Gatwick Airport Northern Runway Project

Environmental Statement
Appendix 9.6.3: Bat Trapping and Radio Tracking Surveys – Part 2

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Annex 4

2019 Survey Report

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1 Introduction

1.1.1 This document forms Annex 4 to Appendix 9.6.3 of the Environmental Statement.

1.2 Relevant Legislation and Planning Policy

1.2.1 The following key pieces of nature conservation legislation are relevant to this assessment:

- The Conservation of Habitats and Species Regulations 2017 (as amended);
- The Wildlife and Countryside Act (WCA) 1981 (as amended); and
- Natural Environment and Rural Communities (NERC) Act 2006.

1.2.2 All native UK bat species are protected under Schedule 5 of the WCA 1981 (as amended) and the Conservation of Habitats and Species Regulations 2017 (as amended). Under this combined legislation it is an offence to:

- deliberately capture, injure or kill a bat;
- intentionally or recklessly disturb a bat whilst occupying a place of shelter or protection;
- possess or advertise/sell/exchange a bat (dead or alive) or any part of a bat; and/or
- deliberately disturb a bat species.

1.2.3 Disturbance of the species 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. Under the legislation it is therefore an offence to:

- damage or destroy a bat breeding site or resting place of a bat; and/or
- intentionally or recklessly obstruct access to any structure or place used by a bat for shelter or protection.

1.2.4 In addition, certain rarer species of bat including Bechstein's bat *Myotis bechsteinii* and barbastelle *Barbastella barbastellus* are listed on Annex II of the EC Habitats Directive (Council Directive 92/43/EEC), for which specific protection through the establishment of Special Areas of Conservation (SAC) applies.

1.2.5 In accordance with Section 41 of the NERC Act (2006), several bat species are also identified on the England Biodiversity List as Species of Principal Importance. The presence of bats represents a material consideration in the planning process.

1.3 Biological Records

1.3.1 Biological records were obtained from the Gatwick Biodiversity Action Plan Five Year Review 2012-2017 (GAL, 2018b)

1.3.2 A total of 12 species of bat have been recorded within the Project site including Bechstein's bats, Brandt's bat *Myotis brandtii*, brown long-eared bat *Plecotus auritus*, common pipistrelle *Pipistrellus pipistrellus*, Daubenton's bat *Myotis daubentonii*, Leisler's bat *Nyctalus leislerii*, Nathusius' pipistrelle *Pipistrellus nathusii*, Natterer's bat *Myotis nattereri*, noctule *Nyctalus noctula*, serotine *Eptesicus serotinus*, soprano pipistrelle *Pipistrellus pygmaeus* and whiskered bats *Myotis mystacinus* (GAL, 2018b).

1.3.3 During a five year monitoring programme of bat boxes on site undertaken by Surrey Bat Group (2012-2017) the species recorded occupying boxes included Bechstein's bat, Natterer's bat, soprano pipistrelle and brown long-eared bat (GAL, 2018b).

1.3.4 A whiskered bat maternity roost was recorded at Charlwood Park Farmhouse in 2016 and 2017. This building was also previously occupied by common and soprano pipistrelles (GAL, 2018b).

1.3.5 A previous trapping and radio-tracking project undertaken in 2014 identified Bechstein's bat roosts in several dead trees in the [redacted] including ash *Fraxinus excelsior*, alder *Alnus glutinosa* and pedunculate oak *Quercus robur* (GAL, 2018b).

1.4 Requirement for Surveys

1.4.1 Bat survey work is required within and adjacent to the Project boundary to help inform any future changes to the airport. Surveys undertaken in the area include automated static bat detector surveys and walked activity surveys. However, advanced bat surveys were required because the data on woodland species including *Myotis* bats and long-eared bats, which are cryptic species, cannot be reliably obtained using standard survey techniques (such as activity surveys and/or automated surveys) alone. The advanced bat surveys detailed in this report were undertaken under Natural England Project Licence (Dr Stephanie Murphy: 2019-40344-SCI-SCI) and involved trapping, attaching radio-transmitter tags and ringing target species.

1.4.2 The surveys were required to provide information on roost locations, status of identified roosts (based on the number of bats in roost), flightlines and foraging areas for target species (Annex II Bechstein's and barbastelle), as well as other woodland bat species including Alcathoe bat*Myotis alcathoe*, Brandt's bat, brown long-eared bat, Daubenton's bat, grey long-eared bat *Plecotus austriacus*, Natterer's bat and whiskered bat. The data obtained will help to inform a better understanding of the bat assemblage within and adjacent to the Project boundary.

1.5 Survey Purpose

1.5.1 The purpose of the surveys was to gather information on the bat assemblage in the area within and adjacent to the Project Area.

1.5.2 The surveys encompassed a range of techniques including:

- trapping bats using harp traps with the assistance of an acoustic lure within land permitted accessible by GAL, public roads, and public rights of way, and radio-tagging target species including barbastelle, Bechstein's bat, grey long-eared bat, Alcathoe bat, Brandt's bat, brown long-eared bat, Daubenton's bat, Natterer's bat and whiskered bat;
- non-invasive DNA analysis on small *Myotis* bats (Alcathoe/ /Brandt's bat/whiskered bat) in order to differentiate and confirm the presence of these species in and adjacent to the Project boundary;
- radio-tracking of barbastelle, Bechstein's bats and grey long-eared bats, if captured in the study area, to determine foraging areas, commuting routes and roost locations and counts;
- radio-tracking of Alcathoe bats, Brandt's bats, brown long-eared bats, Daubenton's bats, Natterer's bats and whiskered bats to determine roost locations; and
- emergence surveys and roost counts conducted on roosts of all radio-tagged bats (access permitting).

1.5.3 It was proposed to radio-tag and radio-track up to a maximum of five barbastelles, ten Bechstein's bats and three grey long-eared bats, if captured, over the survey period.

1.5.4 It was proposed to radio-tag a maximum of six breeding or juvenile females from each of the following species within and adjacent to the Project Area:

- Alcathoe bat;
- Brandt's bat;
- brown long-eared bat;
- Daubenton's bat;

- Nathusius' pipistrelle;
- Natterer's bat; and
- whiskered bat.

1.5.5 This comprised adult females (both parous and non-parous), males and juveniles (providing they are of an appropriate weight and in good health condition.

1.5.6 It was not proposed to radio-tag or radio-track common pipistrelle, soprano pipistrelle, Leisler's bat, noctule or serotine, as these species can be identified through other survey techniques including automated static bat detectors, walked activity transects (Appendix 9.3) and collision risk surveys undertaken in 2019.

1.5.7 In order to obtain a robust assessment of the bats' movements and roosts during pre-maternity, post-maternity and autumnal dispersal seasons and across the Project boundary it was considered necessary to radio-tag the numbers of bats prescribed above.

2 Methodology

2.1.1 The methods generally followed the standard best practice (Collins, 2016 and Natural England, 2013). Any specific deviations due to objectives of the surveys, where necessary, are described.

2.2 Trapping Surveys

2.2.1 Trapping surveys were undertaken during three key periods which corresponded with key stages of the annual life cycle of a bats and included surveys between 28th and 30th May 2019 (maternity), 15th and 17th July 2019 (post-maternity), and 2nd and 4th September 2019 (autumnal dispersal).

2.2.2 Trapping focused more intensively on parts of the Project Area that may be of particular importance to bats, such as locations of known roosts and areas of high suitability foraging/commuting habitat. Trapping locations are shown in Figure 2.2.1a - c and Table 2.2.1.

2.2.3 Trapping surveys were carried out using a combination of triple and double bank harp traps at the above locations within the Project boundary, including woodland habitat, hedgerows and watercourses, which are likely to be habitat features used by commuting and/or foraging bats in close proximity to the Project boundary.

2.2.4 At each of the locations, one harp trap (Austbat) was set up. Each trap was fitted with an acoustic lure (Model: Sussex Autobat) to increase the likelihood of catching bats present within the vicinity of the traps.

2.2.5 Trapping commenced at sunset and continued for a maximum of six to eight hours per night dependant on the conditions, weather, capture success and general bat activity. If the weather became unsuitable during a survey (ie temperatures fell below 8°C and/or heavy rain and/or strong wind), the survey was terminated to avoid captured bats becoming torpid. Where unseasonably cold or poor conditions completely curtailed a survey, the survey was rescheduled, where possible.

2.2.6 When bats were captured in a harp trap, they were removed by a suitably experienced and qualified person (under the direction of the licence holder or accredited agent) and transferred to a clean calico cloth bag. Biometric data was be recorded for each bat including weight, sex, breeding status and forearm measurements. Droppings from small *Myotis* species were collected and transferred to a sterile tube for possible DNA analysis. Bats not selected for radio-tracking were released at the site of capture immediately after biometric data was recorded.

Table 2.2.1: Trapping Locations

Trapping location[1]	Easting	Northing	Description
1a	525478	140615	Within woodland strip west of Brockley Wood/River Mole
1b	525444	140560	At woodland edge within woodland strip west of Brockley Wood/River Mole
2a	525740	140797	Brockley Wood – south west
2b	525775	140837	Brockley Wood – central
2c	525826	140907	Brockley Wood – north east
3a	525600	139752	Crawter's Wood
3b	525862	139810	Crawter's Wood
3c	525928	139818	Crawter's Wood
4a	528108	142137	Woodland within Riverside Garden Park – west
4b	528114	142094	Woodland within Riverside Garden Park – central
4c	528176	142020	Woodland within Riverside Garden Park – east
5a	528797	140459	Horleyland Wood – west
5b	528941	140501	Horleyland Wood – central west
5c	529000	140458	Horleyland Wood – central
5d	529027	140524	Horleyland Wood – central east
5e	529146	140527	Horleyland Wood - east
6a	529611	140738	Lower Pickett's Wood – north
6b	529513	140675	Lower Pickett's Wood – central
6c	529550	140548	Lower Pickett's Wood - south
7a	529403	140139	Upper Pickett's Wood – south west

[1] Trapping locations were surveyed during each session with the following exclusions; 3b was surveyed in September only, 5a was surveyed in May only, 5c was surveyed in May and September, 5d was surveyed in May and July, 5e was surveyed in July and September, 6a, 6b and 6c were surveyed in May and July, 7a, 7b and 7c were surveyed in May and July. More details are provided in Section 3.5.

Trapping location[1]	Easting	Northing	Description
7b	529464	140297	Upper Pickett's Wood – north
7c	529578	140264	Upper Pickett's Wood - east

2.3 Radio-Tracking Survey

2.3.1 Bats were selected for radio-tagging on the basis of their species and apparent health and body condition. No underweight bats were selected for radio-tagging. The weight of the radio-tag was always less than 5% of the bat's weight. Female bats, and in particular reproductive females (avoiding heavily pregnant bats), were radio-tagged in preference to male bats to enable breeding colonies to be located.

2.3.2 Species selected for radio-tagging focused on the woodland assemblage of bats and/or rarer species and included Alcathoe bat, barbastelle, Bechstein's bat, Brandt's bat, brown long-eared bat, Daubenton's bat, grey long-eared bat, Nathusius' pipistrelle, Natterer's bat and whiskered bat.

2.3.3 Biotrack radio-tags were attached to the focal bat using Skin-Bond® (Pfizer Inc) to the area between the shoulder blades from which fur had been clipped.

2.3.4 The bats that were fitted with radio-tags were released on the night of capture at the location of capture and held only for the minimum time necessary to obtain the required data and to be fitted with rings and radio-tags, as necessary.

2.3.5 The roost locations of radio-tagged bats were located by teams of a minimum of two surveyors using radio-tracking equipment. The radio-tracking equipment comprised of a Biotrack Sika radio-receiver unit coupled with a Biotrack Yagi radio-antenna which allowed the surveyors to tune into the frequency of the radio-tag on each radio-tagged bat. By moving through the landscape on foot or by vehicle, surveyors were able to locate radio-tagged bat roost locations by following the direction and strength of the radio signal emitted by the radio-tag.

2.3.6 The movements of active bats at dusk, night and at dawn, were ascertained by multiple teams of surveyors using the radio-tracking equipment described above. Each team was positioned in separate locations within the landscape with their exact location recorded (eastings, northings recorded with GPS unit). Each team was in constant communication with each other via handheld two-way radios or mobile telephones. When bats commenced emergence from their roost location and/or their radio-tag was picked up whilst in flight, the surveyor teams took close approach estimates of location (if the bat was in the immediate vicinity). If bats were located some distance between the surveyors and/or surveyors' access was not permitted to the area in which the bat was situated, simultaneous compass bearings on the direction of the strongest radio signal were taken. Through triangulating simultaneous bearings (using LOAS software; version 2.12, Ecological Software Solutions), surveyor teams were able to record 'fixes' (the point at which two or more separate team's bearings cross) of the bats' locations within the landscape, ie locations at which simultaneous bearings crossed.

2.3.7 The positions of the radio-tagged bats were received at intervals after leaving the roost and were used to identify flightlines, which are important connectivity features between the roosting locations and foraging areas and between separate foraging areas.

2.3.8 The cumulative home range size was plotted against the number of successive locations for all bats radio-tracked in order to determine the point at which the foraging area reached an asymptote, indicating that sufficient data has been gathered from each bat. Estimates of range size for this analysis was based on 100% minimum convex polygons, 95% kernels and 50% kernels, obtained using BIOTAS software (version 2.0 Alpha, Ecological Software Solutions).

2.3.9 Each bat fitted with a radio-tag was followed for a minimum of three nights and a maximum of seven nights, depending on the results obtained from the estimates of home range analysis (i.e. whether sufficient data had been collected). Bats were radio-tracked concurrently.

2.4 Roost Count Surveys

2.4.1 Roosts were identified by locating the radio-tagged bats during the day (as detailed above) and subsequent counts of the number of bats emerging was carried out, where access was permitted by GAL.

2.4.2 The surveys were carried out in appropriate weather conditions following standard guidelines (Collins, 2016) and when bats are likely to be active. The dusk surveys commenced approximately 15 minutes before sunset and continued for a minimum of at least 90 minutes; the optimum time for bats to emerge from a roost.

2.4.3 An infra-red camera (such as the Canon XA-20) equipped with infra-red lamps (such as the IR Lab Outdoor IR Illuminator LIR-IC88) was used to aid accurate counts of bats emerging from the roost. Full spectrum bat detectors, such as Elekon Batlogger M were used to detect bat echolocation calls of any emerging bats and identify species where possible. Both video and ultrasonic audio recordings were subsequently analysed to ensure accurate species identification and roost count. Flightlines from roosts were determined by roost count survey teams taking bearings on emerging bats.

2.5 Data Validity and Limitations

2.5.1 It is important to note that even where data are held, a lack of records for a defined geographical area does not necessarily mean that there is a lack of ecological interest; the area may be simply under-recorded. Bats are highly mobile animals and can move roost sites both within and between years.

2.5.2 Data from bat surveys should be considered to be valid for a period of 18 months, unless there are any meaningful changes to the buildings or other habitats within the site.

Trapping Surveys

2.5.3 Where identification to species level was not possible in the field, particularly for cryptic species such as the small *Myotis* genus, droppings of trapped bats were collected and sent for DNA analysis. As bats were captured for the minimum amount of time necessary, it was not always possible to collect a sample from each bat had they not provided a dropping in the calico cloth bag after one hour. Due to animal welfare priorities, bat droppings collected for DNA analysis was therefore not possible with all captured target species.

2.5.4 The species of one bat caught on 28 May 2019 was not confirmed as the bat escaped prior to processing.

2.5.5 Due to access restrictions trapping surveys could not be undertaken in Lower Pickett's or Upper Pickett's Wood in September. Precise trapping locations varied slightly within Horleyland Wood and Crawter's Wood over the trapping survey period. The locations varied slightly as the condition of the woodland differed between seasons due to vegetation growth. This was not considered to be a significant limitation to the findings of the study as the woodland was thoroughly surveyed during each session.

Radio-tracking Survey (Including Roost Count and Emergence Surveys)

2.5.6 The positions of the radio-tagged bats are received at intervals after leaving the roost and used to identify flightlines between the roost and foraging areas. Therefore, flightlines are partially estimated based on best available data. This is considered as an acceptable limitation as assumptions on direction and use of

landscape features can be made based on known bat behavioural ecology.

2.5.7 It was not GAL policy to obtain ad-hoc access for roost counts outside the Project boundary or in private properties. Therefore, roost counts were not possible in these areas.

2.5.8 All radio-tracking was carried out from land where access was permitted, public roads and public rights of way. Restricted access to land affected the accuracy of the bearings taken during radio-tracking. If a radio-tagged bat was foraging in an area of land where the strength of the signal was weak (as a consequence of topography) and/or had disappeared, then it was not possible to ascertain the precise location of the bat. These constraints were overcome using the following methods:

- if the bat was likely to be roosting in land where access was prohibited, multiple bearings were taken from a variety of different locations to get a better estimate of likely roosting locations; and
- where radio-tracking data on bats was deficient, subsequent radio-tracking night(s) concentrated effort on those bats for which data was limited.

2.5.9 Fast moving traffic on roads within and adjacent to the Project boundary meant that surveyors could not always survey from the most appropriate areas due to health and safety concerns.

2.5.10 Surrey Bat Group was also involved in data collection as information was shared on radio-transmitter frequencies.

2.5.11 Due to the lack of access to areas outside the Project boundary, radio-tracking data was difficult to obtain. As mentioned above, multiple bearings were taken from a variety of different locations when bats were recorded in inaccessible land. However, when bats moved between locations, surveyors moved to locate the bat, but due to the access restrictions, the signal was often lost by the time they had got to a suitable surveying location.

2.5.12 Radio-tracking data can include outliers, especially with fast moving animals such as bats.

2.5.13 Radio-tracking data on bats 3, 9, and 17 was obtained for two nights and radio-tracking data on bat 10 was obtained for one night. Surveyors searched the Project boundary for these bats over at least three nights, but the bats were not found, indicating that they were likely foraging outside the Project boundary.

2.5.14 Bats 1, 14, 16, 19 and 20 were not found during the radio-tracking period. It is considered likely that the radio-tags failed on these bats or the bats were outside the Project boundary. Bats are highly mobile species and consequently any bats trapped and tagged within the survey area may not always be identified roosting or in flight in the survey area on subsequent survey days.

Evaluation

2.5.15 Due to GAL policy, access to areas outside the Project boundary was not possible. Therefore, trapping surveys, roost counts, emergence surveys and radio-tracking could not take place outside the Project boundary. Therefore, the surveys are unlikely to provide a full understanding of the local bat population.

2.5.16 It is likely that the evaluation of the importance of the area for bats is constrained by the lack of knowledge of the wider landscape and, in particular, habitats of value for bats directly connected to the Project boundary.

3 Results

3.1 Trapping Surveys

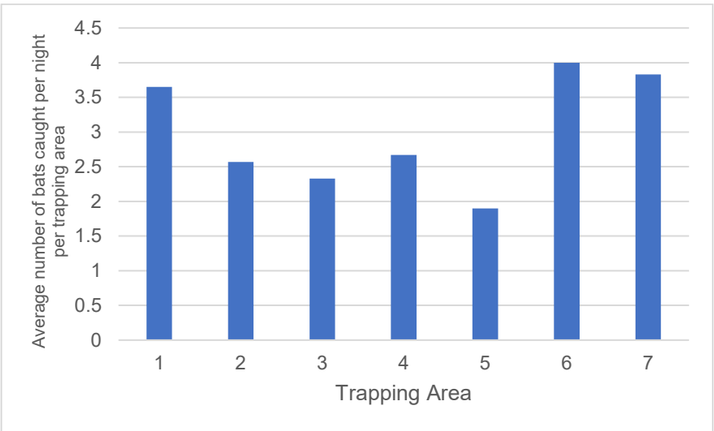
3.1.1 A total of 154 bats of nine species were captured over nine trapping nights between 28 May and 4 September 2019 in 20 different locations. Figure 2.2.1a - c shows the trapping locations, detailed trapping data is shown in Annex 4A and trapping results by species is shown in Table 4.1.1.

Table 3.1.1: Trapping Results

Trapping Results by Species	
Species	**Number of bats**
Bechstein's bat	7
Brandt's bat	2
Daubenton's bat	4
Whiskered bat	19
Whiskered bat/Brandt's bat	9
Natterer's bat	5
Noctule	2
Brown long-eared bat	39
Common pipistrelle	50
Soprano pipistrelle	15
Pipistrelle species	1
Unknown	1

3.1.2 The average number of bats caught across each trapping area is shown in Diagram 3.1.1 below.

Diagram 3.1.1: Average number of bats caught per night by area



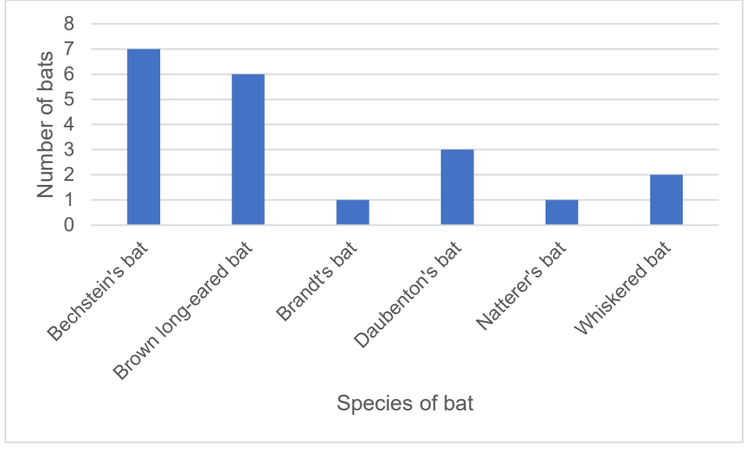
3.1.3 Trapping surveys were also undertaken concurrently by Martyn Cooke of Surrey Bat Group working under Natural England Project Licence 2019-39024-SCI-SCI. The Project Licence is for the Mole Valley Bat Project, which was established in 2013 with the aim of learning more about the local bat populations, particularly Bechstein's bats, and working with landowners to protect bat roosts and improve foraging areas. Martyn works in a voluntary capacity for the GAL Environment Team, specifically to monitor the bats at the airport. Martyn holds a GAL sponsored security pass to undertake this work. The results have not been included above as the trapping locations were outside the Project boundary and/or not covered by the areas included in the Natural England licence but the results are shown in Annex 4D. Only one species not included in the results above was trapped; an adult male Leisler's bat *Nyctalus leisleri* trapped inside the Project boundary at Povey Cross Road on 29 May 2019.

3.1.4 Trapping efforts were coordinated between The Ecology Consultancy and Martyn Cooke to ensure minimal disruption to bats. Martyn Cooke did not ring or fit radio-tags on bats.

DNA Analysis

3.1.5 Droppings were obtained from nine of the trapped small *Myotis* bats, which were all sent for DNA analysis. Eight of these samples were successfully analysed to species level, which confirmed the bats as being whiskered bats.

Diagram 3.2.1: Number of Bats Fitted with Radio-transmitter Tags



3.2 Radio-tracking

3.2.1 Twenty of the trapped bats were selected for radio-tracking. The species, sex, breeding status and bat identification numbers are shown in Diagram 3.2.1 and Table 3.2.1 below.

Table 3.2.1: Radio-tracking Results

Radio-tagged Bats					
Bat Identification number	**Trapping Location**	**Species**	**Sex**	**Breeding Status**	**Month of Capture**
1	3c	Brown long-eared bat	Female	Pregnant	May
2	3c	Brandt's bat	Female	Pregnant	May
3	3c	Bechstein's bat	Male	N/A	May
4	3b	Whiskered bat	Female	Pregnant	May
5	6a	Daubenton's bat	Female	Pregnant	May
6	3a	Brown long-eared bat	Female	Lactating	July
7	3b	Natterer's bat	Female	Lactating	July
8	1a	Bechstein's bat	Male	N/A	July
9	5d	Bechstein's bat	Male	N/A	July
10	4c	Bechstein's bat	Male	N/A	July
11	5d	Daubenton's bat	Female	Lactating	July
12	7a	Brown long-eared bat	Female	Lactating	July
13	2c	Brown long-eared bat	Female	Non-parous	September
14	1b	Bechstein's bat	Female	Juvenile (non-parous)	September
15	1a	Brown long-eared bat	Female	Juvenile (non-parous)	September
16	3c	Whiskered bat	Female	Young adult (non-parous)	September
17	2a	Bechstein's bat	Male	Juvenile	September
18	1b	Bechstein's bat	Female	Non-parous	September
19	4c	Brown long-eared bat	Female	Post-lactating	September
20	5e	Daubenton's bat	Female	Post-lactating	September

Roosts

3.2.2 A total of ten confirmed roosting locations were identified from nine radio-tagged bats of five species. Additionally, eight estimated roosting locations were identified. Dusk emergence surveys were undertaken on eight of the confirmed roosts. The location of these roosts and counts of the roosts are shown in Table 3.2.2 and Figure 3.2.1.

Table 3.2.2: Roost Locations

Roost Locations						Emergence Surveys	
Bat Identification Number	**Species**	**Estimated/Confirmed roost**	**Easting**	**Northing**	**Description**	**Emergence date**	**Roost count**
2	Brandt's bat	Confirmed	526197	141566	Poplar. Visibility of features very constrained due to dense vegetation.	29/05/2019 30/05/2019	12 8
3	Bechstein's bat	Confirmed	525871	139807	Sycamore with low cavity.	29/05/2019 30/05/2019	0 1

Roost Locations						Emergence Surveys	
Bat Identification Number	**Species**	**Estimated/Confirmed roost**	**Easting**	**Northing**	**Description**	**Emergence date**	**Roost count**
4	Whiskered bat	Confirmed	526742	142176	Povey Cross House (identified by bat group). Either under hanging tiles or roof tiles on southern elevation of building.	N/A	N/A
5	Daubenton's bat	Confirmed	530959	141180	Pedunculate oak tree near Burlow.	31/05/2019	1
6	Brown long-eared bat	Estimated	526331	139788	Building behind Charlwood House Day Nursery.	N/A	N/A
7	Natterer's bat	Estimated	525746	140747	Brockley Wood.	N/A	N/A
7	Natterer's bat	Confirmed	525767	140836	Ash tree with bat box 13.	18/07/2019	5
8	Bechstein's bat	Estimated	525462	140577	Within woodland strip west of Brockley Wood/River Mole.	N/A	N/A
8	Bechstein's bat	Confirmed	525210	140858	Pedunculate oak tree. Woodpecker hole on southern aspect. Several dead limbs.	17/07/2019	6
9	Bechstein's bat	Confirmed	529672	140318	Ash tree by sewage works, within woodland. Hazard beam split and knothole.	17/07/2019	1
9	Bechstein's bat	Confirmed	529101	140637	Pedunculate oak trees with knot holes and dead limbs. Two possible trees, tag 1135.	N/A	N/A
11	Daubenton's bat	Confirmed	529755	140322	Pedunculate oak tree by Crawley Sewage Treatment Works. No visible features.	18/07/2019	20
12	Brown long-eared bat	Estimated	529644	140184	Pedunculate oak woodland in garden next to Upper Pickett's Wood.	N/A	N/A
13	Brown long-eared bat	Estimated	523746	139579	Twin woodland south of Russ Hill (Prestwood Copse and Great Burlands – Upper Prestwood Copse). No access. The bat was also heard from Prestwood Lane, with the bearing putting the roost somewhere between Ifieldwood and Naldrets Farm.	N/A	N/A
13	Brown long-eared bat	Estimated	523164	139645	Twin woodland south of Russ Hill (Prestwood Copse and Great Burlands – Upper Prestwood Copse). No access. The bat was also heard from Prestwood Lane, with the bearing putting the roost somewhere between Ifieldwood and Naldrets Farm.	N/A	N/A
15	Brown long-eared bat	Estimated	523164	139645	Twin woodland south of Russ Hill (Prestwood Copse and Great Burlands – Upper Prestwood Copse). No access.	N/A	N/A
15	Brown long-eared bat	Estimated	523880	138989	Woodland west of Charlwood Road, east of Prestwood Paddock and south of Prestwood Lane.	N/A	N/A
18	Bechstein's bat	Estimated	523715	140195	Woodcote Farm.	N/A	N/A
18	Bechstein's bat	Confirmed	522600	141170	Pedunculate oak tree west of Glovers Wood.	06/09/2019	6

Flightlines

Bechstein's Bat

3.2.3 Of the seven radio-tagged Bechstein's bats, flightlines were confirmed for four, bats 8, 10, 17 and 18. Figure 3.2.2 shows the flightlines for Bechstein's bats.

3.2.4 Bat 8 was recorded flying from its roost within the woodland strip to the west of Brockley Wood, north and south along the River Mole and adjacent woodland strip to the west of Brockley Wood.

3.2.5 A flightline from the roost to foraging areas was not identified for bat 10 as the roost was not located. However, a flightline between foraging areas was recorded along the River Mole Corridor, south of Povey Cross Road.

3.2.6 A flightline from the roost to foraging areas was not identified for bat 17 as the roost was not located. However, a flightline between foraging areas was recorded along the River Mole directly north of Brockley Wood and along Man's Brook to the south of Burlands Farm.

3.2.7 A flightline from the roost to foraging areas was not identified for bat 18. However, a flightline was recorded within the core foraging area for this bat, along the River Mole and adjacent woodland strip to the west of Brockley Wood.

Other Species

3.2.8 Although the other bat species radio-tagged were not subject to targeted radio-tracking studies, data was collected when Bechstein's bats could not be located in the survey area. The surveyors recorded flightlines for brown long-eared and Daubenton's bats. Figure 3.2.3 shows the flightlines for these two species.

Brown Long-eared Bat

3.2.9 A specific flightline was not identified for bat 6 but the bat was recorded foraging north of the runway before the signal weakened to an extent that it was considered likely to have crossed to the south of the runway, close to its roosting location.

3.2.10 A flightline from the roost to the foraging area for bat 15 was not identified. However, a flightline was recorded along Man's Brook to the south of Charlwood and the north of Ifield Wood.

Daubenton's Bat

3.2.11 A flightline for bat 5 was identified from its roosting location to the east of the M23 south along Burstow Stream to a large waterbody.

3.2.12 A flightline for bat 11 was identified from its roosting location in Upper Pickett's Wood through the woodland to the New Lagoon and Old Lagoon.

Home Ranges and Foraging Areas

3.2.13 Figures 3.2.4-3.2.9 display visual representations of these data and deduced flightlines and Figure 3.2.10 combines the home ranges for all Bechstein's bats. The fixes obtained during the radio-tracking were analysed with BIOTAS software to calculate the maximum home range (100% MCP), the peripheral foraging areas (95% KDE) and the core foraging areas (50% KDE) of each tracked Bechstein's bat. The calculated 100% MCP, 95% KDE and 50% KDE for each tracked bat are shown in Annex 4B.

Bechstein's Bat 3

3.2.14 Core foraging areas for bat 3 were within Crawter's Wood, close to where the bat was recorded roosting.

3.2.15 Peripheral foraging areas for bat 3 were within and adjacent to a small area of woodland to the west of the Fire Training Ground as well as around the River Mole to the south of Charlwood Road.

Bechstein's Bat 8

3.2.16 Core foraging areas for bat 8 were located north of the runway, around the Museum Field and the woodland to the west of the River Mole and the River Mole Corridor, close to where the bat was estimated to be roosting.

3.2.17 Peripheral foraging areas for bat 8 included the Museum Field, north of the Northern Runway and land to the east of Charlwood.

Bechstein's Bat 9

3.2.18 Core foraging areas for bat 9 were within Upper Pickett's Wood and around the adjacent Crawley Sewage Treatment Works. The easternmost roosting location for this bat is included within the core foraging area in Upper Pickett's Wood.

3.2.19 Peripheral foraging areas for bat 9 were identified within Horleyland Wood and Lower Pickett's Wood. The westernmost roosting location for this bat is included within the peripheral foraging area in Horleyland Wood.

Bechstein's Bat 10

3.2.20 Core foraging areas for bat 10 were identified within Riverside Garden Park and within a small area of woodland to the south of Povey Cross Road. A flightline for this bat was recorded part way along the River Mole corridor between these two foraging areas.

3.2.21 Peripheral foraging areas for bat 10 were identified within a small woodland strip to the south of Povey Cross Road along the River Mole corridor.

Bechstein's Bat 14

3.2.22 Bat 14 was not located following capture during the radio-tracking study.

Bechstein's Bat 17

3.2.23 Core foraging areas for bat 17 were identified around the Museum Field.

3.2.24 Peripheral foraging areas for bat 17 were identified at the River Mole corridor near to Brockley Wood, Museum Field, Man's Brook, and Great Burlands woodland and Prestwood Copse.

3.2.25 Although bat 17 was not recorded foraging or commuting on the runway, the MCP of Bat 17 included the north west section of the runway. However, as discussed in Section 3.5, radio-tracking data can include outliers, especially with fast moving animals such as bats.

