

AEWC Ltd

Animal Ecology & Wildlife Consultants

Static Bat Survey Report

East of Chichester Wildlife Corridor

**Drayton Lane
Chichester**

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21-090
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Summary

- AEWCLtd were commissioned by Sarah Hughes on behalf of Chichester District Council to undertake a static bat survey at two sites to the west of Drayton Lane, to help inform the impacts of reduction of the existing East of Chichester Wildlife Corridor.
- This report details the results of the survey, which was carried out between 12th October 2021 and 20th January 2022 by Annika Binet, a Natural England licensed bat ecologist.
- Surveys carried out near the site in 2015 identified the presence of foraging barbastelle bats within the site. Barbastelle bats are one of the UK's rarest mammals which is listed on Annex II of the EC Habitats and Species Directive (JNCC, 2007) and is a Species of Principal Importance in England under Section 41 of the Natural Environment and Rural Communities Act 2006 in addition to being listed as vulnerable on the IUCN global red list (IUCN, 2016).
- High levels of bat foraging activity were recorded, particularly at the Highways site where the detector was positioned within a better area of habitat and within acoustic range of bats foraging over the nearby water body. A minimum of 10 species were recorded during the surveys: Common, Soprano and Nathusius pipistrelle, Brown long-eared bat, Noctule, Serotine, Barbastelle and Myotis species including Natterer's, Daubenton's and small Myotis, additional species potentially present but unconfirmed due to the cryptic nature of their calls include Leisler's, Grey long-eared and more than one small Myotis species
- Reduction of the existing corridor will cause a loss of foraging area for woodland specialist bats in particular, within what is already a small pocket of relatively isolated habitat. Removal of trees could cause the direct loss of roost sites for rare or vulnerable species in addition to reduction in foraging opportunities through the direct loss of habitat and alteration to the micro-climate of the site, as well as potential destabilisation of the remaining woodland which could lead to further tree losses.
- Changes in use of the neighbouring land for housing could lead to higher disturbance through public access, increased numbers of cats causing increased predation, higher noise and lighting impacts through reduction of the buffer which currently provides a barrier to light and reduced commuting suitability and connectivity.
- Based on the survey results the existing woodland corridor is important for autumn and early winter foraging bats of a number of species, most importantly a number of rare species including barbastelle bats and what appears to be a notably high level of use by Nathusius' pipistrelle bats. However, no summer surveys have been carried out within the site to date and the full extent of the use cannot be determined through the current survey methodology alone.
- As rare and cryptic species are present the woodland and surrounding habitat should be retained and managed to ensure suitability is retained in the long term. It is required that if significant reduction of the corridor is proposed, further detailed bat survey, including trapping and radio tracking, is carried out in order to identify full impacts and inform a suitable mitigation strategy.
- The barbastelle bats which are present on site have been previously found to be linked with the maternity colony present at Goodwood, which is additionally known to be linked to the Singleton and Cocking SAC for which barbastelle is a qualifying feature. Any impacts upon

this woodland could therefore adversely impact the qualifying feature of the SAC and full survey and assessment is therefore required.

This report has been prepared by AEWCLtd, with all reasonable skill, care and diligence within the terms of the Contract with the client. We disclaim any responsibility to the client and others in respect of any matters outside the scope of the above. This report is confidential to the client and we accept no responsibility of whatsoever nature to third parties to whom this report, or any part thereof, is made known. Any such party relies on the report at their own risk.

The information and data which has been prepared and provided is true and has been prepared and provided in accordance with the Professional Guidance and 'Code of Professional Conduct' issued by the Chartered Institute of Ecology and Environmental Management (CIEEM). We confirm that the opinions expressed are our true and professional bona fide opinions.

1 Introduction

- 1.1 AEWCLtd were commissioned by Sarah Hughes on behalf of Chichester District Council to undertake a static bat survey at two sites to the west of Drayton Lane, to help inform the impacts of reduction of the existing East of Chichester Wildlife Corridor.
- 1.2 The bat surveys and report writing were carried out in accordance with Bat Surveys: Good Practice Guidelines (Bat Conservation Trust, 2016).
- 1.3 Surveys carried out near the site in 2015 identified the presence of foraging barbastelle bats within the vicinity of the site. Barbastelle bats are one of the UK's rarest mammals which is listed on Annex II of the EC Habitats and Species Directive (JNCC, 2007) and is a Species of Principal Importance in England under Section 41 of the Natural Environment and Rural Communities Act 2006 in addition to being listed as vulnerable on the IUCN global red list (IUCN, 2016).
- 1.4 Further surveys are therefore required to ascertain whether barbastelle bats are present at the site and therefore may represent a constraint to the proposals.
- 1.5 This report details the results of the static bat survey and outlines recommendations in relation to bats.

Aims and objectives

- 1.6 The objectives of the survey were to:
 - Identify whether barbastelle bats are present within the site;
 - Identify whether other rare or significant bat species are present within the site;
 - Establish a base line of activity levels during the autumn and early winter;
 - Inform recommendations for further survey requirements in order to establish potential impacts of the proposed reduction in the wildlife corridor.

Site Location

- 1.7 The East of Chichester Wildlife Corridor is located to the east of Chichester between the Chichester Bypass and Drayton Lane at central grid reference SU886048. The survey locations were positioned just to the west of Drayton Lane within two areas with access agreements in place. See Figure 1.

