davidson-watts ecology ltd

Bat Trapping and Radio-tracking
Baseline Report and Evaluation
For Land North of Long Copse Lane, Emsworth, Hampshire
For Land and Partners
9 August 2021

CONTENTS

1	**Introduction**	**3**
2	**Methodology**	**4**
3	**Results**	**6**
4	**Discussion and Evaluation**	**8**
6	**References**	**11**

Figure 1	**Trapping Locations and survey areas (red line)**	**12**
Figure 2	**All Radio Tracking Locations/Fixes**	**13**
Figure 3	**Radio Tracking fixes near to the Site**	**14**
Figure 4	**Female Bechstein's bat (106) radio-tracking data**	**15**
Figure 5	**Male juvenile Bechstein's bat (108) radio-tracking data**	**16**
Figure 6	**Female Bechstein's bat (708) radio-tracking data**	**17**
Figure 7	**Female Bechstein's bat (691) radio-tracking data**	**18**
Figure 8	**Female Bechstein's bat (705) radio-tracking data**	**19**
Figure 9	**Female Bechstein's bat (107) radio-tracking data**	**20**
Figure 10	**Female Bechstein's bat (207) radio-tracking data**	**21**
Figure 11	**Female Bechstein's bat (307) radio-tracking data**	**22**

Appendix A	**Roost photographs**	**23**
Appendix B	**Bat trapping data**	**28**

Report	Prepared by:	Reviewed by:
Advanced Bat Survey Report V2 10 August 2021	Dr Ian Davidson-Watts MCIEEM	Diane Davidson-Watts MCIEEM

WORCESTER OFFICE (REGISTERED OFFICE)
Wyche Innovation Centre, Walwyn Road, Upper Colwall
Malvern, Herefordshire WR13 6PL

SALISBURY OFFICE
3 Hillside, Stapleford
Salisbury, Wiltshire SP3 4LG

tel 03333 031276 info@dwecology.co.uk www.dwecology.co.uk

Registered in England No. 8811109

1 Introduction

1.1 BACKGROUND

1.1.1 Residential development is proposed on approximately 16 ha of pastureland interspersed with small copses, north of Long Copse Lane, Emsworth, Hampshire. A study area has been defined that extends beyond the proposed development area (hereafter referred to as the 'Site') (see Figure 1 – indicative site boundary). The Site was found to support a Bechstein's *Myotis bechsteinii* bat population in 2009 following studies in the general area by Portsmouth Water (Unpublished data). As part of the 2009 studies, a large population of this species was also confirmed in Southleigh Forest, which directly borders the northern boundary of the Site (Figure 1).

1.1.2 Trapping surveys under Class Licence (Davidson-Watts Ecology Ltd) in late summer 2016 confirmed the presence of breeding Bechstein's bat in the Southleigh Forest area known as Long Copse adjacent to the northern boundary of the Site. As a result, the Site promoters ('Land & Partners Ltd'), with advice from the Hampshire County Council Ecologist, have recognised the need to gather further information on how Bechstein's bat use the Site and provide context of the Site's importance to the Southleigh population. This information will form part of an Ecological Impact Assessment to accompany an outline planning application for the proposed residential development.

1.1.3 Davidson-Watts Ecology Ltd were commissioned by Land and Partners Ltd to undertake the advanced surveys of the Site and adjacent areas, initially in 2016 and with further studies in 2017 and then again in 2021 to achieve the following objectives:

1.1.4 The aims of the advanced bat surveys are to:

- Further investigate the status of Bechstein's bats at the proposed Site with an emphasis on woodland habitat and tree lines during the breeding season in 2017 and 2021;
- To capture and radio-track key individuals using the Site to locate breeding roosts of Bechstein's bats and to determine activity patterns and habitat use; and
- Combined with the data from 2009 and 2016, present a robust baseline of the use of the Site and surrounding areas by Bechstein's bats, to provide for an effective impact assessment and development of mitigation measures, including appropriate roost protection measures.

2 Methodology

2.1 OVERVIEW

2.1.1 As Bechstein's bats roost in trees and are almost impossible to detect/identify using standard bat surveys the primary approach to meeting the project aims was to trap free-flying bats and to radio-track individual bats to locate maternity and other roost types and to investigate use of the Site by bats when active at night.

2.1.2 Currently three survey sessions of approximately one week duration each were undertaken in June and August 2017, June and July 2021. Each session began with the trapping of bats. Radio-tagged bats were simultaneously/subsequently followed by radio-tracking during the week to locate roost sites and to examine nocturnal activity of bats, with a focus on collecting activity data for bats within the development boundary. Where access was possible, emergence counts were undertaken at identified roosts to determine the function of the roost and to provide an estimate of population sizes.

2.1.3 The following methods were undertaken in line with Chapter 9 (Advanced licensed bat survey methods) in Collins, 2016.

2.2 TRAPPING METHODS

2.2.1 Bats were caught using up to seven 4 m^2 harp traps or 6-12m mist nests placed in woodlands and significant treelines within the land subject to investigation (the Site - see Figure 1). Acoustic lures (e.g. Sussex Autobats) were used to improve catch efficiency in woodland (Hill and Greenaway 2005). The lures emitted synthesised or pre-recorded bat social calls. Lures were placed next to harp traps and any bats captured were identified, sexed, aged and breeding status determined.