Bechstein's Bat 18

3.2.26 Core foraging areas for bat 18 were identified along the River Mole Corridor to the west of Brockley Wood, and the woodland strip to the west of the River Mole. A flightline was recorded for bat 18 in this area.

3.2.27 Peripheral foraging areas for bat 18 were identified within and around the Museum Field, Brockley Wood, the River Mole Corridor as well as locations around both runways and a small area to the west by the estimated roost location at Woodcote Farm.

Other Species

3.2.28 Although other species were not subject to targeted radio-tracking studies, some data was collected when Bechstein's bats could not be located.

Brandt's Bat

3.2.29 Bat 2 was recorded foraging within Brockley Wood.

Brown Long-eared Bat

3.2.30 Bat 6 was recorded foraging along the River Mole Corridor and adjacent woodland strip, to the west of Brockley Wood.

3.2.31 Bat 12 was recorded foraging in Upper Pickett's Wood.

3.2.32 Bat 13 was recorded foraging along the hedgerows and woodland strips to the south of Charlwood.

3.2.33 Bat 15 was recorded foraging east-west-east along Man's Brook to the south of Charlwood and the north of Ifield Wood.

Daubenton's Bat

3.2.34 Bat 5 was recorded foraging around Shipley Bridge to the east of the M23.

3.2.35 Bat 11 was recorded foraging in Lower Pickett's Wood.

Natterer's Bat

3.2.36 Bat 7 was recorded foraging along the hedgerows and woodland strips to the south of Charlwood.

Emergence Surveys

3.2.37 A total of nine emergence surveys were undertaken on eight of the confirmed roosts for Bechstein's bat, Brandt's bat, Daubenton's bat and Natterer's bat.

Bechstein's Bat

3.2.38 Five emergence surveys were undertaken on four Bechstein's bats roosts.

3.2.39 On 29 May 2019 an emergence survey was undertaken on the bat 3 roost within a sycamore tree *Acer pseudoplatanus* in Crawter's Wood. No bats were recorded emerging from the roost, and the tagged bat remained in the roost. This survey was repeated the following night on the 30 May 2019, and one bat (tagged bat 3) was recorded emerging from a cavity on the tree. No other bats were recorded emerging from the roost.

3.2.40 On 17 July 2019, an emergence survey was undertaken on the bat 8 pedunculate oak tree *Quercus robur* roost in a tree line to the east of the Museum Field. A total of six bats, including the radio-tagged bat 8, were recorded emerging from the roost.

3.2.41 On 17 July 2019 an emergence survey was undertaken on the bat 9 ash tree roost within the woodland near the sewage treatment works. One bat (tagged bat 9) was recorded emerging from the roost.

3.2.42 On 6 September 2019 an emergence survey was undertaken on the bat 18 pedunculate oak tree roost west of Glovers Wood. A total of six bats, including radio-tagged bat 18, were recorded emerging from the roost.

Brandt's Bat

3.2.43 Two emergence surveys were undertaken on one Brandt's bat roost.

3.2.44 On 29 May 2019 an emergence survey was undertaken on the bat 2 poplar *Populus spp.* roost within woodland adjacent to the River Mole Corridor, south of the Bear and Bunny Nursery. The survey was undertaken from a public right of way. A total of 12 bats were recorded emerging from the roost. This survey was repeated on 30 May 2019 and a total of eight bats were recorded emerging.

Daubenton's Bat

3.2.45 Two emergence surveys were undertaken on two Daubenton's bat roosts.

3.2.46 On 31 May 2019 an emergence survey was undertaken on the bat 5 pedunculate oak tree roost near Burlow. One bat (tagged bat 5) was recorded emerging from the tree. No other bats were recorded emerging from the roost.

3.2.47 On 18 July 2019 an emergence survey of the bat 11 pedunculate oak tree roost near the sewage works was undertaken. A total of 20 bats were recorded emerging from the roost, including tagged bat 11.

Natterer's Bat

3.2.48 A single emergence survey was undertaken on one Natterer's bat roost.

3.2.49 On 18 July 2019 an emergence survey was undertaken on the bat 7 ash tree roost within Brockley Wood. A total of five bats were recorded emerging from the roost, including tagged bat 7.

4 Discussion

4.1 Summary

4.1.1 The bat assemblage within the Project boundary and adjacent areas is considered of Regional importance due to the presence of the following:

- a minimum of ten species of bat;
- the presence of Bechstein's bat, an Annex II species that is also listed as Near Threatened on the International Union for Conservation of Nature (IUCN) Red List of Threatened Species (Hutson and Paunovic, 2016) and nationally and locally very rare (Bat Conservation Trust, 2010; Sussex Bat Group, 2019); and
- the presence of four Species of Principal Importance (under Section 41 of the NERC Act 2006); Bechstein's bat, brown long-eared bat, noctule and soprano pipistrelle.

4.1.2 The sections below summarise the results obtained for the trapping and radio-tracking surveys undertaken in 2019.

4.1.3 Due to the lack of access to the areas surrounding the Project boundary, it is likely that the evaluation of the importance of the site for bats is considerably constrained by the lack of knowledge of the status of the bat populations in the immediate landscape surrounding the Project boundary.

4.2 Field Survey

Trapping

4.2.1 A total of 154 bats of a minimum of ten species were captured over nine trapping nights between 28th May and September 2019 in 20 different locations. Species included Bechstein's bat, Brandt's bat, brown long-eared bat, common pipistrelle, Daubenton's bat, Natterer's bat, noctule, soprano pipistrelle and whiskered bat.

4.2.2 The most commonly caught bat was common pipistrelle with a total of 50 bats captured, followed by brown long-eared bats (39 bats). The least commonly caught bat were the noctule and Brandt's bat, with just two of each species caught during the survey period.

4.2.3 Trapping locations were split into seven distinct areas across the Project boundary. The highest number of average bats caught per night was four and this was recorded within Lower Pickett's Wood (area 6) with Upper Pickett's Wood (area 7) having the

second highest average number of bats caught per night (3.86). The area with the lowest average capture rate (1.90) was Horleyland Wood (area 5). This woodland was subject to high levels of light from the adjacent sewage treatment works which may have deterred light sensitive bats such as long-eared bats, Myotis species, and barbastelle bats (Institute of Lighting Professionals, 2018).

Bechstein's Bat

4.2.4 This species is listed in Annex II of the EU Habitat Directive, categorised as Near Threatened on the IUCN Red List of Threatened Species (Hutson and Paunovic, 2016), is a Species of Principal Importance in England, and is considered to be very rare at a national (Bat Conservation Trust, 2010) and local level (Sussex Bat Group, 2019 and Surrey Bat Group, 2019). Although this species' range is considered to be stable, the future prospects for this species' habitat is considered to be in decline (Matthews *et al.,* 2018).

4.2.5 A total of seven Bechstein's bats were captured during the 2019 trapping surveys within the Project boundary within the woodland strip west of Brockley Wood/River Mole, Brockley Wood, Crawter's Wood, Riverside Garden Park and Horleyland Wood.

4.2.6 No breeding individuals were recorded for this species; captured bats were all male or non-breeding females. However, juvenile male and females were recorded present in September indicating that there is likely to be a breeding colony close to the Project boundary.

Brandt's Bat

4.2.7 Due to the similarities between whiskered and Brandt's bats, species distribution and rarity is difficult to determine, meaning the range of these species is often estimated for the two species combined (Matthews *et al.,* 2018).

4.2.8 The Brandt's bat is listed as of Least Concern on the IUCN Red List of Threatened Species (Hutson and Paunovic, 2016) and is considered to be widespread and uncommon nationally (Bat Conservation Trust, 2010), widespread and scarce in Sussex (Sussex Bat Group, 2019) and rare and local in Surrey.

4.2.9 A total of two Brandt's bats were captured during the trapping surveys in 2019. These bats were captured at Crawter's Wood and within Lower Pickett's Wood.

4.2.10 Breeding individuals for Brandt's bats were recorded during the trapping survey comprising a pregnant female bat Crawter's Wood.

4.2.11 Five individuals identified as being from a whiskered bat/Brandt's bat were captured but identification to species level was not undertaken. Three of these bats were pregnant.

Brown Long-eared Bat

4.2.12 The brown long-eared bat is listed as of Least Concern on the IUCN Red List of Threatened Species (Hutson and Paunovic, 2016), is a Species of Principal Importance in England, and is considered widespread and relatively common at a national (Bat Conservation Trust, 2010) and local level (Sussex Bat Group, 2019). The future prospects for this species' range and habitat are considered to be stable (Matthews *et al.,* 2018).

4.2.13 A total of 39 brown long-eared bats were captured within all surveyed woodlands and at all trapping locations excluding Riverside Garden Park west and central, Horleyland Wood west and central and Lower Pickett's Wood north.

4.2.14 Breeding individuals for this species were recorded during the trapping survey comprising three pregnant bats, five lactating females and one post-lactating female.

Common Pipistrelle

4.2.15 The common pipistrelle is listed as of Least Concern on the IUCN Red List of Threatened Species (Hutson and Paunovic, 2016) and is considered to have a widespread distribution at a national level (Bat Conservation Trust, 2010) and is considered to be locally abundant in Sussex (Sussex Bat Group, 2019) and common and widespread in Surrey (Surrey Bat Group, 2019). Future prospects for this species' range and habitat are considered to be stable (Matthews *et al.,* 2018).

4.2.16 A total of 50 common pipistrelle bats were captured during the 2019 trapping surveys within all surveyed woodlands and at all trapping locations excluding Brockley Wood south west, Brockley Wood central, Crawter's Wood, Horleyland Wood west, Horleyland Wood east and Upper Pickett's Wood east.

4.2.17 Breeding individuals for this species were recorded during the trapping survey comprising two pregnant bats, two lactating females and one post-lactating female.

Daubenton's Bat

4.2.18 The Daubenton's bat is listed as of Least Concern on the IUCN Red List of Threatened Species (Hutson and Paunovic, 2016) and is considered to be nationally and locally widespread and abundant (Bat Conservation Trust, 2010; Sussex Bat Group, 2019) and common in Surrey (Surrey Bat Group, 2019). The future prospects for this species' range are considered stable and habitat unknown (Matthews *et al.,* 2018).

4.2.19 A total of four Daubenton's bats were captured during the 2019 trapping surveys at Horleyland Wood central west, Horleyland Wood central east, Horleyland Wood east and Lower Pickett's Wood north.

4.2.20 Breeding individuals for this species were recorded during the trapping survey comprising two pregnant bats, one lactating bat and one post-lactating female.

Natterer's Bat

4.2.21 The Natterer's bat is listed as of Least Concern on the IUCN Red List of Threatened Species (Hutson and Paunovic, 2016) and is considered to be widespread and locally common nationally (Bat Conservation Trust, 2010), widespread and scarce in Sussex (Sussex Bat Group, 2019) and uncommon and widespread in Surrey (Surrey Bat Group, 2019). The future prospects for this species' range are considered stable but habitat is considered likely to decline (Matthews *et al.,* 2018).

4.2.22 A total of five individuals of this species were captured during the 2019 trapping surveys at Brockley Wood south west, Brockley Wood central, Brockley Wood north west and Crawter's Wood

4.2.23 Breeding individuals for this species were recorded during the trapping survey comprising a lactating female.

Noctule

4.2.24 This species is considered to be of Least Concern on the IUCN Red List of Threatened Species (Hutson and Paunovic, 2016), is a Species of Principal Importance in England, and is nationally widespread and relatively common (Bat Conservation Trust, 2010) but at a local level is considered to be widespread but uncommon (Sussex Bat Group, 2019 and Surrey Bat Group, 2019).

4.2.25 A total of two noctule bats were captured during the 2019 trapping surveys at Upper Pickett's Wood east.

4.2.26 No breeding individuals for this species were recorded during the trapping surveys.

Soprano Pipistrelle

4.2.27 This species is listed as of Least Concern on the IUCN Red List of Threatened Species (Hutson and Paunovic, 2016), is a Species of Principal Importance in England, and is considered to have a widespread distribution at a national level (Bat Conservation Trust, 2010) and is considered to be locally common (Sussex Bat Group, 2019 and Surrey Bat Group, 2019). The future prospects for this species' range and habitat are considered to be stable (Matthews *et al.,* 2018).

4.2.28 A total of 15 soprano pipistrelle bats were captured during the 2019 trapping surveys at the strip of woodland west of Brockley Wood/River Mole, Brockley Wood central, Brockley Wood north-east, Crawter's Wood, Riverside Park west, Lower Pickett's Wood north and central and Upper Pickett's Wood south west.

4.2.29 Evidence of breeding for this species was recorded during the trapping survey comprising one pregnant bat.

Whiskered Bat

4.2.30 Due to the similarities between whiskered and Brandt's bats, species distribution and rarity is difficult to determine, meaning the range of these species is often estimated for the two species combined (Matthews *et al.,* 2018).

4.2.31 Whiskered bats are listed as of Least Concern on the IUCN Red List of Threatened Species (Hutson and Paunovic, 2016) and are considered to be widespread and scarce both nationally (Bat Conservation Trust, 2010) and in Sussex (Sussex Bat Group, 2019), and uncommon and widespread in Surrey (Surrey Bat Group, 2019).

4.2.32 A total of 18 whiskered bats were captured during the trapping surveys in 2019. These bats were captured at all surveyed woodlands apart from Horleyland Wood.

4.2.33 Breeding individuals for whiskered bats were recorded during the trapping survey comprising two pregnant bats captured at Brockley Wood.

4.2.34 Five individuals identified as being whiskered bat/Brandt's bat were captured but identification to species level was not undertaken. Three of these bats were pregnant.

Radio-tracking

Roosts

Bechstein's Bat

4.2.35 Seven Bechstein's bat roosts were identified during the radio-tracking surveys. Emergence surveys were undertaken on four of these roosts. One of these roosts (bat 8; pedunculate oak tree) was classified as a likely satellite maternity roost (based on the number of individuals present in the roost) and one roost (bat 18; pedunculate oak tree) was classified as a transitional roost as six bats were recorded emerging from this roost in September. The other two roosts were classified as day roosts for individual bats.

Brandt's Bat

4.2.36 One Brandt's bat roost was identified during the radio-tracking surveys, and this roost was located within a poplar tree in woodland adjacent to the River Mole Corridor, south of Bear and Bunny Nursery. An emergence survey was undertaken on this roost which confirmed it as a maternity roost with a peak count of 12 bats recorded emerging from the roost in May.

Brown Long-eared Bat

4.2.37 Six brown long-eared bat roosts were identified during the radio-tracking surveys. Emergence surveys were not undertaken on these roosts due to lack of access to the roost sites.

Daubenton's Bat

4.2.38 Two Daubenton's bat roosts were identified during the radio-tracking surveys. Emergence surveys were undertaken on both roosts. One roost, the roost of bat 11 located within a pedunculate oak tree close to the Crawley Sewage treatment Works, was classified as a maternity roost. Twenty bats were recorded emerging from this roost on 18th July 2019.

4.2.39 One of the Daubenton's bat roosts was to the east of the M23, indicating that this bat had crossed the motorway.

Natterer's Bat

4.2.40 Two Natterer's bat roosts were identified during the radio-tracking surveys. Emergence surveys were undertaken on one of these roosts as access was not possible for the other roost. Five bats were recorded emerging from the roost within Brockley Wood on 18th July 2019. Although only a low number of bats were recorded emerging, the radio-tagged bat (bat 7) was a lactating female and as such it was likely to be a maternity roost. The roost could have additional exit points not observed during the survey.

Whiskered Bat

4.2.41 One whiskered bat roost was identified during the radio-tracking surveys. Emergence surveys were not undertaken on this roost due to lack of access to the roost site.

Flightlines

4.2.42 Flightlines were identified for seven of the radio-tagged bats as follows (see Figures 3.2.2 and 3.2.3):

- **Bechstein's bat**: Flightlines were identified for four of the radio-tracked Bechstein's bats. Various sections of the River Mole were used as a flightline for bats 8, 10, 17 and 18 to commute between foraging areas including the area of the River Mole to the west of Brockley Wood (bat 8 and bat 18), the area south of Povey Cross Road (bat 10), the area north of Brockley Wood (bat 17). Flightlines for Bechstein's bats were also recorded along Man's Brook to the south of Burlands Farm (bat 17).
- **Brown long-eared bat**: Flightlines were identified for one of the radio-tracked brown long-eared bats (bat 15) which identified Man's Brook to the south of Burlands Farm (same flightline as Bechstein's bat 17).
- **Daubenton's bat**: Flightlines were identified for two Daubenton's bats. The flightline for bat 5 was identified from the roost location south along Burstow stream to a large waterbody. The flightline for bat 11 was identified from its roosting location in Upper Pickett's Wood through the woodland to the sewage work lakes.

Foraging Areas

4.2.43 Core foraging areas for radio-tracked Bechstein's bats were identified within the following areas:

- Museum Field;
- Charlwood Park Farm;
- Woodland strip to the west of Brockley Wood;
- River Mole Corridor;
- Woodland to the west of the Fire Training Ground;
- Crawter's Wood;
- Riverside Garden Park;
- Upper Pickett's Wood; and
- Horleyland Wood.

4.2.44 Peripheral foraging areas for radio-tracked Bechstein's bats included the above, along with the following areas:

- Woodland to the east of Bonnett's Lane;

- River Mole to the south of Charlwood Road;
- Land to the east of Charlwood;
- Horleyland Wood;
- Lower Pickett's Wood;
- Woodland strip to the south of Povey Cross Road along the River Mole Corridor;
- Man's Brook;
- Great Burlands woodland;
- Prestwood Copse; and
- Gatwick Airport runways.

4.2.45 The majority of the core and peripheral foraging areas for Bechstein's bats were located within and adjacent to the west of the Project boundary. Estimates of location for one Bechstein's bat was recorded on the runway during radio-tracking surveys undertaken in September. However, radio-tracking data can include outliers, especially with fast moving animals such as bats (as discussed in Section 3.5).

4.2.46 Foraging areas for non-target bat species (Brandt's bat, brown long-eared bat, Daubenton's bat, Natterer's bat and whiskered bat) were identified in similar locations to Bechstein's bats including:

- Brockley Wood;
- River Mole Corridor;
- Woodland strip to the west of Brockley Wood;
- Upper Pickett's Wood;
- Man's Brook;
- Lower Pickett's Wood;
- Woodland to the south of Shipley Bridge; and
- Hedgerows and woodlands to the south of Charlwood.

5 Conclusions

5.1.1 The River Mole and Man's Brook were used as flightlines for bats between roosts and foraging areas, including for Bechstein's bats (see Figure 3.2.1 and 3.2.2).

5.1.2 The Museum Field, adjacent River Mole Corridor and Brockley Wood were used as core foraging areas for multiple Bechstein's bats (bat 8, 17, 18; as shown in Figure 3.2.5, 3.2.8 and 3.2.9 respectively) as well as a Brandt's bat (bat 2), and brown long-eared bat (bat 6) (as shown in Figure 3.2.11).

5.1.3 A brown long-eared bat was recorded north of the runway before the signal weakened to an extent that it was considered likely to have crossed to the south of the runway.

5.1.4 A Daubenton's bat caught in Lower Pickett's Wood was recorded roosting to the east of the M23, indicating that this bat had crossed the motorway.

5.1.5 Although higher rates of bat captures were recorded in eastern trapping locations, the roost locations and home ranges were mostly concentrated within and adjacent to the west of the Project boundary where there are more habitat linkages to suitable bat habitat in the wider landscape (see Figures 3.2.3-3.2.10).

5.1.6 Due to access restrictions in the area surrounding the Project Area it is likely that the evaluation of the importance of the area for bats is considerably constrained by the lack of knowledge of the wider landscape and, in particular, habitats of value for bats directly connected to the Project Area.

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Annex 4A

Trapping Data

Table A4(A).1: Trapping Data

Bat No.	Date	Time (24hr)	Trap No.	Easting	Northing	Species	Extracted by	Measured by	Determined by	Sex - M/F	Age - Juv/ Imm/ Ad	Breeding status (male) - Testes size 0-2	Breeding status (female) - Par/ NP/ Preg/ Lact	Forearm (mm)	Total weight (g)	Bag weight(g)	Bat weight (g)	Tagged bat? Include bat number, freq and ring number	Sample taken?	ID features, damage, parasites photos and samples collected
1	28/05/2019	21:50	3c	525928	139818	P.pyg	TE	TE	TE	M	Ad	0	-	31.8	21	16.5	4.5			
2	28/05/2019	22:20	3a	525600	139752	Unknown	TE													Escaped
3	28/05/2019	22:20	3a	525600	139752	P.pip	TE	TE	TE	M	Ad	0	-	30.3	21	16.5	4.5			Confirmed using BL
4	28/05/2019	22:40	3c	525928	139818	M.mys/ bra	TE	TE	TE	F	Ad	-	Preg	35.6	23	16.5	6.5			
5	28/05/2019	22:40	3c	525928	139818	P.aur	TE	TE	TE	F	Ad	-	Preg	37.2	25	17	8	Bat 1 / 173.7730		Radiotagged Bat 1 173.7730
6	28/05/2019	22:40	3c	525928	139818	P.aur	TE	TE	TE	M	Ad	1	-	38.7	26	18.5	7.5			Epis = black + starting to fill (1)
7	28/05/2019	22:40	3c	525928	139818	M.mys	TE	TE	TE	M	Ad	0	-	32.7	23	18.5	4.5			Epis = black + grain of rice
8	28/05/2019	22:40	3c	525928	139818	M.bra	TE	TE	SM	F	Ad	-	Preg	35.9	22	15	7	Bat 2 / 173.2410		Radiotagged Bat 2 173.2410
9	28/05/2019	23:15	3a	525600	139752	P.aur	SM	TE	TE	M	Ad	0	-	36.5	24.5	17.5	7			Epis = black + grain of rice
10	28/05/2019	23:50	3c	525928	139818	M.nat	TE	TE	TE	M	Ad	0	-	39	25.5	18.5	7			Epis = black + starting to fill (1)
11	28/05/2019	00:20	3c	525928	139818	M.bec	TE	TE	SM	M	Ad	0		41.4	26	17.5	8.5	Bat 3 / 173.9397		Epis = black + starting to fill (1) Radiotagged Bat 3 173.9397
12	28/05/2019	22:20	2b	525775	140837	M.mys	DH	DH	DH	F	Ad	-	Preg	32.9	28.7	22.6	6.1			
13	28/05/2019	22:20	2b	525775	140837	M.mys	DH	DH	DH	F	Ad	-	Preg	32.9	28.6	22.4	6.2	Bat 4 / 173.9839		TAGGED BAT #4 173.9839
14	28/05/2019	23:15	2c	525826	140907	P.pyg	DH	DH	DH	M	Ad	0	-	31.5	19.3	14.8	4.5			
15	28/05/2019	23:54	2c	525826	140907	P.pyg	DH	DH	DH	M	Ad	0	-	30.8	19.5	14.8	4.7			
16	28/05/2019	00:57	2c	525826	140907	P.pip	DH	DH	DH	F	Ad	-	Par	32.5	19.8	14.7	5.1			
17	28/05/2019	21:42	1a	525478	140615	M.mys/ bra	RM	GB	GB	F	Ad	N/A	Par	35	7.6	2	5.6		Yes	Sample taken
18	28/05/2019	21:50	1a	525478	140615	M.mys/ bra	GB	GB	GB	F	Ad	N/A	Par	36	8.8	2	6.8		Yes	Sample taken
19	28/05/2019	22:55	1a	525478	140615	P.pyg	RM	GB	GB	M	Ad	0	N/A	31	6.3	2	4.3			

Bat No.	Date	Time (24hr)	Trap No.	Easting	Northing	Species	Extracted by	Measured by	Determined by	Sex - M/F	Age - Juv/ Imm/ Ad	Breeding status (male) - Testes size 0-2	Breeding status (female) - Par/ NP/ Preg/ Lact	Forearm (mm)	Total weight (g)	Bag weight(g)	Bat weight (g)	Tagged bat? Include bat number, freq and ring number	Sample taken?	ID features, damage, parasites photos and samples collected
20	28/05/2019	23:50	1b	525444	140560	M.mys	RM	GB	GB	M	Ad	1	N/A	31	6.8	2	4.8			
21	28/05/2019	01:10	1a	525478	140615	P.pip	GB	GB	GB	F	Ad	N/A	Par	32	7.5	2	5.5			
22	29/05/2019	23:20	5b	528931	140494	P.pip	DH	DH	DH	M	Ad	0	-	31.2	18.7	14.2	4.5			Growth on right rear back
23	29/05/2019	00:25	5b	528931	140494	P.pip	DH	DH	DH	F	Ad	-	NP	32.1	27.6	23.2	4.4			
24	29/05/2019	00:25	5b	528931	140494	P.pip	DH	DH	DH	M	Ad	0	-	32	19.7	15	4.7			
25	29/05/2019	00:25	5b	528931	140494	P.pip	DH	DH	DH	F	Ad	-	Par	33.2	33.2	22.3	4.4			
26	29/05/2019	00:51	5b	528931	140494	P.pip	DH	DH	DH	F	Ad	-	Par	31.4	31.4	14.9	4.6			
27	29/05/2019	22:30	4c	528182	142014	P.pip	CW	CW	CW	F	Ad	N/A	Preg	34.1	30	24	6			
28	30/05/2019	22:15	6c	529550	140548	P.pip	CW	CW	CW	F	Ad	N/A	Par + preg	33.1	24	18	6			
29	30/05/2019	22:20	6b	529513	140675	M.mys/ bra	CW	CW	CW	F	Ad	N/A	Par + preg	31.9	46	40	6			
30	30/05/2019	22:20	6b	529513	140675	P.pyg	CW	CW	CW	F	Ad	N/A	Preg	30.7	23	17	5			
31	30/05/2019	23:30	6a	529611	140738	M.mys/ bra	CW	CW	FW	F	Ad	N/A	Par + preg	31	46.5	40	6.5			
32	30/05/2019	23:30	6a	529611	140738	P.aur	CW	CW	CW	M	Ad	1	N/A	36.5	26	18.5	7.5			
33	30/05/2019	23:30	6a	529611	140738	P.aur	CW	CW	CW	F	Ad	N/A	Par + preg	37	27	18.5	8.5			
34	30/05/2019	23:30	6b	529513	140675	M.mys/ bra	CW	CW	CW	F	Ad	N/A	Par	33.5	22.5	16.5	6			
35	30/05/2019	23:30	6a	529611	140738	P.pip	CW	CW	CW	F	Ad	N/A	Par	30.5	26	21	5			
36	30/05/2019	00:45	6a	529611	140738	P.pyg	CW	CW	CW	F	Ad	N/A	Par	28	21	15.5	5.5			
37	30/05/2019	00:45	6a	529611	140738	P.pip	CW	CW	CW	F	Ad	N/A	Par	30.5	25	20	5			
38	30/05/2019	00:45	6a	529611	140738	P.pyg	CW	CW	CW	F	Ad	N/A	Par	31	26	20	6			
39	30/05/2019	00:45	6a	529611	140738	M.daub	CW	CW	CW	F	Ad	N/A	Par + preg	38.63	48.5	39.5	9	Bat 5 / 173.2618		TAGGED BAT #5 173.2618
40	30/05/2019	01:30	6a	529611	140738	P.aur	CW	CW	CW	M	Ad	1	N/A	34.5	45	39	6			
41	30/05/2019	01:30	6c	529550	140548	Pipsp	CW	CW	CW											Bat let go due to stress
42	30/05/2019	21:45	7b	529464	140297	P.pip	DH	DH	DH	M	Ad	0	-	32.9	18.9	14.7	4.2			
43	30/05/2019	21:47	7a	529403	140139	P.pip	DH	DH	DH	M	Ad	0	-	31.2	26.4	21.7	4.7			
44	30/05/2019	22:02	7b	529464	140297	P.aur	DH	DH	DH	F	Ad	-	Pregnant	40.5	31	22.5	8.5			
45	30/05/2019	22:14	7b	529464	140297	P.pip	DH	DH	DH	M	Ad	0	-	30.4	22.2	17.4	4.8			
46	30/05/2019	22:45	7b	529464	140297	P.pip	DH	DH	DH	M	Ad	0	-	31.5	19.6	14.9	4.7			
47	30/05/2019	23:05	7b	529464	140297	P.aur	DH	DH	DH	M	Ad	0	-	38.3	21.8	14.2	7.6			
48	30/05/2019	23:19	7c	529578	140264	N.noc	DH	DH	DH	M	Ad	1	-	54.9	47.7	16.8	30.9			
49	30/05/2019	23:19	7c	529578	140264	M.mys	DH	DH	DH	M	Ad	0	-	35.4	23.5	17.8	5.7			
50	30/05/2019	00:12	7c	529578	140264	P.aur	DH	DH	DH	M	Ad	0	-	38.8	24.7	17.1	7.6			
51	30/05/2019	00:18	7b	529464	140297	P.aur	DH	DH	DH	M	Ad	0	-	39.8	24.9	16.9	8			

Bat No.	Date	Time (24hr)	Trap No.	Easting	Northing	Species	Extracted by	Measured by	Determined by	Sex - M/F	Age - Juv/ Imm/ Ad	Breeding status (male) - Testes size 0-2	Breeding status (female) - Par/ NP/ Preg/ Lact	Forearm (mm)	Total weight (g)	Bag weight(g)	Bat weight (g)	Tagged bat? Include bat number, freq and ring number	Sample taken?	ID features, damage, parasites photos and samples collected
52	30/05/2019	00:43	7c	529578	140264	P.aur	DH	DH	DH	M	Ad	0	-	38.2	22.2	15.2	7			
53	30/05/2019	00:43	7c	529578	140264	P.aur	DH	DH	DH	F	Ad	-	Pregnant	40.4	26.8	18	8.8			
54	30/05/2019	01:20	7b	529464	140297	P.pip	DH	DH	DH	F	Ad	-	NP	32.3	22.8	17.9	4.9			
55	15/07/2019	22:20	2b	525730	140880	M.nat	DH	DH	DH	F	Ad		Lact	41.1	30.7	22.4	8.3	Bat 7 / 173.2373		RT BAT 7 Tag freq. 2373
56	15/07/2019	22:25	2c	525792	140893	M.mys	DH	DH	DH	M	Ad	0		32.4	25.5	20	5.5		Yes	Tibia length 15mm (Alcathoe? Faecal sample)
57	15/07/2019	00:07	2c	525792	140893	M.nat	DH	DH	DH	M	Juv			38.8	26.5	20.2	6.3			
58	15/07/2019	00:07	2c	525792	140893	M.mys	DH	DH	DH	M	Juv			34	27.2	22.5	4.7			
59	15/07/2019	00:52	2a	525740	140797	M.nat	DH	DH	DH	F	Juv			29.5	28.9	22.7	6.2			
60	15/07/2019	00:52	2a	525740	140797	P.aur	DH	DH	DH	F	Ad		Par	38.7	29.2	21.2	8			
61	15/07/2019	22:20	1b	525445	140561	M.mys/ bra	FW	FW	RMc	F	Ad		NP	31	24.5	19	5.5		Yes	Sample taken
62	15/07/2019	23:10	1a	525485	140622	P.aur	RM	RM	RM	F	Ad		Lact							Released immediately as lactating
63	15/07/2019	23:10	1a	525485	140622	M.bec	RM	RM	RM	M	Ad	1		39.8	26.5	17.5	9	Bat 8 / 173.8440 / H6474		RT BAT #8 173.8440 RING#6474
64	15/07/2019	23:10	1a	525485	140622	M.mys/ bra	FW	FW	FW	F	Juv		NP	32.6	23	18	5		Yes	Sample taken
65	15/07/2019	23:15	1b	525445	140561	M.mys/ bra	FW	FW	FW	F	Ad		NP	38	26	19.5	6.5			
66	15/07/2019	22:14	3a	525600	139752	P.aur	OC	SM	SM	F	Ad		Lact	39.87	29	21	8	Bat 6 / 173.8870		8870 BAT6
67	15/07/2019	22:48	3c	525928	139818	P.pip	OC	OC	OC	F	Ad		Lact	29.1	23	17	6			
68	15/07/2019	22:48	3c	525928	139818	P.pip	OC	OC	OC	M	Juv	1	N/A	29.96	27.5	23	4.5			
69	15/07/2019	23:09	3a	525600	139752	M.nat	SM	OC	SM	M	Ad	1	N/A	39.9	27.5	17.5	10			
70	15/07/2019	01:10	3c	525928	139818	P.pip	OC	OC	OC	M	Ad	0	N/A	33.1	28.5	21.5	7			
71	15/07/2019	02:20	3a	525600	139752	M.mys	SM	SM	SM	M	Ad	1	N/A	34.47	20	15	5			
72	16/07/2019	21:45	4a	528108	142137	P.pip	FW	FW	FW	M	Ad	1		30.5	24	19	5			
73	16/07/2019	21:50	4b	528114	142094	P.pip	SB	SB	FW	F	Juv		NP	30	21.3	16.5	4.8			Mites on wings
74	16/07/2019	00:05	4c	528176	142020	M.bec	RMc	RMc	RMc	M	Ad	0		41.4	29	19.5	9.5	Bat 10 / 173.7307		tag #7307 Bat10
75	16/07/2019	00:05	4c	528176	142020	P.pip	SB	SB	SB	F	Juv		NP	32.2	42	36.5	6.5			
76	16/07/2019	00:05	4c	528176	142020	P.pip	FW	SB	SB	M					42	37	6			Distressed - Released