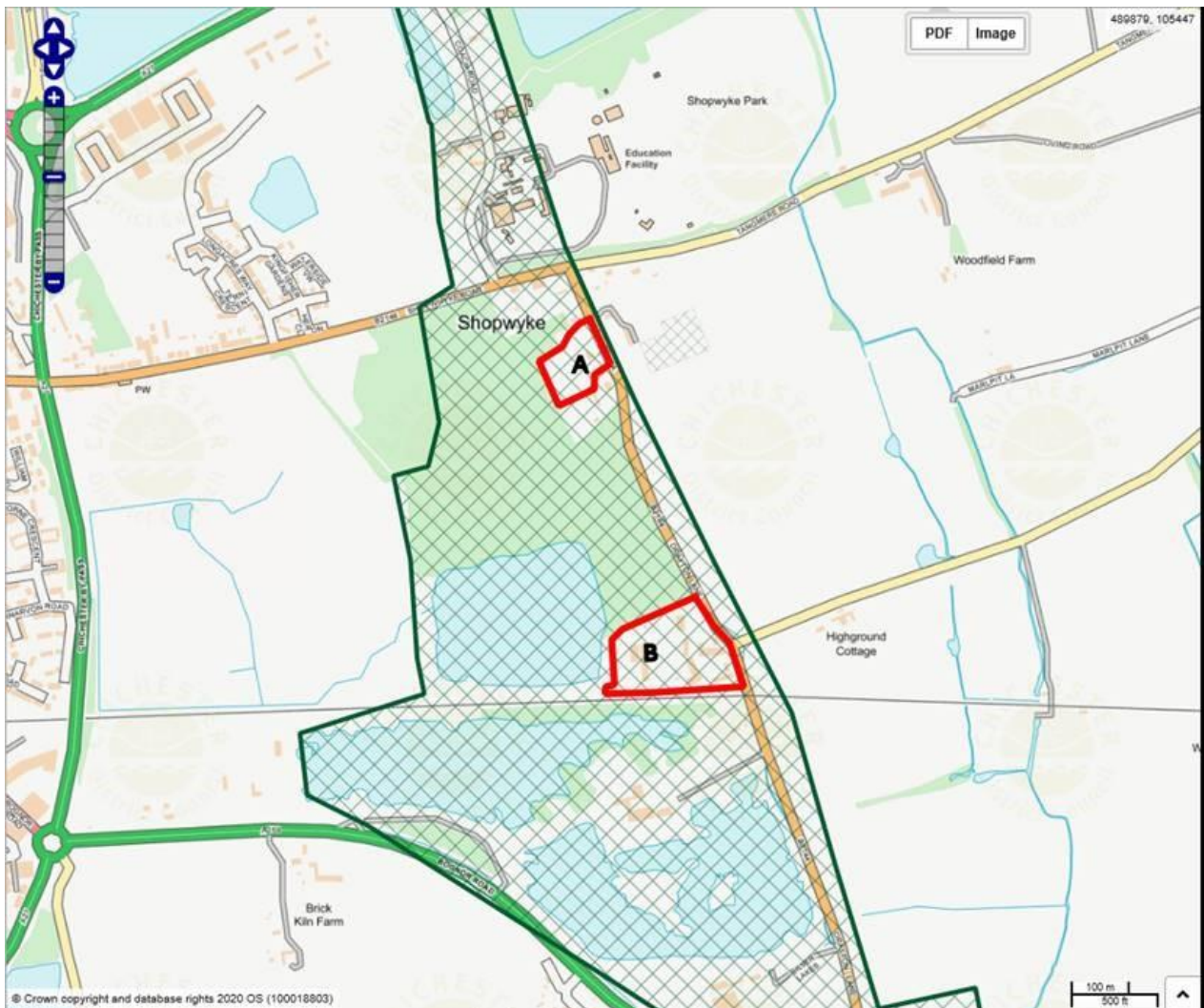


FIGURE 1: SHOWING THE LOCATION OF THE SURVEY SITES WITHIN THE CHICHESTER WILDLIFE CORRIDOR

- 1.8 Two static detectors were placed in tree lines on the edge of the woodlands to the west of Drayton Lane on the 12th October 2021, to record bat passes on a nightly basis to identify the bat species and activity levels present within acoustic range of the detector positions, with a focus on confirming the presence of barbastelle bats (*Barbastella barbastellus*) within the woodland corridor.
- 1.9 The northern detector was positioned in a coniferous tree line within a garden of a house on Drayton Lane immediately adjacent to a dense area of woodland. The southern detector was positioned on a tree on the edge of the Chichester City Council Highways Yard within the woodland boundary and in close proximity to the adjacent water body within an area of high suitability for foraging bats. See Figure 2.



FIGURE 2: SHOWING THE LOCATIONS OF THE STATIC BAT DETECTORS

Legislation

1.10 All species of bats are listed on *Schedule 5* of the *Wildlife and Countryside Act 1981 (as amended)* which affords them protection under *Section 9*, as amended. They are also protected under the *Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019*. In combination, this makes it an offence to:

- intentionally kill, injure or take (capture etc.);
- possess;
- intentionally or recklessly damage, destroy, obstruct access to any structure or place used by a scheduled animal for shelter or protection, or disturb any animal occupying such a structure or place; and
- sell, offer for sale, possess or transport for the purpose of sale (live or dead animal, part or derivative) or advertise for buying or selling such things.

1.11 A roost is defined as ‘any structure or place which a bat uses for shelter or protection’. As bats tend to reuse the same roosts, legal opinion is that a roost is protected whether or not bats are present.

1.12 Any disturbance of a bat occupying a roost can lead to prosecution. Disturbance can be caused by noise, vibration and artificial lighting. Penalties for breaking the law can include fines of £5,000 per bat, imprisonment and the seizure of equipment.

1.13 Furthermore, seven bat species (barbastelle, Bechstein's, noctule, soprano pipistrelle, brown long-eared, lesser horseshoe and greater horseshoe) are also Species of Principal Importance in England under *Section 41* of the *Natural Environment and Rural Communities Act 2006*.

2 Methods

Desk Study

- 2.1 A data record search was requested from the Sussex Biodiversity Record Centre for all bat records within 2km of the site. Records received were analysed and mapped using QGIS software.
- 2.2 The Multi Agency Geographic Information for the Countryside (MAGIC) website provided by the Department for Environment, Food and Rural Affairs (Defra) was consulted to obtain information about any granted European Protected Species licences within 2km of the site boundary.
- 2.3 Data from barbastelle radio tracking work carried out by AEWC Ltd in 2015 was reviewed.

Static Bat Detector Surveys

- 2.4 The static bat detector surveys were conducted between 12th October 2021 and 20th January 2022. This is a time of year outside of the primary bat activity season, but when bats are still active, particularly on mild nights, the autumn and early winter of 2021/2022 has been noted to be particularly mild with brief cold spells periodically.
- 2.5 Elekon Batlogger A+ Detectors with microphones on 2m cables were used for taking full spectrum recordings of any bats within acoustic range. The microphones were positioned extended out from the tree to which the detector was affixed in order to minimise echo as far as practicable. The detectors were set to record from 30 minutes before sunset until 30 minutes after sunrise with trigger parameters set to record all bat passes during this time.
- 2.6 Calls were manually analysed using Elekon Bat Explorer software which is designed to work with the Batlogger detectors.

3 Constraints/Limitations

- 3.1 As access into the woodlands was not available the detectors were placed in or just outside the woodland boundary within tree lines immediately adjacent to the edge of the woodland. The northern detector could not be positioned within the woodland due to a lack of access and was therefore positioned within the most suitable accessible location on a line of coniferous trees.

- 3.2 This positioning of the detectors limits the amount of information that can be obtained for bat activity within the woodland as a whole, however it does give an indication of some of the species which are present within the wider woodland, although quiet whispering species, including Bechstein's bat (*Myotis bechsteinii*), barbastelle, myotis (*Myotis spp.*) and long-eared bats (*Plecotus spp.*), can be under-recorded on detector surveys.
- 3.3 Additionally, many species have very similar echolocation calls making accurate species identification from acoustic surveys difficult, especially for cryptic groups like Myotis and Plecotus bats. Different amplitude of species' calls dramatically under or over identify the presence of some species, resulting in a very biased survey technique and commonly misidentifying presence of some species, notably long-eared bats.
- 3.4 The detectors were not deployed until mid-October, outside of the primary bat activity period. The results are therefore only representative of activity levels and species present within the autumn and early winter only. Other species and activity levels may be present at other times of the year. Notably preferred habitats further from core roosting areas are considered less likely to be used during colder times of the year when bats will opportunistically forage closer to roost sites. This data cannot be considered representative of summer foraging levels.

4 Results

Data Search

- 4.1 The search on MAGIC identified six granted European protected species licences for bats within 2km of the site from between 2009 and 2017 covering four bat species for the destruction of resting places.

Common pipistrelle – *Pipistrellus pipistrellus*

Soprano pipistrelle – *Pipistrellus pygmaeus*

Long-eared bat, brown – *Plecotus auritus*

Natterer's bat – *Myotis nattereri*

- 4.2 Two licences from 2009 covering common pipistrelle, brown long-eared and natterer's bats and 2012 covering common pipistrelle and brown long-eared bats were for the same property which is situated around 600m to the east of the survey site boundary.