2.2.2 Generally trapping teams monitored trap sites with handheld bat detectors (Pettersson 240x or Elekon Batlogger M) during the trapping survey, mainly to assess bat activity in the vicinity of the traps.

2.3 TRACKING METHODS

2.3.1 Target bats were fitted with lightweight radio-transmitter tags (Biotrack Ltd, Wareham, Dorset, United Kingdom) weighing <5 % of the weight of the bat using skin bond or similar proven adhesive. Tagging of female bats in advanced stages of pregnancy was avoided. Lactating bats were tagged if they met the target weight and were in good condition, although early lactating bats were not tagged for welfare reasons. Bats were processed quickly and released within 30 minutes of capture provided the glue attaching the transmitter had cured sufficiently.

2.3.2 All tagged bats were tracked using a Sika receiver (Biotrack Ltd., Wareham, United Kingdom) and a 3-element Yagi antenna (Biotrack Ltd). Tagged bats were located during the day to find roost sites and tracked from suck until dawn to determine the extent of use of the Site and surrounding areas for commuting and foraging. The primary aim at night was to record positional fixes that enabled determination of key areas of activity within the Site. Bats were tracked using the "homing-in" method (White and Garrott 1990) either on foot or by vehicle. Radio-tracking fixes for each individual bat were plotted in the field on digitised 1:25,000 scale Ordinance Survey maps and subsequently transferred into Ranges 9 radio tracking software (Anatrak Ltd). Aerial images in the Google Earth mobile application were used in the field as an additional visual guide when plotting fixes. Digitised radio-tracking data were analysed in Ranges 9 (Anatrack Ltd., Wareham, United Kingdom) to calculate home range areas (100% minimum convex polygons (MCPs)) and core activity areas (cluster core polygons) (Davidson-Watts et al 2006; Zeale et al 2012).

2.4 ROOST EMERGENCE

2.4.1 When tagged bats were tracked to accessible roost sites, subsequent roost exit counts were undertaken using infrared cameras (Canon XA10) with infrared illuminators to determine roost size and

status (e.g. maternity roost). Roost attributes such as location, type of structure and other descriptors were recorded where possible.

2.5 LICENSING

2.5.1 In 2016 trapping was undertaken by experienced bat surveyor and level 3 and 4 Natural England Class Licence holder Dr Ian Davidson-Watts (2015-12289/12287-CLS-CLS). In 2017 and 2021, all trapping and tracking surveys were undertaken under a project licence from Natural England numbers 2017-28892-SCI-SCI and 2021-52094-SCI-SCI obtained by Dr Ian Davidson-Watts, with 27 years bat survey experience, who designed and coordinated the field surveys and undertook the analysis of the results. Field surveys in 2017 and 2021 were undertaken by Dr David Hill, Mike Bird, Alan Crane, Tom Foxley and Dom Hill.

2.6 ADJUSTMENTS AND LIMITATIONS

2.6.1 Bats are mobile species and may use a variety of roosts, commuting routes and foraging areas during their yearly lifecycle, which is influenced by a range of factors such as breeding status, energetic requirements and the availability of prey. The survey techniques described in this report involve a sampling effort that is considered appropriate for obtaining valuable information on the location of roosts and foraging areas potentially affected by the development proposals while ensuring that local bat populations are not disturbed adversely. The methods used here do not provide a full account of all bat activity in the area or activity at other times of the year outside of the survey periods (i.e. outside of the summer early to mid-breeding period) which is focussed on identifying key maternity populations.

2.6.2 Weather conditions were appropriate throughout both survey sessions and so the results of trapping and radio-tracking were not constrained or affected by weather in so far as expected bat activity at that time of year.

2.6.3 A number of day roost sites located via radio tracking occurred on private land where access was not possible. It was usually possible to determine whether the roost was likely to be a tree or building from triangulation, however it was not possible to undertake emergence surveys and determine population sizes. In such cases professional judgement was used to determine likely roost status, informed by the status of the tagged bat, time of year and the length of use of the day roost.

2.7 EVALUATION CRITERIA

2.7.1 Ecological features and resources have been evaluated based on the approach described in 'Guidelines for Ecological Impact Assessment in the United Kingdom' published by the Chartered Institute of Ecology and Environmental Management (2016) whereby the value of an ecological feature or resource is determined within a defined geographical context using the following criteria:

- International,
- National (England),
- Regional (South-East),
- County/District (Havant),
- Local (or Parish) (Emsworth); and
- At the site level only.