Bat No.	Date	Time (24hr)	Trap No.	Easting	Northing	Species	Extracted by	Measured by	Determined by	Sex - M/F	Age - Juv/ Imm/ Ad	Breeding status (male) - Testes size 0-2	Breeding status (female) - Par/ NP/ Preg/ Lact	Forearm (mm)	Total weight (g)	Bag weight(g)	Bat weight (g)	Tagged bat? Include bat number, freq and ring number	Sample taken?	ID features, damage, parasites photos and samples collected
77	16/07/2019	00:05	4c	528176	142020	P.pip	FW	SB	SB	F	Juv		NP	31	22.5	18	4.5			
78	16/07/2019	01:10	4a	528108	142137	P.pip	FW	FW	FW	F	Ad		NP	29.9	25.5	19.5	6			
79	16/07/2019	01:15	4c	528176	142020	P.pip	SB	SB	SB	M	Juv	0		29	24	19.5	5.5			
80	16/07/2019	01:15	4c	528176	142020	P.pip	FW	SB	SB	M	Juv	0		33.3	21	16.5	5.5			
81	16/07/2019	01:15	4c	528176	142020	P.pip	SB	SB	SB	F	Juv		NP	31.8	20	15.5	4.5			
82	16/07/2019	01:50	4c	528176	142020	P.pip	RMc	RMc	RMc	F	Ad		Lact	33	21.5	16	5.5			
83	16/07/2019	01:15	4c	528176	142020	P.pip	FQ	SB	SB	F	Juv		NP	33	24.5	20	4.5			
84	16/07/2019	01:50	4c	528176	142020	P.pip	RMc	RMc	RMc	F				31.5	22	15.5	7.5			Mites, distressed - released
85	16/07/2019	01:15	4c	528176	142020	M.mys	FW	RMc	RMc	M	Ad	1		33.3	41.5	36.5	5			
86	16/07/2019	01:15	4c	528176	142020	M.mys	SB	SB	SB	M	Ad	0		35.3	22	15	7			
87	16/07/2019	02:20	4a	528108	142137	P.pyg	RMc	RMc	RMc	F	Ad		NP	31.4	24	18	6			
88	16/07/2019	02:20	4a	528108	142137	M.mys	RMc	RMc	RMc	M	Ad	1		33.1	35	30	5			
89	16/07/2019	22:44	5b	528941	140501	P.aur	DH	DH	DH	M	Ad	0		39.3	25.7	16.6	9.1			
90	16/07/2019	23:15	5d	529027	140524	P.aur	DH	DH	DH	M	Ad	0		36	24.2	16.7	7.5			
91	16/07/2019	23:15	5d	529027	140524	M.bec	DH	DH	DH	M	Ad	0		39.9	26.7	16.8	9.9	Bat 9 / 173.8194		RT BAT 9 Tagged freq. 8194
92	16/07/2019	00:20	5e	529146	140527	P.pyg	DH	DH	DH	M	Ad	0		30.3	22.4	17.5	4.9			
93	16/07/2019	00:20	5d	529027	140524	P.pip	DH	DH	DH	M	Juv			29.1	21.3	16.8	5			
94	16/07/2019	01:10	5d	529027	140524	M.daub	DH	DH	DH	F	Ad		Lact	38.7	27.3	17.7	9.6	Bat 11 / 173.9277		RT BAT 11 Forearm - 36.6mm tagged freq. 9277
95	16/07/2019	01:15	5b	528941	140501	P.pip	DH	DH	DH	M	Ad	2		31.8	22.1	17.1	5			
96	16/07/2019	01:15	5b	528941	140501	P.pip	DH	DH	DH	F	Juv			32.2	22.2	17.5	4.7			
97	16/07/2019	01:15	5b	528941	140501	M.daub	DH	DH	DH	F	Ad		Preg	39.2	27.8	17.8	10			
98	16/07/2019	01:55	5e	529146	140527	P.pyg	DH	DH	DH	M	Ad	1		30.9	22.4	17.7	4.7			
99	16/07/2019	02:00	5d	529027	140524	P.pyg	DH	DH	DH	M	Ad	2		30.6	22.7	17.1	5.6			
100	16/07/2019	02:45	5d	529027	140524	P.aur	DH	DH	DH	M	Ad	0		40.3	25.8	17.6	8.2			
101	17/07/2019	22:35	7a	529537	140151	P.aur	DH	DH	DH	M	Ad	0		37.5	24.8	17.6	7.2			(Young)
102	17/07/2019	22:35	7a	529537	140151	P.aur	DH	DH	DH	F	Ad		Lact	38.1	25.7	17.5	8.2	Bat 12 / 173.7808		RT BAT 12 Tagged freq. 7808
103	17/07/2019	00:21	7a	529537	140151	P.pyg	DH	DH	DH	M	Ad	2		31.5	22.3	17.4	4.9			
104	17/07/2019	01:51	7b	529467	140300	P.pip	DH	DH	DH	F	Ad		Postlac	33	23.4	17.2	6.2			
105	17/07/2019	02:39	7c	529579	140265	P.aur	DH	DH	DH	F	Ad		Lact	39.7	25.4	16.8	8.6			Or Post lac

Bat No.	Date	Time (24hr)	Trap No.	Easting	Northing	Species	Extracted by	Measured by	Determined by	Sex - M/F	Age - Juv/ Imm/ Ad	Breeding status (male) - Testes size 0-2	Breeding status (female) - Par/ NP/ Preg/ Lact	Forearm (mm)	Total weight (g)	Bag weight(g)	Bat weight (g)	Tagged bat? Include bat number, freq and ring number	Sample taken?	ID features, damage, parasites photos and samples collected
106	17/07/2019	02:39	7c	529579	140265	P.aur	DH	DH	DH	M	Ad	0		39.6	25.8	17.6	8.2			
107	17/07/2019	02:39	7c	529579	140265	P.aur	DH	DH	DH	F	Juv			39.3	24.7	17.6	7.1			
108	17/07/2019	02:39	7c	529579	140265	P.aur	DH	DH	DH	F	Ad		Lact	40.3	26.1	17.7	8.4			Or post lac
109	17/07/2019	02:39	7c	529579	140265	P.aur	DH	DH	DH	M	Juv			38.2	26.7	19.9	6.8			
110	17/07/2019	02:39	7c	529579	140265	N.noc	DH	DH	DH	M	Ad	2		51.8	47.3	18.4	28.9			
111	17/07/2019	22:05	6b	529538	140701	P.pip	FW	FW	FW	F	Ad		NP	31.5	22	16.5	5.5			
112	17/07/2019	22:10	6a	529586	140752	P.aur	FW	FW	FW	M	Ad	1		37	26.5	19	7.5			
113	17/07/2019	23:10	6b	529538	140701	P.pyg	FW	FW	FW	F	Ad		NP	32.5	22	17	5			
114	17/07/2019	23:10	6b	529538	140701	P.pip	FW	FW	FW	M	Ad	1		30	23.5	19	4.5			
115	17/07/2019	23:10	6b	529538	140701	P.pyg	FW	FW	FW	F	Ad		NP	31.3	21	15	6			
116	17/07/2019	23:10	6b	529538	140701	P.pip	FW	FW	FW	F	Juv		NP	33.5	21	16	5			Mites
117	17/07/2019	23:20	6a	529586	140752	P.pip	FW	FW	FW	M	Ad	2		32.1	22	16.5	5.5			
118	17/07/2019	00:05	6b	529538	140701	M.bra	FW	FW	FW	M	Ad	1		35.6	26	18.5	7.5			Lots of mites
119	17/07/2019	01:50	6b	529538	140701	P.aur	FW	FW	FW	M	Juv	0		37.8	25	18	7			
120	17/07/2019	02:15	6a	529586	140752	M.mys	RM	RM	RM	M	Ad	1		36.5	44.5	38	6.5			
121	02/09/2019	21:40	1b	525448	140548	P.pip	KT	KT	KT	M	Juv	0		29.5	24	19.5	5			
122	02/09/2019	21:40	1b	525448	140548	P.aur	KT	KT	KT	M	Juv	0		38	25	17.5	7.5			
123	02/09/2019	21:45	1a	525484	140626	P.pip	KT	KT	RM	M	Juv	0		31	19	14.5	4.5			
124	02/09/2019	22:30	1b	525448	140548	P.pip	KT	RM	RM	M	Ad	1		30.5	22	18	4			
125	02/09/2019	22:30	1b	525448	140548	M.bec	RM	RM	RM	F	Juv		NP	40.9	44	35.5	8.5	Bat 14 / 173.7603		RT BAT #14 173.7603
126	02/09/2019	22:35	1a	525484	140626	P.aur	KT	RM	RM	F	Juv		NP	38	24.5	16.5	8	Bat 15 / 173.9430		RT BAT #15 173.9430
127	02/09/2019	22:35	1a	525484	140626	P.aur	KT	RM	RM	M	Juv	0		37.1	22.5	15.5	7			
128	02/09/2019	22:35	1a	525484	140626	M.mys	KT	RM	RM	M	Ad	0		34.6	21	16.5	4.5			Split/hole in wing ~1cm
129	02/09/2019	22:35	1a	525484	140626	P.pip	KT	RM	RM	F	Ad		NP	31.4	24	19.5	4.5			
130	02/09/2019	23:30	1b	525448	140548	P.aur	RM	RM	RM	M	Juv	1		37	24.5	16.5	8			Mites
131	02/09/2019	00:20	1a	525484	140626	M.mys	KT	RM	RM	M	Juv	0		34.3	23.5	18.5	5			
132	02/09/2019	01:10	1b	525448	140548	M.bec	KT	KT	KT	F	Ad		NP	43	47	35.5	11.5	Bat 18 / 173.9728		RT BAT #17 173
133	02/09/2019	20:40	2a	525740	140797	M.mys	DH	DH	DH	M	Juv	0		34.8	24.2	19.7	4.5			No scars on wings, very clean

Bat No.	Date	Time (24hr)	Trap No.	Easting	Northing	Species	Extracted by	Measured by	Determined by	Sex - M/F	Age - Juv/ Imm/ Ad	Breeding status (male) - Testes size 0-2	Breeding status (female) - Par/ NP/ Preg/ Lact	Forearm (mm)	Total weight (g)	Bag weight(g)	Bat weight (g)	Tagged bat? Include bat number, freq and ring number	Sample taken?	ID features, damage, parasites photos and samples collected
134	02/09/2019	21:20	2c	525826	140907	P.aur	DH	DH	DH	M	Ad	0		39.8	25.3	17.5	7.8			Tear at bottom of wing, scar
135	02/09/2019	21:20	2c	525826	140907	P.aur	DH	DH	DH	F	Ad		NP	39.9	25.2	17.4	7.8	Bat 13 / 173.8566		Tagged 173.8566
136	02/09/2019	21:25	2b	525775	140837	P.aur	DH	DH	DH	M	Ad	1		37.2	27.2		8.4			
137	02/09/2019	22:05	2a	525740	140797	M.mys	SB	DH	DH	M	Juv	0		32.7	25.8	17.4	4.4		Yes	Droppings in blue epindorph
138	02/09/2019	22:10	2c	525826	140907	M.mys	SB	DH	DH	F	Juv/young ad		NP	34.3	22.7	17.6	5.1		Yes	Clean wings. Too feisty to tag. Droppings in green tube
139	02/09/2019	22:20	2b	525775	140837	P.pyg	SB	DH	DH	F	Young ad		NP	32.1	24	18.9	5.1			Tiny scar
140	02/09/2019	23:55	2c	525826	140907	M.mys	DH	DH	DH	F	Young ad		NP	35	35.1	29.8	5.3	Bat 16 / 173.2106	Yes	Tagged 173.2106. Droppings taken
141	02/09/2019	00:40	2a	525740	140797	P.aur	DH	DH	DH	F										Recaptured tagged bat
142	02/09/2019	01:05	2c	525826	140907	M.alc	DH	DH	DH	M	Young ad	0		32.2	24	19.2	4.8		Yes	Droppings in pink epindorph
143	02/09/2019	01:20	2b	525775	140837	P.aur	DH	DH	DH	M	Juv	0		36.8	22.2	14.8	7.4			
144	02/09/2019	01:35	2a	525740	140797	M.bec	SB	DH	DH	M	Juv	0		40.7	24.2	16.6	7.8	Bat 17 / 173.8770		Tagged 173.8770
145	03/09/2019	22:10	5e	529146	140527	P.pip	DH	DH	DH	F	Ad		NP	32.3	21.4	16.3	5.1			Young adult
146	03/09/2019	22:10	5e	529146	140527	M.daub	DH	DH	DH	F	Ad		Post lac	37.6	30.7	18.9	11.8	Bat 20 / 173.2765		
147	03/09/2019	21:20	4c	528176	142020	P.pip	TS	TS	TS	F	Imm		NP	32.2	22.5	17	5.5			
148	03/09/2019	21:20	4c	528176	142020	P.pip	OC	SB	SB	M	Imm	0		32.45	39	34.5	4.5			
149	03/09/2019	21:20	4c	528176	142020	P.aur	SB	TS	TS	F	Ad		Post lac	38	44.5	34	10.5	Bat 19 / 173.9020		Tagged 9020 Bat # 19
150	03/09/2019	21:55	4b	528114	142094	P.pip	OC	SB	TS	M	Imm	0		31.3	22	17.5	4.5			
151	03/09/2019	22:30	4c	528176	142020	P.pip	OC	OC	TS	M	Imm	0		32.3	23.5	19.5	4			
152	03/09/2019	23:05	4c	528176	142020	P.pip	TS	TS	TS	M		0		30.02	22.5	18.5	4.5			
153	04/09/2019	21:05	3b	525862	139810	P.aur	DH	DH	DH	F	Juv		NP	39.8	26	18.7	7.3			
154	04/09/2019	22:20	3a	525609	139762	P.aur	DH	DH	DH	F	Juv		NP	39.6	26.2	18.9	7.3			

Annex 4B

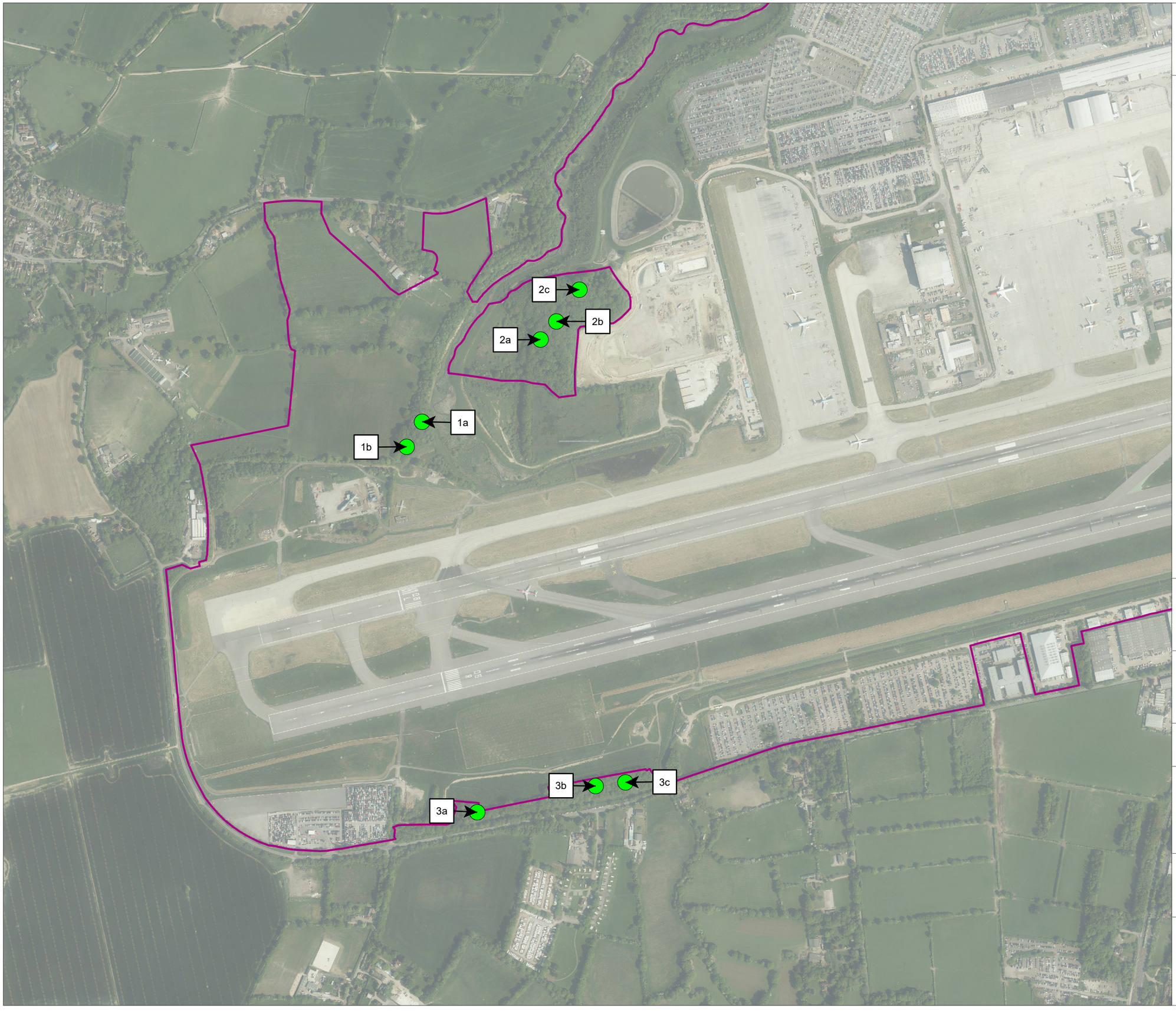
Home Range Analysis

Table A4(B).1: Home Range Analysis

Bat number	50% KDE (ha)	95% KDE (ha)	100% MCP (ha)
3	0.75	11..57	58.54
8	6.82	38.05	65.09
9	2.34	28.46	50.99
10	0.03	7.59	53.25
17	1.43	39.98	249.55
18	2.45	54.80	266.72

Annex 4C

Figures



LONDON GATWICK

KEY

Project Site Boundary (ES)

Trapping Location

DOCUMENT

Environmental Statement
Appendix 9.6.3

DRAWING TITLE

Bat Trapping Locations 2019

DATE

July 2023

ORIENTATION	DRAWING NO.	REVISION
N	Figure 2.2.1a	For ES Issue
	DRAWN BY: BG	PM / CHECKED BY: RM

SCALE @ A3 1:8,000

0 50 100 200 m

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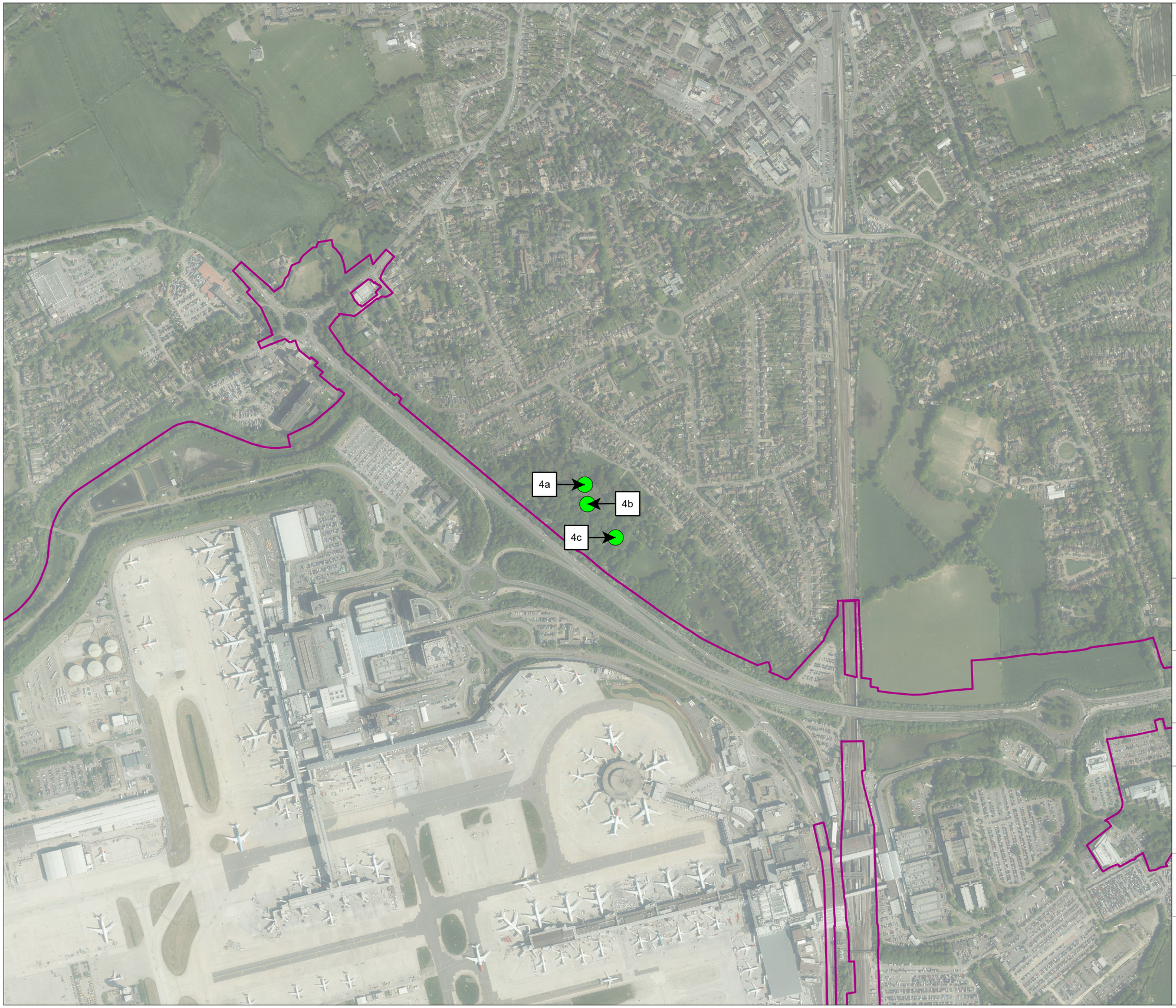

LONDON GATWICK

KEY

Project Site Boundary (ES)

Trapping Location

DOCUMENT

Environmental Statement
Appendix 9.6.3

DRAWING TITLE

Bat Trapping Locations 2019

DATE

July 2023

ORIENTATION	DRAWING NO.	REVISION
N	Figure 2.2.1b	For ES Issue
	DRAWN BY: BG	PM / CHECKED BY: RM

SCALE @ A3 1:8,000

0 50 100 200 m

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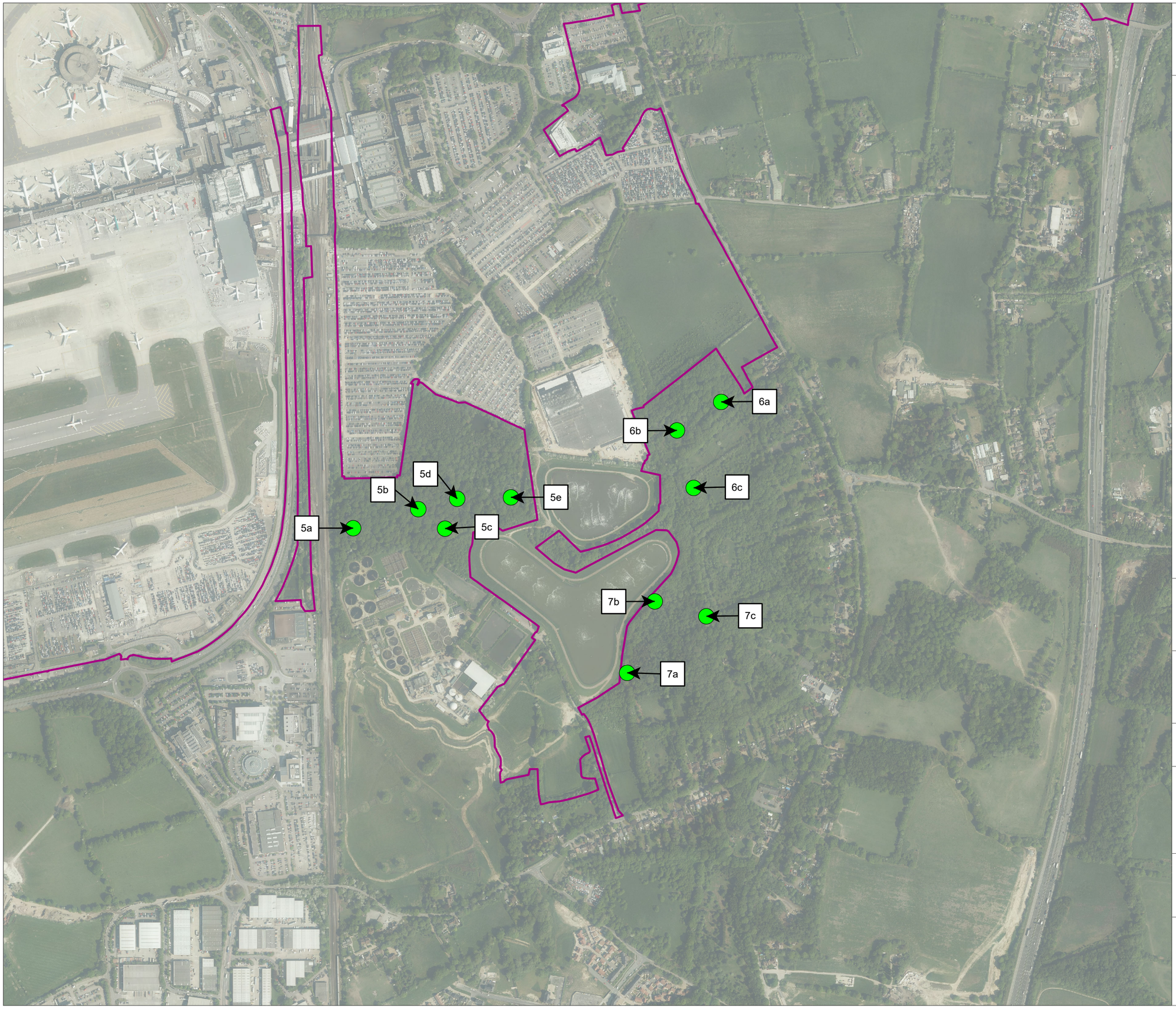

LONDON GATWICK

KEY

Project Site Boundary (ES)

Trapping Location

DOCUMENT

Environmental Statement
Appendix 9.6.3

DRAWING TITLE

Bat Trapping Locations 2019

DATE

July 2023

ORIENTATION	DRAWING NO.	REVISION
N	Figure 2.2.1c	For ES Issue
	DRAWN BY: BG	PM / CHECKED BY: RM

SCALE @ A3 1:8,000

0 50 100 200 m

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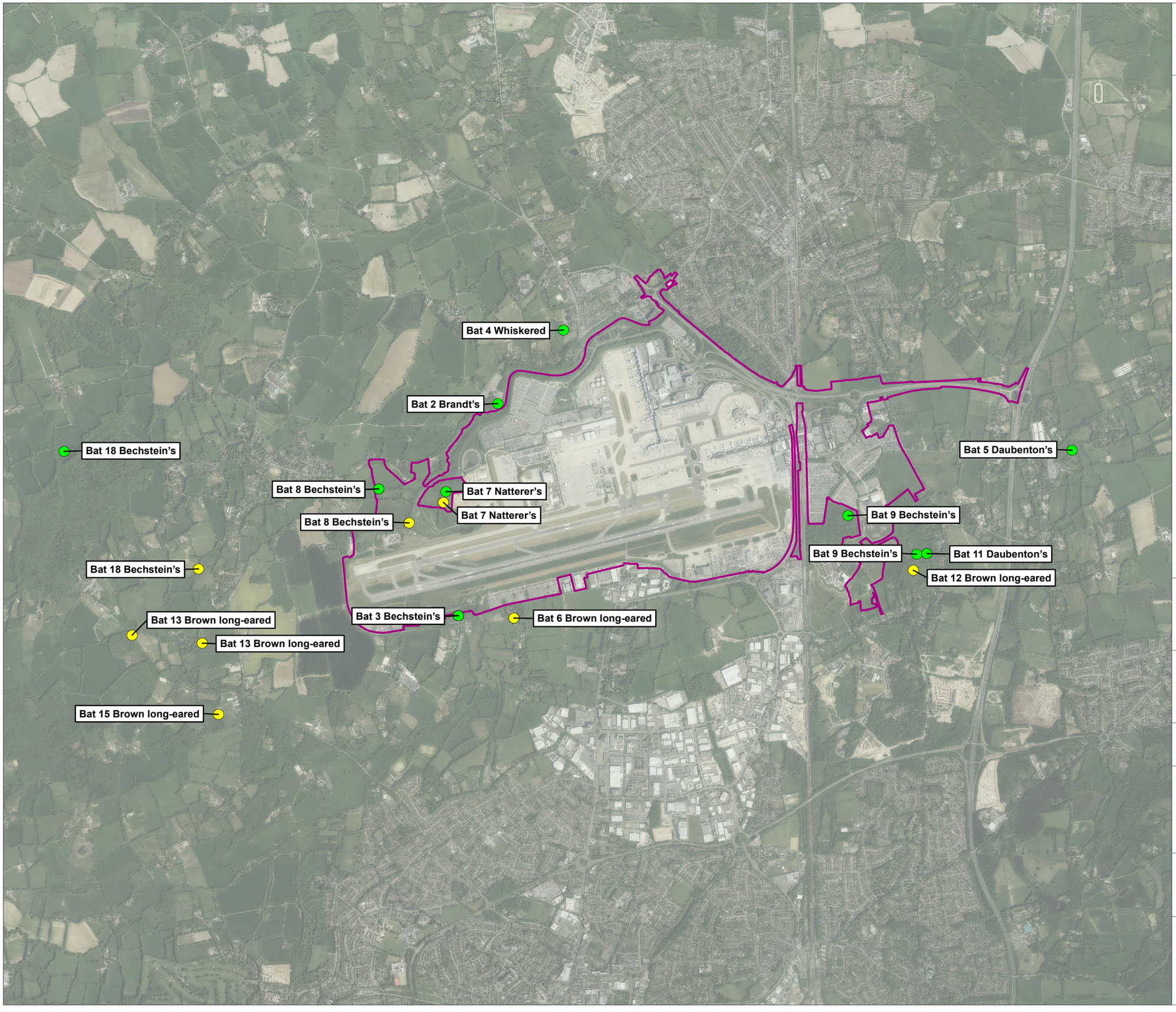