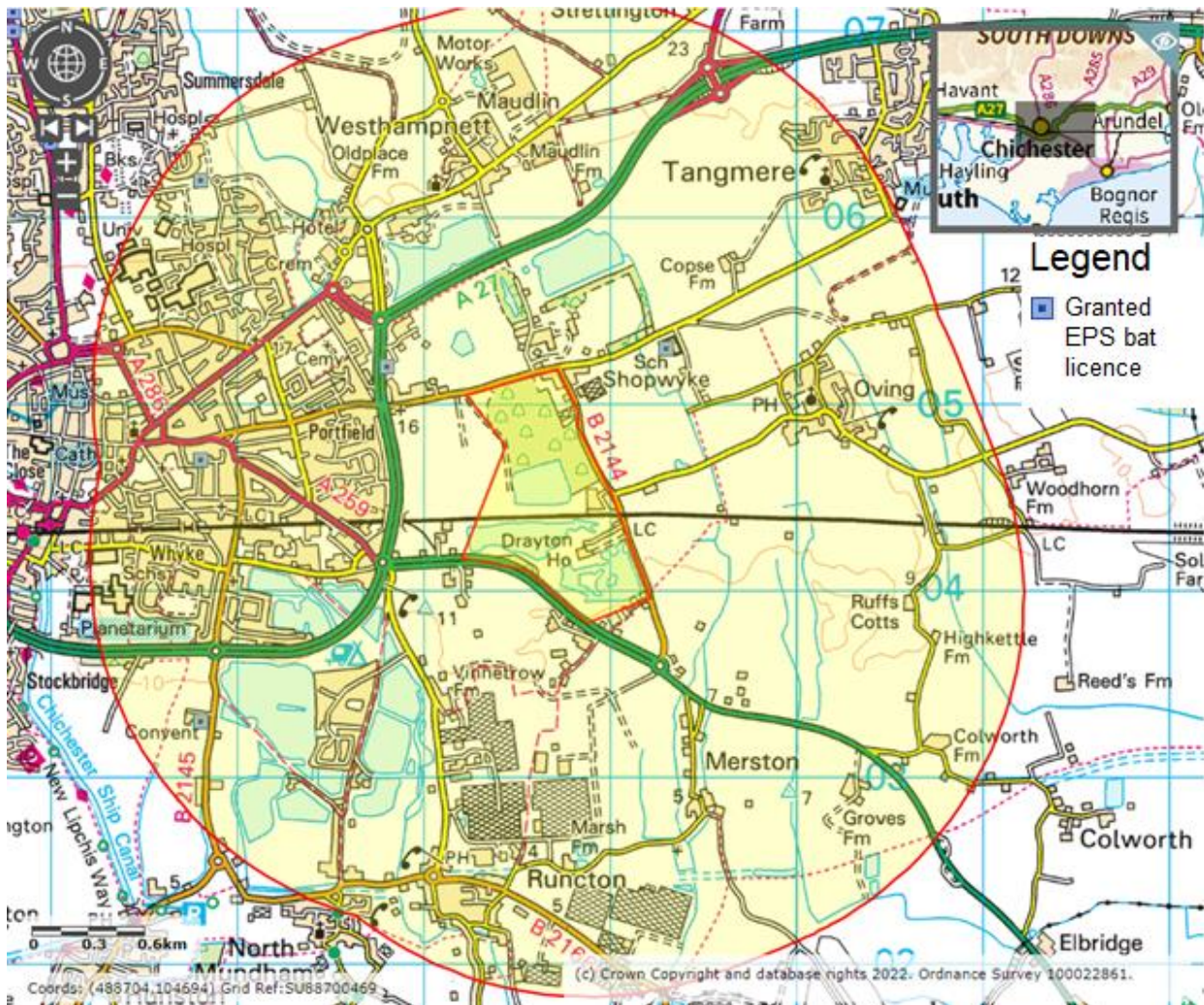


FIGURE 3: MAGIC MAP SEARCH RESULTS FOR GRANTED EPS LICENCES FOR BATS

4.3 The data record search from the Sussex Biodiversity Record Centre returned 284 bat records within 2km of the site, comprising of records of eight species, including Nathusius' pipistrelle and barbastelle bat records, three species groups and records of unknown bat species.

- Common pipistrelle – *Pipistrellus pipistrellus*
- Soprano pipistrelle – *Pipistrellus pygmaeus*
- Nathusius' pipistrelle – *Pipistrellus nathusii*
- Pipistrelle species – *Pipistrellus spp.*
- Long-eared bat, brown – *Plecotus auritus*
- Long-eared bat, species – *Plecotus spp.*
- Daubenton's bat – *Myotis daubentoni*
- Myotis bat species – *Myotis spp.*
- Noctule bat – *Nyctalus noctula*
- Serotine bat – *Eptesicus serotinus*
- Barbastelle bat – *Barbastella barbastellus*
- Bat, unknown species – *Chiroptera spp.*

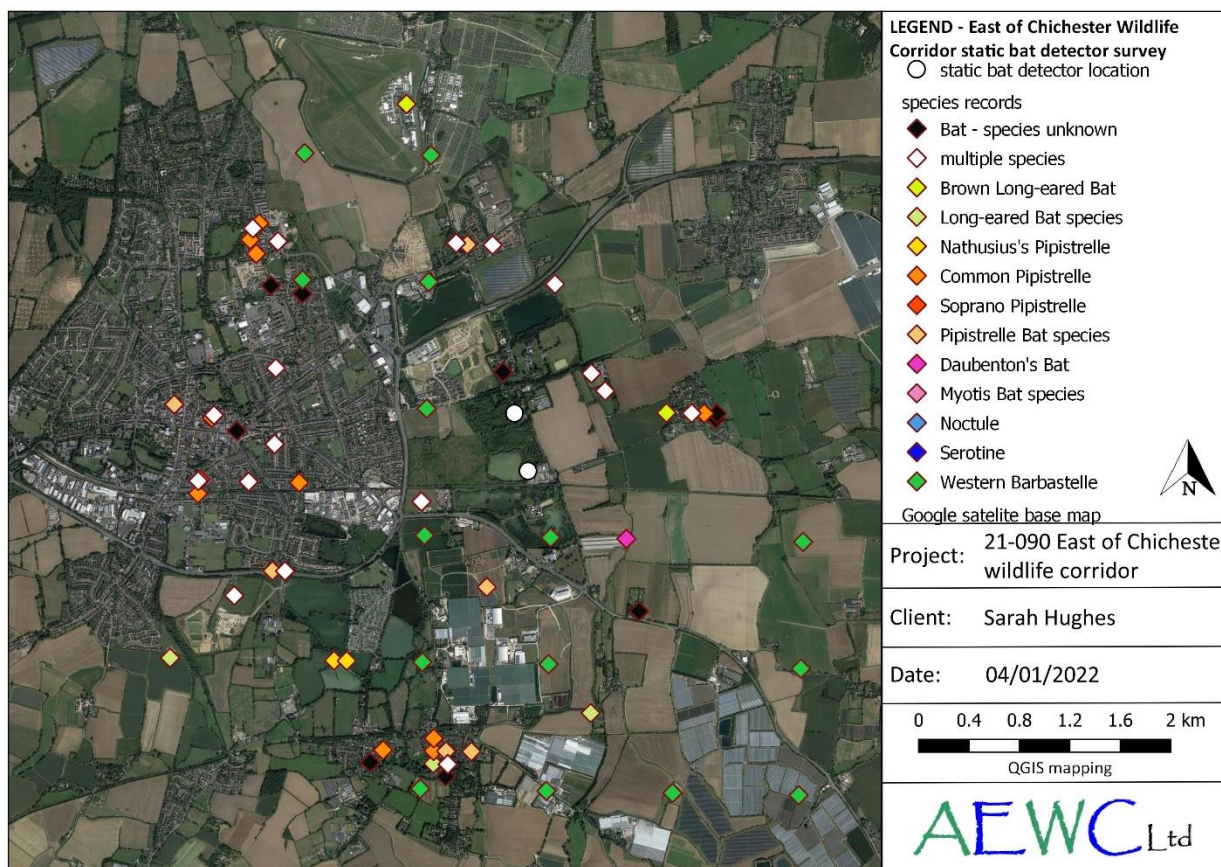


FIGURE 4: SHOWING THE LOCATIONS OF BAT RECORDS WITHIN 2KM OF THE SITE

4.4 Of the 284 records a total of 162 were results of roost surveys carried out on 33 separate confirmed roosts. Four roosts were identified to be within 1km of the survey locations, with species present within the roosts to be recorded as common pipistrelle, soprano pipistrelle and brown long-eared bats. One Nathusius’ pipistrelle roost was recorded within 2km of the survey site. No confirmed roosts for barbastelle were returned in the data search.