3 Results

3.1 BAT TRAPPING

3.1.1 One bat trapping survey was undertaken on the 31 August 2016. This was followed by four bat trapping survey sessions in mid and late summer of 2017 and summer 2021. The primary aim of the 2017 and 2021 trapping was to capture rare tree dwelling Bechstein's bats for radio tracking. All 2017 and 2021 trapping data is detailed in Table 1 below. In 2016 only one trapping area was sampled (T2). Four trapping areas were sampled during the surveys and are shown on Figure 1 in 2017 and 2021. Trapping Area 1 included the south-eastern boundary of the site adjacent to the grounds of Hollybank House. Trapping Area 2 was located on the southern boundary of 'Long Copse Hill', which is on the north and north-eastern boundary of the Site, and forms part of the Southleigh Forest Complex. Trapping Area 3 is the small copse located on the southern boundary of the Site known as Colman's copse, that projects into the Site from Long Copse Road. Trapping Area 4 was located on the eastern boundary of the site.

3.1.2 The single survey on 31 August 2016 captured a total of 10 bats of six species. Bat species captured that were of particular note included a female Bechstein's bat captured in trapping area 2 (the boundary of Southleigh Forest). The other bat species included common and soprano pipistrelle (*Pipistrellus pipistrellus and P. pygmaeus*), brown long-eared (*Plecotus auritus*), Natterer's (*Myotis nattererii*) and whiskered (*M. mystacinus*) bats.

3.1.3 A total of 21 bats of six species were caught in the total of four nights of trapping in June and August 2017. 27 bats of seven species were captured in June/July 2021 over six nights of trapping.

3.1.4 Species recorded included Natterer's, small *Myotis* (possibly whiskered/Brandt's (*M. brandtii)* or alcathoe bat *(Myotis alcathoe))*, Daubenton's bat (*Myotis daubentonii*), Bechstein's, soprano pipistrelle, brown long-eared bat and noctule (*Nyctalus noctula*). Breeding bats of Bechstein's, Natterer's, Daubenton's, whiskered/Brandt's (small *Myotis*), soprano pipistrelle and brown long-eared bat were all confirmed in the survey/trapping areas.

3.1.5 The majority of the bats, including all Bechstein's bats, were captured in trapping area 2 which is the northern boundary of the site on the end of Southleigh Forest. Bechstein's Bat 106 was captured and found to have been previously marked with a ring Z4446. Reviewing previous data from 2009 (Portsmouth Water surveys 2009), this bat was originally captured in July 2009 in Long Copse (Southleigh Forest). T3 and T4 recorded no Bechstein's bats and very few bat captures overall.

3.2 RADIO TRACKING AND ROOSTING PATTERNS

3.2.1 A total of five target Bechstein's bats were fitted with radio transmitters to primarily locate roost sites and determine broad activity areas including foraging sites.

3.2.2 For each bat, their roosting location was confirmed (where access was permitted) or estimated through triangulation of the radio signal (where access was not permitted). Each tagged bat was followed as described in the methods section for at least two to three nights. The fixes of all tracking nights for each bat were pooled (see Figure 2 and 3), from which it was possible to determine the main area of activity (home range/Minimum Convex Polygon- MCP). Ranges 9 was used to mathematically determine core areas of activity (usually associated with roosting or foraging areas). Objective cluster polygons (Kenward 1987) were considered the most appropriate minimum-linkage estimators to define the core areas bats were using, because the bats spent most of their time in relatively small areas, moving quickly between them.

Table 2 - Summary data of tagged bats and their home range statistics (refer to Figures 4 and 5)

ID	Species	Sex *breeding	Date captured	Location of capture	Range span (m)	MCP (ha)	Mean core area (ha)
106	*M. bechsteinii*	Female*	04/06/17	T2	1537	27.8	2.1
108	*M. bechsteinii*	Male**	07/08/17	T2	2185	154.8	3.5
708	*M. bechsteinii*	Female	07/06/21	T2	3158	123.1	1.8
691	*M. bechsteinii*	Female	08/06/21	T2	2656	141.0	0.9
705	*M. bechsteinii*	Female	08/06/21	T2	2560	67.3	5.6
107	*M. bechsteinii*	Female	27/07/21	T2	430	6.9	0.6
207	*M. bechsteinii*	Female*	27/07/21	T2	2344	45.6	2.2
307	*M. bechsteinii*	Female*	27/07/21	T2	2261	29.1	2.8

**Breeding bat. ** Juvenile bat.*

Table 3 – Roost locations and summary roost attributes of tagged bats (refer to Figures 4 and 5 and Appendix A for photographs of roosts where roosts were accessible).

ID	Species	Date	Roost				
			ID	Type	Location	Feature	Count
106	*M. bechsteinii*	08/06/17	1	Ash Tree*	SU755072	Poss Cavity	8
106	*M. bechsteinii*	07/06/17	2	Oak Tree	SU751083	Poss Cavity	1
108	*M. bechsteinii*	10/08/17	3	Oak Tree	SU750083	Poss Cavity	1
108	*M. bechsteinii*	11/08/17	4	Ash Tree*	SU755077	Poss Cavity	3
708/691/705	*M. bechsteinii*	08/06/21	5	Oak Tree*	SU755060	Poss Cavity	3**
107/207/207	*M. bechsteinii*	29/07/21	6	Ash Tree*	SU752083	Cavity	19

*Likely maternity roost. **no access for count, based on presence of tagged bats only.

3.3 RADIO TRACKING DATA

3.3.1 All tagged Bechstein's bats (n=8) were captured on the southern fringes of Southleigh Forest on the border of the proposed development site in the trapping area T2.