LONDON GATWICK

KEY

- Project Site Boundary (ES)
- Confirmed roost
- Estimated roost

DOCUMENT

Environmental Statement
Appendix 9.6.3

DRAWING TITLE

Confirmed and Estimated Roosting Locations 2019

DATE

July 2023

ORIENTATION	DRAWING NO.	REVISION
N	Figure 3.2.1	For ES Issue
	DRAWN BY: CR	PM / CHECKED BY: RM

SCALE @ A3 1:30,000

0 250 500 1,000 m

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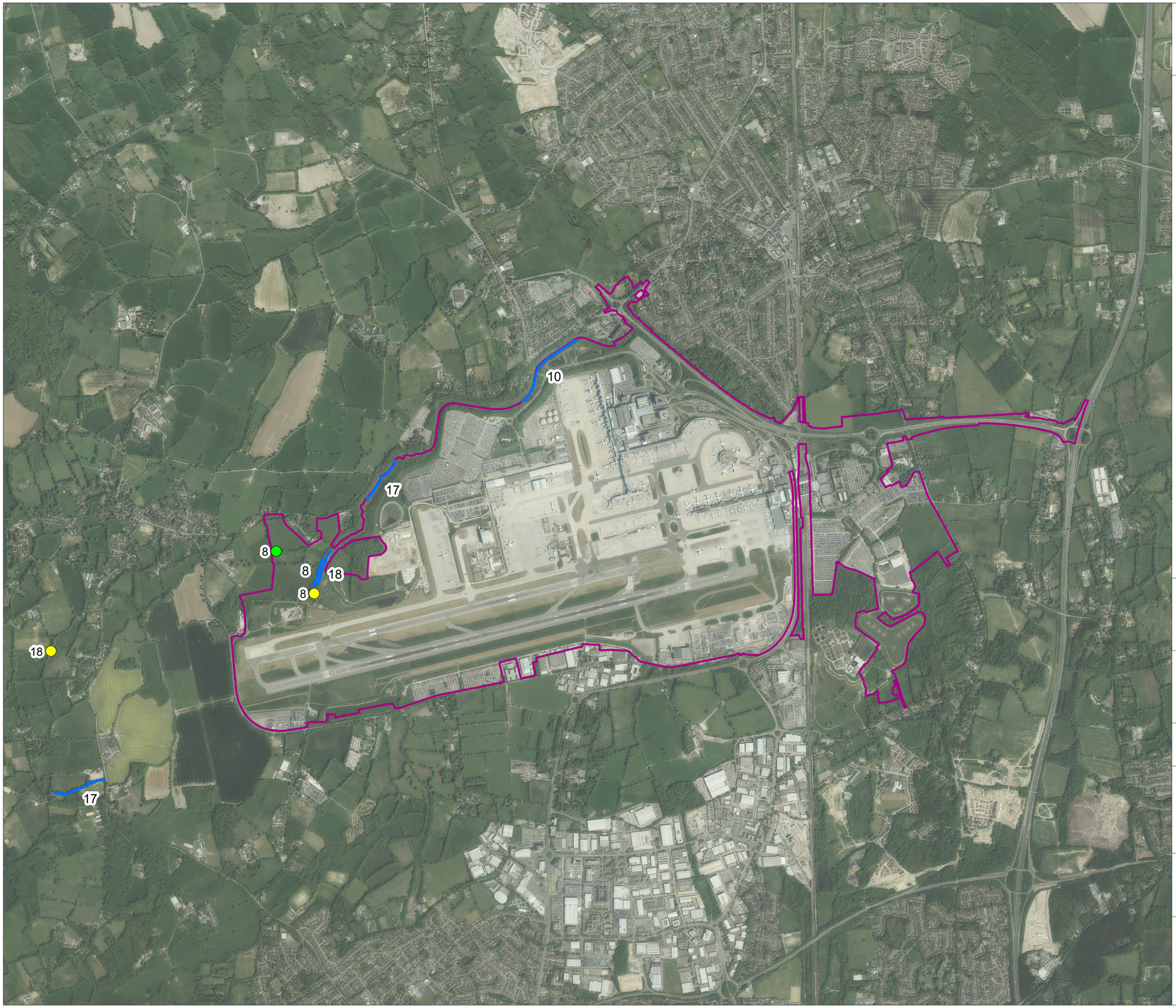

LONDON GATWICK

KEY

- Project Site Boundary (ES)
- Bechstein's bat flightlines
- Confirmed roost
- Estimated roost

XX - Bat reference

DOCUMENT

Environmental Statement
Appendix 9.6.3

DRAWING TITLE

Bechstein's Flightlines

DATE

July 2023

ORIENTATION	DRAWING NO.	REVISION
N	FIGURE 3.2.2	For ES Issue
	DRAWN BY: CR	PM / CHECKED BY: RM

SCALE @ A3 1:24,000

0 250 500 1,000 m

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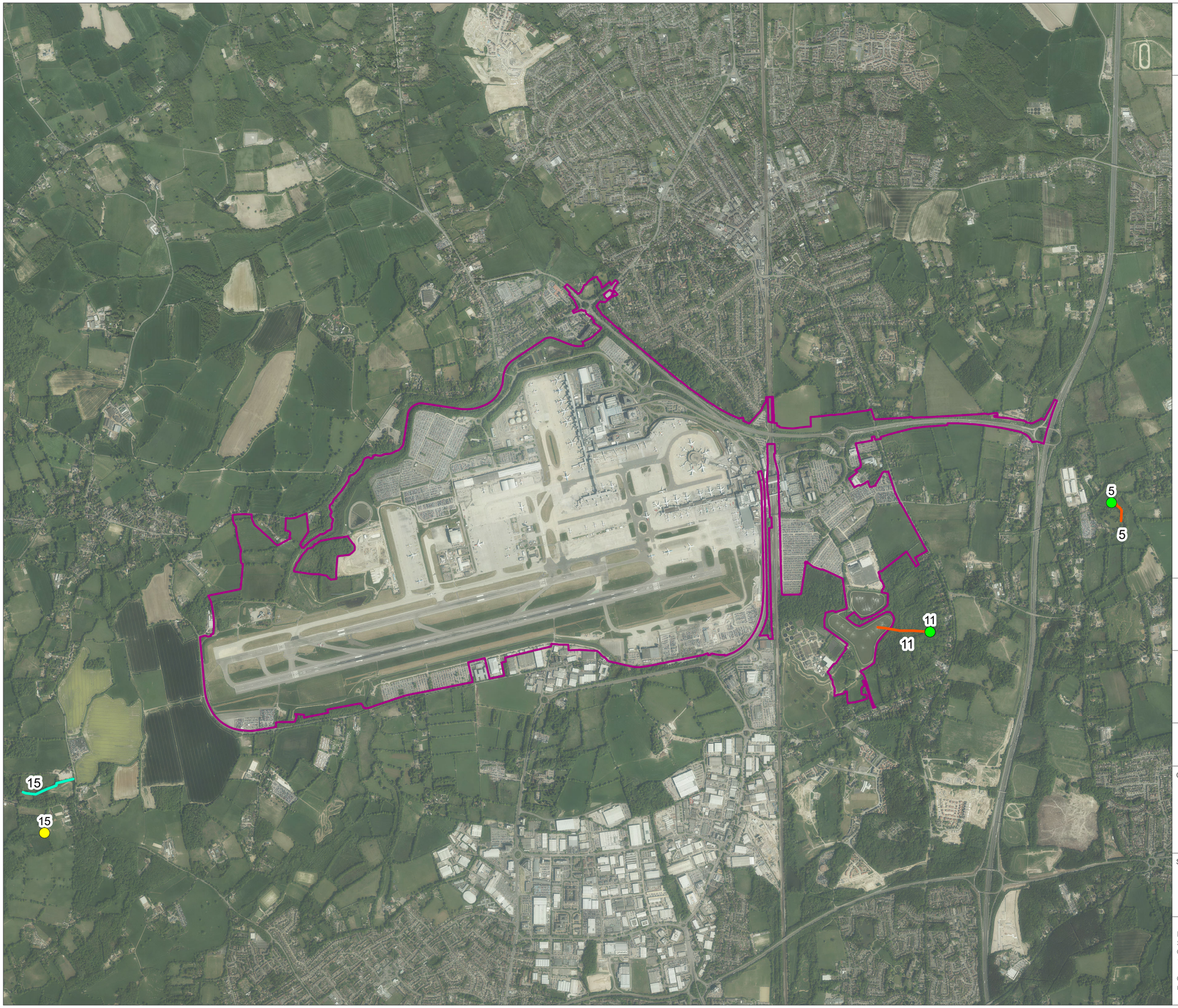

LONDON GATWICK

KEY

- Project Site Boundary (ES)
- Brown long-eared bat flightlines
- Daubenton's bat flightlines
- Confirmed Daubenton's bat roost
- Estimated Brown long-eared bat roost

XX - Bat reference

DOCUMENT

Environmental Statement
Appendix 9.6.3

DRAWING TITLE

Brown Long-eared and
Daubenton's Flightlines

DATE

July 2023

ORIENTATION	DRAWING NO.	REVISION
N	FIGURE 3.2.3	For ES Issue
	DRAWN BY: CR	PM / CHECKED BY: RM

SCALE @ A3 1:24,000

0 250 500 1,000 m

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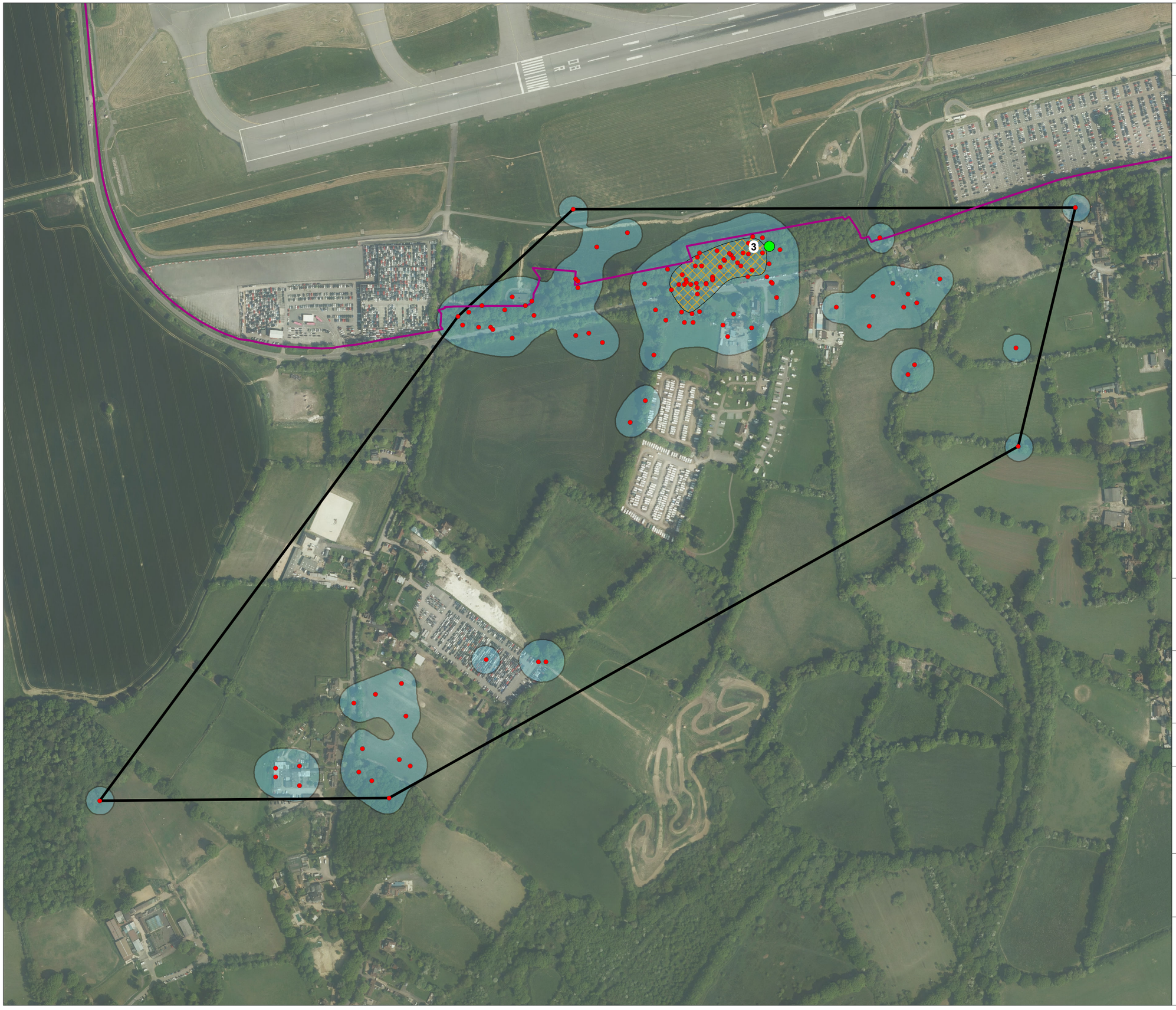

LONDON GATWICK

KEY

- Project Site Boundary (ES)
- Confirmed roost
- Bat 3 fixes
- Bat 3 50% kernel density estimation core foraging area
- Bat 3 95% kernel density estimation peripheral foraging area
- Bat 3 100% maximum convex polygon

DOCUMENT

Environmental Statement
Appendix 9.6.3

DRAWING TITLE

Bechstein's Bat 3 Home Range

DATE

July 2023

ORIENTATION	DRAWING NO.	REVISION
N	FIGURE 3.2.4	For ES Issue
	DRAWN BY: CR	PM / CHECKED BY: RM

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0 50 100 200 m

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LONDON GATWICK

KEY

- Project Site Boundary (ES)
- Confirmed roost
- Estimated roost
- Bat 8 fixes
- Bat 8 flightline
- Bat 8 50% kernel density estimation core foraging area
- Bat 8 95% kernel density estimation peripheral foraging area
- Bat 8 100% maximum convex polygon

DOCUMENT

Environmental Statement
Appendix 9.6.3

DRAWING TITLE

Bechstein's Bat 8 Home Range

DATE

July 2023

ORIENTATION	DRAWING NO.	REVISION
N	FIGURE 3.2.5	For ES Issue
	DRAWN BY: CR	PM / CHECKED BY: MR

SCALE @ A3 1:5,000

0 50 100 200 m

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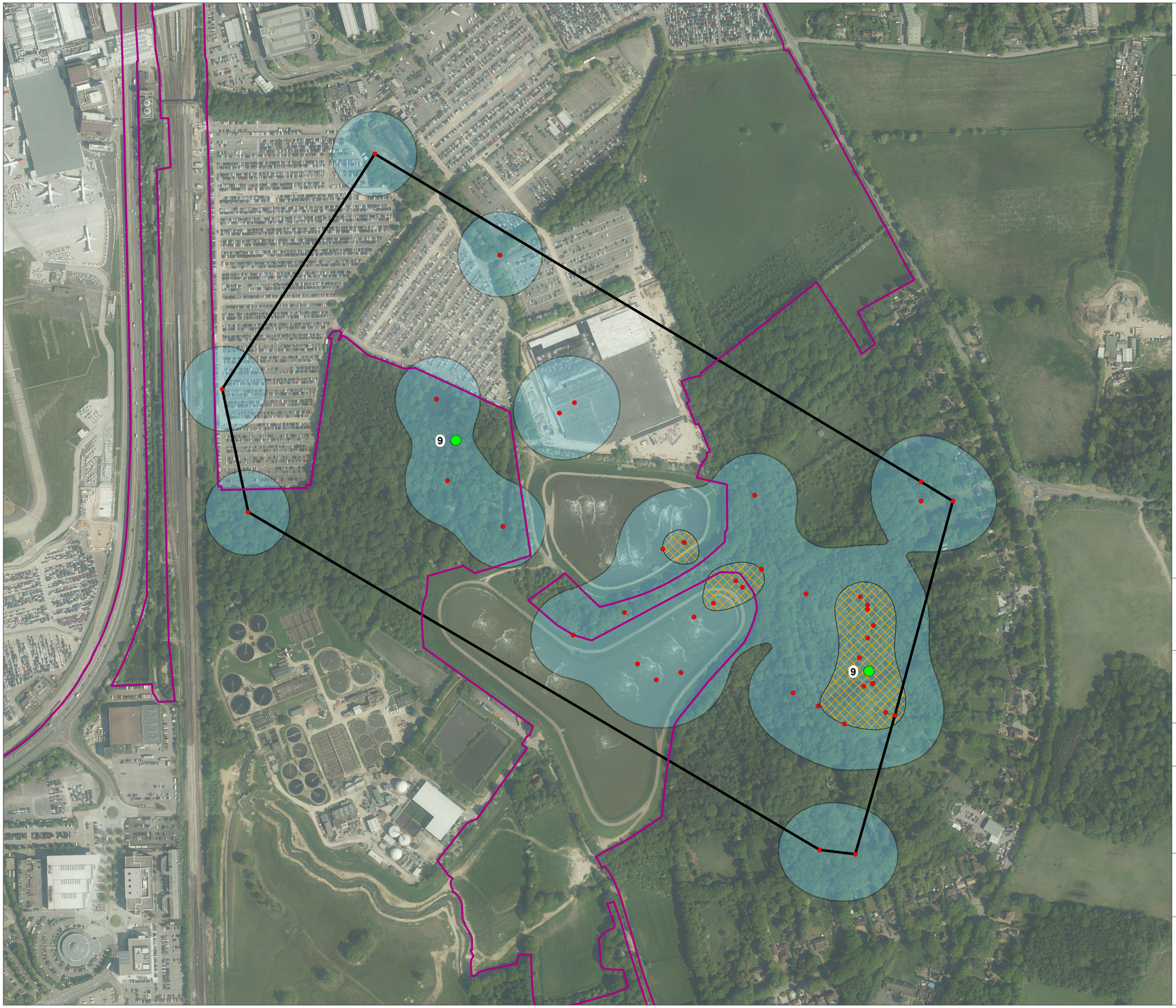

LONDON GATWICK

KEY

- Project Site Boundary (ES)
- Confirmed roost
- Bat 9 fixes
- Bat 9 50% kernel density estimation core foraging area
- Bat 9 95% kernel density estimation peripheral foraging area
- Bat 9 100% maximum convex polygon

DOCUMENT

Environmental Statement
Appendix 9.6.3

DRAWING TITLE

Bechstein's Bat 9 Home Range

DATE

July 2023

ORIENTATION	DRAWING NO.	REVISION
N	FIGURE 3.2.6	For ES Issue
	DRAWN BY: CR	PM / CHECKED BY: RM

SCALE @ A3 1:5,000

0 50 100 200 m

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LONDON GATWICK

KEY

- Project Site Boundary (ES)
- Bat 10 fixes
- Bat 10 flightline
- Bat 10 50% kernel density estimation core foraging area
- Bat 10 95% kernel density estimation peripheral foraging area
- Bat 10 100% maximum convex polygon

DOCUMENT

Environmental Statement
Appendix 9.6.3

DRAWING TITLE

Bechstein's Bat 10 Home Range

DATE

July 2023

ORIENTATION	DRAWING NO.	REVISION
N	FIGURE 3.2.7	For ES Issue
	DRAWN BY: CR	PM / CHECKED BY: RM

SCALE @ A3 1:6,000

0 50 100 200 m

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LONDON GATWICK

KEY

- Project Site Boundary (ES)
- Bat 17 fixes
- Bat 17 flightline
- Bat 17 50% kernel density estimation core foraging area
- Bat 17 95% kernel density estimation peripheral foraging area
- Bat 17 100% maximum convex polygon

DOCUMENT

Environmental Statement
Appendix 9.6.3

DRAWING TITLE

Bechstein's Bat 17 Home Range

DATE

July 2023

ORIENTATION	DRAWING NO.	REVISION
N	FIGURE 3.2.8	For ES Issue
	DRAWN BY: CR	PM / CHECKED BY: RM

SCALE @ A3 1:12,000

0 125 250 500 m

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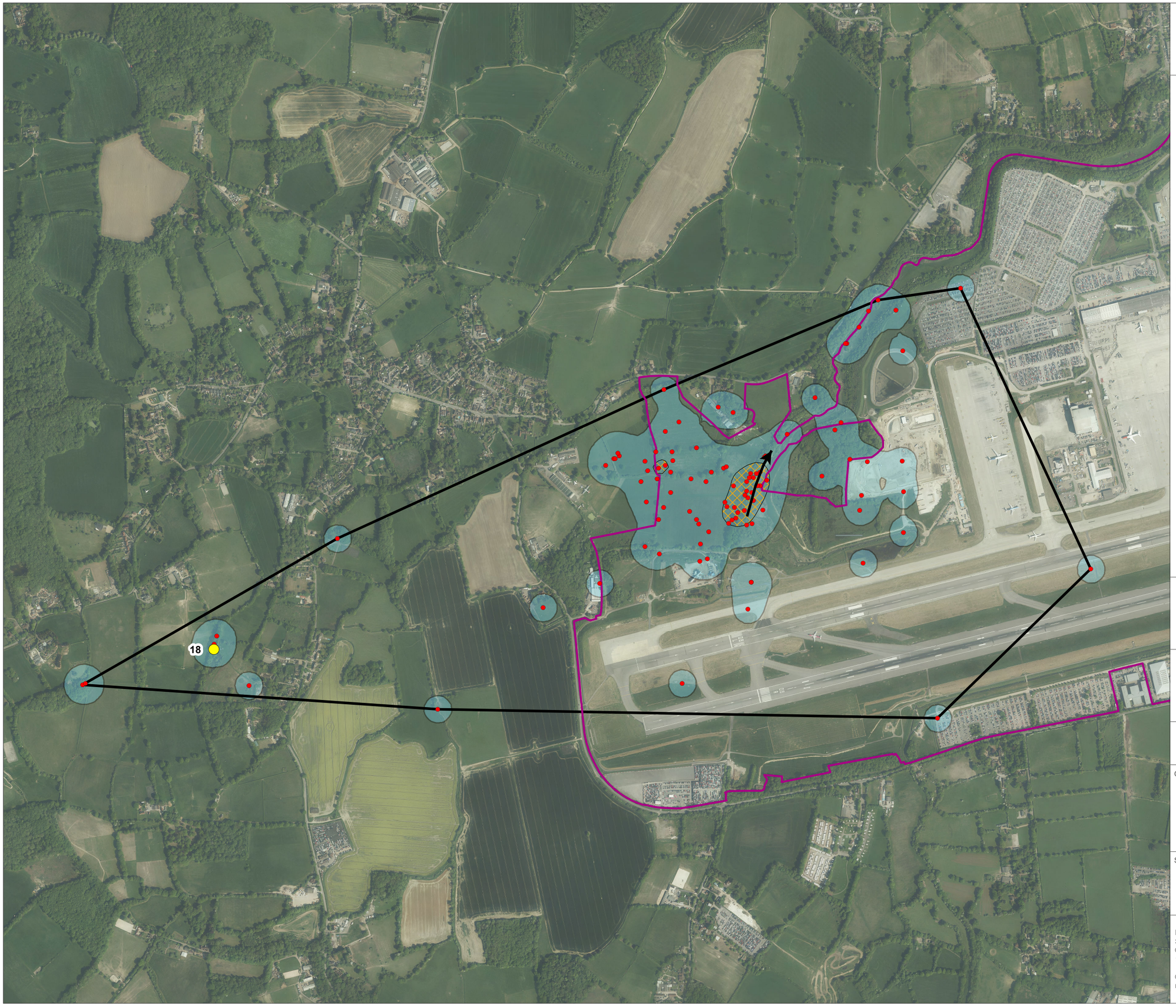

LONDON GATWICK

KEY

- Project Site Boundary (ES)
- Estimated roost
- Bat 18 fixes
- Bat 18 flightline
- Bat 18 50% kernel density estimation core foraging area
- Bat 18 95% kernel density estimation peripheral foraging area
- Bat 18 100% maximum convex polygon

DOCUMENT

Environmental Statement
Appendix 9.6.3

DRAWING TITLE

Bechstein's Bat 18 Home Range

DATE

July 2023

ORIENTATION	DRAWING NO.	REVISION
N	FIGURE 3.2.9	For ES Issue
	DRAWN BY: CR	PM / CHECKED BY: RM

SCALE @ A3 1:12,000

0 125 250 500 m

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LONDON GATWICK

KEY

- Project Site Boundary (ES)
- 50% kernel density estimation core foraging area
- 95% kernel density estimation peripheral foraging area
- 100% maximum convex polygon

DOCUMENT

Environmental Statement
Appendix 9.6.3

DRAWING TITLE

Bechstein's Bats Combined Home Range

DATE

July 2023

ORIENTATION	DRAWING NO.	REVISION
N	FIGURE 3.2.10	For ES Issue
	DRAWN BY: CR	PM / CHECKED BY: MR

SCALE @ A3 1:25,000

0 250 500 1,000 m

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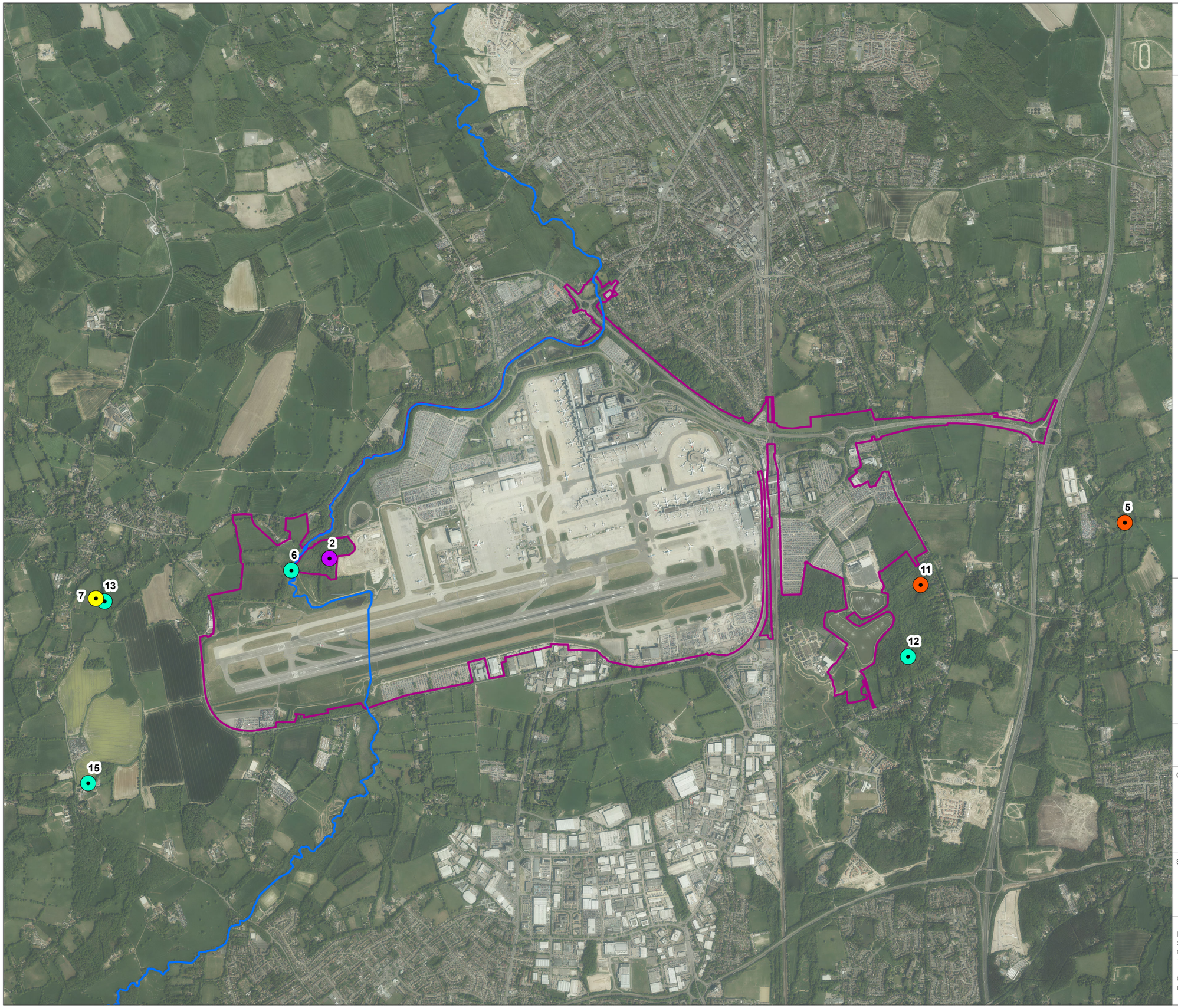

LONDON GATWICK

KEY

Project Site Boundary (ES)

Foraging Areas

- Brandt's bat
- Brown long-eared
- Daubenton's bat
- Natterer's bat

XX - Bat reference

DOCUMENT

Environmental Statement
Appendix 9.6.3

DRAWING TITLE

Approximate foraging locations for Brandt's bat, brown long-eared bat, Daubenton's bat and Natterer's bat

DATE

July 2023

ORIENTATION	DRAWING NO.	REVISION
N	FIGURE 3.2.11	For ES Issue
	DRAWN BY: CR	PM / CHECKED BY: RM

SCALE @ A3 1:24,000

0 250 500 1,000 m

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Annex 4D

Martyn Cooke data

Date:	17/05/2019	Location:	Edolphs Copse, Charlwood	Grid Ref:	
Trap 1:	Harp Trap:	Trap 2:	Harp Trap:	Trap 3:	
Sunset:	20:58	Start Time:	21:00	Finish Time:	00:20
Start Temp:	13C	Finish Temp:	9C	Lure:	1 & 2 AT100
Cloud:	OVC	Wind:	Calm	Wx:	Nil

Num.	Time	Trap	*Sp.*	Sex	Age	Br. Cond	FA	Weight	Remarks
1	23:00	1	MYOMYS	F	A		34.6	5.46	
2	23:00	1	MYONAT	M	A		37.8	6.59	
3	23:00	2	PIPPIP	F	A		33.2	4.60	

Date:	29/05/2019	Location:	Povey Cross, Gatwick	Grid Ref:	TQ 265 418
Trap 1:	Harp Trap: TQ 26802 41871	Trap 2:	Harp Trap: TQ 26695 41862	Trap 3:	
Sunset:	21:03	Start Time:	21:30	Finish Time:	01:00
Start Temp:	14C	Finish Temp:	14C	Lure:	1 & 2 AT100
Cloud:	OVC	Wind:	Calm	Wx:	Nil

Num.	Time	Trap	*Sp.*	Sex	Age	Br. Cond	FA	Weight	Remarks
1	22:00	2	NYCLEI	M	A		44.1	14.00	
2	22:00	2	PIPPYG	M	A		30.2	4.20	

Date:	15/07/2019	Location:	Horley Rd Pond, Gatwick	Grid Ref:	TQ 257 410
Trap 1:	Harp Trap: TQ 25753 41008	Trap 2:		Trap 3:	
Sunset:	21:10	Start Time:	21:25	Finish Time:	01:00
Start Temp:	16C	Finish Temp:	11C	Lure:	AT100
Cloud:	Clear	Wind:	Calm	Wx:	Nil

Num.	Time	Trap	*Sp.*	Sex	Age	Br. Cond	FA	Weight	Remarks
1	00:20	1	MYOMYS	F	A	Lac	33.80	5.91	
2	00:20	1	MYOMYS	F	A	Lac	34.00	5.94	

Date:	16/07/2019	Location:	Povey Cross, Gatwick	Grid Ref:	TQ 265 418
Trap 1:	Harp Trap: TQ 26565 41845	Trap 2:		Trap 3:	
Sunset:	21:10	Start Time:	21:25	Finish Time:	00:20
Start Temp:	17C	Finish Temp:	13C	Lure:	AT100
Cloud:	Clear	Wind:	Calm	Wx:	Nil

Num.	Time	Trap	*Sp.*	Sex	Age	Br. Cond	FA	Weight	Remarks
1	21:40	1	PIPPIP	F	J		33.10	4.58	
2	22:00	1	PIPPIP	F	A	NP	31.80	4.92	
3	22:20	1	PLEAUR	M	A		36.40	7.96	
4	00:20	1	MYONAT	M	A		39.40	7.41	

Date:	13/08/2019	Location:	Glovers Wood, Charlwood	Grid Ref:	TQ 226 401
Trap 1:	Harp Trap: TQ 2261040206	Trap 2:	Harp Trap: TQ 2261940118	Trap 3:	
Sunset:	20:19	Start Time:	21:15	Finish Time:	00:01
Start Temp:	15C	Finish Temp:	12C	Lure:	1 & 2 AT100
Cloud:	Clear	Wind:	Calm	Wx:	Nil

Num.	Time	Trap	*Sp.*	Sex	Age	Br. Cond	FA	Weight	Remarks
1	21:40	2	MYOBEC	M	J		41.20	8.52	Chin Spot
2	22:00	2	MYONAT	F	J		39.60	6.34	

Date:	02/09/2019	Location:	Brockley Wood, Gatwick	Grid Ref:	TQ 257 408
Trap 1:	Harp Trap: TQ 25803 40984	Trap 2:		Trap 3:	
Sunset:	19:44	Start Time:	20:00	Finish Time:	23:50
Start Temp:	18C	Finish Temp:	16C	Lure:	AT100
Cloud:	Broken	Wind:	Calm	Wx:	Nil

Num.	Time	Trap	*Sp.*	Sex	Age	Br. Cond	FA	Weight	Remarks
1	20:40	1	PIPPYG	M	A	TD1	30.20	4.32	
2	21:20	1	MYOMYS	F	J		34.50	5.25	
3	21:20	1	PIPPIP	F	A		30.30	4.58	

Annex 5

Bat Collision Risk

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1 Introduction

1.1 The Project

1.1.1 This document forms Annex 5 to Appendix 9.6.3 of the Environmental Statement (ES) prepared on behalf of Gatwick Airport Limited (GAL). The ES presents the findings of the Environmental Impact Assessment (EIA) process for the proposal to make best use of Gatwick Airport's existing runways and infrastructure (referred to within this report a 'the Project').

1.2 Biological records

1.2.1 A total of 12 species of bat have previously been recorded within the Project Area including Bechstein's bats, Brandt's bat *Myotis brandtii*, brown long-eared bat *Plecotus auritus*, common pipistrelle *Pipistrellus pipistrellus*, Daubenton's bat *Myotis daubentonii*, Leisler's bat *Nyctalus leislerii*, Nathusius' pipistrelle *Pipistrellus nathusii*, Natterer's bat *Myotis nattereri*, noctule *Nyctalus noctula*, serotine *Eptesicus serotinus*, soprano pipistrelle *Pipistrellus pygmaeus* and whiskered bats *Myotis mystacinus* (Gatwick Airport, 2018b).

1.2.2 During a five-year monitoring programme of bat boxes on site (2012-2017) the species recorded occupying boxes included Bechstein's bat, Natterer's bat, soprano pipistrelle and brown long-eared bat (Gatwick Airport, 2018b).