4.5 16 records were from radio tracked bats, all for barbastelle which were recorded to 1km grid squares only, with all other records from aural bat detector records covering all species and groups, often with multiple species recorded in any one location.

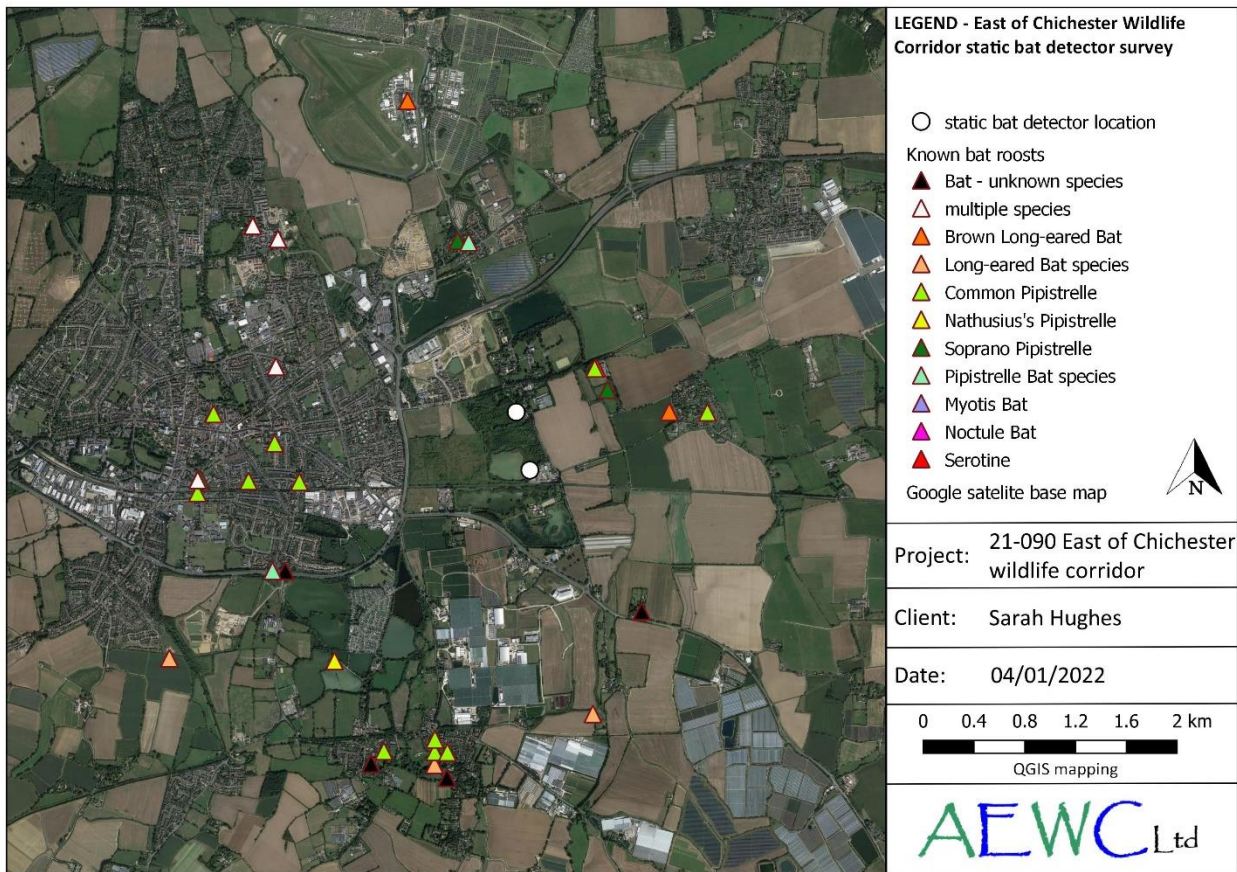


FIGURE 5: SHOWING THE LOCATIONS OF KNOWN ROOSTS WITHIN 2KM OF THE SITE



FIGURE 6: SHOWING THE LOCATIONS OF RARE AND NOTABLE BAT SPECIES RECORDS WITHIN 2KM OF THE SITE

4.6 The work undertaken in 2015 showed that a barbastelle bat maternity colony is present on the Goodwood Estate just under 4km to the north of the survey site. Individuals from the colony were radio tracked and shown to travel south through the East of Chichester Wildlife Corridor utilising this area for foraging.