3.3.2 Bats were tagged and followed for 3-5 nights post capture night. Flying distances (span of home ranges) were between 1.5 and 3.1km. Home ranges (100% of all bat fixes) for bats 106 and 108 tracked in 2017 were from Southleigh Forest to Westbourne area and for bat 108 the home range extended to south-west of New Brighton where foraging areas were recorded for this bat on woodlands either side of the A27 corridor.

3.3.3 Core areas for 106 and 108 were also recorded on the north and north-eastern boundary of the proposed development site, with tree roosts occurring in Southleigh Forest and south of Westbourne Road in Westbourne and another tree roost located in a tree line in the River Ems (see Figures 4 and 5).

3.3.4 The three female Bechstein's bat tracked in June 2021 all roosted in a small copse north of Hermitage south of the A27, approximately 2.5km south of Southleigh Forest. The three bats roosted here for the entire tracking period. These Bechstein's bats used the River Ems corridor for commuting between this roost site and foraging/core areas within the River Ems corridor and parts of Southleigh Forest (see Figures 6-8). Core areas occurred on the northern and north-eastern boundary of the proposed site.

3.3.5 In July 2021 the three female Bechstein's bats roosted in the same roost (R6) located in Long Copse Hill for the entire period of the survey session. On this occasion access and the confirmation of the roost cavity were possible and the peak count from an IR camera emergence survey was 19 bats. The majority of flying ranges remained within the area of the roost, the eastern boundary of the site and one core area along the A27 road corridor (see Figures 9-11).

4 Discussion and Evaluation

4.1 USE OF THE SITE BY BECHSTEIN' S BAT

4.1.1 The trapping surveys in 2017 and June 2021 were successful in tagging and tracking five Bechstein's to obtain specific data on this rare woodland species. The results of the tracking data show that in 2017 and at the time of writing in 2021, no roosts appear to be within the Site or directly adjacent to the proposed development areas. The majority of foraging/flying activity took place beyond the proposed development site in Long Copse (part of the Forestry Commission managed areas), or in discreet woodlands/treelines to the south in the River Ems corridor and north-east of the Site.

4.1.2 Two maternity roosts were confirmed during the 2017 surveys, and both of these were located in relatively open habitats, single trees near a small copse. Neither fell within the Site. In the case of bat 106, the maternity roost was located within 50m of suburban areas with streetlights. The field surveyor reported the roost location was relatively shielded from artificial light, although a house garden was within 25m of the roost tree. In 2021, one likely maternity roost was located in a small copse south of the A27 north of the suburban area known as Hermitage.

4.1.3 The radio tracking surveys of 2017/21 appear to support the model of Bechstein's bats use of the landscape elsewhere in the Havant area. For instance, research on Bechstein's bat conducted in the Horndean/Rowlands Castle area in 2014 (Davidson-Watts 2014), found that foraging habitat use of Bechstein's bat focussed on the large, forested areas (generally owned and managed by the Forestry Commission). However, roosting habitat within these areas was considered sub optimal, and contrary to studies of this species elsewhere (Davidson-Watts, 2008), breeding populations at Horndean were found roosting in small outlying copses usually within 1km of a major forest. In this situation, bats from the Horndean/Rowland Castle area used a range of treelines and hedges occurring around horse, cattle and sheep grazed pasture, to commute to the forestry areas to forage. This appears to be the same pattern of behaviour for the population using Long Copse (part of Southleigh Forest adjoining the norther boundary of the Site) and the rest of the Southleigh Forest complex.

4.1.4 Furthermore, in the case of the proposed development north of Long Copse Lane, the Portsmouth Water data (2009) also supports the same roosting behaviour in respect of the site and its relationship with Southleigh Forest, in that the roosting site found in the south-west part of the site in 2009 is not in the main forest area and bats use relatively open (i.e. not closed canopy) habitats to commute to foraging areas in the main forest.

4.1.5 It is also important to note that data from 2021 has increased the understanding of the roosting patterns of the bats in 2017 and the use of roost trees in less forested/fragmented areas. The value of the River Ems corridor as a commuting route to roosting areas to the south cannot be understated and the treelined eastern boundary of the site is likely to have an important role in maintaining ecological connectively to the local Bechstein's bat population. Furthermore, tracked Bechstein's bats made use of the tree line vegetation along the A27 and were regularly confirmed crossing over the dual carriage way, especially when roosting south of the A27 in June 2021.

4.2 EVALUATION

4.2.1 In conclusion, the previous presence of a maternity population of Bechstein's located on the Site in 2009 and the continued presence of breeding Bechstein's bats on the northern and eastern boundaries from both the trapping survey in 2016 and the radio tracking studies, suggests that the Site has an important role for local Bechstein's bats using the Southleigh Forest complex during the breeding season, primarily as a commuting route.

4.2.2 Bechstein's bats are one of the rarest bat species in the UK and Europe, and the population at Southleigh Forest is one of only three known meta populations in Hampshire (Hampshire being central to the known range of this species in the UK), the role of the Site, primarily for commuting bats is therefore considered of **National** significance for this species.

