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Contents

1. Introduction

1.1 Background

1.1.1 This Bat Radio-tracking Report has been produced as an appendix to Chapter 8: Ecology and Biodiversity (document reference 6.8) of the Environment Statement (ES) (Volume 6 of the Development Consent Order (DCO) application) for Norwich to Tilbury (the 'Project'). This report details the approach to surveying roosting bats, through Advanced Licence Bat Survey Techniques (ALBST) as identified through consultation with Natural England, who agreed the scope in May 2024. The survey methods and roost characterisations reflect best practice guidelines published in September 2023 (Collins, J. (ed.) (2023)).

1.1.2 The Environmental Impact Assessment (EIA) Scoping Report (document reference 6.19) for the Project, issued to the Planning Inspectorate in November 2022 defined the proposed scope of the bat surveys to be conducted for the Project. It was anticipated that the landscape surrounding the Project contained habitat suitable for bats that is well connected to the wider landscape by features such as rivers, tree-lined watercourses, arable field margins, extensive hedgerows, and broadleaved woodland. These habitats have the potential to support a wide range of UK bat species, including rare woodland bats (i.e., barbastelle *Barbastella barbastellus*) that do not occur where habitat diversity is of lower quality.

1.1.3 The general approach to impact assessment for bats is to ensure that the impacts to bats are avoided, where possible, minimised and/or mitigation provided to maintain the favourable conservation status (FCS) of species present that utilise the habitats across the Project. Overall, the Project approach aims to provide replacement and/or areas of better-quality habitat than that affected by the Project and ensure that these habitats are well connected to the wider landscape. This would be achieved by avoiding permanent effects to habitats of perceived value to bats, reinstating habitats affected by temporary habitat loss to equal or better condition than existing and improving the quality and availability of ecological networks across the Project.

1.1.4 Based upon this approach, the EIA Scoping Report (National Grid, 2022) identified the need for surveys for bats where:

- Trees required removal to facilitate the construction of the Project
- Where significant potential adverse effects to roosting, foraging, and commuting bats may occur, for example, in areas where underground cables, Cable Sealing End (CSE) compounds, new and extensions to existing substations and associated construction areas are proposed
- No buildings or other man-made structures have been identified that would be removed by the Project and so there has been no assessment for roosting bats on structures.

ALBST Survey Scope

1.1.5 ALBST is a more detailed roost survey and has been undertaken to more clearly evaluate the impacts to bat populations where potential high impacts are anticipated. These are focused on:

- Habitats of important value for tree-dwelling, woodland roosting bats (i.e., barbastelle)
- Locations where roosts of high conservation value (i.e., maternity roosts) have been identified, which cannot be avoided through the design of the Project.

1.1.6 This report details the approach to surveying roosting bats, through ALBST. This report should be read in conjunction with the following two bat reports:

- Appendix 8.9: Bat Roosting Report provides the approach to the Ground Level Tree Assessment (GLTA) surveys (document reference 6.8.A9)
- Appendix 8.10: Bat Activity Report provides the approach to bat activity surveys (using static detectors) (document reference 6.8.A10).

1.1.7 The Project has also been sub-divided into eight geographical sections for reader accessibility, based largely on Local Planning Authority boundaries. As shown on Figure 1.1: Site Location Plan and Project Sections (document reference 6.1.F1) and comprise:

- Section A – South Norfolk Council
- Section B – Mid-Suffolk District Council
- Section C – Babergh District Council, Colchester City Council and Tendring District Council
- Section D – Colchester City Council
- Section E – Braintree District Council
- Section F – Chelmsford City Council and Brentwood District Council
- Section G – Basildon Borough Council and Brentwood Borough Council (and part of Chelmsford City Council)
- Section H – Thurrock Council.

1.2 Brief and Objectives

1.2.1 The brief of the survey work was to establish a robust baseline for roosting bats to support an impact assessment through undertaking the following:

- Complete a detailed desk study of bat presence and confirmed roosts
- Use the baseline dataset to determine the importance of the Survey Area for roosting bats and key areas of bat activity
- Tagging and tracking individuals to roost locations to gain an understanding of tree suitability to support roosting bats, specifically focusing on target species such as barbastelle and establish the presence of roosting bats and key commuting flight line

- Determine the bat species assemblage and the sex, age and breeding status of bats at identified trapping locations.

1.3 Desk Study and Survey Area

1.3.1 A detailed desk study was undertaken in September 2023. The results of the desk study are presented in Appendix 8.9: Bat Roosting Report (document reference 6.8.A9).

1.3.2 The ‘Survey Area’ is shown on Figure A8.11.1: Survey Locations in Annex A. This area was selected considering the nature of work where impacts to habitats of important value for tree-dwelling, woodland roosting bats (i.e., barbastelle) and locations where roosts of high conservation value (i.e., maternity roosts) could not be avoided.

2. Relevant Legislation and Policy

2.1 Legal Compliance

2.1.1 Surveys and assessments have been undertaken in accordance with current legislation and planning policy in the context of the Project. A summary of the relevant legislation and policy is provided in Table A8.11.1.