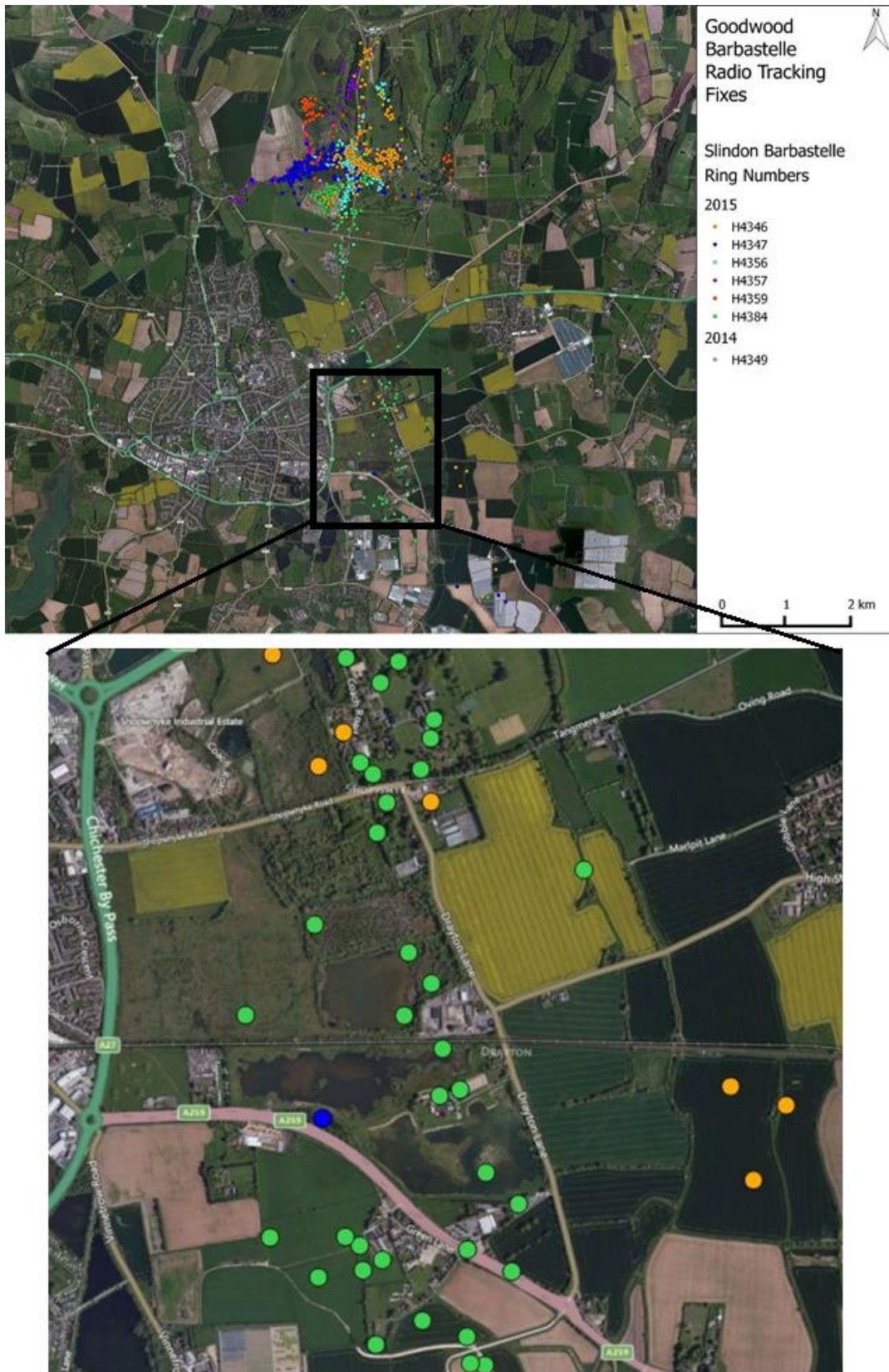


FIGURE 7: RADIO TRACKING MAP OF BARBASTELLE BATS FROM GOODWOOD ESTATE 2015

Static Bat Survey

- 4.7 A total of 5510 call files were recorded between 12th October 2021 and 20th January 2022 of eight different species plus two genera, where cryptic species calls could not confidently be classified to species level.

Common pipistrelle – *Pipistrellus pipistrellus*

Soprano pipistrelle – *Pipistrellus pygmaeus*

Nathusius' pipistrelle – *Pipistrellus nathusii*

Long-eared bat, brown – *Plecotus auritus*

Long-eared bat, species – *Plecotus spp.*

Myotis bat species – *Myotis spp.* – *Natterer's bats and daubenton's are both present, in addition to calls characteristic of small myotis, but all myotis calls have been classified only to genus level*

Noctule bat – *Nyctalus noctula*

Leisler's bat – *Nyctalus leisleri*

Serotine bat – *Eptesicus serotinus*

Barbastelle bat – *Barbastella barbastellus*

TABLE 1: NUMBER OF CALL FILES RECORDED FOR EACH SPECIES AT EACH SITE

Species	Highways	House
<i>Pipistrellus pipistrellus</i>	99	77
<i>Pipistrellus pygmaeus</i>	665	323
<i>Pipistrellus nathusii</i>	921	43
<i>Plecotus auritus</i>	171	5
<i>Plecotus spp.</i>	54	29
<i>Myotis spp.</i>	3027	30
<i>Nyctalus noctula</i>	14	32
<i>Nyctalus leisleri</i>	1	0
<i>Eptesicus serotinus</i>	0	1
<i>Barbastella barbastellus</i>	8	9
Total files	4961	549

- 4.8 A total of 158 call files were recorded within 30 mins of sunset, with a further 362 call files recorded between 30 and 60 minutes after sunset (see table 2). Both subsets were for the same species:

Common pipistrelle – *Pipistrellus pipistrellus*

Soprano pipistrelle – *Pipistrellus pygmaeus*

Nathusius' pipistrelle – *Pipistrellus nathusii*

Long-eared bat, brown – *Plecotus auritus*

Long-eared bat, species – *Plecotus spp.*

Myotis bat species – *Myotis spp.*

Noctule bat – *Nyctalus noctula*

TABLE 2: NUMBER OF CALL FILES RECORDED FOR EACH SPECIES AT EACH SITE WITHIN AN HOUR OF SUNSET

Species	Total call files recorded		Files within 30 mins of sunset		Files 30-60 mins of sunset	
	Highways	House	Highways	House	Highways	House
<i>Pipistrellus pipistrellus</i>	99	77	2	1	30	3
<i>Pipistrellus pygmaeus</i>	665	323	35	53	125	128
<i>Pipistrellus nathusii</i>	922	43	0	1	5	10
<i>Plecotus auritus</i>	171	5	3	1	4	1
<i>Plecotus spp.</i>	54	29	1	5	3	0
<i>Myotis spp.</i>	3027	30	32	2	47	5
<i>Nyctalus noctula</i>	14	32	5	17	0	1
Total files	4952	539	78	80	214	148

4.9 Temperatures during the survey period were extremely variable, ranging from -6 °C to 19°C. Temperatures at the static detector location at the time of file recording were logged by the Batlogger A+ detectors, with call files recorded when temperatures were between 1 and 19°C. Whilst soprano pipistrelle bats were recorded during the full range of temperature, other species were recorded within a reduced temperature range. See table 3.

TABLE 3: TEMPERATURE RANGES FOR SPECIES RECORDED

Species	temperature range for recordings
<i>Pipistrellus pipistrellus</i>	7 - 18 °C
<i>Pipistrellus pygmaeus</i>	1 - 19 °C
<i>Pipistrellus nathusii</i>	4 - 19 °C
<i>Plecotus spp.</i>	6 - 19 °C
<i>Myotis spp.</i>	5 - 19 °C
<i>Nyctalus noctula</i>	6 - 18 °C
<i>Nyctalus leisleri</i>	10 °C
<i>Eptesicus serotinus</i>	13 °C
<i>Barbastella barbastellus</i>	6 - 16 °C

4.10 Whilst the number of calls recorded on any given night varied significantly, on average the highest number of calls were recorded during the milder nights. See table 4.

TABLE 4: TEMPERATURE RANGES FOR SPECIES RECORDED*

Temperature (°C)	Number of files recorded	Number of nights on which recordings were made	Average No. calls per night
1	1	1	1.00
3	8	2	4.00
4	10	4	2.50
5	10	6	1.67
6	128	8	16.00

7	446	10	44.60
8	195	12	16.25
9	701	15	46.73
10	531	13	40.85
11	332	19	17.47
12	593	20	29.65
13	1062	25	42.48
14	925	16	57.81
15	285	9	31.67
16	19	5	3.80
17	2	1	2.00
18	226	2	113.00
19	31	1	31.00

*No calls were recorded with a temperature logged at 2°C

Myotis Species

Myotis species were the most frequently recorded with the vast majority of calls recorded at the Highways site. There are six myotis species that all have partially cryptic partially overlapping calls, especially the three small myotis species. However, calls identified as from Natterer's bats and daubenton's are both present, in addition to calls characteristic of small myotis species, but due to the overlapping nature of these calls which can be difficult to separate out all calls were classified to genus level only for the purposes of analysis.

- 4.11 A single Myotis species roost location was returned in the data search for a site approximately 2.4km to the north-west of the detector positioned at the house. Additionally, the MAGIC map search for granted EPS licences returned a record for a Natterer's bat roost for the destruction of a resting place, for a site located approximately 700m to the east of the detector positioned at the house.
- 4.12 3027 call files were recorded at the Highways site over 19 nights in October, 14 nights in November, three nights in December and two nights in January. 30 call files were recorded at the house over 10 nights in October and two nights in November.
- 4.13 Of the total calls recorded approximately 3% of the call files were recorded within one hour of sunset, with approximately 1% recorded within 30 minutes of sunset. Call files were recorded when temperatures were between 5 and 19°C.

Nathusius' Pipistrelle

- 4.14 Nathusius' pipistrelle was the second most commonly recorded species at the Highways site, this species is resident in the UK but is also a migratory species with peak activity recorded during the spring and autumn.
- 4.15 A single roost location for this species was identified within the data search and the peak count for this roost is recorded as being five bats present in both September and October of 2003.