5 Impacts and Mitigation

5.1 POTENTIAL IMPACTS

5.1.1 Although there appears to be some element of foraging behaviour in the north-east of the Site and likely use of the eastern boundary, the data suggest that the main role of the Site for the local Bechstein's bat breeding population centred around Long Copse Hill and the wider Southleigh Forest is primarily for commuting bats. The 2009 and 2017/2021 data have found key maternity roosts located either at the southern boundary of the Site (2009 data) or up to 1km from the southern boundary of the site to the east of New Brighton (2017/2021 data).

5.1.2 Treelines and woodland copses linking the roosting areas to the south (Westbourne/Hermitage) with Southleigh are of high conservation value. This includes the site's northern, eastern and western boundary which are known or likely Bechstein's bat commuting/foraging areas.

5.1.3 Without any mitigation, direct impacts during construction from the removal of roost trees, potential roost trees and the creation of gaps within existing/used treelines supporting commuting habitat would be certain to have a significant adverse effect at the National level. In addition, noise, dust and general construction activity may deter bats from using the proposed development site during this phase.

5.1.4 Without mitigation, operational/long term impacts of the development include light spill from the proposed development, which is likely to have a detrimental impact on Bechstein's bats that use the flight lines as well as known and potential roosting areas. This is particularly relevant for Bechstein's as they are generally considered as species associated with darker rural areas.

5.1.5 Furthermore, without mitigation, recreational and general human activity from an increase in the local population is likely to have an indirect negative impact on these tree roosting bats if potential roosts trees are felled or topped as a result of health and safety concerns relating to dead trees or limbs and increase proximity and frequency of disturbance events, as well as use of the woodland areas for recreation generally.

5.2 MITIGATION

5.2.1 The primary objective of mitigation from the potential impacts associated with the proposed development is the protection and/or enhancement of known and/or potential bat commuting routes and the protection of known roosting areas on or adjacent to the Site.

5.2.2 As part of the masterplan development process for this development, Bechstein's bat mitigation (and other bats species) have been the starting point for creating a Green Infrastructure-led masterplan which retains and enhances the existing environmental assets. Based on the Portsmouth Water bat data and the radio tracking data from 2017/2021, key native treelines are being retained and

enhanced within the inherent design of the masterplan (see Figure 6). In particular, two significant bat corridors of at least 25-35m in width are being provided on the eastern boundary and from the Colman's copse adjacent to Long Copse Lane (T3) linking with woodlands around Hollybank House, and most significantly a 30m+ buffer on the northern boundary of the site adjacent to Southleigh Forest.

5.2.3 There will be no roads constructed within the main bat corridor on the eastern boundary. Where other corridors are bisected by road access, high canopy vegetation will be retained adjacent to these roads where possible to retain bat flight corridors, even if it means damaging tree roots as part of the construction as the affected trees will have some further life as a bat crossing feature. Semi-mature tree plantings to replace these features should be planted as soon as possible.

5.2.4 The Colman's copse located adjacent to Long Copse Lane (T3), identified by the Portsmouth Water surveys in 2009 as a known roosting site, will be protected from the development through 25-35m buffers area. Working with other stakeholders, a bat box scheme on and off Site providing short to medium term roosting opportunities for these bats should be developed. Ideally this scheme should extend to the Southleigh Forest areas and collaboration with the Forestry Commission will be required.

5.2.5 Bechstein's bats are considered to be a light adverse species, and the management of lighting impacts will be critical as part of the mitigation strategy. The main commuting corridors for Bechstein's bat on the eastern and northern boundaries of the site, as well as Colman's copse on the western boundary of the site should be primarily managed to maintain or reduce existing light levels. Lighting assessments will follow guidelines set out in the Trowbridge Bat Mitigation Strategy (John's Associates, 2019), which has developed agreed parameters to address development impacts on rare bat species including Bechstein's bat. This will result in bat buffers being <1lux at their start reducing to <0.2 lux on the horizontal plane and <0.4 lux on the vertical plane for any adjacent lighting (street, housing etc).

5.2.6 Management is required to ensure long term provision of these measures and the appropriate management of potential buffers and human related disturbance/activities. It is therefore recommended that a management plan be developed to identify key areas for bats and recreational use and proactively manage these areas to achieve both objectives in conserving potential bat roosts/dark corridors and providing safe recreational use of the woodland areas for the public.

5.3 ENHANCEMENT

5.3.1 In line with biodiversity net gain principles, 1.6 ha of new Bechstein's bat habitat is to be created on the Stansted Estate within the home range of the local Bechstein's bat population in the wider area (Portsmouth Water 2009). This will provide a woodland link between Southleigh and Stansted Forest and increase woodland foraging and commuting habitats. This is in addition to new woodland planting being established for nitrate compensation in the same area (>5ha).

5.4 MONITORING

5.4.1 Monitoring of the effectiveness of these mitigation measures should be undertaken through undertaking baseline assessment one year prior to construction and for year's 1 to 3 post construction, at year 5 and at years 8 and 12.

5.5 RESIDUAL IMPACTS ON BECHSTEIN'S BATS

5.5.1 Subject to the implementation of the full range of mitigation and compensation measures, it is considered that the residual impact of the proposed development will be neutral.