1.2.3 A whiskered bat maternity roost was recorded at Charlwood Park Farmhouse in 2016 and 2017. This building was also previously occupied by common and soprano pipistrelles (Gatwick Airport, 2018b).

1.2.4 A previous trapping and radio-tracking project undertaken in 2014 identified Bechstein's bat roosts in several dead trees in the northern part of Brockley Wood including ash *Fraxinus excelsior*, alder *Alnus glutinosa* and oak *Quercus robur* (Gatwick Airport, 2018b).

1.3 Requirement for surveys

1.3.1 Bat survey work was required within and adjacent to the Project Area to help inform any future changes to the airport. The surveys detailed in this report were required to provide information on bat activity on and in the proximity of the existing taxiway in order to calculate the risk of bats colliding with planes or suffering from barotrauma.

1.3.2 Barotrauma is caused by rapid-air pressure reduction near fast moving objects such as planes. Barotrauma involves tissue damage to air-containing structures caused by rapid or excessive pressure damage; pulmonary barotrauma is lung damage due to expansion of air in the lungs that is not accommodated by exhalation (Baerwald *et al*, 2008).

1.3.3 The data obtained will help to inform a better understanding of bat levels of activity within the Project Area and the subsequent collision risk associated with those levels. This data will help inform mitigation strategies to avoid breaking the law by killing or injure bats that might be present within the Project Area.

1.3.4 The purpose of this study is to evaluate the level and type of bat activity at the existing taxiway to evaluate forecast bat fatalities for this area (as a consequence of collision and barotrauma).

1.3.5 The surveys completed as part of this study were undertaken prior to the COVID-19 pandemic in 2019. Subsequent data capture has not been possible as flight numbers have still not returned to pre-pandemic levels meaning that any further data gathered to refine the models presented here would not be representative of actual bat usage of the airspace around the runway. Lower flight numbers are likely to mean greater bat usage such that any model based on elevated numbers would over-estimate the risk of collision.

2 Methodology

2.1 Thermal surveys

2.1.1 Thermal surveys were undertaken at four locations,. Each location was surveyed as follows:

- Two dusk and two dawn surveys during pre-maternity season (May and June);
- Two dusk and two dawn surveys post-maternity season (July and August); and
- One dusk and one dawn during autumn dispersal season (September and October); see section 3.4.

2.1.2 Air traffic levels are continuous between 05:30 to 23:00 daily with the levels being reduced to inbound traffic only between 23:00 and 02:00. Traffic in the morning between 05:30 to 07:00 is predominantly outbound.

2.1.3 The majority of bat movements between roosts and foraging areas take place just after sunset and before sunrise.

2.1.4 In order to record activity levels when bats are more likely to be commuting and when the runway traffic is its peak, dusk surveys commenced at sunset and continued until midnight, and dawn surveys commenced two hours before sunrise and continued until sunrise.

2.1.5 Locations for surveys were selected based on satellite images and aimed to include all habitats present along the existing taxiway. Descriptions of the locations are as shown in **Table 2.1.1**.

Table 2.1.1: Survey locations and description.

Survey locations	
Location number	**Description**
1a	Located at the westernmost end of the taxiway. The habitats included amenity grassland maintained at a short sward. The surrounding areas included a roadside hedgerow along Lowfield Heath Road that ran north-south. This hedgerow was considered suitable for commuting bats as it linked Brockley Wood, River Mole and nearby woodlands north of the runway, to arable land and nearby woodland copses and hedgerows south of the runway.
1b	Located immediately south of a large waterbody at the north of the airside boundary. The surrounding areas considered suitable for bats included the River Mole which offered a potential commuting route for bats along the northern boundary of the Project Area.
2a	Located to the eastern end of the existing taxiway. The nearby habitats included amenity grassland maintained at a short sward, and hard standing.
2b	Located at the easternmost end of the taxiway. The habitats at this location were dominated by hard standing and buildings as well as amenity grassland maintained at a short sward.

2.1.6 In order to reduce the influence of weather conditions, surveys were undertaken concurrently at the western (Locations 1a and 1b) and eastern (Locations 2a and 2b) ends of the taxiway.

2.1.7 Each survey was undertaken using thermal cameras (FLIR T1020) with 45-degree lenses. The thermal sensitivity of the

equipment was of <20mK at 30˚C meaning that the equipment used was capable of resolving temperature differences of less than 0.02K. The infrared (IR) resolution was 1024 x 768 pixels allowing the detection of small objects at greater distances. The combination of these characteristics allows for the maximum detection distance of a bat in flight to be 104 metres (Fawcett-Williams, 2019).

2.1.8 The footage captured during the surveys was stored on an internal SD card inside the camera. It was stored in radiometric format. Although this increases analysis time, it allows analysis of thermal patterns in the images through thermal tuning and colour palettes. The object of interest can be enhanced through thermal tuning, with non-target objects falling outside the scale (Infrared Training Centre, 2017). The colour palette allows different colours to be assigned to mark specific temperature levels; palettes can provide high or low contrast, depending on the colours used (Infrared Training Centre, 2017). For this study, high contrast palettes were utilised to enhance small temperature differences and improve detectability of small moving objects (bats) against a varied background.

2.1.9 Bat sound was recorded by handheld full spectrum bat detectors (Elekon Batlogger M) which were deployed next to the thermal cameras. This allowed for the recording of any bat passes which were in close proximity to the thermal camera. The detectors were set up to automatically record ultrasounds between 13 and 155kHz and signals were digitized at a rate of 312kHz with 16 bit sampling depth.

2.1.10 Detection ranges for bats vary between species (Barataud, 2015) as shown in **Table 2.1.2** below. In order to account for the differences in detectability between the bat species present within the survey area, a full spectrum automated static bat detector (Elekon Batlogger A+) was positioned between filming locations (Locations 1 A+ and 2 A+).

Table 2.1.2: Detection range for the bat species subject to study.

Detection range of bat species		
Intensity of emission	**Species**	**Detection range (m)**
Very weak to weak	Alcathoe	10
	Whiskered bat	10
	Brandt's bat	10
	Daubenton's bat	15
	Natterer's bat	15
	Bechstein's bat	15
Medium	Long-eared bat	20
	Common pipistrelle	25
	Soprano pipistrelle	25
	Nathusius' pipistrelle	25
Strong	Serotine	40
Very strong	Leisler's	80
	Noctule	100

2.2 Analysis

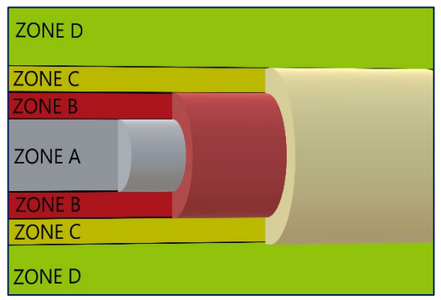
2.2.1 Sound data collected by the handheld and static bat detectors were analysed using Elekon BatExplorer software, version 2.1.

2.2.2 The number of bat passes[1] per species was obtained during analysis.

2.2.3 Radiometric footage was manually analysed using FLIR Tools software. Footage was optimised using high definition colour palettes and by adjusting thermal span parameters.

2.2.4 In order to classify the bat passes observed on the camera footage, hazard zones were established. These zones were a modification of those used by New *et al.* (2015) who used a two dimensional model to define hazardous areas for eagles around wind turbines. The New *et al.* (2015) study suggested that alternative models in three dimensional space (such as this collision risk study at Gatwick Airport) could be considered. Therefore, a three dimensional hazard zone was developed in the form of a cylinder (Zone A) or hollow cylinders (Zones B, C and D) with a radius defined by their distance to the central point of the existing runway. Figure 2.2.1 below provides a visual representation of the four activity zones and a description of each zone is provided in **Table 2.2.1**.

Figure 2.2.1. Hazard zones



[1] A bat pass was defined as one or more bat echolocation call per sound recording

Table 2.2.1: Hazard zone descriptions

Hazard zone descriptions	
Zone	Description
A	Existing taxiway. This area is defined as a cylinder of 45m radius and the length of the taxiway. This is the zone where aircraft will be running.
B	The zone where bats will be susceptible to barotrauma when the bat is hit by the vortex pressure wave created by a passing aircraft. This area is defined as a hollow cylinder with a radius of 70m with the length of the existing taxiway.
C	Area in close proximity of the danger zones A and B. This area is defined as a hollow cylinder with a radius of 95m and the length of the existing taxiway.
D	>50m from edge of taxiway. This area is considered to be safe for bats.

2.2.5 For each bat observed on the footage, the following was recorded:

- time of bat pass on detector/camera;
- species of bat (where possible, see 3.5.2);
- number of bats;
- activity type (foraging/commuting);
- direction of flight;
- flight height, grouped into the following classes:
  - 0-20m;
  - 20-40m; and
  - >40m
- approximate distance from camera;
- zones where the bat(s) were observed, and the approximate time spent within each zone (rounded to the nearest second); and
- any other relevant comments (including file names).

2.2.6 To account for the differences in bat flight strategies, foraging behaviour and perception ranges, species recorded were grouped according to their echolocation call parameters into three foraging guilds (previously used by Frey-Ehrenbold *et al.,* 2013) including short-range echolocators (SRE), mid-range echolocators (MRE) and long-range echolocators (LRE).

2.2.7 **Table 2.2.2** below summarises the parameters used to group the species into the three different guilds (as defined by Obrist *et al,* 2004) and the species included into each of the guilds.

2.2.8 Species detailed in the tables include those recorded during collision risk surveys and those previously recorded within the Project Area (Gatwick, 2018b) including Bechstein's bats, Brandt's bat, brown long-eared bat, common pipistrelle, Daubenton's bat, Leisler's bat, Nathusius' pipistrelle, Natterer's bat, noctule, serotine, soprano pipistrelle and whiskered bat.

Table 2.2.2: Foraging guilds

Foraging guilds			
Guild	**Bandwidth**	**Call duration**	**Species included**
Short-range echolocators	>50kHz	≤6ms	Bechstein's bat Brandt's bat Daubenton's bat Natterer's bat Whiskered bat Brown long-eared bat*
Medium-range echolocators	[50kHz – 30kHz)	(6ms – 9ms]	Common pipistrelle Nathusius' pipistrelle Soprano pipistrelle
Long-range echolocators	<30kHz	>9ms	Leisler's bat Noctule Serotine bat

*See section 3.4

2.2.9 The SRE guild included species with flight altitudes varying from very low above ground level up to the tree canopy level. This guild includes gleaning species such as Natterer's and brown long-eared bats. Foraging is often associated with woodland or linear vegetation features for these species. Commuting flight occurs at heights between 1 to 10m (Dietz *et al*., 2019) for these species.

2.2.10 Species included within the MRE guild included very agile species with erratic flight, usually along linear structures or fixed flight paths (with the exception of Nathusius' pipistrelle). For all three species, flight height is strongly associated with vegetation (Dietz *et al*., 2019).

2.2.11 The species included within the LRE guild show adaptations to prey capture in open areas. These species present very fast (over 50km/h) and direct flight often at heights of 10 to 50m. (Dietz *et al*., 2019).

Statistical analysis

2.2.12 A Bayesian method was used to predict the annual bat fatality rate, collision probability, fatalities and to account for uncertainty for the existing taxiway. This approach was based on existing models which allowed for the assessment of collision risk probability of eagles with wind turbines (New *et al*., 2015). However, this model altered the calculation of the estimated hazardous space of the project to appropriately fit the specifics of the runways.

2.2.13 This approach allowed for uncertainty to be incorporated into the modelling approach, which can be updated with post-hoc monitoring of actual fatality levels at the airport.

2.2.14 The model used differed in some ways from other commonly used collision risk models. Other models often differentiate between a collision probability based on non-varying flight (i.e. a straight line at a constant height and speed) and an avoidance rate which incorporates an animals ability to evade a collision (Band *et al.,* 2007). Because of the assumption of non-varying flight, existing models would only consider the area where an aircraft is on its approach to landing to be hazardous, since a bat flying above or below the airplane is presumed to be unable to change its trajectory. As well as being biologically unrealistic, this requires accurate measures of bat flight height, which are difficult to obtain in the field and necessitates that there be no change in plane flight path specifications between planning, construction, and operation. In contrast, the model used in this report incorporates heterogeneity into the collision risk value, which is more reflective of the physiological impact of planes passing close by to bats, such as damage to bats from barotrauma, as well as incorporating the uncertainty around flight path specifications early in the planning and construction period.

2.2.15 The R code used for the model is shown in Annex 5B.

2.2.16 The total annual bat fatalities (F) as the result of collision with moving planes and from barotrauma was represented as the product of the rate of bat exposure (λ) to runway hazards, the probability that the bat exposure will result in a collision with a plane or suffer from barotrauma (C), and an expansion factor (ε) that scales the resulting fatality rate.

2.2.17 The annual predicted fatalities (F) for the project was calculated:

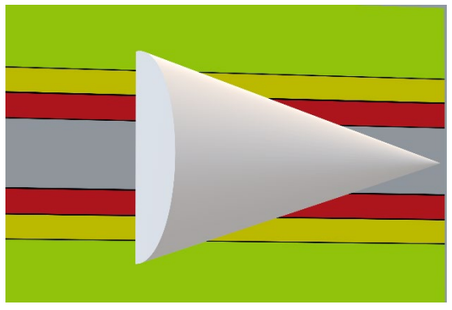
$$F = \varepsilon \lambda C$$

2.2.18 The prior distribution for exposure rate was based on three large datasets from other airport authorities within the UK, USA and Australia (Parsons *et al.,* 2010; Federal Aviation Administration, 2019; International Civil Aviation Organization, 2017). Mean annual bat strikes per airport were calculated for each dataset and these values were used in the model.

2.2.19 The exposure rate λ was the expected number of exposure events (bat-seconds) per hour between dusk and dawn per square kilometre (h/km^2).

2.2.20 Bat exposure data was collected during surveys and was utilised to determine the posterior distribution which was used to predict bat fatalities. In order to calculate the bat exposure, the volume covered by the thermal surveys was calculated as the volume of half cone with a 45-degree opening angle and a height of 104m (maximum detection distance of bat on flight with a thermal camera with a 45-degree lens and a resolution of 1024x768 pixels). The space covered by the thermal cameras equated to 20,600m^3 (See Figure 3.2.2)

Figure 3.2.2. Volume covered by thermal surveys



2.2.21 Collision probability C is the probability, given exposure (1 second of flight in Zones A and B, δ) of a bat colliding with a moving aircraft or suffering from barotrauma when the bat is hit by the vortex pressure wave created by a passing aircraft. This collision probability was used to estimate the annual predicted fatalities.

2.2.22 The expansion factor (ε) scales the resulting per unit fatality rate (fatalities per hour per km^2) to the night hours, τ, during the bat active season (April to October) and total hazardous area (km^2) within the project footprint.

2.2.23 The predicted annual fatalities were generated as the expanded product of the posterior exposure rate and the prior collision probability.

$$F = \varepsilon \; x \; posterior \; \lambda \; x \; prior \; C$$

2.2.24 The mean, standard deviation and 80% quantile (considered to be the upper credible limit) was determined directly from the distribution of predicted fatalities.

2.2.25 The analysis for Gatwick used the 80% quantile in line with accepted expert advice (United States Fish and Wildlife Service, 2018).

2.2.26 Increased corpse monitoring schemes on the ground at Gatwick in future can inform the prior distribution and allow for a more bespoke and individualised model for Gatwick Airport.

2.3 Personnel

2.3.1 Surveys were designed and lead by an ITC Certified Category 1 Infrared Thermographer and experienced ecologist. This certification is accredited by Authorised Training Organisation (ATO) for the British Institute of Non Destructive Testing (BINDT) as per requirements of ISO 18436. All field staff were trained Camera Operators.

2.3.2 Radiometric footage was analysed by trained Ecologists and supervised by a Category 1 Infrared Thermographer.

2.3.3 Sound analysis and species identification was undertaken by suitable experienced and qualified ecologists. Under the supervision of experienced senior consultants.

2.3.4 All analysis was submitted to a Quality Assurance process where 10% of data was reviewed at a senior level.

2.4 Data validity and limitations

2.4.1 Not all bat passes could be associated with a recording from the ultrasound detectors deployed therefore it was not possible to identify the species of all bats. The ultrasound detectors deployed at the eastern end of the taxiway recorded fewer bat calls than those deployed at the western end (despite bat activity being recorded by cameras at both ends of the taxiway). High levels of light, such as those recorded at the eastern end of the taxiway, can inhibit bats from areas for hunting, with the biggest impact being on woodland specialist species such as long-eared bats and members of the *Myotis* genus (Spoelstra et al., 2017). Noctule bats tend to fly quite high compared to other bat species so may not have been as directly affected by the light pollution at the eastern end of the Gatwick runways. Alternatively, it can be suggested that fewer bat calls were recorded at the eastern side of the runway (Location 2a and 2b) because when light is available, bats might use visual stimuli rather than sound waves to hunt (Pappas, 2016). This is particularly common in *Plecotus spp.* (Eklof and Jones, 2003). This would mean that bats could still be hunting in the area, but not using echolocation and thus not producing any bat calls for the detectors to pick up.

2.4.2 Bat species were identified to species level where possible. Identification criteria was based on the association between acoustic call type, call shapes and measurable parameters (start frequency, end frequency, signal length and peak frequency), interval duration between calls and the environment (clutter / open space). Echolocation calls for certain species are sometimes very close, with parameters overlapping, even identical in certain flight circumstances as is the case with bats of the genus *Myotis spp.* Therefore, identification to species level was not undertaken for *Myotis spp.* bats. In the instances that bats could not be identified to species level, the collection of the required data on flight height, zones and frequency of passes was still obtained.

2.4.3 The genus *Plecotus* is known to echolocate with faint calls restricting its perception ranges (Waters & Jones, 1995). Therefore, brown long-eared bats have been included in the SRE guild.

2.4.4 Thermal imaging equipment is exceptionally sensitive to sub-optimal weather conditions and, as a consequence, one survey was cancelled and had to be re-scheduled due to adverse weather. When surveys were cancelled in these circumstances, every effort was made to reschedule them during the survey period (pre-maternity and post maternity) or current month.

2.4.5 Due to access and sub-optimal weather conditions only dusk survey and one dawn survey per location could be undertaken during the autumn dispersal period and, therefore, the survey effort for this period was reduced by 50% compared to the other periods. This factor may affect the accuracy of the collision risk results for that period by increasing the uncertainty in the collision risk model. This uncertainty can be minimised by incorporating data from future surveys into the current collision risk model.

2.4.6 Thermal imaging surveys were not carried out at Location 2A in June, July, August or September as following the single survey undertaken in May, it was deemed potentially unsafe due to the close proximity of moving vehicles. However, based on the low numbers of bats recorded during the May survey at Location 2a, and the low number of bats observed in general at the eastern side of the runway, it is considered unlikely that this impacts the overall results obtained.

2.4.7 The value for fatalities from the collision risk model, in part, reflects the uncertainty involved in the model using uninformed priors. If corpse monitoring were to take place in the future at Gatwick this value would likely decrease and, as a result, make the model more accurate. It is currently quite a conservative evaluation of how many bats would be detected on an annual basis and, as such, may be higher than the actual value.

2.4.8 Other factors which may influence the height at which bats fly were not considered in this dataset. These include biotic factors which may influence the flight height of bats such as the density of insects in the area, or presence of predators such as owls. Abiotic factors influencing bat flight height includes precipitation, wind (Roemer, 2017) and humidity (Collins, 2016). Bats are also influenced by the presence and density of insects in an area (Avila-Flores and Fenton, 2005). However, it is considered that the use of the collision risk model is appropriate without taking these factors into account.

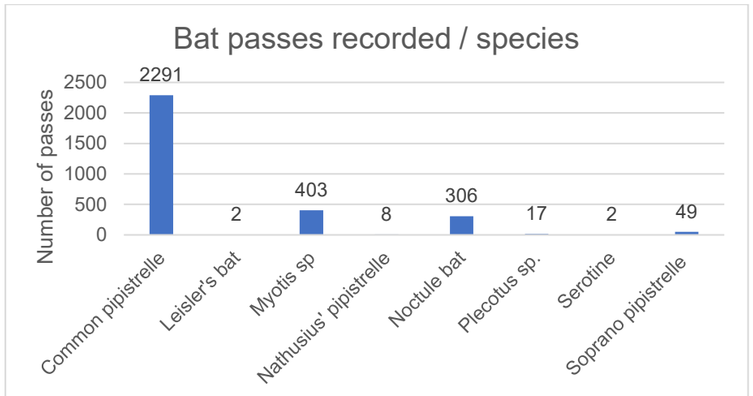
3 Results

3.1 Sound analysis results

3.1.1 A total of 3,078 bat calls were recorded across 82 hours survey time over the three survey seasons. The species identified include common pipistrelle, Leisler's bat, *Myotis spp.*, Nathusius' pipistrelle, noctule, *Plecotus spp.*, serotine and soprano pipistrelle.

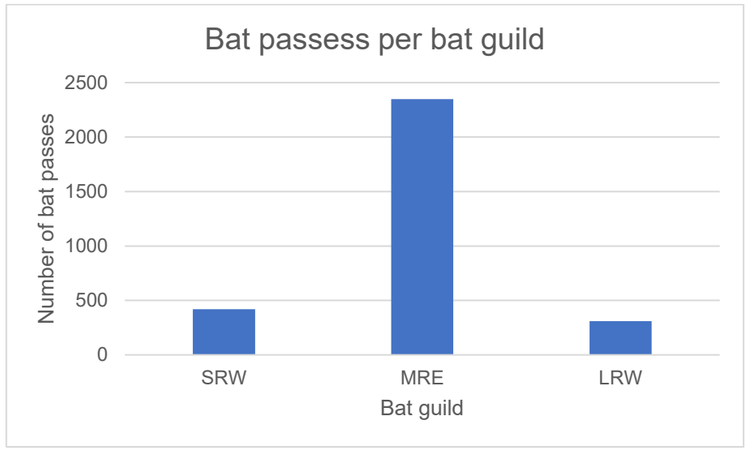
3.1.2 Overall, 74.4% of the bat passes recorded during the surveys were identified as common pipistrelle bats (2291 passes), followed by *Myotis spp*. bats with 13.1% (403) of the passes, and noctule bats with 9.9% (306 passes). Figure 4.1.1 shows the number of bats identified for each species throughout the survey period.

Figure 3.1.1. Number of bat passes per species.



3.1.3 Species of all three bat guilds were identified during surveys (SRE species: *Myotis spp.* and brown long-eared bats; MRE species: common, soprano and Nathusius' pipistrelles; LRE species: noctule, Leisler's and serotine bat). The majority of bat passes recorded (69.5%) belong to the MRE guild with 2348 passes, followed by SRE (12.5%; 420 passes) and LRE (9.1%; 310 passes). Figure 4.1.2 shows the number of bat passes per bat guild across all surveys.

Figure 3.1.2. Number of bat passes per guild.



3.1.4 The majority of bat passes were recorded at Location 1b with 51.6% of the bat passes recorded (1297 passes) and Location 1a with 41.4% of passes (1274 passes). **Table 3.1.1** below shows the number of passes recorded per location and per season.

Table 3.1.1: Total number of bat passes per location

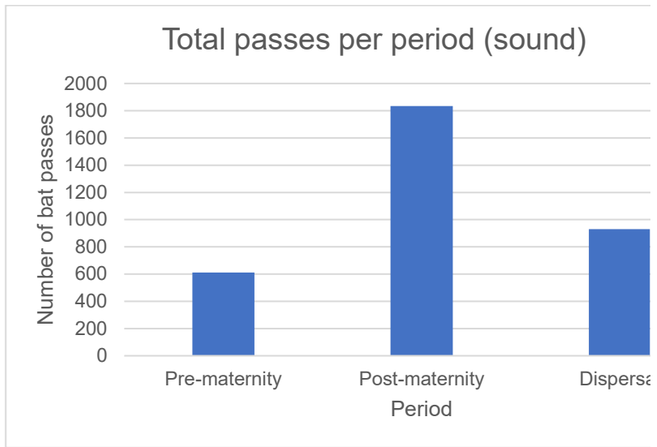
Location and period		Number of passes
Location 1a	Pre-maternity	18
	Post -maternity	1043
	Dispersal	213
	Total	**1274**
Location 1b	Pre-maternity	483
	Post -maternity	395
	Dispersal	419
	Total	**1297**
Location 1A+	Pre-maternity	68
	Post -maternity	148
	Dispersal	278
	Total	**494**
Location 2a	Prematernity	0
Location 2b	Pre-maternity	0
	Post -maternity	8
	Dispersal	0

Location and period		Number of passes
	Total	**8**
Location 2 A+	Pre-maternity	1
	Post -maternity	4
	Dispersal	0
	Total	**5**

3.1.5 Across all surveys, the majority of the bat passes were recorded by the bat detectors which were situated at and between Locations 1a and 1b (western end of the taxiway) with 99.6% of the bat passes recorded at these locations. Very low levels of bat ultrasound activity was recorded at the locations situated at the eastern end of the runway (Location 2a (May only) and Location 2b).

3.1.6 Figure 4.1.3 shows the number of bat passes per period (pre-maternity, post-maternity and autumn dispersal) for Location 1a. Most ultrasound bat passes were identified during the maternity period.

Figure 3.1.3. Number of ultrasound bat passes per period at Location 1a



3.1.7 The majority of bat calls (69.5%) were identified as belonging to the MRE guild across all Locations and periods with the exception of the static detector deployed at the western end of the runway (Location 1A+). At this location the majority of calls recorded were identified to species belonging to the LRE guild in the pre-maternity period (97.0% of bat passes) and post-maternity (64.8% of bat passes) and to the SRE in the post maternity period (80.9% of bat passes), as shown in **Table 3.1.2**.

Table 3.1.2: Number of bat passes by period and guild.

Location and period		SRE	MRE	LRE
Location 1a	Pre-maternity	0	13	5
	Post -maternity	92	946	5
	Dispersal	34	173	6
	Total	**126**	**1132**	**16**
Location 1b	Pre-maternity	0	370	113
	Post -maternity	22	373	0
	Dispersal	35	379	5
	Total	**57**	**1122**	**118**
Location 1A+	Pre-maternity	0	2	66
	Post -maternity	12	40	96
	Dispersal	225	49	4
	Total	**237**	**91**	**166**
Location 2a	Prematernity	0	0	0
Location 2b	Pre-maternity	0	0	0
	Post -maternity	0	3	5
	Dispersal	0	0	0
	Total	**0**	**3**	**5**
Location 2 A+	Pre-maternity	0	0	1
	Post -maternity	0	0	4
	Dispersal	0	0	0
	Total	**0**	**0**	**5**

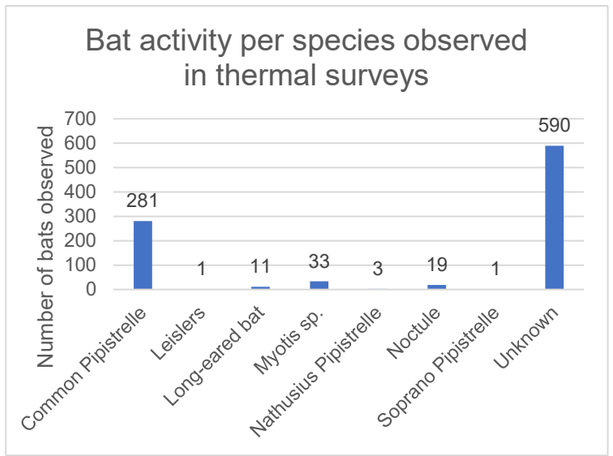
3.2 Thermal imaging surveys

3.2.1 Summary data for thermal imaging surveys is detailed in Annex 5A.

3.2.2 A total of 940 bats were observed and subsequent flight heights and zones were recorded across 12 survey nights for Locations 1a, 1b and 2b. Thermal surveys for Location 2a were undertaken for one night only in May 2019 (see Section 3.4).

3.2.3 Of the 943 bats observed, 590 (63%) could not be identified to genera or species level. The species that were able to be identified in the thermal footage comprised species of the LRW guild (*Myotis spp.* and brown long-eared bats), MRE guild (common, Nathusius' and soprano pipistrelles) and LRE guild (noctule bats) (see Figure 4.1.4).

Figure 3.1.4. Bat activity observed in thermal surveys by species



3.2.4 **Table 3.2.1** below summarises the number of seconds bats were recorded in each of the modelled risk zones.

Table 3.2.1: Bat seconds per hazardous zones

	Zone			
Bat species	**A**	**B**	**C**	**D**
Common Pipistrelle	150	286	598	246
Soprano Pipistrelle	1	2	2	0
Nathusius Pipistrelle	0	2	7	3
Myotis spp.	24	68	24	11
Noctule	16	19	19	18
Leisler's Bat	1	1	1	1
Long-eared	6	17	9	5
Unknown	333.5	673	463	309
All bats	**531.5**	**1,068**	**1,123**	**593**

3.3 Statistical analysis

3.3.1 The mean of the collision risk model was 51 fatalities per year (SD 7.3).

3.3.2 The 80% Quantile value was 60 fatalities, indicating that there is a 20% chance the runway exceeds the predicted fatalities. The 80% quantile is a cut-off taken from pre-existing similar monitoring schemes (United States Fish and Wildlife Service, 2018), as detailed in Section 3.2.

4 Discussion

4.1 Summary of bat activity

Sound Analysis

4.1.1 Six species and two genera of bats belonging to three guilds (SRE, MRE and LRE) were recorded during surveys undertaken at the eastern and western ends of the taxiway. The species identified include common pipistrelle, Leisler's bat, Nathusius' pipistrelle, noctule, serotine, soprano pipistrelle bat, *Myotis spp*. and *Plecotus sp*p.

4.1.2 The sound analysis results recorded a higher number of bat calls at the locations sited at the western end of the taxiway (Locations 1a, 1b and 1A+) compared to those at the eastern end (Locations 2a and 2b). The differing levels of bat calls at the two locations could be explained by environmental conditions including light, noise and habitat type.

4.1.3 The low levels of bat calls recorded by the ultrasound detectors at the eastern end of the taxiway does not represent a lack of bat activity as bats were observed at these locations on the thermal imaging devices. Bats may use visual stimuli rather than sound waves to hunt as light levels are high in this area (Pappas, 2016). This is particularly common in *Plecotus spp*. (Eklof and Jones, 2003). Therefore, bats could still be foraging or commuting in the area, but not using echolocation and, as a consequence, bat calls would not be registered on the detectors. Although the most intense aircraft noise is at <10kHz (below the range picked up by the bat detectors), aircraft noise might be attenuating echolocation calls and therefore reducing the detectability of the bats (Fu *et al.,* 2018). This would explain why the majority of calls at the eastern end of the taxiway were from LRE bats.

4.1.4 The highest number of bat calls recorded across all seasons and locations was attributed to the common pipistrelle. This species is considered to have a widespread distribution at a national level (Bat Conservation Trust, 2010) and is considered to be locally abundant in Sussex (Sussex Bat Group, 2019) and common and widespread in Surrey (Surrey Bat Group, 2019). This species belongs to the MRE guild which is characterised by medium range detection distance and very agile flight associated with vegetation.

4.1.5 The highest number of bat calls was recorded during the maternity period (as shown in Figure 4.1.3). An explanation for this could be that during this period bats are feeding both themselves and their offspring, meaning they must hunt for longer and often travel further distances for food. To increase the survival rate of their young, bats often roost together in large groups called maternity roosts; therefore the higher number of bats recorded during this period could suggest maternity roost(s) being located in the nearby area.

Thermal Imaging

4.1.6 The thermal imaging cameras recorded a total of 940 bats. Of these bats, 63% were identified to species level. Of the bats observed on the thermal imaging cameras, the majority of time spent in a zone was recorded in zones B and C. Bats spent a total of 531.5 seconds in zone A. Bats recorded during all surveys spent a total of 2722.5 seconds (45.375 minutes) in zones that put them at risk of fatal injury or death.

Statistical Analysis

4.1.7 The collision risk models returned predicted future detectable fatalities at a mean of 51 fatalities per year. This is higher than the mean for other airports (Parsons *et al.,* 2010). This is likely to be a product of using uninformed priors, which incorporates uncertainty into the estimate and thus can produce a larger than expected collision risk. As data on metrics targeted to reduce known uncertainties (e.g. carcass monitoring) are collected in future, the estimates of collision probability and predictions of annual bat fatalities will improve. This can facilitate reassessment of decisions and conservation actions in an adaptive management framework, facilitating flexible and rapid reactive monitoring.

4.2 Collision risk

4.2.1 The hazard zones established as part of this study included zone A where bats would be at a high risk of both collision and barotrauma, zone B where they would be at a high risk of barotrauma, zone C where there would be a moderate to low risk of barotrauma and zone D which is considered safe for bats. Of the bats observed on the thermal imaging cameras, the majority of time spent in a zone was recorded in zones B and C. Bats spent a total of 531.5 seconds in zone A. Bats recorded during all surveys spent a total of 2,722.5 seconds (45.375 minutes) in zones that put them at risk of fatal injury or death.