4.16 922 call files were recorded at the Highways yard over 13 nights in October and one night in January. 42 call files were recorded at the house over seven nights in October, one night in November, two nights in December and two nights in January.

4.17 Of the total calls recorded just under 2% of the call files were recorded within one hour of sunset. Call files were recorded when temperatures were between 4 and 19°C.

Soprano Pipistrelle

4.18 Soprano pipistrelle bats were frequently recorded at both sites, this is a generalist species which is found within a range of habitats, however maternity roosts are most commonly found within buildings within close proximity to large water bodies, over which the bats are also recorded to forage.

4.19 Five roost locations were identified for this species within the data record search, including a maternity roost with a peak count of 275 bats present which is situated 2.5km to the west of the Highways yard.

4.20 326 calls were recorded at the House over 15 nights in October, 18 nights in November, four nights in December and six nights in January. 665 calls were recorded at the Highways yard over 17 nights in October, 14 nights in November and six nights in December.

4.21 Of the total calls recorded approximately 34.5% of the call files were recorded within one hour of sunset, with around 9% recorded within 30 minutes of sunset. Call files were recorded when temperatures were between 1 and 19°C.

Common Pipistrelle

4.22 18 roost locations were identified for this species within the data record search, including two maternity roosts with peak counts of 161 and 138 bats present. The closest roost, which contained a single common pipistrelle in addition to other bat species, is situated approximately 700m to the north-east of the static detector positioned at the House.

4.23 Comparable numbers of calls were recorded for common pipistrelle at both sites. 77 common pipistrelle call files were recorded at the House over seven nights in October, nine nights in November and two nights in December. 99 common pipistrelle call files were recorded at the Highways yard over 12 nights in October and six nights in November.

4.24 Of the total calls recorded approximately 20% of the call files were recorded within one hour of sunset, with just under 2% recorded within 30 minutes of sunset. Call files were recorded when temperatures were between 7 and 18°C.

Long-eared Bats

4.25 Brown long-eared bat calls were recorded at both sites, additionally calls which are highly typical of grey long-eared bats (*Plecotus austriacus*) were recorded on the northern detector, in addition to calls which could fit both grey and brown long-eared

bats but cannot be confirmed due to the overlap in the calls of both species and the lack of social calls, which have been identified to *Plecotus* spp.

4.26 Seven roost locations were identified for long-eared bats within the data record search, including a maternity roost for which no peak count was available, which is situated approximately 2.5km to the south-west of the Highway Yard detector location. The closest roost is situated approximately 700m east of the detector positioned at the house where two bats were recorded to be present.

4.27 34 long-eared calls were recorded at the House over 12 nights in October and one night in November. 225 long-eared calls were recorded at the Highways Yard over 16 nights in October and two nights in November.

4.28 Of the total calls recorded approximately 7% of the call files were recorded within one hour of sunset, with just under 4% recorded within 30 minutes of sunset. Call files were recorded when temperatures were between 6 and 19°C.

Barbastelle

4.29 No roost sites were identified for this species within the data search.

4.30 Low numbers of call files were recorded for this species at both sites, with eight files recorded over four nights in October and one night in November at the Highways yard and nine files over five nights in October and one night in November at the house. Calls from both sites were within the same period but recordings were only made at both sites on the night of the 14th/15th October with the calls recorded at the Highways yard around 1 hour after sunset and the calls at the house approximately 5.5 and 3.5 hours before sunrise. Call files were recorded when temperatures were between 6 and 16°C. See table 5.

TABLE 5: BARBASTELLE CALL FILE TIMING, RECORDING LOCATION AND TEMPERATURE

Timestamp	Sunset time	Sunrise time	Species Text	Site	Temperature [°C]
12/10/2021 21:11	18:16	07:23	<i>Barbastella barbastellus</i>	House	13
13/10/2021 22:35	18:14	07:24	<i>Barbastella barbastellus</i>	Highways yard	13
13/10/2021 23:57	18:14	07:24	<i>Barbastella barbastellus</i>	Highways yard	13
14/10/2021 19:14	18:12	07:26	<i>Barbastella barbastellus</i>	Highways yard	15
14/10/2021 19:14	18:12	07:26	<i>Barbastella barbastellus</i>	Highways yard	15
15/10/2021 01:55	18:12	07:26	<i>Barbastella barbastellus</i>	House	11
15/10/2021 03:57	18:12	07:26	<i>Barbastella barbastellus</i>	House	12
16/10/2021 01:13	18:10	07:28	<i>Barbastella barbastellus</i>	House	12
16/10/2021 03:50	18:10	07:28	<i>Barbastella barbastellus</i>	House	12
16/10/2021 04:19	18:10	07:28	<i>Barbastella barbastellus</i>	House	12
18/10/2021 03:08	18:06	07:31	<i>Barbastella barbastellus</i>	House	9
21/10/2021 20:48	17:58	07:38	<i>Barbastella barbastellus</i>	Highways yard	7
21/10/2021 21:56	17:58	07:38	<i>Barbastella barbastellus</i>	Highways yard	6
29/10/2021 01:02	17:44	07:49	<i>Barbastella barbastellus</i>	House	16
30/10/2021 23:35	17:41	06:53	<i>Barbastella barbastellus</i>	Highways yard	10

06/11/2021 19:43	16:29	07:05	<i>Barbastella barbastellus</i>	House	13
15/11/2021 22:47	16:15	07:20	<i>Barbastella barbastellus</i>	Highways yard	10

Nyctalus bats

- 4.31 One roost site for noctule was identified within the data search, approximately 2.5km to the west of the Highways yard detector location. No roost sites were identified for Leisler's within the data search.
- 4.32 Low numbers of calls were recorded for noctule with 32 calls recorded over 13 nights at the house, with all calls recorded in October and November and 14 files recorded over six nights at the Highways yard, again all in October and November. A single file characteristic of Leisler's was identified from the Highways yard in November, as calls of this species can be cryptic and mis-identified this has been classified as a potential species for the site.
- 4.33 Of the total calls recorded approximately 50% of the noctule call files were recorded within one hour of sunset, with just under 48% recorded within 30 minutes of sunset. Call files were recorded when temperatures were between 6 and 18°C.

Serotine

- 4.34 One roost site was identified within the data search, approximately 2.5km to the west of the Highways yard detector location with two bat recorded to be present.
- 4.35 A single serotine call file was recorded at the house during one night in October when the temperature was logged as 13°C.

5 Discussion

- 5.1 High levels of bat foraging activity were recorded, particularly at the Highways yard site where the detector was positioned within a better area of habitat and within acoustic range of bats foraging over the nearby water body. A minimum of 10 species were recorded during the surveys: Common, Soprano and Nathusius pipistrelle, Brown long-eared bat, Noctule, Serotine, Barbastelle and Myotis species including Natterer's, Daubenton's and small Myotis, additional species potentially present but unconfirmed due to the cryptic nature of their calls include Leisler's, Grey long-eared bat and more than one small Myotis species, showing these to be important foraging areas for bats in the local area.
- 5.2 Roost emergence times vary between species, but additionally during the winter they can be extremely variable with bats emerging earlier or later than standard dependant on the weather conditions.
- 5.3 A wide range of temperatures were recorded during the survey period, temperature at the time of file recording was logged by the static detectors, however the temperature at the logger position does not necessarily correspond to the temperature

within the woodland or over the water body where different micro-climates will be present.