6 References

Bat Conservation Trust (2016). National Bat Monitoring Programme Report. London.

Collins, J. (ed) (2016). Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd Ed). The Bat Conservation Trust. London.

Davidson-Watts, I.F. (2008). Isle of Wight Woodland Bat Project. Final Report of the Peoples Trust for Endangered Species. London.

Davidson-Watts Ecology Ltd (2014). Bechstein's bat survey report for the development of Land East of Horndean. Report for WYG. Davidson-Watts Ecology Ltd. Gloucester.

Davidson-Watts Ecology Ltd (2017). Land at Hollybank Farm. Bat Trapping Survey and Bechstein's Bat Assessment for Land and Partners Lt. Gloucester.

Johns Associates (2019). Trowbridge Bat Mitigation Strategy. Report for the Draft Wiltshire Housing Site Allocations Plan- Wiltshire County Council. Trowbridge.

Hill, D. A. and Greenaway, F.G. (2005). Effectiveness of an acoustic lure for surveying bats in British woodlands. Mammal Review, 35, 116-122.

White, G. C. and Garrott, R.A. (1990). Analysis of wildlife radio-tracking data. Academic Press, San Diego, California.

Figure 1 Trapping Locations and survey areas (red line)

Long Copse Lane
Advanced bat surveys
Land and Partners

davidson-watts ecology ltd

Figure 2 All Radio Tracking Locations/Fixes

Long Copse Lane
Advanced bat surveys
Land and Partners

davidson-watts ecology ltd

Figure 3 Radio Tracking fixes near to the Site

Long Copse Lane
Advanced bat surveys
Land and Partners

davidson-watts ecology ltd

Figure 4 Female Bechstein's bat (106) radio-tracking data June 2017

Long Copse Lane
Advanced bat surveys
Land and Partners

davidson-watts ecology ltd

Figure 5 Male juvenile Bechstein's bat (108) radio-tracking data August 2017

Long Copse Lane
Advanced bat surveys
Land and Partners

davidson-watts ecology ltd

Figure 6 Female Bechstein's bat (708) radio-tracking data

Long Copse Lane
Advanced bat surveys
Land and Partners

davidson-watts ecology ltd