4.2.2 The risk of collision also depends on the height at which bats fly. Bat flight height varies with species, but it is known that bats of the LRE and MRE guilds (i.e. *Myotis spp*., *Plecotus spp*., and soprano pipistrelle) tend to spend their time at low heights and rarely go much higher (Roemer, 2017).

4.2.3 The bat recorded most frequently during the collision surveys was the common pipistrelle, which belongs to the MRE guild. The flight strategy for this species is characterised with variable flight heights for commuting and foraging but with a strong association of those heights with vegetation features (Dietz, 2016).

4.2.4 With the average aeroplane height being approximately 20 metres, this means that most bats recorded within zones A and B are still at risk of mortality.

4.2.5 However, based on the results obtained during the collision risk surveys, the species most likely to be impacted at Gatwick are from the MRE guild, most notably common pipistrelle. It is unlikely, given the abundance and distribution of this species both locally and nationally, that the favourable conservation status of this species would be adversely affected.

4.2.6 It is recommended that existing vegetation management zones (vegetation management with respect to the control of bird strike risk) are maintained to reduce this risk.

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Annex 5A

Sound analysis results

Month	Date	Location	Dusk/Dawn	Myotis spp	Common Pipistrelle	Soprano pipistrelle	Nathusius' pipistrelle	Serotine	Plecotus spp	Leisler's bat	Noctule	Total passes
May	15.05.2019	Location 1a	Dawn	0	0	0	0	0	0	0	0	0
	15.05.2019	Location 1b	Dawn	0	1	0	0	0	0	0	0	1
	15.05.2019	Location 1 A+	Dawn	0	0	0	0	0	0	0	0	0
	22.05.2019	Location 2a	Dusk	0	0	0	0	0	0	0	0	0
	22.05.2019	Location 2b	Dusk	0	0	0	0	0	0	0	0	0
	22.05.2019	Location 2 A+	Dusk	0	0	0	0	0	0	0	1	1
	17.06.2019	Location 1a	Dusk	0	4	0	0	0	0	0	5	9
	17.06.2019	Location 1b	Dusk	0	28	11	0	0	0	1	108	148
	17.06.2019	Location 1 A+	Dusk	0	2	0	0	0	0	0	13	15
	18.06.2019	Location 2b	Dawn	0	0	0	0	0	0	0	0	0
	18.06.2019	Location 2A+	Dawn	0	0	0	0	0	0	0	0	0
June	26.06.2019	Location 2b	Dusk	0	0	0	0	0	0	0	0	0
	26.06.2019	Location 2b A+	Dusk	0	0	0	0	0	0	0	0	0
	27.06.2019	Location 1a	Dusk	0	5	0	0	0	0	0	0	5
	27.06.2019	Location 1b	Dusk	0	330	0	0	0	0	0	4	334
	27.06.2019	Location 1a	Dawn	0	4	0	0	0	0	0	0	4
	27.06.2019	Location 1b	Dawn	0	0	0	0	0	0	0	0	0
	27.06.2019	Location 1A+	Dawn	0	0	0	0	0	0	0	53	53
	28.06.2019	Location 2b	Dawn	0	0	0	0	0	0	0	0	0
	28.06.2019	Location 2 A+	Dawn	0	0	0	0	0	0	0	0	0
July	01.07.2019	Location 2b	Dusk	0	2	0	0	0	0	0	2	4
	01.07.2019	Location 2 A+	Dusk	0	0	0	0	0	0	0	2	2
	09.07.2019	Location 2b	Dawn	0	1	0	0	0	0	0	1	2
	09.07.2019	Location 2 A+	Dawn	0	0	0	0	0	0	0	0	0
	17.07.2019	Location 1a	Dusk	0	99	2	7	0	0	0	0	108
	17.07.2019	Location 1b	Dusk	0	70	1	1	0	0	0	0	72
	17.07.2019	Location 1 A+	Dusk	1	35	1	0	0	0	0	5	42
	24.07.2019	Location 1a	Dawn	0	24	0	0	0	0	0	0	24
	24.07.2019	Location 1b	Dawn	0	24	0	0	0	0	0	0	24
	24.07.2019	Location 1 A+	Dawn	0	0	0	0	0	0	0	0	0
August	02.08.2019	Location 2b	Dawn	0	0	0	0	0	0	0	0	0
	02.08.2019	Location 2 A+	Dawn	0	0	0	0	0	0	0	0	0
	05.08.2019	Location 2b	Dusk	0	0	0	0	0	0	0	2	2
	05.08.2019	Location 2 A+	Dusk	0	0	0	0	0	0	0	2	2

	23.08.2019	Location 1a	Dawn	1	0	0	0	0	0	0	1	2
	23.08.2019	Location 1b	Dawn	0	0	0	0	0	0	0	0	0
	23.08.2019	Location 1 A+	Dawn	11	3	1	0	0	0	0	91	106
	29.08.2019	Location 1a	Dusk	81	813	1	0	1	10	0	3	909
	29.08.2019	Location 1b	Dusk	22	277	0	0	0	0	0	0	299
	29.08.2019	Location 1 A+	Dusk	0	0	0	0	0	0	0	0	0
September	02.09.2019	Location 1a	Dusk	32	172	1	0	0	2	0	6	213
	02.09.2019	Location 1b	Dusk	31	373	6	0	1	4	1	3	419
	02.09.2019	Location 1 A+	Dusk	224	24	25	0	0	1	0	4	278
	18.09.2019	Location 2b	Dawn	0	0	0	0	0	0	0	0	0
	25.09.2019	Location 2b	Dusk	0	0	0	0		0	0	0	0
	25.09.2019	Location 2 A+	Dusk	0	0	0	0	0	0	0	0	0
	09.10.2019	Location 1a	Dawn	0	0	0	0	0	0	0	0	0
	09.10.2019	Location 1b	Dawn	0	0	0	0	0	0	0	0	0
	09.10.2019	Location 1 A+	Dawn	0	0	0	0	0	0	0	0	0
			Total	403	2291	49	8	2	17	2	306	3078

Sound analysis results Location 1a

Identified species per survey

Date	Location	Dusk/Dawn	Myotis spp	Common pipistrelle	Soprano pipistrelle	Nathusius' pipistrelle	Serotine	Plecotus spp	Leisler's bat	Noctule	Total
15.05.2019	Location 1a	Dawn	0	0	0	0	0	0	0	0	0
17.06.2019	Location 1a	Dusk	0	4	0	0	0	0	0	5	9
27.06.2019	Location 1a	Dusk	0	5	0	0	0	0	0	0	5
27.06.2019	Location 1a	Dawn	0	4	0	0	0	0	0	0	4
17.07.2019	Location 1a	Dusk	0	99	2	7	0	0	0	0	108
24.07.2019	Location 1a	Dawn	0	24	0	0	0	0	0	0	24
23.08.2019	Location 1a	Dawn	1	0	0	0	0	0	0	1	2
29.08.2019	Location 1a	Dusk	81	813	1	0	1	10	0	3	909
02.09.2019	Location 1a	Dusk	32	172	1	0	0	2	0	6	213
09.10.2019	Location 1b SW	Dawn	0	0	0	0	0	0	0	0	0

Sound analysis results Location 1b

Identified species per survey

Date	Location	Dusk/Dawn	Myotis	Common pipistrelle	Soprano pipistrelle	Nathusius' pipistrelle	Serotine bat	Plecotus spp	Leisler's	Noctule	Total
15.05.2019	Location 1b	Dawn	0	1	0	0	0	0	0	0	1
17.06.2019	Location 1b	Dusk	0	28	11	0	0	0	1	108	148
27.06.2019	Location 1b	Dusk	0	330	0	0	0	0	0	4	334
27.06.2019	Location 1b	Dawn	0	0	0	0	0	0	0	0	0
17.07.2019	Location 1b	Dusk	0	70	1	1	0	0	0	0	72
24.07.2019	Location 1b	Dawn	0	24	0	0	0	0	0	0	24
23.08.2019	Location 1b	Dawn	0	0	0	0	0	0	0	0	0
29.08.2019	Location 1b	Dusk	22	277	0	0	0	0	0	0	299
02.09.2019	Location 1b	Dusk	31	373	6	0	1	4	1	3	419
09.10.2019	Location 1b E	Dawn	0	0	0	0	0	0	0	0	0

Sound analysis results Location 1 Static detector

Identified species per survey

Date	Location	Dusk/Dawn	Myotis	Common pipistrelle	Soprano pipistrelle	Nathusius' pipistrelle	Serotine bat	Plecotus spp	Leisler's	Noctule	Total
15.05.2019	Location 1 A+	Dawn	0	0	0	0	0	0	0	0	0
17.06.2019	Location 1 A+	Dusk	0	2	0	0	0	0	0	13	15
27.06.2019	Location 1A+	Dawn	0	0	0	0	0	0	0	53	53
17.07.2019	Location 1 A+	Dusk	1	35	1	0	0	0	0	5	42
24.07.2019	Location 1 A+	Dawn	0	0	0	0	0	0	0	0	0
23.08.2019	Location 1 A+	Dawn	11	3	1	0	0	0	0	91	106
29.08.2019	Location 1 A+	Dusk	0	0	0	0	0	0	0	0	0
02.09.2019	Location 1 A+	Dusk	224	24	25	0	0	1	0	4	278
09.10.2019	Location 1 A+	Dawn	0	0	0	0	0	0	0	0	0

Sound analysis results Location 2b

Identified species per survey

Date	Location	Dusk/Dawn	Myotis	Common pipistrelle	Soprano pipistrelle	Nathusius' pipistrelle	Serotine bat	Plecotus spp	Leisler's	Noctule	Total
22.05.2019	Location 2b	Dusk	0	0	0	0	0	0	0	0	0
18.06.2019	Location 2b	Dawn	0	0	0	0	0	0	0	0	0
26.06.2019	Location 2b	Dusk	0	0	0	0	0	0	0	0	0
28.06.2019	Location 2b	Dawn	0	0	0	0	0	0	0	0	0
01.07.2019	Location 2b	Dusk	0	2	0	0	0	0	0	2	4
09.07.2019	Location 2b	Dawn	0	1	0	0	0	0	0	1	2
02.08.2019	Location 2b	Dawn	0	0	0	0	0	0	0	0	0
05.08.2019	Location 2b	Dusk	0	0	0	0	0	0	0	2	2
18.09.2019	Location 2b	Dawn	0	0	0	0	0	0	0	0	0
25.09.2019	Location 2b	Dusk	0	0	0	0		0	0	0	0

Sound analysis results Location 2 static detector

Identified species per survey

Date	Location	Dusk/Dawn	Myotis	Common pipistrelle	Soprano pipistrelle	Nathusius' pipistrelle	Serotine bat	Plecotus spp	Leisler's	Noctule	Total
22.05.2019	Location 2 A+	Dusk	0	0	0	0	0	0	0	1	1
18.06.2019	Location 2A+	Dawn	0	0	0	0	0	0	0	0	0
26.06.2019	Location 2b A+	Dusk	0	0	0	0	0	0	0	0	0
28.06.2019	Location 2 A+	Dawn	0	0	0	0	0	0	0	0	0
01.07.2019	Location 2 A+	Dusk	0	0	0	0	0	0	0	2	2
09.07.2019	Location 2 A+	Dawn	0	0	0	0	0	0	0	0	0
02.08.2019	Location 2 A+	Dawn	0	0	0	0	0	0	0	0	0
05.08.2019	Location 2 A+	Dusk	0	0	0	0	0	0	0	2	2
25.09.2019	Location 2A+	Dusk	0	0	0	0	0	0	0	0	0

Thermal surveys results

Thermal Surveys Results							Time (s) in Zones			
Period	Date	Orientation	Number of bats	Location	Time	Species	A	B	C	D
PreMaternity	27.06.19	SE	1	1B	21:48 (21:49 on camera)	Noctule		3	3	5
PreMaternity	27.06.19	SE	1	1B	21:56 (02:55 video) 21:56 logger	Unknown		1		
PreMaternity	27.06.19	SE	1	1B	22:08:00	Common Pipistrelle		1		
PreMaternity	27.06.19	SE	1	1B	22:09:00	Common Pipistrelle				1
PreMaternity	27.06.19	SE	1	1B	22:17:00	Common Pipistrelle			200	
PreMaternity	27.06.19	SE	1	1B	22:22:00	Common Pipistrelle			90	
PreMaternity	27.06.19	SE	1	1B	22:26:00	Common Pipistrelle			2	100
PreMaternity	27.06.19	SE	1	1B	22:28 (03:10 on cam)	Common Pipistrelle			3	1
PreMaternity	27.06.19	SE	1	1B	22:30 (5:55)	Common Pipistrelle			2	
PreMaternity	27.06.19	SE	1	1B	22:31 (06:33)	Common Pipistrelle			2	
PreMaternity	27.06.19	SE	1	1B	22:32 (07:42)	Common Pipistrelle			2	
PreMaternity	27.06.19	SE	1	1B	22:33 (08:27)	Common Pipistrelle			2	
PreMaternity	27.06.19	SE	1	1B	22:35 (10:00)	Common Pipistrelle			2	
PreMaternity	27.06.19	SE	1	1B	22:35 (00:50)	Common Pipistrelle			4	
PreMaternity	27.06.19	SE	1	1B	22:36 (01:52)	Common Pipistrelle			2	
PreMaternity	27.06.19	SE	1	1B	22:36 (02:27)	Common Pipistrelle			10	
PreMaternity	27.06.19	SE	1	1B	22:37 (03:20, 04:02)	Common Pipistrelle			2	
PreMaternity	27.06.19	SE	1	1B	22:39 (until 04:47, 05:11, 05:37)	Common Pipistrelle			8	
PreMaternity	27.06.19	SE	1	1B	22:41 (06:10)	Common Pipistrelle		2	10	
PreMaternity	27.06.19	SE	1	1B	22:43 (08:10)	Common Pipistrelle		2	2	
PreMaternity	27.06.19	SE	1	1B	22:45 (09:54)	Common Pipistrelle		2		
PreMaternity	27.06.19	SE	1	1B	22:45 (10:22, 11:14)	Common Pipistrelle		2	2	
PreMaternity	27.06.19	SE	1	1B	21:56:00	Unknown		3		
PreMaternity	27.06.19	SE	1	1B	21:57:00	Unknown			2	1
PreMaternity	27.06.19	SE	1	1B	22:00:00	Unknown		1	1	1
PreMaternity	27.06.19	SE	1	1B	22:25:00	Common Pipistrelle				1
PreMaternity	27.06.19	SE	1	1B	22:33:00	Common Pipistrelle				1
PreMaternity	27.06.19	SE	1	1B	22:45 (11:14-13:13)	Common Pipistrelle			2	2
PreMaternity	27.06.19	SE	1	1B	22:47 (0:14 - 5:28)	Common Pipistrelle			1	2
PreMaternity	27.06.19	SE	1	1B	22:54 (7:35 - 10:07)	Common Pipistrelle			2	4
PreMaternity	27.06.19	SE	1	1B	22:58 (0:15 - 2:20)	Common Pipistrelle			1	1
PreMaternity	27.06.19	SE	1	1B	23:00:00	Common Pipistrelle			1	
PreMaternity	27.06.19	SE	1	1B	23:00 (2:40 - 7:42)	Common Pipistrelle		1	1	1
PreMaternity	27.06.19	SE	1	1B	23:06 (8:39 - 10:13)	Common Pipistrelle			1	1
PreMaternity	27.06.19	SE	1	1B	23:08:00	Common Pipistrelle	1	1	1	1

PreMaternity	27.06.19	SE	1	1B	23:09 (0:02 - 2:27)	Common Pipistrelle			1	1
PreMaternity	27.06.19	SE	1	1B	23:11:00	Common Pipistrelle			4	2
PreMaternity	27.06.19	SE	1	1B	23:11 (3:42 - 10:02)	Common Pipistrelle			1	2
PreMaternity	27.06.19	SE	1	1B	23:19 (0:03 - 3:00)	Common Pipistrelle			1	1
PreMaternity	27.06.19	SE	1	1B	23:22:00	Common Pipistrelle			1	1
PreMaternity	27.06.19	SE	1	1B	23:24:00	Common Pipistrelle			1	1
PreMaternity	27.06.19	SE	1	1B	23:24 (5:13 - 9:24)	Common Pipistrelle			1	1
PreMaternity	27.06.19	SE	1	1B	23:28 (0:18 - 4:36)	Common Pipistrelle			1	1
PreMaternity	27.06.19	SE	1	1B	23:35 (6:49 - 10:25)	Common Pipistrelle			1	1
PreMaternity	27.06.19	SE	1	1B	23:38:00	Common Pipistrelle		1	1	
PreMaternity	27.06.19	SE	1	1B	23:40 (0:25 - 10:49)	Common Pipistrelle		1	1	1
PreMaternity	27.06.19	SE	1	1B	23:51 (0:15 - 7:23)	Common Pipistrelle			1	1
PreMaternity	27.06.2019	W	1	1A	21:49:00	Unknown		1		
PreMaternity	27.06.2019	W	1	1A	22:01:00	Unknown		1		
PreMaternity	27.06.2019	W	1	1A	22:04:00	Unknown		1		
PreMaternity	27.06.2019	W	1	1A	22:06:00	Unknown	1			
PreMaternity	27.06.2019	W	1	1A	22:08:00	Common Pipistrelle	1			
PreMaternity	27.06.2019	W	1	1A	22:10:00	Unknown	1	1		
PreMaternity	27.06.2019	W	1	1A	22:16:00	Unknown		1		
PreMaternity	27.06.2019	W	1	1A	22:19:00	Unknown		2		
PreMaternity	27.06.2019	W	1	1A	22:22:00	Unknown		1		
PreMaternity	27.06.2019	W	1	1A	22:22:00	Unknown		2		
PreMaternity	27.06.2019	W	1	1A	22:30:00	Common pipistrelle		1		
PreMaternity	27.06.2019	W	1	1A	22:32:00	Unknown		2		
PreMaternity	27.06.2019	W	1	1A	22:37:00	Unknown		2		
PreMaternity	27.06.2019	W	1	1A	22:37:00	Unknown		4		
PreMaternity	27.06.2019	W	1	1A	22:40:00	Unknown		2		
PreMaternity	27.06.2019	W	1	1A	22:40:00	Unknown		1		
PreMaternity	27.06.2019	W	1	1A	22:40:00	Unknown		2		
PreMaternity	27.06.2019	W	1	1A	22:41:00	Unknown		1		
PreMaternity	27.06.2019	W	1	1A	22:43:00	Unknown	1	2		
PreMaternity	27.06.2019	W	1	1A	22:50:00	Unknown		4		
PreMaternity	27.06.2019	W	1	1A	22:51:00	Unknown		2		
PreMaternity	27.06.2019	W	1	1A	22:52:00	Unknown		2		
PreMaternity	27.06.2019	W	1	1A	22:59:00	Unknown		2		
PreMaternity	27.06.2019	W	1	1A	23:00:00	Unknown		2		
PreMaternity	27.06.2019	W	1	1A	23:02:00	Unknown		2		
PreMaternity	27.06.2019	W	1	1A	23:04:00	Unknown		5		
PreMaternity	27.06.2019	W	1	1A	23:04:00	Unknown		2		
PreMaternity	27.06.2019	W	1	1A	23:12:00	Unknown		2		

PreMaternity	27.06.2019	W	1	1A	23:16:00	Unknown		2		
PreMaternity	27.06.2019	W	1	1A	23:16:00	Unknown		2		
PreMaternity	27.06.2019	W	1	1A	23:18:00	Unknown		3		
PreMaternity	27.06.2019	W	1	1A	23:20:00	Unknown		1		
PreMaternity	27.06.2019	W	1	1A	23:26:00	Unknown		2		
PreMaternity	27.06.2019	W	1	1A	23:29:00	Unknown		2		
PreMaternity	27.06.2019	W	1	1A	23:29:00	Unknown		3		
PreMaternity	27.06.2019	W	1	1A	23:29:00	Unknown		1		
PreMaternity	27.06.2019	W	1	1A	23:30:00	Unknown		1		
PreMaternity	27.06.2019	W	1	1A	23:46:00	Unknown		2		
PreMaternity	27.06.2019	W	1	1A	23:47:00	Common pipistrelle		1		
PreMaternity	27.06.2019	W	1	1A	23:47:00	Common pipistrelle		1		
PreMaternity	27.06.2019	W	1	1A	23:49:00	Unknown		2		
PreMaternity	27.06.2019	W	1	1A	23:51:00	Unknown		2		
PreMaternity	27.06.2019	W	1	1A	23:51:00	Unknown		2		
PreMaternity	27.06.2019	W	1	1A	23:53:00	Unknown		2		
PreMaternity	27.06.2019	W	1	1A	23:57:00	Unknown		1		
PreMaternity	28.06.19	W	1	2east	02:53:00	Unknown	1	1		
PreMaternity	28.06.19	W	1	2east	03:09:00	Unknown				1
PreMaternity	28.06.19	W	1	2east	03:48:00	Unknown	2	3	2	10
PreMaternity	28.06.19	W	1	2east	04:04:00	Unknown	2			
PreMaternity	28.06.19	W	1	2east	04:22:00	Unknown		1	1	
PreMaternity	22.05.19	E	1	2a	21:15:00	Unknown	1	1	3	2
PreMaternity	22.05.19	E	1	2a	21:39:00	Unknown	1	1		
PreMaternity	22.05.19	E	1	2a	20:58:00	Unknown				1
PreMaternity	22.05.19	E	1	2a	21:13:00	Unknown		2	1	
PreMaternity	22.05.19	E	1	2a	21:23:19	Unknown		1	1	1
PreMaternity	22.05.19	E	1	2a	21:23:00	Unknown			1	1
PreMaternity	22.05.19	E	1	2a	21:24:55	Unknown	1	1	1	1
PreMaternity	22.05.19	E	1	2a	21:27:56	Unknown		2	2	
PreMaternity	22.05.19	E	1	2a	21:29:09	Unknown	3	1		
PreMaternity	22.05.19	E	1	2a	21:29:51	Unknown			3	
PreMaternity	22.05.19	E	1	2a	21:31:50	Unknown	2			
PreMaternity	22.05.19	E	1	2a	21:47:00	Unknown		1	1	1
PreMaternity	22.05.19	E	1	2a	21:54:00	Unknown		1	1	1
PreMaternity	22.05.19	E	1	2a	22:27:00	Unknown	1	1	1	1
PreMaternity	22.05.19	E	1	2a	23:05:54	Unknown	3	3	2	
PreMaternity	22.05.19	E	1	2a	23:11:32	Unknown				1
PreMaternity	22.05.19	E	1	2a	23:20:00	Unknown		1	1	1
PreMaternity	22.05.19	E	1	2a	23:31:00	Unknown	1	1		

PreMaternity	22.05.19	W	1	2B	20:54:38	Unknown				1
PreMaternity	22.05.19	W	1	2B	20:55:16	Unknown			1	
PreMaternity	22.05.19	W	1	2B	20:56:51	Unknown			1	
PreMaternity	22.05.19	W	1	2B	20:57:26	Unknown			1	
PreMaternity	22.05.19	W	1	2B	20:57:32	Unknown		1	1	
PreMaternity	22.05.19	W	1	2B	20:58:31	Unknown			1	1
PreMaternity	22.05.19	W	1	2B	21:00:46	Unknown			1	1
PreMaternity	22.05.19	W	1	2B	21:00:48	Unknown	1	1	1	1
PreMaternity	22.05.19	W	1	2B	21:03:59	Unknown		3		
PreMaternity	22.05.19	W	1	2B	21:04:33	Unknown		4		
PreMaternity	22.05.19	W	1	2B	21:08:13	Unknown		1		
PreMaternity	22.05.19	W	1	2B	21:09:19	Unknown			1	
PreMaternity	22.05.19	W	1	2B	21:09:37	Unknown		1		
PreMaternity	22.05.19	W	1	2B	21:09:44	Unknown			2	
PreMaternity	22.05.19	W	1	2B	21:11:01	Unknown		1		
PreMaternity	22.05.19	W	1	2B	21:11:01	Unknown	1	1		
PreMaternity	22.05.19	W	1	2B	21:11:26	Unknown				2
PreMaternity	22.05.19	W	1	2B	21:11:37	Unknown		1		
PreMaternity	22.05.19	W	1	2B	21:11:41	Unknown		1	1	
PreMaternity	22.05.19	W	1	2B	21:11:59	Unknown		1	1	
PreMaternity	22.05.19	W	1	2B	21:12:00	Unknown				
PreMaternity	22.05.19	W	1	2B	21:12:03	Unknown		1		
PreMaternity	22.05.19	W	1	2B	21:12:05	Unknown		1		
PreMaternity	22.05.19	W	1	2B	21:12:26	Unknown			1	
PreMaternity	22.05.19	W	1	2B	21:12:30	Unknown			1	
PreMaternity	22.05.19	W	1	2B	21:12:37	Unknown		1		
PreMaternity	22.05.19	W	1	2B	21:13:02	Unknown		1		
PreMaternity	22.05.19	W	1	2B	21:13:55	Unknown			1	
PreMaternity	22.05.19	W	1	2B	21:14:05	Unknown		1		
PreMaternity	22.05.19	W	1	2B	21:14:10	Unknown		1		
PreMaternity	22.05.19	W	1	2B	21:14:28	Unknown	1	1	1	1
PreMaternity	22.05.19	W	1	2B	21:14:34	Unknown		1		
PreMaternity	22.05.19	W	1	2B	21:14:55	Unknown		1		
PreMaternity	22.05.19	W	2	2B	21:14:55	Unknown		1		
PreMaternity	22.05.19	W	1	2B	21:15:21	Unknown			2	
PreMaternity	22.05.19	W	1	2B	21:15:27	Unknown		1	1	
PreMaternity	22.05.19	W	1	2B	21:15:27	Unknown			1	
PreMaternity	22.05.19	W	1	2B	21:15:31	Unknown		1		
PreMaternity	22.05.19	W	1	2B	21:15:32	Unknown			1	
PreMaternity	22.05.19	W	1	2B	21:15:49	Unknown			1	

PreMaternity	22.05.19	W	1	2B	21:16:07	Unknown		1		
PreMaternity	22.05.19	W	1	2B	21:16:41	Unknown		1		
PreMaternity	22.05.19	W	1	2B	21:16:57	Unknown		1	1	
PreMaternity	22.05.19	W	1	2B	21:18:03	Unknown			1	
PreMaternity	22.05.19	W	1	2B	21:18:21	Unknown		1		
PreMaternity	22.05.19	W	5	2B	21:19:21	Unknown		4	3	
PreMaternity	22.05.19	W	1	2B	21:19:30	Unknown			2	
PreMaternity	22.05.19	W	1	2B	21:19:45	Unknown			1	
PreMaternity	22.05.19	W	2	2B	21:19:58	Unknown			2	1
PreMaternity	22.05.19	W	1	2B	21:20:11	Unknown	3			
PreMaternity	22.05.19	W	2	2B	21:20:15	Unknown		1	1	
PreMaternity	22.05.19	W	1	2B	21:20:45	Unknown				2
PreMaternity	22.05.19	W	3	2B	21:21:09	Unknown	1	1	1	1
PreMaternity	22.05.19	W	1	2B	21:21:23	Unknown	1	1	1	1
PreMaternity	22.05.19	W	1	2B	21:21:27	Unknown	1	1	1	1
PreMaternity	22.05.19	W	3	2B	21:21:46	Unknown	1	1	1	1
PreMaternity	22.05.19	W	1	2B	21:21:50	Unknown			2	
PreMaternity	22.05.19	W	1	2B	21:22:01	Unknown			1	
PreMaternity	22.05.19	W	1	2B	21:22:22	Unknown		1	1	
PreMaternity	22.05.19	W	3	2B	21:22:47	Unknown		1	1	1
PreMaternity	22.05.19	W	2	2B	21:23:10	Unknown		1	1	1
PreMaternity	22.05.19	W	1	2B	21:24:45	Unknown		1	1	1
PreMaternity	22.05.19	W	1	2B	21:24:59	Unknown		2		
PreMaternity	22.05.19	W	1	2B	21:25:13	Unknown			2	
PreMaternity	22.05.19	W	1	2B	21:25:59	Unknown		1		
PreMaternity	22.05.19	W	1	2B	21:27:09	Unknown		1	1	
PreMaternity	22.05.19	W	1	2B	21:27:25	Unknown		1		
PreMaternity	22.05.19	W	1	2B	21:27:37	Unknown			2	
PreMaternity	22.05.19	W	1	2B	21:28:17	Unknown	1	1	1	1
PreMaternity	22.05.19	W	1	2B	21:29:10	Unknown	1	2		
PreMaternity	22.05.19	W	1	2B	21:29:13	Unknown	1	1		
PreMaternity	22.05.19	W	1	2B	21:29:24	Unknown		3		
PreMaternity	22.05.19	W	1	2B	21:29:44	Unknown	1	1	1	
PreMaternity	22.05.19	W	2	2B	21:30:24	Unknown	1	1	1	1
PreMaternity	22.05.19	W	1	2B	21:30:51	Unknown	1	1	1	1
PreMaternity	22.05.19	W	1	2B	21:31:49	Unknown			1	1
PreMaternity	22.05.19	W	1	2B	21:33:07	Unknown			1	
PreMaternity	22.05.19	W	1	2B	21:34:24	Unknown		1	1	
PreMaternity	22.05.19	W	1	2B	21:34:39	Unknown	1	1		
PreMaternity	22.05.19	W	1	2B	21:44:23	Unknown		1		

PreMaternity	22.05.19	W	1	2B	21:45:46	Unknown		1	1	
PreMaternity	22.05.19	W	1	2B	22:09:50	Unknown		1		
PreMaternity	22.05.19	W	1	2B	22:36:43	Unknown		1	1	
PreMaternity	22.05.19	W	1	2B	22:41:00	Unknown				
PreMaternity	22.05.19	W	1	2B	22:56:45	Unknown	1	1	1	1
PreMaternity	15.05.19	E	1	1B	04:43:00	Unknown	8			
PreMaternity	15.05.19	SW	1	1A	04:53:00	Unknown	4	2		
PreMaternity	18.06.19	W	2	2B	03:34:00	Unknown	10	5	5	0
PreMaternity	18.06.19	W	1	2B	03:45:00	Unknown	5	10	0	0
PreMaternity	18.06.19	W	1	2B	04:42:00	Unknown	5	4	3	
PreMaternity	22.05.19	E	1	2A	21:15:00	Unknown	1	1	3	2
PreMaternity	22.05.19	E	1	2A	21:39:00	Unknown	1	1		
PreMaternity	22.05.19	E	1	2A	20:58:00	Unknown				1
PreMaternity	22.05.19	E	1	2A	21:13:00	Unknown		2	1	
PreMaternity	22.05.19	E	1	2A	21:23:19	Unknown		1	1	1
PreMaternity	22.05.19	E	1	2A	21:23:00	Unknown			1	1
PreMaternity	22.05.19	E	1	2A	21:24:55	Unknown	1	1	1	1
PreMaternity	22.05.19	E	1	2A	21:27:56	Unknown		2	2	
PreMaternity	22.05.19	E	1	2A	21:29:09	Unknown	3	1		
PreMaternity	22.05.19	E	1	2A	21:29:51	Unknown			3	
PreMaternity	22.05.19	E	1	2A	21:31:50	Unknown	2			
PreMaternity	22.05.19	E	1	2A	21:47:00	Unknown		1	1	1
PreMaternity	22.05.19	E	1	2A	21:54:00	Unknown		1	1	1
PreMaternity	22.05.19	E	1	2A	22:27:00	Unknown	0.5	0.5	0.5	0.5
PreMaternity	22.05.19	E	1	2A	23:05:54	Unknown	3	3	2	
PreMaternity	22.05.19	E	1	2A	23:11:32	Unknown				1
PreMaternity	22.05.19	E	1	2A	23:20:00	Unknown		0.5	0.5	0.5
PreMaternity	22.05.19	E	1	2A	23:31:00	Unknown	1	1		
PreMaternity	17.06.19	E	1	1A	22:11:00	Unknown	2	3		
PreMaternity	17.06.19	E	1	1A	22:13:00	Common Pipistrelle		1		
PreMaternity	17.06.19	E	1	1A	22:28:00	Common Pipistrelle		1		
PreMaternity	17.06.19	E	1	1A	22:33:00	Unknown		2		
PreMaternity	17.06.19	E	1	1A	22:34:00	Unknown		2		
PreMaternity	17.06.19	E	1	1A	22:35:00	Unknown	2	2	2	
PreMaternity	17.06.19	E	1	1A	22:35:00	Unknown		2		
PreMaternity	17.06.19	E	1	1A	22:39:00	Unknown		2	2	
PreMaternity	17.06.19	E	1	1A	22:42:00	Unknown		2	2	1
PreMaternity	17.06.19	E	1	1A	22:44:00	Unknown		2		
PreMaternity	17.06.19	E	1	1A	22:49:00	Unknown		1	1	1
PreMaternity	17.06.19	E	1	1A	22:54:00	Unknown	3	2	1	1