Species Discussion

Myotis species

- 5.4 All myotis calls were classified to genus level only due to the overlaps in call parameters making these cryptic species difficult to confidently differentiate through acoustic analysis, particularly for small myotis species, however, calls considered to be characteristic of Daubenton's, Natterer's bats and small myotis bats were identified at both sites.
- 5.5 Daubenton's bats are a common widespread species which are predominately associated with large water bodies over which they forage and are most commonly found roosting within trees. Maternity roosts are most frequently found within close proximity to large water bodies. This species is likely to account for a large number of the recorded calls, particularly from the Highways yard, based on the parameters noted and the habitats present.
- 5.6 Natterer's bats are a common widespread species across the UK often associated with woodlands but also forage in open meadows, hedges and livestock areas. This bat commonly roosts in trees but can also be found roosting within voids in buildings.
- 5.7 There are three species of small myotis bats present within the UK, whiskered, Brandt's and Alcahoie. Whiskered bats are a common widespread species largely associated with woodlands and scrub habitat. Brandt's bat is found throughout the UK but is less common and widespread than whiskered with the majority of large colonies found within the more northern areas of the UK, but with some colonies known to be present within SE England. Alcahoie was first identified in 2010 and is still classified as data deficient although it is understood to be a woodland specialist, the majority of known roost sites are within West Sussex.
- 5.8 A single Natterer's bat roost record was found during the desk study with the site having been granted a licence in 2009 for the destruction of a resting place, in addition to a roost for an unconfirmed Myotis species around 2.5km to the north-east of the location of the detector positioned at the house. No information regarding known roosts for Daubenton's or small myotis bats was found.
- 5.9 Due to the high number of calls recorded, the wide temperature range in which the recordings were made, and the presence of files being recorded within 1 hour of sunset, it is considered to be likely that further myotis species roosts are present within close proximity to the site. As this appears to be an important foraging area for Myotis bats, confirmation of the species present and breeding status is important to understand any potential impacts from the proposed reduction of the wildlife corridor. The only way to gather this data is through the use of advanced survey techniques to capture the bats and confirm species, age, sex and breeding status. Radio tracking could also be used to identify roost locations, key foraging areas and commuting routes.

5.10 The woodland within the Wildlife Corridor is relatively isolated from other woodland blocks through the presence of residential and commercial development in the surrounding area, and whilst non-breeding Daubenton's and Natterer's bats are known to travel reasonable distances between roosting and foraging sites, small myotis bats are thought to largely remain closer to their roost sites for foraging and therefore require habitat which contains suitable roosting and foraging sites within close proximity. Any reduction in the size of this woodland block could therefore significantly reduce the foraging opportunities available for these species, in addition to potentially destroying roost sites and reducing the suitability of the area as a whole through reduction in habitat area and alteration of the micro-climatic conditions through-out the site.

Soprano pipistrelle

5.11 This is a common widespread species across the UK, which is found using a wide range of habitats, however it is mostly associated with water, especially larger open waterbodies and larger rivers.

5.12 Whilst soprano pipistrelle bats are known to travel a reasonable distance to foraging sites, maternity roosts in particular are often found within close proximity to water bodies. The water body within the survey site is approximately 2.5km from the maternity roost identified within the data search, where there is a different water body located approximately 900m from the identified maternity roost site. It is therefore likely, given the distance to this roost and availability of other water bodies for the bats from this colony, that this colony remains closer to home.

5.13 The number of calls recorded, the presence of calls files recorded across a wide range of temperatures and calls recorded within 30 minutes of sunset increase the likelihood of roosts being present within close proximity to the site, additionally the habitats present and the location of a number of known day roosts within the surrounding area increases the likelihood of the presence of a maternity colony within close proximity of the site.

Nathusius' pipistrelle

5.14 Research into this species is ongoing within the UK and roost sites are currently under-recorded, but it is known to be a resident breeding species in addition to an annual migrant. It is commonly associated with large water bodies, over which they forage and are often found roosting close to their foraging sites in trees and buildings.

5.15 The level of recordings at the Highways yard location is considered notably high even for migration and the count signifies how important this area may be for this species. The reason for this high number is unknown; there could be a maternity colony nearby, this water body could be a notable part of a migration route, or there may be a significant resident population in this area.

5.16 Whilst low numbers of Nathusius' pipistrelle calls were recorded at the House on Drayton Lane, calls were recorded at this site in November and December, where they were not recorded at the Highways site during this period. Calls were recorded

at the house between temperatures of 4 and 14°C and at the highways site when temperatures between 8 and 19°C.

- 5.17 Whilst the temperatures logged on the detectors were low the temperatures within the woodland block are likely to have been higher due to the warmer air becoming trapped within the larger woodland area situated away from the water body and open gardens. As the woodland is likely to remain warmer through the winter this could then provide winter foraging opportunities.
- 5.18 In addition to the potential loss of roost sites within trees, woodland near to large water bodies is very important for foraging for this and many other species, especially in late autumn and winter. Reduction of the woodland could still retain connectivity, but it will be a notable localised loss of foraging near the water. Additionally, the reduction in this woodland would reduce winter foraging opportunities for this species which could restrict winter survival and therefore impact the favourable conservation status of the species.

Common pipistrelle

- 5.19 This is a common widespread species across the UK which is associated with a wide range of habitats as a generalist species, with maternity roosts largely found within buildings, but smaller roosts found in both buildings and trees.
- 5.20 Whilst slightly higher numbers of files were recorded for this species at the Highways yard, the majority of calls were recorded at this site in October, with a small number in November. At the more northerly House the majority of calls were recorded in December, with calls also recorded in October and November, which as with Nathusius' pipistrelles could be due to the use of the area for foraging due to the retained warmth during mild periods and availability of prey species. Call files were recorded when temperatures were between 7 and 18°C.
- 5.21 In addition to the potential loss of roost sites within trees, the reduction in this woodland could reduce winter foraging opportunities for this species which could restrict winter survival and therefore impact the favourable conservation status of the species.

Long-eared bats

- 5.22 Due to the quiet nature of these species, they are commonly under-recorded on acoustic surveys. Neither species are known to travel particularly far from their maternity roost sites for foraging, with the majority of foraging activity within 500m of the roost site (Entwistle et.al 1996) and therefore the presence of suitable foraging habitat near to potential roost sites is an important factor in roost selection.
- 5.23 A single maternity roost was identified for Plecotus species on the data search within a building close to a number of small, connected woodland blocks approximately 2km to the south-west of the site on the edge of a residential area which is bordered by agricultural land, and it is likely that bats from this colony remain within this area rather than travelling up to the survey area.

- 5.24 Long-eared bats usually emerge from their roosts between 40 and 90 minutes after sunset when it is almost fully dark, with some variability with season. In the autumn and winter, the bats often emerge sooner after sunset as the light levels drop more rapidly. Calls were recorded within 30 minutes of sunset at both sites which increases the likelihood of there being roosts within close proximity to the survey site.
- 5.25 The closest identified roost is 700m to the west of the detector positioned at the house with a peak count of two bats recorded to be present, other small roosts are also known to the present within 1km of the survey site, males and non-breeding females often roost within the area surrounding maternity colonies, often within slightly less optimal habitat and it is therefore considered likely that a maternity colony of brown long-eared bats could be present within closer proximity, or within the site within this area of more suitable habitat.
- 5.26 Brown long-eared bats are common and widespread throughout the UK and are often associated with woodland for foraging and are frequently found roosting within trees in addition to being commonly found roosting within the roof voids of buildings. As a slow-flying species, they are at greater risk of predation and therefore are light-sensitive, emerging when it is almost fully dark and generally sticking to dark corridors and tree lines for foraging and commuting in order to reduce likelihood of predation.
- 5.27 The woodland within the Wildlife Corridor is relatively isolated from other woodland blocks through the presence of residential and commercial development in the surrounding area, any reduction in the size of this woodland block could therefore significantly reduce the foraging opportunities available for this species, in addition to potentially destroying roost sites.
- 5.28 Grey-long eared bats are extremely rare in the UK with their range restricted to the southern-most counties and coastal regions. Grey long-eared bats are not known to roost within trees and are associated with large, uncluttered roof voids and barns for roosting and open semi-improved and unimproved grassland and pasture for foraging.
- 5.29 Grey long-eared bats are known to be present in the wider area but are not confirmed to be present on, or within close proximity to the site with no confirmed records returned on the data search, however suitable foraging and roosting habitats are present within the Wildlife Corridor and immediately surrounding areas. There have been significant losses of suitable habitat for grey long-eared bats historically with continuing declines in semi-improved and unimproved grassland. Reduction of grassland within the Wildlife Corridor would reduce the availability of foraging habitat for this species if present within this vicinity.