Figure 7 Female Bechstein's bat (691) radio-tracking data

Long Copse Lane
Advanced bat surveys
Land and Partners

davidson-watts ecology ltd

Figure 8 Female Bechstein's bat (705) radio-tracking data

Long Copse Lane
Advanced bat surveys
Land and Partners

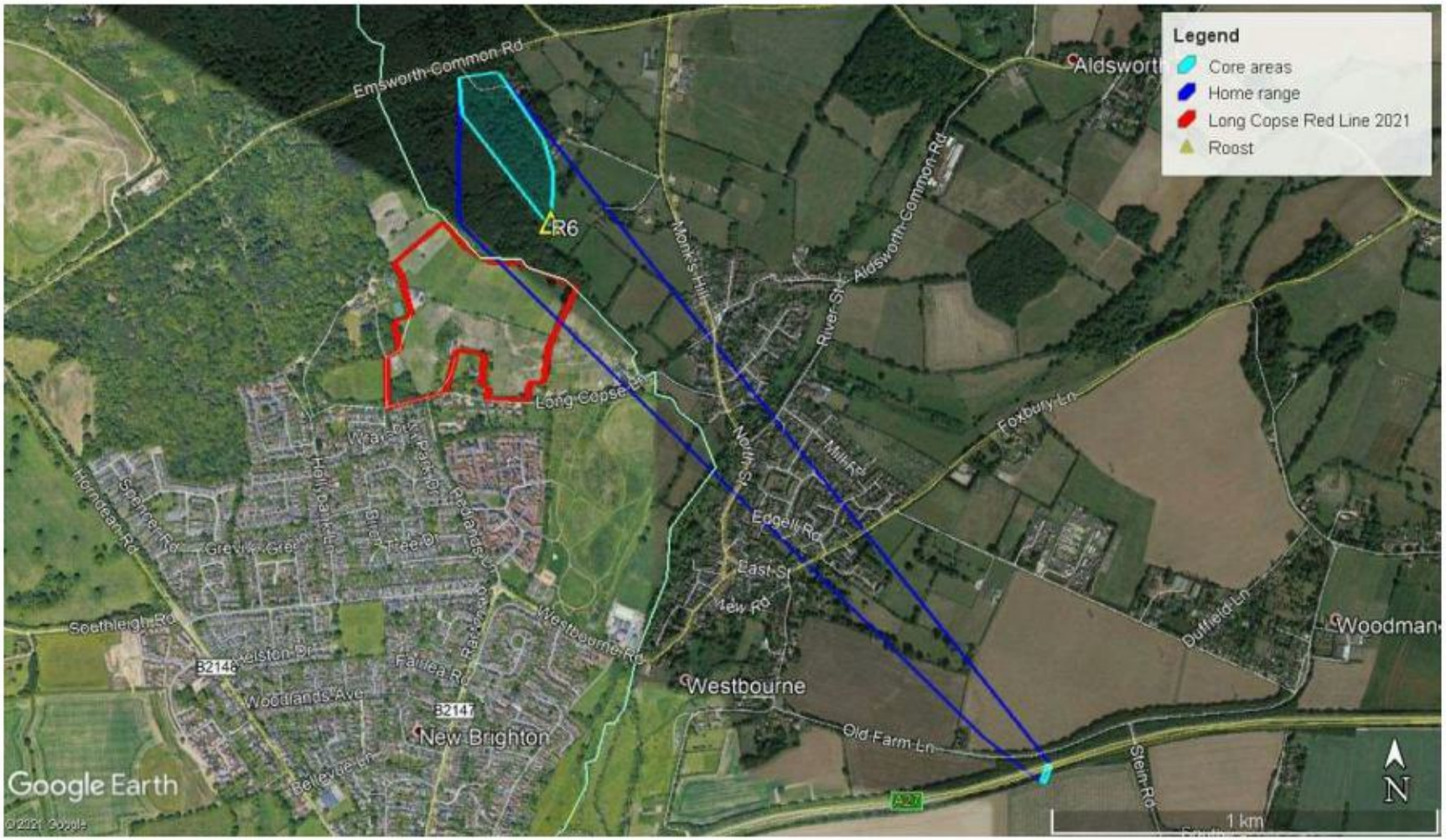
davidson-watts ecology ltd

Figure 9 Female Bechstein's bat (107) radio-tracking data

Long Copse Lane
Advanced bat surveys
Land and Partners

davidson-watts ecology ltd

Figure 10 Female Bechstein's bat (207) radio-tracking data



Long Copse Lane
Advanced bat surveys
Land and Partners

davidson-watts ecology ltd

Figure 11 Female Bechstein's bat (307) radio-tracking data

Long Copse Lane
Advanced bat surveys
Land and Partners

davidson-watts ecology ltd

Appendix A Roost photographs

Plate 1 – Female Bechstein's bat (bat 106 R1) June 2017

Plate 2 – Female Bechstein's roost -oak tree (bat 106 R2) – June 2017

Plate 3 – Bechstein's male juvenile roost -oak tree (bat 108 R3) – August 2017

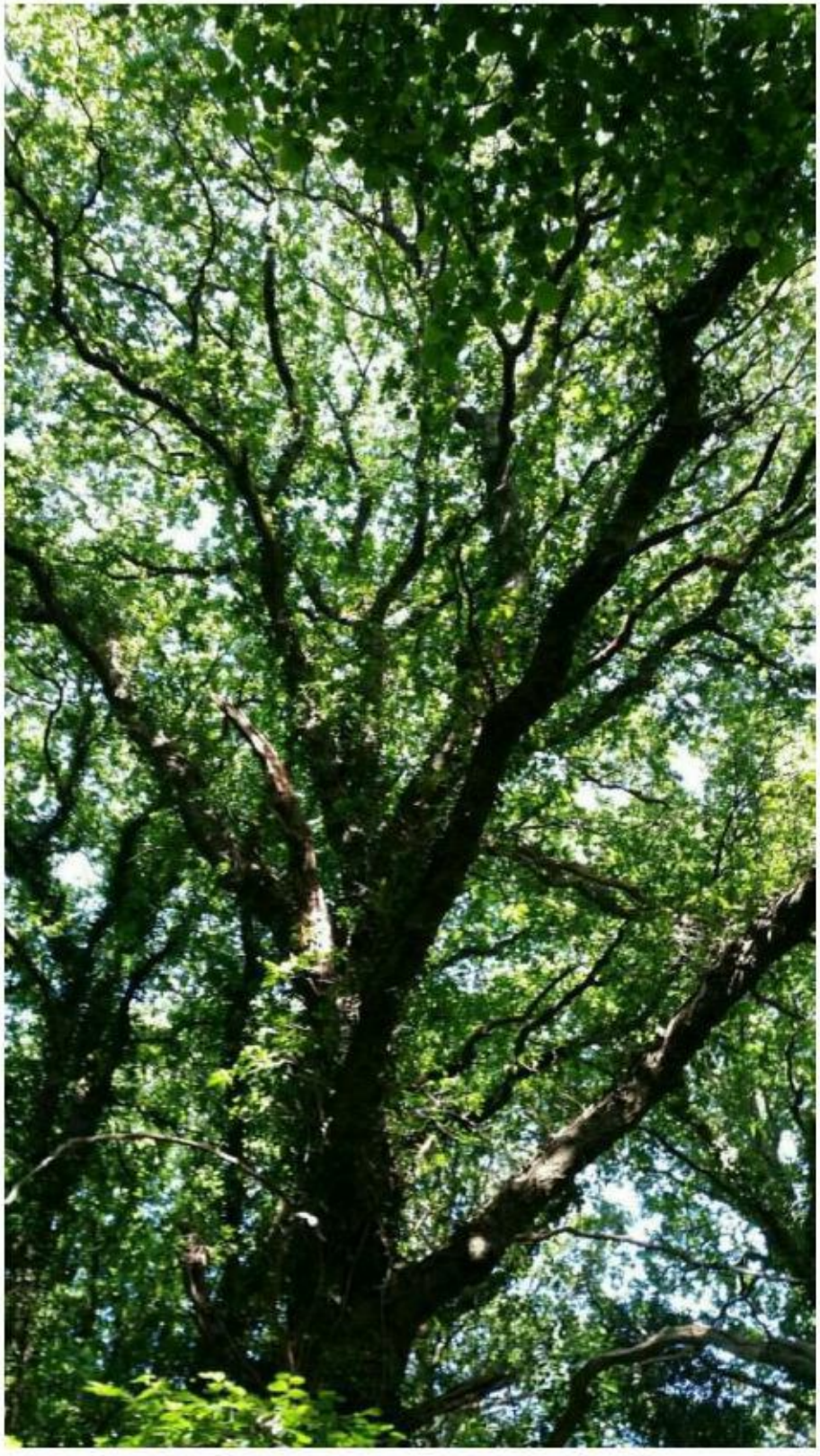


Plate 4 – Bechstein's male juvenile roost -ash tree (bat 108 R4) – August 2017

Plate 5 - Bechstein's maternity roost -ash tree (bat 107, 207, 307 R6) – July 2021

Appendix B Bat trapping data

Trap Area	Date (at start)	Species	Sex	Age (class)	Breeding status	Ring No.	Bat ref
4	28/07/2021	*No captures*					
2	27/07/2021	*Myotis bechsteinii*	Female	Adult	Post lactating		307
2	27/07/2021	*Myotis bechsteinii*	Female	Adult	Post lactating		207
2	27/07/201	*Myotis bechsteinii*	Female	Adult	Non-breeding		107
3	26/07/2021	*No captures*					
2	07/06/2021	*Myotis nattereri*	Female	Adult	Pregnant		
2	07/06/2021	*Myotis nattereri*	Female	Adult	Pregnant		
2	07/06/2021	*Plecotus auritus*	*Male*	Adult			
2	07/06/2021	Small *Myotis*	Male	Adult			
2	07/06/2021	*Myotis bechsteinii*	Female	Adult	Non-breeding		708
2	07/06/2021	Small *Myotis*	Male	Adult			
2	07/06/2021	*Whiskered/Brandt's*	Female	Adult	Non-breeding		