PreMaternity	17.06.19	E	1	1A	23:03:00	Common Pipistrelle				
PreMaternity	17.06.19	E	1	1A	23:28:00	Unknown		1	1	1
PreMaternity	17.06.19	E	1	1A	23:36:00	Common Pipistrelle		2	1	1
PreMaternity	17.06.19	E	1	1A	23:43:00	Common Pipistrelle		2	1	1
PreMaternity	17.06.19	E	1	1A	23:49:00	Common Pipistrelle		3	2	1
PreMaternity	17.06.19	E	1	1A	23:53:00	Common Pipistrelle	2	2	2	2
PreMaternity	17.06.19	E	1	1A	23:57:00	Unknown		2	2	2
PreMaternity	17.06.19	SW	1	1B	21:18:07	Unknown	1	1	1	1
PreMaternity	17.06.19	SW	1	1B	21:22:07	Unknown	1	1	1	1
PreMaternity	17.06.19	SW	1	1B	21:25:25	Unknown	1	1	1	1
PreMaternity	17.06.19	SW	2	1B	21:29:14	Unknown	1	1	1	1
PreMaternity	17.06.19	SW	2	1B	21:31:22	Noctule	1	1	1	1
PreMaternity	17.06.19	SW	1	1B	21:33:42	Unknown	1	1	1	1
PreMaternity	17.06.19	SW	1	1B	21:34:35	Noctule	1	1	1	
PreMaternity	17.06.19	SW	1	1B	21:37:08	Noctule	1	1	1	1
PreMaternity	17.06.19	SW	1	1B	21:41:32	Unknown	1	1	1	1
PreMaternity	17.06.19	SW	1	1B	21:52:19	Unknown		2	2	
PreMaternity	17.06.19	SW	1	1B	21:52:27	Unknown			2	
PreMaternity	17.06.19	SW	1	1B	21:59:42	Noctule	1	1	1	1
PreMaternity	17.06.19	SW	1	1B	22:03:26	Unknown	1	1	1	1
PreMaternity	17.06.19	SW	1	1B	22:10:02	Noctule			1	
PreMaternity	17.06.19	SW	1	1B	22:14:52	Noctule	1	1	1	1
PreMaternity	17.06.19	SW	1	1B	22:16:11	Noctule	1	1	1	1
PreMaternity	17.06.19	SW	1	1B	22:17:23	Noctule	1	1	1	1
PreMaternity	17.06.19	SW	1	1B	22:21:48	Leisler's	1	1	1	1
PreMaternity	17.06.19	SW	1	1B	22:27:57	Noctule	1	1	1	1
PreMaternity	17.06.19	SW	1	1B	22:39:22	Noctule	1	1	1	1
PreMaternity	17.06.19	SW	1	1B	22:41:59	Noctule	1	1	1	1
PreMaternity	17.06.19	SW	1	1B	22:43:12	Noctule			1	1
PreMaternity	17.06.19	SW	1	1B	22:52:19	Unknown	1	1	1	1
PreMaternity	17.06.19	SW	1	1B	22:52:36	Unknown	1	1	1	1
PreMaternity	17.06.19	SW	1	1B	22:58:13	Unknown	1	1	1	1
PreMaternity	17.06.19	SW	1	1B	23:09:06	Unknown	2	2	2	1
PreMaternity	17.06.19	SW	1	1B	23:09:45	Unknown	2	2	2	1
PreMaternity	17.06.19	SW	1	1B	23:09:59	Unknown	1	1	1	1
PreMaternity	17.06.19	SW	1	1B	23:13:54	Common Pipistrelle	1	1	1	1
PreMaternity	17.06.19	SW	1	1B	23:14:47	Unknown		3	2	1
PreMaternity	17.06.19	SW	1	1B	23:15:44	Noctule	1	1	1	1
PreMaternity	17.06.19	SW	1	1B	23:17:49	Common Pipistrelle	1	1	1	1
PreMaternity	17.06.19	SW	1	1B	23:26:08	Common Pipistrelle	1	1	1	1

PreMaternity	17.06.19	SW	1	1B	23:30:09	Unknown	1	1	1	1
PreMaternity	17.06.19	SW	1	1B	23:35:35	Unknown			1	1
PreMaternity	17.06.19	SW	1	1B	23:37:57	Common Pipistrelle	1	1	1	1
PreMaternity	17.06.19	SW	1	1B	23:47:42	Common Pipistrelle		2	1	1
PreMaternity	17.06.19	SW	1	1B	23:51:24	Unknown			1	1
PreMaternity	22.05.19	W	1	2B	20:54:38	Unknown				1
PreMaternity	22.05.19	W	1	2B	20:55:16	Unknown			1	
PreMaternity	22.05.19	W	1	2B	20:56:51	Unknown			1	
PreMaternity	22.05.19	W	1	2B	20:57:26	Unknown			1	
PreMaternity	22.05.19	W	1	2B	20:57:32	Unknown		1	1	
PreMaternity	22.05.19	W	1	2B	20:58:31	Unknown			1	1
PreMaternity	22.05.19	W	1	2B	21:00:46	Unknown			1	1
PreMaternity	22.05.19	W	1	2B	21:00:48	Unknown	1	1	1	1
PreMaternity	22.05.19	W	1	2B	21:03:59	Unknown		3		
PreMaternity	22.05.19	W	1	2B	21:04:33	Unknown		4		
PreMaternity	22.05.19	W	1	2B	21:08:13	Unknown		1		
PreMaternity	22.05.19	W	1	2B	21:09:19	Unknown			1	
PreMaternity	22.05.19	W	1	2B	21:09:37	Unknown		1		
PreMaternity	22.05.19	W	1	2B	21:09:44	Unknown			2	
PreMaternity	22.05.19	W	1	2B	21:11:01	Unknown		1		
PreMaternity	22.05.19	W	1	2B	21:11:01	Unknown	1	1		
PreMaternity	22.05.19	W	1	2B	21:11:26	Unknown				2
PreMaternity	22.05.19	W	1	2B	21:11:37	Unknown		1		
PreMaternity	22.05.19	W	1	2B	21:11:41	Unknown		1	1	
PreMaternity	22.05.19	W	1	2B	21:11:59	Unknown		1	1	
PreMaternity	22.05.19	W	1	2B	21:12:00	Unknown				
PreMaternity	22.05.19	W	1	2B	21:12:03	Unknown		1		
PreMaternity	22.05.19	W	1	2B	21:12:05	Unknown		1		
PreMaternity	22.05.19	W	1	2B	21:12:26	Unknown			1	
PreMaternity	22.05.19	W	1	2B	21:12:30	Unknown			1	
PreMaternity	22.05.19	W	1	2B	21:12:37	Unknown		1		
PreMaternity	22.05.19	W	1	2B	21:13:02	Unknown		1		
PreMaternity	22.05.19	W	1	2B	21:13:55	Unknown			1	
PreMaternity	22.05.19	W	1	2B	21:14:05	Unknown		1		
PreMaternity	22.05.19	W	1	2B	21:14:10	Unknown		1		
PreMaternity	22.05.19	W	1	2B	21:14:28	Unknown	1	1	1	1
PreMaternity	22.05.19	W	1	2B	21:14:34	Unknown		1		
PreMaternity	22.05.19	W	1	2B	21:14:55	Unknown		1		
PreMaternity	22.05.19	W	1	2B	21:14:55	Unknown		1		
PreMaternity	22.05.19	W	1	2B	21:15:21	Unknown			2	

PreMaternity	22.05.19	W	1	2B	21:15:27	Unknown		1	1	
PreMaternity	22.05.19	W	1	2B	21:15:27	Unknown			1	
PreMaternity	22.05.19	W	1	2B	21:15:31	Unknown		1		
PreMaternity	22.05.19	W	1	2B	21:15:32	Unknown			1	
PreMaternity	22.05.19	W	1	2B	21:15:49	Unknown			1	
PreMaternity	22.05.19	W	1	2B	21:16:07	Unknown		1		
PreMaternity	22.05.19	W	1	2B	21:16:41	Unknown		1		
PreMaternity	22.05.19	W	1	2B	21:16:57	Unknown		1	1	
PreMaternity	22.05.19	W	1	2B	21:18:03	Unknown			1	
PreMaternity	22.05.19	W	1	2B	21:18:21	Unknown		1		
PreMaternity	22.05.19	W	1	2B	21:19:21	Unknown		4	3	
PreMaternity	22.05.19	W	1	2B	21:19:30	Unknown			2	
PreMaternity	22.05.19	W	1	2B	21:19:45	Unknown			1	
PreMaternity	22.05.19	W	2	2B	21:19:58	Unknown			2	1
PreMaternity	22.05.19	W	1	2B	21:20:11	Unknown	3			
PreMaternity	22.05.19	W	2	2B	21:20:15	Unknown		1	1	
PreMaternity	22.05.19	W	1	2B	21:20:45	Unknown				2
PreMaternity	22.05.19	W	3	2B	21:21:09	Unknown	1	1	1	1
PreMaternity	22.05.19	W	1	2B	21:21:23	Unknown	1	1	1	1
PreMaternity	22.05.19	W	3	2B	21:21:27	Unknown	1	1	1	1
PreMaternity	22.05.19	W	1	2B	21:21:46	Unknown	1	1	1	1
PreMaternity	22.05.19	W	1	2B	21:21:50	Unknown			2	
PreMaternity	22.05.19	W	1	2B	21:22:01	Unknown			1	
PreMaternity	22.05.19	W	1	2B	21:22:22	Unknown		1	1	
PreMaternity	22.05.19	W	3	2B	21:22:47	Unknown		1	1	1
PreMaternity	22.05.19	W	2	2B	21:23:10	Unknown		1	1	1
PreMaternity	22.05.19	W	1	2B	21:24:45	Unknown		1	1	1
PreMaternity	22.05.19	W	1	2B	21:24:59	Unknown		2		
PreMaternity	22.05.19	W	1	2B	21:25:13	Unknown			2	
PreMaternity	22.05.19	W	1	2B	21:25:59	Unknown		1		
PreMaternity	22.05.19	W	1	2B	21:27:09	Unknown		1	1	
PreMaternity	22.05.19	W	1	2B	21:27:25	Unknown		1		
PreMaternity	22.05.19	W	1	2B	21:27:37	Unknown			2	
PreMaternity	22.05.19	W	1	2B	21:28:17	Unknown	1	1	1	1
PreMaternity	22.05.19	W	1	2B	21:29:10	Unknown	1	2		
PreMaternity	22.05.19	W	1	2B	21:29:13	Unknown	1	1		
PreMaternity	22.05.19	W	1	2B	21:29:24	Unknown		3		
PreMaternity	22.05.19	W	1	2B	21:29:44	Unknown	1	1	1	
PreMaternity	22.05.19	W	2	2B	21:30:24	Unknown	1	1	1	1
PreMaternity	22.05.19	W	1	2B	21:30:51	Unknown	1	1	1	1

PreMaternity	22.05.19	W	1	2B	21:31:49	Unknown			1	1
PreMaternity	22.05.19	W	1	2B	21:33:07	Unknown			1	
PreMaternity	22.05.19	W	1	2B	21:34:24	Unknown		1	1	
PreMaternity	22.05.19	W	1	2B	21:34:39	Unknown	1	1		
PreMaternity	22.05.19	W	1	2B	21:44:23	Unknown		1		
PreMaternity	22.05.19	W	1	2B	21:45:46	Unknown		1	1	
PreMaternity	22.05.19	W	1	2B	22:09:50	Unknown		1		
PreMaternity	22.05.19	W	1	2B	22:36:43	Unknown		1	1	
PreMaternity	22.05.19	W	2	2B	21:14:55	Unknown		1		
PreMaternity	22.05.19	W	2	2B	21:19:58	Unknown			2	1
PreMaternity	22.05.19	W	2	2B	21:20:15	Unknown		1	1	
PreMaternity	22.05.19	W	2	2B	21:23:10	Unknown		1	1	1
PreMaternity	22.05.19	W	2	2B	21:30:24	Unknown	1	1	1	1
PreMaternity	18.06.19	W	2	2B	03:34:00	Unknown	10	5	5	0
PreMaternity	17.06.19	SW	2	1B	21:29:14	Unknown	1	1	1	1
PreMaternity	17.06.19	SW	2	1B	21:31:22	Noctule	1	1	1	1
PreMaternity	22.05.19	W	2	2B	21:19:58	Unknown			2	1
PreMaternity	22.05.19	W	2	2B	21:20:15	Unknown		1	1	
PreMaternity	22.05.19	W	2	2B	21:23:10	Unknown		1	1	1
PreMaternity	22.05.19	W	2	2B	21:30:24	Unknown	1	1	1	1
PreMaternity	22.05.19	W	3	2B	21:21:09	Unknown	1	1	1	1
PreMaternity	22.05.19	W	3	2B	21:21:46	Unknown	1	1	1	1
PreMaternity	22.05.19	W	3	2B	21:22:47	Unknown		1	1	1
PreMaternity	22.05.19	W	3	2B	21:21:09	Unknown	1	1	1	1
PreMaternity	22.05.19	W	3	2B	21:21:27	Unknown	1	1	1	1
PreMaternity	22.05.19	W	3	2B	21:22:47	Unknown		1	1	1
PreMaternity	22.05.19	W	3	2B	21:21:09	Unknown	1	1	1	1
PreMaternity	22.05.19	W	3	2B	21:21:46	Unknown	1	1	1	1
PreMaternity	22.05.19	W	3	2B	21:22:47	Unknown		1	1	1
PreMaternity	22.05.19	W	3	2B	21:21:09	Unknown	1	1	1	1
PreMaternity	22.05.19	W	3	2B	21:21:27	Unknown	1	1	1	1
PreMaternity	22.05.19	W	3	2B	21:22:47	Unknown		1	1	1
PreMaternity	22.05.19	W	5	2B	21:19:21	Unknown		4	3	
PreMaternity	22.05.19	W	5	2B	21:19:21	Unknown		4	3	
PreMaternity	22.05.19	W	5	2B	21:19:21	Unknown		4	3	
PreMaternity	22.05.19	W	5	2B	21:19:21	Unknown		4	3	
Maternity	23.08.19	SW	1	1a	04:37:37	Unknown	1	1	1	1
Maternity	23.08.19	SW	2	1a	05:27:42	Unknown	1	1	1	1
Maternity	23.08.19	SW	1	1a	05:33:02	Unknown	1	1	1	1
Maternity	23.08.19	SW	1	1a	05:33:58	Unknown			1	1

Maternity	23.08.19	SW	1	1a	05:34:10	Unknown			1	1
Maternity	23.08.19	SW	1	1a	05:36:17	Unknown			1	1
Maternity	23.08.19	SW	1	1a	05:40:04	Unknown	1		1	1
Maternity	23.08.19	SW	1	1a	05:55:09	Unknown	1	1	1	1
Maternity	23.08.19	SW	1	1a	05:57:50	Unknown	1	1	1	1
Maternity	23.08.19	SW	1	1a	05:57:58	Unknown			1	1
Maternity	23.08.19	SW	1	1a	05:58:08	Unknown	1	1	1	1
Maternity	23.08.19	SE	1	1B	04:11:57	Unknown	1	1	1	1
Maternity	23.08.19	SE	1	1B	04:14:33	Unknown	1	1	1	1
Maternity	23.08.19	SE	1	1B	05:39:07	Unknown	1	1	1	1
Maternity	23.08.19	SE	1	1B	05:52:52	Unknown			1	1
Maternity	29.08.19	SE	2	1A	20:23-28	Unknown				
Maternity	29.08.19	SE	1	1A	20:25:00	Noctule	4	2	2	1
Maternity	29.08.19	SE	1	1A	20:27:00	Common Pipistrelle			1	
Maternity	29.08.19	SE	1	1A	20:30-36	Common Pipistrelle				1
Maternity	29.08.19	SE	1	1A	20:38:00	Common Pipistrelle				1
Maternity	29.08.19	SE	1	1A	20:45:00	Common Pipistrelle				
Maternity	29.08.19	SE	1	1A	20:51:00	Common Pipistrelle				
Maternity	29.08.19	SE	1	1A	20:59:00	Noctule				
Maternity	29.08.19	SE	1	1A	21:01:00	Common Pipistrelle		3	3	3
Maternity	29.08.19	SE	1	1A	21:01:00	Common Pipistrelle	5	3		
Maternity	29.08.19	SE	1	1A	21:04:00	Common Pipistrelle		4		
Maternity	29.08.19	SE	1	1A	21:08:00	Common Pipistrelle	2	3		
Maternity	29.08.19	SE	1	1A	21:08:00	Common Pipistrelle	2	3		
Maternity	29.08.19	SE	1	1A	21:09:00	Common Pipistrelle	2	3		
Maternity	29.08.19	SE	1	1A	21:10:00	Common Pipistrelle				
Maternity	29.08.19	SE	1	1A	21:11:00	Common Pipistrelle	2	3		
Maternity	29.08.19	SE	1	1A	21:13:00	Common Pipistrelle	2	2		
Maternity	29.08.19	SE	1	1A	21:15:00	Common Pipistrelle	2			
Maternity	29.08.19	SE	1	1A	21:16:00	Common Pipistrelle		1		
Maternity	29.08.19	SE	1	1A	21:19:00	Common Pipistrelle	2	2		
Maternity	29.08.19	SE	1	1A	21:20:00	Common Pipistrelle	3	3	3	
Maternity	29.08.19	SE	1	1A	21:21:00	Common Pipistrelle				
Maternity	29.08.19	SE	1	1A	21:26:00	Common Pipistrelle		3	3	
Maternity	29.08.19	SE	1	1A	21:27:00	Common Pipistrelle	2	3		
Maternity	29.08.19	SE	1	1A	21:28:00	Common Pipistrelle		4		
Maternity	29.08.19	SE	1	1A	21:33:00	Common Pipistrelle	3	3		
Maternity	29.08.19	SE	1	1A	21:36:00	Common Pipistrelle	3	3		
Maternity	29.08.19	SE	1	1A	21:51:00	Common Pipistrelle	10			
Maternity	29.08.19	SE	1	1A	22:05:00	Common Pipistrelle		4		

Maternity	29.08.19	SE	1	1A	22:08:00	Common Pipistrelle		2		
Maternity	29.08.19	SE	1	1A	22:12:00	Common Pipistrelle		1		
Maternity	29.08.19	SE	1	1A	22:22:00	Common Pipistrelle				
Maternity	29.08.19	SE	2	1A	22:26:00	Common Pipistrelle				
Maternity	29.08.19	SE	1	1A	22:26:00	Common Pipistrelle		2		
Maternity	29.08.19	SE	1	1A	22:29:00	Common Pipistrelle		4		
Maternity	29.08.19	SE	1	1A	22:35:00	Common Pipistrelle		1	1	1
Maternity	29.08.19	SE	1	1A	22:35:00	Myotis spp.		1	1	1
Maternity	29.08.19	SE	1	1A	22:36:00	Common Pipistrelle			3	
Maternity	29.08.19	SE	1	1A	22:36:00	Myotis spp.			3	
Maternity	29.08.19	SE	1	1A	22:37:00	Common Pipistrelle			3	
Maternity	29.08.19	SE	1	1A	22:37:00	Myotis spp.			3	
Maternity	29.08.19	SE	1	1A	22:43:00	Common Pipistrelle		1	1	
Maternity	29.08.19	SE	1	1A	22:45:00	Common Pipistrelle		1		
Maternity	29.08.19	SE	1	1A	22:45:00	Common Pipistrelle		1	1	
Maternity	29.08.19	SE	1	1A	22:47:00	Common Pipistrelle		1	1	
Maternity	29.08.19	SE	1	1A	22:51:00	Common Pipistrelle				
Maternity	29.08.19	SE	1	1A	22:52:00	Common Pipistrelle		1	1	
Maternity	29.08.19	SE	1	1A	22:57:00	Common Pipistrelle		2		
Maternity	29.08.19	SE	1	1A	23:03:00	Common Pipistrelle		1	1	
Maternity	29.08.19	SE	1	1A	23:03:00	Common Pipistrelle		1	1	
Maternity	29.08.19	SE	1	1A	23:06:00	Common Pipistrelle	3	2	2	
Maternity	29.08.19	SE	1	1A	23:10:00	Common Pipistrelle	1	1	1	
Maternity	29.08.19	SE	1	1A	23:15:00	Common Pipistrelle			1	1
Maternity	29.08.19	SE	1	1A	23:16:00	Common Pipistrelle	1	1	1	1
Maternity	29.08.19	SE	1	1A	23:25:00	Common Pipistrelle		1	1	
Maternity	29.08.19	SE	1	1A	23:26:00	Long-eared bat	1	1	1	
Maternity	29.08.19	SE	1	1A	23:27:00	Long-eared bat	1	1	1	
Maternity	29.08.19	SE	1	1A	23:30:00	Common Pipistrelle			1	
Maternity	29.08.19	SE	1	1A	23:35:00	Common Pipistrelle			1	
Maternity	29.08.19	SE	1	1A	23:39:00	Common Pipistrelle				
Maternity	29.08.19	SE	1	1A	23:40:00	Myotis spp.			1	
Maternity	29.08.19	SE	1	1A	23:45:00	Myotis spp.	1	1	1	
Maternity	29.08.19	SE	1	1A	23:46:00	Myotis spp.	1	1	1	
Maternity	29.08.19	SE	1	1A	23:47:00	Common Pipistrelle				
Maternity	29.08.19	SE	1	1A	23:52:00	Common Pipistrelle				
Maternity	29.08.19	SE	1	1A	23:52:00	Long-eared bat			3	1
Maternity	29.08.19	SE	1	1A	23:53:00	Common Pipistrelle				1
Maternity	02.08.19	W	1	2B	03:47:26	Unknown		1		
Maternity	02.08.19	W	1	2B	04:40:30	Unknown	1			

Maternity	02.08.19	W	1	2B	04:40:30	Unknown	1			
Maternity	02.08.19	W	1	2B	04:40:57	Unknown		2	1	
Maternity	02.08.19	W	1	2B	04:44:20	Unknown	1			
Maternity	02.08.19	W	1	2B	04:46:24	Unknown	1			
Maternity	02.08.19	W	1	2B	04:46:14	Unknown	1	1		
Maternity	02.08.19	W	1	2B	04:46:44	Unknown	1			
Maternity	02.08.19	W	1	2B	04:47:31	Unknown	1			
Maternity	02.08.19	W	1	2B	04:49:51	Unknown		1		
Maternity	02.08.19	W	1	2B	05:00:00	Unknown				
Maternity	02.08.19	W	1	2B	05:02:35	Unknown		2		
Maternity	02.08.19	W	1	2B	05:10:00	Unknown	1	1		
Maternity	05.08.19	SW	1	2B	20:50:00	Unknown	2	2	2	4
Maternity	05.08.19	SW	1	2B	20:55:00	Unknown	2	2	2	4
Maternity	05.08.19	SW	1	2B	21:08:00	Unknown	2	2	2	4
Maternity	05.08.19	SW	1	2B	22:43:00	Unknown				
Maternity	05.08.19	SW	1	2B	21:43:00	Unknown	1	1	1	
Maternity	05.08.19	SW	1	2B	21:54:00	Unknown	1	1	1	1
Maternity	05.08.19	SW	1	2B	21:55:00	Unknown	1	1	1	1
Maternity	05.08.19	SW	1	2B	22:53:00	Unknown	10	7	7	3
Maternity	05.08.19	SW	1	2B	23:19:23	Unknown	1	1		
Maternity	29.08.19	SW	1	1B	20:15:00	Noctule		2		
Maternity	29.08.19	SW	1	1B	20:24:00	Common pipistrelle				
Maternity	29.08.19	SW	1	1B	20:26:00	Noctule				
Maternity	29.08.19	SW	1	1B	20:32:00	Myotis spp.			1	
Maternity	29.08.19	SW	1	1B	20:39:00	Common pipistrelle				
Maternity	29.08.19	SW	1	1B	20:40:00	Common pipistrelle		2		
Maternity	29.08.19	SW	1	1B	20:52:00	Common pipistrelle		2		
Maternity	29.08.19	SW	1	1B	21:02:00	Common pipistrelle		2		
Maternity	29.08.19	SW	1	1B	21:05:00	Common pipistrelle		2		
Maternity	29.08.19	SW	1	1B	21:08:00	Common pipistrelle		3		
Maternity	29.08.19	SW	1	1B	21:14:00	Common pipistrelle	2			
Maternity	29.08.19	SW	1	1B	21:34:00	Common pipistrelle		2		
Maternity	29.08.19	SW	1	1B	21:47:00	Unknown		2		
Maternity	29.08.19	SW	1	1B	21:57:00	Common pipistrelle	7			
Maternity	29.08.19	SW	1	1B	22:15:00	Unknown		3		
Maternity	29.08.19	SW	1	1B	22:21:00	Unknown		3		
Maternity	29.08.19	SW	1	1B	22:25:00	Unknown		4		
Maternity	29.08.19	SW	1	1B	22:25:00	Unknown		4		
Maternity	29.08.19	SW	1	1B	22:26:00	Unknown		4		
Maternity	29.08.19	SW	1	1B	22:27:00	Unknown		4		

Maternity	29.08.19	SW	1	1B	22:29:00	Myotis spp.		12		
Maternity	29.08.19	SW	1	1B	22:31:00	Common pipistrelle		2		
Maternity	29.08.19	SW	1	1B	22:33:00	Unknown		3		
Maternity	29.08.19	SW	1	1B	22:36:00	Unknown		2		
Maternity	29.08.19	SW	1	1B	22:38:00	Unknown		2		
Maternity	29.08.19	SW	1	1B	22:43:00	Myotis spp.	2	2		
Maternity	29.08.19	SW	1	1B	22:44:00	Common pipistrelle		4		
Maternity	29.08.19	SW	1	1B	22:46:00	Common pipistrelle		5		
Maternity	29.08.19	SW	1	1B	22:54:00	Unknown		4		
Maternity	29.08.19	SW	1	1B	22:59:00	Myotis spp.		4		
Maternity	29.08.19	SW	1	1B	23:01:00	Myotis spp.	5			
Maternity	29.08.19	SW	1	1B	23:01:00	Myotis spp.		3		
Maternity	29.08.19	SW	1	1B	23:02:00	Myotis spp.		3		
Maternity	29.08.19	SW	1	1B	23:03:00	Myotis spp.	1	4		
Maternity	29.08.19	SW	1	1B	23:07:00	Common pipistrelle		2		
Maternity	29.08.19	SW	1	1B	23:08:00	Common pipistrelle		2		
Maternity	29.08.19	SW	1	1B	23:23:00	Myotis spp.	5	15		
Maternity	29.08.19	SW	1	1B	23:25:00	Myotis spp.		4		
Maternity	29.08.19	SW	1	1B	23:32:00	Myotis spp.		4		
Maternity	29.08.19	SW	1	1B	23:36:00	Unknown		5		
Maternity	29.08.19	SW	1	1B	23:37:00	Unknown		7		
Maternity	29.08.19	SW	1	1B	23:38:00	Unknown	2	5		
Maternity	29.08.19	SW	1	1B	23:40:00	Myotis spp.	2	5		
Maternity	29.08.19	SW	1	1B	23:40:00	Myotis spp.	1	1		
Maternity	29.08.19	SW	1	1B	23:50:00	Long-eared bat	2	4		
Maternity	29.08.19	SW	1	1B	23:51:00	Long-eared bat		4		
Maternity	29.08.19	SW	1	1B	23:58:00	Long-eared bat		3		
Maternity	01.07.19	W	1	2	22:39:22	Unknown	2	2		
Maternity	01.07.19	W	1	2	22:39:32	Unknown	2	2		
Maternity	01.07.19	W	1	2	23:25:06	Unknown	2	2		
Maternity	01.07.19	W	1	2	23:37:27	Unknown	2	2		
Maternity	17.07.19	E	1	1B	21:11:03	Unknown		1	1	
Maternity	17.07.19	E	1	1B	21:14:05	Unknown		1		
Maternity	17.07.19	E	1	1B	21:17:03	Unknown		1	2	
Maternity	17.07.19	E	1	1B	21:17:51	Unknown	1	1	1	
Maternity	17.07.19	E	1	1B	21:21:57	Unknown	1	1	1	1
Maternity	17.07.19	E	1	1B	21:22:04	Unknown		1	1	1
Maternity	17.07.19	E	1	1B	21:22:25	Unknown		1	1	2
Maternity	17.07.19	E	1	1B	21:22:42	Unknown	1			
Maternity	17.07.19	E	1	1B	21:24:37	Unknown	1	1		

Maternity	17.07.19	E	1	1B	21:26:05	Unknown	1	1	1	2
Maternity	17.07.19	E	1	1B	21:28:36	Unknown		1		
Maternity	17.07.19	E	1	1B	21:29:47	Unknown	1	1	1	2
Maternity	17.07.19	E	1	1B	21:30:17	Unknown		1	1	1
Maternity	17.07.19	E	1	1B	21:34:21	Unknown			1	1
Maternity	17.07.19	E	1	1B	21:36:37	Unknown	1	1	1	1
Maternity	17.07.19	E	1	1B	21:37:20	Unknown	1	1	1	1
Maternity	17.07.19	E	1	1B	21:44:07	Unknown	1	1	1	1
Maternity	17.07.19	E	1	1B	21:44:27	Unknown	1	1	1	1
Maternity	17.07.19	E	1	1B	21:46:57	Unknown	2	1		
Maternity	17.07.19	E	1	1B	21:47:55	Unknown		1	1	
Maternity	17.07.19	E	1	1B	21:48:44	Unknown		1	1	1
Maternity	17.07.19	E	1	1B	21:49:15	Unknown	1	1	1	1
Maternity	17.07.19	E	1	1B	21:52:27	Unknown			1	1
Maternity	17.07.19	E	1	1B	21:52:56	Unknown	1	1	1	1
Maternity	17.07.19	E	2	1B	21:53:04	Unknown	1	1	1	1
Maternity	17.07.19	E	1	1B	21:53:42	Unknown			1	
Maternity	17.07.19	E	1	1B	21:53:50	Unknown	1	1	1	1
Maternity	17.07.19	E	1	1B	21:54:42	Unknown	1	1	1	
Maternity	17.07.19	E	1	1B	21:56:00	Common Pipistrelle	1	1	1	1
Maternity	17.07.19	E	1	1B	21:57:01	Unknown	1	1	1	1
Maternity	17.07.19	E	1	1B	21:58:22	Unknown		3		
Maternity	17.07.19	E	1	1B	22:03:47	Unknown	1	1	1	1
Maternity	17.07.19	E	1	1B	22:04:45	Unknown		1	1	1
Maternity	17.07.19	E	1	1B	22:05:04	Common Pipistrelle	1	1	1	1
Maternity	17.07.19	E	1	1B	22:05:35	Common Pipistrelle		2	1	1
Maternity	17.07.19	E	1	1B	22:07:42	Unknown	1	1	1	1
Maternity	17.07.19	E	1	1B	22:08:00	Common Pipistrelle		1		
Maternity	17.07.19	E	1	1B	22:08:54	Common Pipistrelle			1	
Maternity	17.07.19	E	1	1B	22:09:39	Unknown	1	1	1	1
Maternity	17.07.19	E	1	1B	22:10:46	Unknown	2	5		
Maternity	17.07.19	E	1	1B	22:11:03	Unknown	3			
Maternity	17.07.19	E	1	1B	22:12:50	Unknown		1	1	
Maternity	17.07.19	E	1	1B	22:13:02	Unknown	1	1	1	1
Maternity	17.07.19	E	1	1B	22:13:19	Unknown			1	1
Maternity	17.07.19	E	1	1B	22:13:25	Unknown	1	1	1	
Maternity	17.07.19	E	1	1B	22:13:38	Unknown	1	1		
Maternity	17.07.19	E	1	1B	22:14:00	Unknown			1	1
Maternity	17.07.19	E	1	1B	22:14:10	Unknown	1	1	1	1
Maternity	17.07.19	E	1	1B	22:14:13	Unknown	2	3		