Barbastelle

- 5.30 The barbastelle is a rare species heavily associated with woodland for both roosts and foraging and are commonly found to forage some distance from roost locations which are often spread over a wide range, commonly a couple of kilometres.

- 5.31 Colonies of barbastelle bats commonly fragment into a number of smaller roosts with a fission-fusion behaviour, with individuals separating and coming together to roost and winter foraging activity frequently recorded.
- 5.32 Activity was recorded at the Highways site when the temperature was logged at between 6 and 15°C and at the house when temperatures were logged between 9 and 16°C as shown in Table 4. These temperatures are representative of the temperatures recorded at the logger location at the time the call was recorded and are likely to be different from the temperature present immediately over the water or within the woodland but are considered to be representative of the range of temperatures in which activity was recorded.
- 5.33 A maternity colony is known to be present within the Goodwood Estate around 4km to the north of the survey area and previous radio tracking has confirmed that bats from this colony use the wildlife corridor and surrounding areas of habitat as part of their foraging range. It is therefore likely that further barbastelle roosts are present within the wider area between Drayton Lane and Goodwood.
- 5.34 Radio tracking in 2015 and the acoustic surveys carried out for this report have shown that the wildlife corridor is used by barbastelle bats, however the extent of use of the wildlife corridor and the presence of potential roost sites within this area cannot be established through acoustic surveys alone, further advanced survey effort including trapping and radio tracking is required in order to establish the true extent of use of this area and the location of roost sites if present.
- 5.35 Reducing the size of the woodland in the right way could still retain the connectivity, but it would represent a notable reduction in foraging availability locally. Woodland is very important for foraging all year but particularly for autumn and winter foraging, which is frequently carried out by barbastelle. Activity is likely to shift from the water areas to the woodland through autumn and into winter as the woodland will contain warmer areas through the insulating properties of dense vegetation present. Whilst this area represents a small area of habitat, the reduction in size of the woodland would not only directly reduce the amount of woodland available for foraging but can make the whole wood colder and thereby reduce the suitability of the area even proportionally to that which was previously present.
- 5.36 The proposed works are impacting a maternity colony of barbastelle bats, which is an Annex II species. The colony present at Goodwood, which are known to use the survey site, are proven to be linked with the population that uses Singleton and Cocking SAC. Therefore, the proposals affecting this population are affecting the qualifying feature of the SAC and require a full assessment.

Nyctalus Bats

- 5.37 Noctule bats are common and widespread in the UK, Leisler's is less common. These are high-flying species that forage over a wide area and as a loud echolocating species they are easily picked up on bat detectors. There is overlap between the calls of the species which can result in mis-identification and potential under- or over-recording, however as both species forage over a wide area loss of habitat from the

potential narrowing of the corridor is not considered to be a significant negative impact for these species. Whilst noctule bats are recorded to roost within buildings, they are most frequently recorded roosting in trees and therefore removal of trees could result in loss of roost sites.

Serotine

- 5.38 Serotine bats are a relatively common species in the UK mainly found roosting within buildings and rock crevices and are rarely found in trees. They usually forage within 2km of their roost site at tree top height and are relatively frequently noted to forage around streetlamps in order to capture their preferred moth and beetle prey which are attracted to the lights. Very little is known about the hibernation habits of serotine bats, but it is believed that they largely hibernate within buildings.
- 5.39 As a loud echolocating species, they are easily picked up on bat detectors and therefore the very low number of calls recorded may indicate that there is only a very low population present within the surrounding area during the autumn and early winter. Due to the dependence on buildings for roosts and the species' tendency to forage over a wide area, the loss of habitat from the potential narrowing of the corridor is not considered to be a significant negative impact for this species.

General Discussion

- 5.40 The acoustic surveys to date have been carried out late in the year and outside of the primary active season for bats, additionally due to access constraints detectors were positioned right on the eastern edge of the habitat corridor. These factors will have impacted the number and range of species recorded, particularly for quiet species such as barbastelle, long-eared bats and Myotis species, but even with these constraints high levels of activity have still been recorded.
- 5.41 The pattern of activity recorded altered during the study period with proportionally higher levels of activity recorded in close proximity to the water body during the autumn and within the more northern areas of the woodland during the winter months, this pattern likely corresponds with the variation in temperatures and prey species availability during these times of year. Water bodies and woodland hold and retain heat in different ways and this variation in conditions causes variation in insect activity over and within these areas, with greater prey availability over the waterbody in the autumn and then within the warmer woodland during the colder months.
- 5.42 Reduction of the existing corridor will cause a direct loss of foraging area for woodland specialist bats in particular, within what is already a small pocket of habitat. Removal of trees could additionally cause the direct the loss of roost sites for rare or vulnerable species.
- 5.43 The growth of trees and root structure varies throughout a woodland block, with trees at the outer edge and on the side of the prevailing wind having stronger root systems than trees positioned further into the woodland where the edge trees provide a wind break. Removal of trees within woodlands can therefore cause destabilisation of

further trees which have previously been sheltered, which can then lead to increased loss of trees over time. Reduction in the overall woodland size will additionally alter the micro-climatic conditions within this area with reduced ability to retain stable temperatures and humidity, this will in turn lead to altered overall ecology of the site with changes likely to prey species composition and availability in the area.

- 5.44 Changes in use of the neighbouring land could lead to higher disturbance through public access, increased numbers of cats causing increased predation, higher noise and lighting impacts through reduction of the buffer which currently provides a barrier to light and reduced commuting suitability and connectivity.

6 Recommendations

- 6.1 Based on the survey results the existing woodland corridor is important for foraging bats of a number of species, most importantly a number of rare species including barbastelle bats and what appears to be a notably high level of use by Nathusius' pipistrelle bats. However, no summer surveys have been carried out within the site to date and the full extent of use cannot be determined through the current survey methodology alone.
- 6.2 As rare and cryptic species are present the existing woodland and surrounding habitat areas should be retained and managed to ensure long term suitability for bats. Detailed bat survey to identify the species present and breeding status of these species could be carried out in order to increase the knowledge of the level of use of the area to inform a suitable long-term management strategy for the site.
- 6.3 Should a significant reduction of the corridor be unavoidable, it is required that further detailed bat survey, including trapping and radio tracking, in addition to acoustic surveys during the active season, is carried out in order to confirm the species present, breeding status type and extent of use of the site and thereby allow the identification of full impacts and inform a suitable mitigation strategy.
- 6.4 The barbastelle bats which are present on site have been previously found to be linked with the maternity colony present at Goodwood, which is additionally known to be linked to the Singleton and Cocking SAC for which barbastelle is a qualifying feature. Any impacts upon this woodland could therefore adversely impact the qualifying feature of the SAC and full survey and assessment is therefore required.

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