areas as secondary foraging areas.

- 7.1.6.14 Brown long-eared bats are common and widespread throughout the UK and Surrey. This species was caught regularly throughout the surveys, with a total of 12 individuals caught, and on every night except one night of unsuitable weather. Prior to commencing surveys, brown long-eared bats were reported to be using one of the buildings in the south-west quadrant. Radio tracking has confirmed that there is also a maternity colony roosting within the south-east quadrant in a tree roost (Figure 7.14).
- 7.1.6.15 Serotine bats have a limited range in the UK being more of a southern species, with current trends indicating a population decline, especially in the south-east. Serotine bats were caught in good numbers within the Scheme, representing 14% of all bats caught. The number of breeding females and juveniles caught indicates that there is at least one, and possibly a couple of maternity colonies locally.
- 7.1.6.16 Serotine bats are found to almost exclusively roost in buildings and it is highly unlikely that they would be using any of the trees as roosts within the Scheme. It is therefore highly unlikely that any tree felling is likely to have direct impacts or result in loss of roosts for this species.
- 7.1.6.17 Natterer's bats are common and widespread throughout the UK and Surrey. Individuals of this species were caught in good numbers throughout the surveys, with breeding females and juveniles comprising 80% of the captures. Natterer's bats forage in a range of habitats, and are commonly associated with trees, particularly broad-leaved woodland but also coniferous woodlands. They also make use of tree-lined river corridors, trees in parkland, hedgerows adjacent to pasture, and in the open, over pasture, meadows and scrub habitats.
- 7.1.6.18 Radio tracking identified two Natterer's bat maternity colony roosts in trees in the south-west and south-east quadrants in close proximity to the Scheme. Although these colonies are not considered far apart, the colonies are likely fragmented and separated by the A3 and therefore likely to be separate colonies.
- 7.1.6.19 Both of the Natterer's bat maternity colonies are considered within reasonably close proximity to the nearby main roads, the M25 and A3. Therefore, there is potential for adjacent works to disturb these roosts, depending on the final design, as well causing a loss of available foraging habitat.

Annex A – Weather conditions and bat trapping survey results

Table 7.1.1: Weather conditions for bat trapping surveys

Date	Location	Time Start (sunrise) / end	Temp (°C) Start / end	Wind (mph) & direction Start / end	Beaufort scale Start / end	Precipitation Start / end
15/07/2017	South-west quadrant	21:11 / 03:00	20 / 18.3	9 WSW / 12 W	Light breeze / Gentle breeze	0 / 0
16/07/2017	South-east quadrant	21:10 / 03:00	21.1 / 17.2	10 NW / 12 N	Light breeze / Gentle breeze	0 / 0
23/07/2017	North-west quadrant	21:02 / 03:00	15 / 14.4	5 WSW / 6 W	Light air / Light breeze	0 / 0
27/07/2017	North-east quadrant	20:56 / 03:00	15.6 / 13.3	10 SSW / 10 SW	Light breeze / Light breeze	0 / 0
04/08/2017	South-west quadrant	20:43 / 03:00	17.2 / 15	9 SW / 5 W	Light breeze / Light air	0 / 0
05/08/2017	North-east quadrant	20:42 / 02:00	15 / 10	7 W / 3 SW	Light breeze / Light air	0 / 0
06/08/2017	South-east quadrant (Bolder Mere)	20:40 / 02:30	15.6 / 12.2	9 S / 8 SSW	Light breeze / Light breeze	0 / 0
21/08/2017	North-west quadrant	20:11 / 03:00	18.3 / 16.6	3 SSE / 6 SE	Light air / Light breeze	0 / 0

Table 7.1.2: Bat trapping results

Date	Site	Trap No.	Grid Reference	Total	P. pipistrellus				P. pygmaeus				P. auritus				M. natteri				M. mystacinus				M. daubentonii				N. noctula				E. serotinus				
					AM	AF	JM	JF	AM	AF	JM	JF	AM	AF	JM	JF	AM	AF	JM	JF	AM	AF	JM	JF	AM	AF	JM	JF	AM	AF	JM	JF	AM	AF	JM	JF	
15/07/2017	South-west quadrant	1	TQ 0749 5899	18	2	4	1		3	1				1	1				1	1			1										1	1			
		2	TQ 0778 5900	2										1															1								
		3	TQ 0776 5888	1														1																			
16/07/2017	South-east quadrant	4	TQ 0838 5869	7			1			1			1																				2	2			
		5	TQ 0852 5883	9		1	1	1	1					1	1			1	2																		
		6	TQ 0870 5875	10		1					1								1							1				2	2	1	1				
23/07/2017	North-west quadrant	7	TQ 0822 5980	1																																	
		8	TQ 0822 5969	4					2									1																			
		9	TQ 0799 5949	6									1				1			1									1	1		1					
27/07/2017	North-east quadrant	10	TQ 0829 5943	7									1																					3	2		
		11	TQ 0837 5928	4			1														1								1								
		12	TQ 0849 5922	2																													2				
04/08/2017	South-west quadrant	1	TQ 0749 5899	38			3	8	6	7	6	4		1										1					2								
		13	TQ 0780 5898	3							1																						1				
		14	TQ 0778 5918	6	1		1	1								1					1													1			
05/08/2017	North-east quadrant	15	TQ 0851 5915	1																																	
		16	TQ 0845 5921	1																													1				
		17	TQ 0832 5938	2																																1	
06/08/2017	South-east quadrant (Bolder Mere)	18	TQ 0752 5830	19			1	1	2	2	5	4					1		1						2												
		19	TQ 0765 5828	20	1	1	1	3	2	2	6	2						2																			
		20	TQ 0782 5829	9					1		1	2			1										2	2											
21/08/2017	North-west quadrant	21	TQ 0782 5952	12			1	1		1				1											1		1		1	5							
		22	TQ 0803 5955	5					2	1	1																		1								
		23	TQ 0816 5970	2																													1				
Total					4	7	9	17	19	14	22	13	4	5	2	1	3	7	2	3	0	1	1	1	5	3	1	2	6	10	0	0	7	14	3	3	

Annex B – Roost locations

Bat 1 – Brown long-eared bat

Plate 7.1 Roost tree used by brown long-eared bat in the north-east quadrant of junction 10 – TQ 0900 5845



Bat 2 – Natterers bat

Plate 7.2 Natterers bat roosting in western area of junction 10 – TQ 07394 58531



Bat 4 – Natterers bat

Plate 7.3 Bat 4, Natterers bat – first roost – TQ 09111 58477



Plate 7.4 Bat 4, Natterers – second roost – TQ 08981 58466



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