Maternity	17.07.19	E	1	1B	22:14:41	Unknown			1	1
Maternity	17.07.19	E	1	1B	22:16:05	Unknown	4			
Maternity	17.07.19	E	1	1B	22:16:00	Common Pipistrelle	5	6		
Maternity	17.07.19	E	1	1B	22:16:43	Unknown	3			
Maternity	17.07.19	E	1	1B	22:17:31	Unknown	1			
Maternity	17.07.19	E	1	1B	22:17:59	Unknown	1	1		
Maternity	17.07.19	E	1	1B	22:18:00	Common Pipistrelle		30	30	
Maternity	17.07.19	E	1	1B	22:18:13	Unknown	1	1		
Maternity	17.07.19	E	1	1B	22:18:17	Unknown	1	1		
Maternity	17.07.19	E	1	1B	22:18:42	Unknown		1	1	
Maternity	17.07.19	E	1	1B	22:18:55	Common Pipistrelle	1	1		
Maternity	17.07.19	E	1	1B	22:19:08	Unknown	1	1		
Maternity	17.07.19	E	1	1B	22:19:00	Common Pipistrelle	1	1	1	1
Maternity	17.07.19	E	1	1B	22:19:29	Unknown	1	1		
Maternity	17.07.19	E	1	1B	22:19:49	Unknown	1	1		
Maternity	17.07.19	E	1	1B	22:20:00	Unknown				
Maternity	17.07.19	E	1	1B	22:20:28	Unknown	1	1	1	
Maternity	17.07.19	E	1	1B	22:21:54	Common Pipistrelle	1	1	1	
Maternity	17.07.19	E	1	1B	22:22:14	Common Pipistrelle	1	1	1	
Maternity	17.07.19	E	1	1B	22:23:03	Unknown	1	1	1	1
Maternity	17.07.19	E	1	1B	22:23:22	Unknown	1	1	1	1
Maternity	17.07.19	E	1	1B	22:24:42	Unknown	1	1		
Maternity	17.07.19	E	1	1B	22:26:48	Unknown	1	1	1	1
Maternity	17.07.19	E	1	1B	22:26:54	Unknown	2	1	1	
Maternity	17.07.19	E	1	1B	22:27:03	Common Pipistrelle	1	1	1	1
Maternity	17.07.19	E	1	1B	22:27:33	Common Pipistrelle	2	2	1	1
Maternity	17.07.19	E	1	1B	22:30:10	Common Pipistrelle	1	1	1	1
Maternity	17.07.19	E	1	1B	22:30:59	Common Pipistrelle	2	1		
Maternity	17.07.19	E	1	1B	22:31:28	Common Pipistrelle	3	1	1	
Maternity	17.07.19	E	1	1B	22:31:51	Common Pipistrelle			2	
Maternity	17.07.19	E	1	1B	22:33:00	Common Pipistrelle		1	1	1
Maternity	17.07.19	E	1	1B	22:34:50	Unknown		2		
Maternity	17.07.19	E	1	1B	22:35:41	Unknown			1	1
Maternity	17.07.19	E	1	1B	22:35:58	Unknown	1	1	1	1
Maternity	17.07.19	E	1	1B	22:36:22	Unknown			1	1
Maternity	17.07.19	E	1	1B	22:36:50	Unknown	1	1	1	1
Maternity	17.07.19	E	1	1B	22:37:25	Unknown	1	1	1	
Maternity	17.07.19	E	1	1B	22:37:32	Unknown	1	1	1	
Maternity	17.07.19	E	1	1B	22:37:50	Unknown		1	1	1
Maternity	17.07.19	E	1	1B	22:38:08	Unknown			1	1

Maternity	17.07.19	E	1	1B	22:38:21	Unknown		1	1	1
Maternity	17.07.19	E	1	1B	22:38:51	Unknown		1	1	1
Maternity	17.07.19	E	1	1B	22:39:42	Unknown		1	1	
Maternity	17.07.19	E	1	1B	22:39:54	Unknown		2	2	1
Maternity	17.07.19	E	1	1B	22:40:22	Unknown		1	1	1
Maternity	17.07.19	E	1	1B	22:41:25	Unknown				1
Maternity	17.07.19	E	1	1B	22:41:33	Unknown	1	1	1	1
Maternity	17.07.19	E	1	1B	22:42:51	Unknown		2	1	1
Maternity	17.07.19	E	1	1B	22:43:20	Unknown	1	2		
Maternity	17.07.19	E	1	1B	22:45:30	Unknown	1	5	3	1
Maternity	17.07.19	E	1	1B	22:45:58	Unknown			1	1
Maternity	17.07.19	E	1	1B	22:46:13	Common Pipistrelle		3		
Maternity	17.07.19	E	1	1B	22:46:44	Common Pipistrelle		1	1	
Maternity	17.07.19	E	1	1B	22:46:54	Common Pipistrelle		1	1	1
Maternity	17.07.19	E	1	1B	22:47:35	Common Pipistrelle		4	1	
Maternity	17.07.19	E	1	1B	22:47:45	Common Pipistrelle		4	1	1
Maternity	17.07.19	E	1	1B	22:48:43	Common Pipistrelle	1	1	1	1
Maternity	17.07.19	E	1	1B	22:49:00	Common Pipistrelle		1	1	1
Maternity	17.07.19	E	1	1B	22:50:20	Common Pipistrelle	2	2	1	
Maternity	17.07.19	E	1	1B	22:53:50	Unknown			1	2
Maternity	17.07.19	E	1	1B	22:54:30	Unknown			1	2
Maternity	17.07.19	E	1	1B	22:54:41	Unknown	1	2	1	1
Maternity	17.07.19	E	1	1B	22:56:17	Unknown	1	1	1	1
Maternity	17.07.19	E	1	1B	22:57:29	Common Pipistrelle			2	1
Maternity	17.07.19	E	1	1B	22:57:44	Common Pipistrelle	1	1	1	1
Maternity	17.07.19	E	1	1B	22:59:27	Unknown				1
Maternity	17.07.19	E	1	1B	23:01:13	Unknown	1	2		
Maternity	17.07.19	E	1	1B	23:01:34	Unknown		1	1	1
Maternity	17.07.19	E	1	1B	23:01:58	Unknown				1
Maternity	17.07.19	E	1	1B	23:04:54	Common Pipistrelle		2	1	1
Maternity	17.07.19	E	1	1B	23:05:02	Unknown		2	1	1
Maternity	17.07.19	E	1	1B	23:08:00	Unknown		1	1	1
Maternity	17.07.19	E	1	1B	23:08:29	Unknown		1	1	1
Maternity	17.07.19	E	1	1B	23:09:40	Unknown	1	1	1	1
Maternity	17.07.19	E	1	1B	23:14:05	Common Pipistrelle		1	1	1
Maternity	17.07.19	E	1	1B	23:16:10	Unknown		1	1	1
Maternity	17.07.19	E	1	1B	23:19:46	Unknown	1	1	1	
Maternity	17.07.19	E	1	1B	23:20:38	Common Pipistrelle		1	1	
Maternity	17.07.19	E	1	1B	23:23:00	Common Pipistrelle		1	1	1
Maternity	17.07.19	E	1	1B	23:25:33	Common Pipistrelle			1	1

Maternity	17.07.19	E	1	1B	23:26:49	Unknown			1	
Maternity	17.07.19	E	1	1B	23:31:27	Unknown		1	1	
Maternity	17.07.19	E	1	1B	23:32:34	Unknown			1	1
Maternity	17.07.19	E	1	1B	23:32:50	Unknown		1	1	1
Maternity	17.07.19	E	1	1B	23:33:28	Unknown	1	1	1	1
Maternity	17.07.19	E	1	1B	23:35:00	Myotis spp.			1	
Maternity	17.07.19	E	1	1B	23:35:43	Unknown			1	1
Maternity	17.07.19	E	1	1B	23:37:05	Unknown		1	1	1
Maternity	17.07.19	E	1	1B	23:37:51	Unknown		1	1	
Maternity	17.07.19	E	1	1B	23:38:36	Unknown	1	1	1	1
Maternity	17.07.19	E	1	1B	23:42:52	Unknown		1	1	
Maternity	17.07.19	E	1	1B	23:44:05	Unknown	1	1	1	1
Maternity	17.07.19	E	1	1B	23:44:06	Unknown		1	1	1
Maternity	17.07.19	E	1	1B	23:44:12	Unknown	1	1	1	1
Maternity	17.07.19	E	1	1B	23:45:19	Unknown			1	1
Maternity	17.07.19	E	1	1B	23:49:28	Unknown		1	1	
Maternity	17.07.19	E	1	1B	23:50:13	Unknown		1	1	1
Maternity	17.07.19	E	1	1B	23:50:59	Unknown		1	1	1
Maternity	17.07.19	E	1	1B	23:56:28	Unknown		1	1	1
Maternity	17.07.19	E	1	1B	23:57:27	Unknown		1	1	1
Maternity	17.07.19	E	1	1B	23:57:48	Unknown	1	1		
Maternity	17.07.19	E	1	1B	23:58:54	Unknown			1	1
Maternity	17.07.19	E	1	1A	21:23:00	Unknown		2		
Maternity	17.07.19	E	1	1A	21:28:00	Unknown	1	5		
Maternity	17.07.19	E	1	1A	21:29:00	Unknown		2		
Maternity	17.07.19	E	1	1A	21:36:00	Unknown		2	5	5
Maternity	17.07.19	E	1	1A	21:37:00	Unknown	2	2	4	5
Maternity	17.07.19	E	1	1A	21:42:00	Common Pipistrelle		2	1	
Maternity	17.07.19	E	1	1A	22:03:00	Common Pipistrelle		1	1	1
Maternity	17.07.19	E	1	1A	22:09:00	Common Pipistrelle			2	2
Maternity	17.07.19	E	1	1A	21:52:00	Common Pipistrelle			3	
Maternity	17.07.19	E	1	1A	21:56:00	Common Pipistrelle			1	1
Maternity	17.07.19	E	1	1A	22:00:00	Nathusius Pipistrelle			2	
Maternity	17.07.19	E	1	1A	22:01:00	Common Pipistrelle		1	1	3
Maternity	17.07.19	E	1	1A	22:01:00	Common Pipistrelle			1	1
Maternity	17.07.19	E	1	1A	22:02:00	Common Pipistrelle		1	2	
Maternity	17.07.19	E	1	1A	22:02:00	Unknown			1	1
Maternity	17.07.19	E	1	1A	22:05:00	Common Pipistrelle		1	1	1
Maternity	17.07.19	E	1	1A	22:06:00	Unknown	2	2		
Maternity	17.07.19	E	1	1A	22:07:00	Nathusius Pipistrelle			3	3

Maternity	17.07.19	E	1	1A	22:08:00	Common Pipistrelle			2	2
Maternity	17.07.19	E	1	1A	22:09:00	Unknown		1	1	
Maternity	17.07.19	E	1	1A	22:10:00	Nathusius Pipistrelle		2	2	
Maternity	17.07.19	E	1	1A	22:16:00	Common Pipistrelle			4	
Maternity	17.07.19	E	1	1A	22:23:00	Common Pipistrelle			4	4
Maternity	17.07.19	E	1	1A	22:23:00	Common Pipistrelle			1	
Maternity	17.07.19	E	1	1A	22:27:00	Common Pipistrelle	1	3	2	
Maternity	17.07.19	E	1	1A	22:34:00	Common Pipistrelle	1	1	1	
Maternity	17.07.19	E	1	1A	22:35:00	Common Pipistrelle	10	5	4	
Maternity	17.07.19	E	1	1A	22:35:00	Common Pipistrelle		3	3	
Maternity	17.07.19	E	1	1A	22:35:00	Common Pipistrelle	2	2	2	
Maternity	17.07.19	E	1	1A	22:36:00	Unknown	1	2	2	1
Maternity	17.07.19	E	1	1A	22:40:00	Common Pipistrelle		4	3	
Maternity	17.07.19	E	1	1A	22:52:00	Common Pipistrelle			1	1
Maternity	17.07.19	E	1	1A	22:54:00	Common Pipistrelle		1	1	1
Maternity	17.07.19	E	1	1A	22:55:00	Common Pipistrelle			2	1
Maternity	17.07.19	E	1	1A	22:55:00	Common Pipistrelle	1	1	3	1
Maternity	17.07.19	E	1	1A	22:58:00	Common Pipistrelle	4	4	3	1
Maternity	17.07.19	E	1	1A	22:59:00	Common Pipistrelle			2	2
Maternity	17.07.19	E	1	1A	22:59:00	Soprano Pipistrelle	1	2	2	
Maternity	17.07.19	E	1	1A	23:00:00	Unknown		3	2	
Maternity	17.07.19	E	1	1A	23:02:00	Unknown		2	2	
Maternity	17.07.19	E	1	1A	23:02:00	Unknown		2	1	
Maternity	17.07.19	E	1	1A	23:06:00	Common Pipistrelle		4	3	
Maternity	17.07.19	E	1	1A	23:07:00	Common Pipistrelle		4	3	
Maternity	17.07.19	E	1	1A	23:09:00	Unknown		2		
Maternity	17.07.19	E	1	1A	23:15:00	Unknown			2	2
Maternity	17.07.19	E	1	1A	23:16:00	Common Pipistrelle			3	
Maternity	17.07.19	E	1	1A	23:27:00	Common Pipistrelle			4	2
Maternity	17.07.19	E	1	1A	23:28:00	Common Pipistrelle		1	2	1
Maternity	17.07.19	E	1	1A	23:55:00	Common Pipistrelle		1	1	1
Maternity	24.07.19	SW	1	1A	03:45:00	Unknown			1	
Maternity	24.07.19	SW	1	1A	03:55:30	Unknown			2	
Maternity	24.07.19	SW	1	1A	04:15:00	Common Pipistrelle			1	
Maternity	24.07.19	SW	1	1A	04:16:00	Common Pipistrelle			4	
Maternity	24.07.19	SW	1	1A	04:21:00	Unknown			1	
Maternity	24.07.19	SW	1	1A	04:22:00	Unknown	1			
Maternity	24.07.19	SW	1	1A	05:10:00	Unknown			1	
Maternity	24.07.19	SE	1	1B	03:25:24	Unknown				2
Maternity	24.07.19	SE	1	1B	03:32:07	Unknown				2

Maternity	24.07.19	SE	1	1B	03:33:22	Unknown				3
Maternity	24.07.19	SE	1	1B	03:36:00	Unknown				3
Maternity	24.07.19	SE	1	1B	03:37:23	Unknown				1
Maternity	24.07.19	SE	1	1B	03:53:33	Unknown			1	1
Maternity	24.07.19	SE	1	1B	04:00:46	Common Pipistrelle				1
Maternity	24.07.19	SE	1	1B	04:05:56	Common Pipistrelle			1	1
Maternity	24.07.19	SE	1	1B	04:21:50	Unknown			2	2
Maternity	24.07.19	SE	1	1B	04:24:18	Unknown			1	
Maternity	24.07.19	SE	1	1B	04:38:40	Unknown				2
Maternity	24.07.19	SE	1	1B	04:39:43	Unknown				1
Maternity	24.07.19	SE	1	1B	04:40:42	Unknown				1
Maternity	24.07.19	SE	1	1B	04:41:01	Unknown				2
Maternity	24.07.19	SE	1	1B	04:42:06	Unknown				2
Maternity	24.07.19	SE	1	1B	04:54:46	Unknown			1	1
Maternity	24.07.19	SE	1	1B	04:57:39	Unknown				3
Maternity	24.07.19	SE	1	1B	05:00:03	Unknown				3
Maternity	24.07.19	SE	1	1B	05:00:35	Unknown			1	
Maternity	24.07.19	SE	1	1B	05:01:07	Unknown			1	
Maternity	24.07.19	SE	1	1B	05:01:13	Unknown			1	1
Maternity	24.07.19	SE	1	1B	05:01:20	Unknown			1	2
Maternity	09.07.19	SW	1	2B	03:50:00	Unknown	1	2	2	
Maternity	09.07.19	SW	1	2B	03:10:00	Unknown	2	3	3	
Maternity	09.07.19	SW	1	2B	03:12:00	Unknown	3	3	3	
Maternity	09.07.19	SW	1	2B	03:22:00	Unknown	2	4	4	
Maternity	09.07.19	SW	1	2B	03:40:00	Unknown	2	4	4	
Maternity	09.07.19	SW	1	2B	03:51:00	Unknown	2	4	4	
Maternity	09.07.19	SW	1	2B	04:24:00	Unknown	1	6		
Maternity	23.08.19	SW	2	1a	05:27:42	Unknown	1	1	1	1
Maternity	29.08.19	SE	2	1A	20:23-28	Unknown				
Maternity	29.08.19	SE	2	1A	22:26:00	Common Pipistrelle				
Maternity	17.07.19	E	2	1B	21:53:04	Unknown	1	1	1	1
Autumn dispersal	02.09.19	E	1	1B	20:33:00	Common Pipistrelle			1	
Autumn dispersal	02.09.19	E	1	1B	20:59:00	Common Pipistrelle			1	
Autumn dispersal	02.09.19	E	1	1B	21:01:00	Unknown	1			
Autumn dispersal	02.09.19	E	1	1B	21:02:00	Unknown		1		
Autumn dispersal	02.09.19	E	1	1B	21:13:00	Common Pipistrelle			1	
Autumn dispersal	02.09.19	E	1	1B	21:17:00	Unknown		1		
Autumn dispersal	02.09.19	E	1	1B	21:25:00	Common Pipistrelle	1			

Autumn dispersal	02.09.19	E	1	1B	21:25:00	Myotis spp.	1			
Autumn dispersal	02.09.19	E	1	1B	21:28:00	Common Pipistrelle		1		
Autumn dispersal	02.09.19	E	1	1B	21:32:00	Common Pipistrelle		1		
Autumn dispersal	02.09.19	E	1	1B	21:35:00	Common Pipistrelle		1		
Autumn dispersal	02.09.19	E	1	1B	21:44:00	Myotis spp.			1	
Autumn dispersal	02.09.19	E	1	1B	21:48:00	Common Pipistrelle		1		
Autumn dispersal	02.09.19	E	1	1B	21:55:00	Unknown		1		
Autumn dispersal	02.09.19	E	1	1B	21:58:00	Unknown		1		
Autumn dispersal	02.09.19	E	1	1B	22:54:00	Unknown		1		
Autumn dispersal	02.09.19	E	1	1B	22:55:00	Common Pipistrelle		1		
Autumn dispersal	02.09.19	E	1	1B	22:57:00	Common Pipistrelle		1		
Autumn dispersal	02.09.19	E	1	1B	23:12:00	Unknown		1		
Autumn dispersal	02.09.19	E	1	1B	23:26:00	Common Pipistrelle		1		
Autumn dispersal	02.09.19	E	1	1B	23:35:00	Unknown	1			
Autumn dispersal	02.09.19	E	1	1B	23:47:00	Unknown		1		
Autumn dispersal	02.09.19	E	1	1B	20:33:00	Common Pipistrelle			1	1
Autumn dispersal	02.09.19	E	1	1B	20:33:23	Common Pipistrelle	1	1	1	1
Autumn dispersal	02.09.19	E	1	1B	20:42:41	Common Pipistrelle	1	1	1	
Autumn dispersal	02.09.19	E	1	1B	20:47:12	Common Pipistrelle		1	1	1
Autumn dispersal	02.09.19	E	1	1B	20:50:53	Common Pipistrelle			1	1
Autumn dispersal	02.09.19	E	1	1B	20:57:04	Common Pipistrelle			1	1
Autumn dispersal	02.09.19	E	1	1B	21:00:45	Common Pipistrelle	1	1	1	1
Autumn dispersal	02.09.19	E	1	1B	21:01:05	Long-eared bat	1	1	1	1
Autumn dispersal	02.09.19	E	1	1B	21:01:24	Myotis spp.	1	1	1	1
Autumn dispersal	02.09.19	E	1	1B	21:01:49	Long-eared bat		1	1	1
Autumn dispersal	02.09.19	E	1	1B	21:02:35	Long-eared bat		1	1	1
Autumn dispersal	02.09.19	E	1	1B	21:07:50	Unknown		1	1	1
Autumn dispersal	02.09.19	E	1	1B	21:09:16	Common Pipistrelle		1	1	1
Autumn dispersal	02.09.19	E	1	1B	21:12:11	Common Pipistrelle			1	1
Autumn dispersal	02.09.19	E	1	1B	21:24:43	Common Pipistrelle			1	1

Autumn dispersal	02.09.19	E	1	1B	21:35:18	Common Pipistrelle	1	1	1	1
Autumn dispersal	02.09.19	E	1	1B	21:37:19	Myotis spp.		1	1	1
Autumn dispersal	02.09.19	E	1	1B	21:39:48	Common Pipistrelle		1	1	1
Autumn dispersal	02.09.19	E	1	1B	21:43:24	Common Pipistrelle			1	
Autumn dispersal	02.09.19	E	1	1B	21:47:29	Common Pipistrelle	1	1	1	
Autumn dispersal	02.09.19	E	1	1B	21:52:36	Common Pipistrelle		1	1	1
Autumn dispersal	02.09.19	E	1	1B	21:54:22	Common Pipistrelle	1	1		
Autumn dispersal	02.09.19	E	1	1B	22:11:13	Common Pipistrelle			1	1
Autumn dispersal	02.09.19	E	1	1B	22:12:40	Common Pipistrelle	1	1	1	1
Autumn dispersal	02.09.19	E	1	1B	22:14:20	Common Pipistrelle	1	1	1	1
Autumn dispersal	02.09.19	E	1	1B	22:53:39	Unknown	1	1	1	1
Autumn dispersal	02.09.19	E	1	1B	22:54:00	Myotis spp.	1	1	1	1
Autumn dispersal	02.09.19	E	1	1B	22:55:01	Common Pipistrelle			1	1
Autumn dispersal	02.09.19	E	1	1B	21:55:51	Common Pipistrelle			1	1
Autumn dispersal	02.09.19	E	1	1B	22:56:40	Common Pipistrelle			1	1
Autumn dispersal	02.09.19	E	1	1B	22:58:02	Common Pipistrelle			1	1
Autumn dispersal	02.09.19	E	1	1B	22:59:59	Common Pipistrelle				1
Autumn dispersal	02.09.19	E	1	1B	23:25:39	Common Pipistrelle	1	1	1	1
Autumn dispersal	02.09.19	E	1	1B	23:44:39	Common Pipistrelle	1	1	1	1
Autumn dispersal	02.09.19	E	1	1A	20:24:00	Common Pipistrelle				
Autumn dispersal	02.09.19	E	1	1A	20:30:00	Common Pipistrelle				
Autumn dispersal	02.09.19	E	1	1A	20:32:00	Common Pipistrelle				
Autumn dispersal	02.09.19	E	1	1A	20:35:00	Common Pipistrelle				
Autumn dispersal	02.09.19	E	1	1A	20:37:00	Common Pipistrelle				
Autumn dispersal	02.09.19	E	1	1A	20:38:00	Common Pipistrelle				
Autumn dispersal	02.09.19	E	1	1A	20:42:00	Common Pipistrelle				
Autumn dispersal	02.09.19	E	1	1A	20:51:00	Common Pipistrelle				
Autumn dispersal	02.09.19	E	1	1A	20:53:00	Common Pipistrelle				
Autumn dispersal	02.09.19	E	1	1A	20:57:00	Common Pipistrelle				
Autumn dispersal	02.09.19	E	1	1A	21:03:00	Common Pipistrelle				

Autumn dispersal	02.09.19	E	1	1A	21:09:00	Common Pipistrelle	1			
Autumn dispersal	02.09.19	E	1	1A	21:20:00	Common Pipistrelle				
Autumn dispersal	02.09.19	E	1	1A	21:27:00	Common Pipistrelle				
Autumn dispersal	02.09.19	E	1	1A	21:33:00	Common Pipistrelle				
Autumn dispersal	02.09.19	E	1	1A	21:52:00	Long-eared bat				
Autumn dispersal	02.09.19	E	1	1A	21:54:00	Common Pipistrelle				
Autumn dispersal	02.09.19	E	1	1A	21:56:00	Common Pipistrelle				
Autumn dispersal	02.09.19	E	1	1A	22:03:00	Common Pipistrelle				
Autumn dispersal	02.09.19	E	1	1A	23:25:00	Common Pipistrelle	25			
Autumn dispersal	02.09.19	E	1	1A	20:23:34	Unknown			1	1
Autumn dispersal	02.09.19	E	1	1A	20:33:16	Common Pipistrelle	1	1	1	1
Autumn dispersal	02.09.19	E	1	1A	20:34:30	Common Pipistrelle			1	1
Autumn dispersal	02.09.19	E	1	1A	20:35:23	Common Pipistrelle		1	1	1
Autumn dispersal	02.09.19	E	1	1A	20:38:43	Common Pipistrelle		1	1	1
Autumn dispersal	02.09.19	E	1	1A	20:40:21	Unknown		1	1	1
Autumn dispersal	02.09.19	E	1	1A	20:41:39	Common Pipistrelle	1	1	1	1
Autumn dispersal	02.09.19	E	1	1A	20:43:21	Unknown	1	1	1	1
Autumn dispersal	02.09.19	E	1	1A	20:44:01	Unknown			1	1
Autumn dispersal	02.09.19	E	1	1A	20:48:50	Unknown	1	1	1	1
Autumn dispersal	02.09.19	E	1	1A	20:52:39	Unknown				1
Autumn dispersal	02.09.19	E	1	1A	20:57:11	Unknown	1	1	1	1
Autumn dispersal	02.09.19	E	1	1A	21:01:02	Common Pipistrelle		1	1	1
Autumn dispersal	02.09.19	E	1	1A	21:02:35	Myotis spp.		1	1	1
Autumn dispersal	02.09.19	E	1	1A	21:02:51	Myotis spp.		1	1	1
Autumn dispersal	02.09.19	E	1	1A	21:03:10	Long-eared bat	1	1	1	1
Autumn dispersal	02.09.19	E	1	1A	21:06:39	Unknown	1	1	1	1
Autumn dispersal	02.09.19	E	1	1A	21:08:33	Myotis spp.	1	1	1	
Autumn dispersal	02.09.19	E	1	1A	21:12:10	Myotis spp.			1	1
Autumn dispersal	02.09.19	E	1	1A	21:14:12	Unknown			1	1
Autumn dispersal	02.09.19	E	1	1A	21:19:26	Common Pipistrelle	1	1	1	1

Autumn dispersal	02.09.19	E	1	1A	21:19:44	Common Pipistrelle		1	1	1
Autumn dispersal	02.09.19	E	1	1A	21:19:47	Common Pipistrelle	1	1	1	1
Autumn dispersal	02.09.19	E	1	1A	21:20:20	Unknown	2	1		
Autumn dispersal	02.09.19	E	1	1A	21:25:49	Common Pipistrelle			1	1
Autumn dispersal	02.09.19	E	1	1A	21:26:23	Myotis spp.	2	2		
Autumn dispersal	02.09.19	E	1	1A	21:27:25	Unknown	2	2	1	
Autumn dispersal	02.09.19	E	1	1A	21:27:36	Unknown		1	1	1
Autumn dispersal	02.09.19	E	1	1A	21:32:24	Myotis spp.			2	2
Autumn dispersal	02.09.19	E	1	1A	21:34:45	Common Pipistrelle			1	1
Autumn dispersal	02.09.19	E	1	1A	21:36:31	Common Pipistrelle	1	1	1	1
Autumn dispersal	02.09.19	E	1	1A	21:38:11	Myotis spp.			1	1
Autumn dispersal	02.09.19	E	1	1A	21:39:50	Unknown	1	1	1	1
Autumn dispersal	02.09.19	E	1	1A	21:41:43	Unknown	1	1	1	1
Autumn dispersal	02.09.19	E	1	1A	21:56:03	Myotis spp.			1	1
Autumn dispersal	02.09.19	E	1	1A	21:57:05	Unknown	1	1	1	1
Autumn dispersal	02.09.19	E	1	1A	22:15:42	Unknown			1	1
Autumn dispersal	02.09.19	E	1	1A	22:18:12	Common Pipistrelle		1	1	1
Autumn dispersal	02.09.19	E	1	1A	22:49:54	Unknown	2	1	1	1
Autumn dispersal	02.09.19	E	1	1A	22:52:48	Common Pipistrelle				1
Autumn dispersal	02.09.19	E	1	1A	22:55:24	Common Pipistrelle				1
Autumn dispersal	02.09.19	E	1	1A	23:02:39	Common Pipistrelle			1	1
Autumn dispersal	02.09.19	E	1	1A	23:05:25	Common Pipistrelle			1	1
Autumn dispersal	02.09.19	E	1	1A	23:05:51	Common Pipistrelle	1	1	1	1
Autumn dispersal	02.09.19	E	1	1A	23:16:33	Unknown			1	1
Autumn dispersal	02.09.19	E	1	1A	23:19:25	Unknown	1	1	1	1
Autumn dispersal	02.09.19	E	1	1A	23:21:13	Common Pipistrelle		1	1	1
Autumn dispersal	02.09.19	E	1	1A	23:24:19	Common Pipistrelle		1	2	3
Autumn dispersal	02.09.19	E	1	1A	23:25:28	Unknown		1	1	1
Autumn dispersal	02.09.19	E	1	1A	23:28:42	Common Pipistrelle			1	1
Autumn dispersal	02.09.19	E	1	1A	23:31:40	Common Pipistrelle			1	1

Autumn dispersal	02.09.19	E	1	1A	23:35:58	Unknown	1	1	1	1
Autumn dispersal	02.09.19	E	1	1A	23:37:29	Unknown			1	1
Autumn dispersal	02.09.19	E	1	1A	23:41:51	Unknown				1
Autumn dispersal	02.09.19	E	1	1A	23:42:51	Unknown	1	1	1	1
Autumn dispersal	02.09.19	E	1	1A	23:44:10	Common Pipistrelle			1	1
Autumn dispersal	02.09.19	E	1	1A	23:48:34	Common Pipistrelle	1	1	1	1
Autumn dispersal	02.09.19	E	1	1A	23:50:54	Common Pipistrelle			1	1
Autumn dispersal	02.09.19	E	1	1A	23:53:13	Common Pipistrelle	1	1	1	1
Autumn dispersal	02.09.19	E	1	1A	23:57:10	Common Pipistrelle			1	1
Autumn dispersal	02.09.19	E	1	1A	23:57:33	Common Pipistrelle			1	1
Autumn dispersal	09.10.19	E	1	1B	05:46:00	Unknown			3	
Autumn dispersal	09.10.19	E	1	1B	06:09:00	Unknown	2	4	2	2
Autumn dispersal	09.10.19	SW	1	1B	06:37:00	Unknown				1
Autumn dispersal	09.10.19	SW	1	1B	07:04:00	Unknown				1
Autumn dispersal	09.10.19	SW	1	1B	05:57:00	Unknown	4	4	2	1
Autumn dispersal	09.10.19	SW	1	1B	06:04:00	Unknown			3	2
Autumn dispersal	09.10.19	SW	1	1B	06:05:00	Unknown	1	1	1	
Autumn dispersal	09.10.19	SW	1	1B	06:05:00	Unknown		2	2	1
Autumn dispersal	09.10.19	SW	1	1B	06:24:00	Unknown	7	5	2	
Autumn dispersal	09.10.19	SW	1	1B	07:04:00	Unknown	2	2	3	1
Autumn dispersal	25.09.19	W	1	2	18:31:52	Unknown	2	2		
Autumn dispersal	25.09.19	W	1	2	18:38:43	Unknown	3	2		
Autumn dispersal	25.09.19	W	1	2	19:23:19	Unknown	3	2		
Autumn dispersal	25.09.19	W	1	2	19:24:55	Unknown	3	2		
Autumn dispersal	25.09.19	W	1	2	19:39:31	Unknown	1	1		
Autumn dispersal	25.09.19	W	1	2	20:17:58	Unknown	2	2		

Annex 5B

R Code

S1: simFatal function

```
simFatal <- function(BMin=-1, Fatal=-1, SmpHrKm, ExpFac, aPriExp=1,
bPriExp=1,aPriCPr=1, bPriCPr=1){

# BMin:   observed number of bat minutes
# Fatal:  annual bat fatalities on an operational airport facility
# SmpHrKm: total time and area surveyed for bat minutes
# ExpFac:  expansion factor
# aPriExp: alpha parameter for the prior on lambda
# bPriExp: beta parameter for the prior on lambda
# aPriCPr: alpha parameter for the prior on C
# bPriCPr: beta parameter for the prior on C

# The default of a negative value for BMin or Fatal indicates that no data were collected for those model inputs

require(rv)

# Update the exposure prior
if(BMin>=0){
aPostExp <- aPriExp + BMin
bPostExp <- bPriExp + SmpHrKm
}else{
aPostExp <- aPriExp
bPostExp <- bPriExp}

Exp <- rvgamma(n=1, aPostExp, bPostExp)

# Update the collisions prior
if(Fatal>=0){
aPostCPr <- aPriCPr + Fatal
bPostCPr <- ((rvmean(Exp) * ExpFac) - Fatal) + bPriCPr
}else{
aPostCPr <- aPriCPr
```

```
                                                    bPostCPr <- bPriCPr}

                                                CPr <- rvbeta(n=1, aPostCPr, bPostCPr)

                                                    Fatalities       <- ExpFac * Exp * CPr
attr(Fatalities,"Exp") <- c(Mean=rvmean(Exp), SD=rvsd(Exp))
attr(Fatalities,"CPr") <- c(Mean=rvmean(CPr), SD=rvsd(CPr))

                                                    return(Fatalities)}
```