2	07/06/2021	*Myotis daubentonii*	Female	Adult	Pregnant		
2	07/06/2021	*Myotis nattereri*	Female	Adult	Pregnant		
2	07/06/2021	*Myotis nattereri*	Female	Adult	Pregnant		
2	07/06/2021	*Myotis daubentonii*	Male	Adult			

2	08/06/2021	*Myotis bechsteinii*	Female	Adult	Non-breeding		691
2	08/06/2021	*Myotis nattereri*	Male	Adult			
2	08/06/2021	*Nyctalus noctula*	Male	Adult			
2	08/06/2021	*Pipistrellus pygmaeus*	Male	Adult			
2	08/06/2021	*Pipistrellus pygmaeus*	Female	Adult	Pregnant		
2	08/06/2021	*Pipistrellus pygmaeus*	Male	Adult			
2	08/06/2021	*Myotis nattereri*	Female	Adult	Non-breeding		
2	08/06/2021	*Myotis bechsteinii*	Female	Adult	Pregnant		
4	09/06/2021	*Plecotus auritus*	Male	Adult			
3	07/06/2021	Myotis mystacinus / brandtii	Female	Adult	Non-breeding		
2	08/06/2021	Myotis mystacinus / brandtii / alcathoe	Male	Adult			
2	08/06/2021	Myotis bechsteinii	Female	Adult	Non-breeding		705
2	08/06/2021	Myotis bechsteinii	Female	Adult	Non-breeding		
2	4th June 2017	Pipistrellus pygmaeus	Male	Adult			
2		Myotis nattererii	Male	Adult			
2		Myotis mystacinus	Male	Adult			
2		Myotis sp (W/B)	Female	Adult	Pregnant		
2		Myotis bechsteinii	Female	Adult	Pregnant	Z 4446	106
2		Myotis nattererii	Female	Adult	Pregnant		
2	6th June 2017	Myotis mystacinus	Male	Adult			
2		Myotis daubentonii	Male	Adult			
2		Myotis nattererii	Female	Adult	Not pregnant		

2		Myotis bechsteinii	Female	Adult	Pregnant	Z 4446 - recapture	106
1	4th June 2017	No captures					
3		Myotis mystacinus	Male	Adult			
3		Myotis brandti	Male	Adult			
3		Myotis nattererii	Male	Adult			
1	6th June 2017	No captures					
2	6th August 2017	Plecotus auritus	Female	Adult	Post-lactating		
2		Myotis nattererii	Male	Juvenile			
2		Myotis nattereri	Female	Adult	Non-parous		
2		Myotis sp (W/B)	Female	Juvenile			
2		Myotis sp (W/B)	Female	Juvenile			
2		Plecotus auritus	Male	Adult			
2	7th August 2017	Plecotus auritus	Female	Adult	Post-lactating		
2	7th August 2017	Myotis bechsteinii	Male	Juvenile		J5498	108