Table A8.11.1 Legal compliance

Legislation	Details
Conservation of Habitats and Species Regulations 2017 (as amended in 2019) ('Habitats Regulations')	The Regulations require authorities on behalf of the Secretary of State to maintain a list of sites which are important for bats (Special Areas of Conservation (Special Areas of Conservation (SACs)) and to provide protection for these sites through designation, planning, and other controls. Barbastelle, Bechstein's bat *Myotis bechsteinii*, greater horseshoe bat *Rhinolophus ferrumequinum* and lesser horseshoe bat *Rhinolophus hipposideros* are also listed on Annex II of the European Habitats Directive, which means that SACs may be attributed to internationally important roosts and foraging areas of these species. The Regulations make it an offence (subject to exceptions) to deliberately capture, kill, injure, disturb, trade in, damage or destroy a breeding site or resting place of the animals such as bats that are listed in Schedule 2. However, these actions can be made lawful through the granting of licences by the appropriate authority (Natural England). Licences may be granted for several purposes (such as science and education, conservation, preserving public health and safety), but only after the appropriate authority is satisfied that there are no satisfactory alternatives and that such actions will have no detrimental effect on the favourable conservation status of the bat species concerned.
The Environment Act 2021	The Environment Act 2021 is a significant legislative framework aimed at enhancing environmental protection and biodiversity in the UK. In relation to bats, the Act reinforces existing measures to safeguard their habitats, as they are vital indicators of ecosystem health. It includes provisions that require public authorities to conserve and restore biodiversity, which directly supports bat populations by ensuring the protection of roosting sites and foraging areas. Additionally, the Act introduces Biodiversity Net Gain requirements for new developments, mandating that construction projects must leave the natural environment in a better state, benefiting bat habitats. By embedding long-term strategies to improve ecological conditions, the Environment Act 2021 plays a critical role in addressing threats to bats caused by habitat loss and environmental degradation.
The Wildlife and Countryside Act 1981, as amended (WCA)	The Act is the main mechanism for legislative protection of wildlife in England. It gives protection to native species (particularly threatened species), their resting places and places of shelter by making it an offence

Legislation	Details
	to kill, injure, take, damage, destroy, sell, or possess them (with exceptions). All 18 native UK bat species receive protection under Schedule 5 of the Wildlife and Countryside Act 1981 (WCA) (as amended). Under this Act it is an offence to intentionally kill, injure or take any protected species; intentionally or recklessly damage, destroy or obstruct access to any structure or place which a protected species uses for shelter or protection; and intentionally or recklessly disturb any protected species while it is occupying a structure or place which it uses for shelter or protection.
The Natural Environment and Rural Communities (NERC) Act 2006	The NERC Act 2006 places a duty upon public bodies to maintain Section 41 (s41) lists of flora, fauna, and habitats and to consider these ecological features as a material consideration in planning. It also requires decision-makers to have regard to the conservation of biodiversity in England, when carrying out their normal functions. Seven species of bats are identified as species of principal importance these are: greater horseshoe bat; lesser horseshoe bat; Bechstein's bat; noctule *Nyctalus noctula*; soprano pipistrelle *Pipistrellus pygmaeus*; brown long-eared bat *Plecotus auritus*; and barbastelle.

2.1.2 FCS is the minimum threshold at which there is confidence that the species is thriving in England and is expected to continue to thrive sustainably in the future. The conservation status will be taken as 'favourable' when:

- Population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats
- The natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future
- There is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

2.1.3 Barbastelle bats are widely distributed through southern and central England, but they are uncommon and occur in low numbers. Their range is highly fragmented, reflecting the distribution of their preferred habitat of woodlands. As of July 2022, based on a comparison of the favourable values with the current values, barbastelle bats are not in FCS. To achieve FCS, barbastelle bat populations in the UK should increase to be within the range of 73,000 to147,000 individuals, occupying the habitat available across the species' current and historic range (Zeale M. R. K. & Natural England (2024)).

2.2 Planning Policy

2.2.1 Chapter 8: Ecology and Biodiversity (document reference 6.8) provides details of relevant planning policy.

3. Methodology

3.1 Desk Study

3.1.1 A desk study was conducted in September 2023, to identify records of bats across the Project. The results of the desk study are presented in Appendix 8.9: Bat Roosting Report (document reference 6.8.A9).

3.2 Site Selection

3.2.1 A range of factors were considered to inform the decision to use ALBST survey approaches. The primary factors were the potential impact pathways that may arise from the Project. This includes areas where potential impacts to bats were likely to be the highest, such as areas requiring the removal of large numbers of trees, areas where woodland is directly affected, or where several commuting lines between potential roost woodlands are likely to be impacted. Although every effort was made to avoid these high value areas through sensitive routeing, in some cases it could not be avoided due to construction challenges.

3.2.2 The key activities in respect of the Project from overhead lines, underground cables, substation and associated works areas (including haul roads), have the potential impacts to tree roosting bats, such as loss of commuting and foraging areas, loss of roost sites and indirect impacts on roosts.

3.2.3 In addition to considering the potential impact of the Project on bats, other contributory factors were assessed. This included the presence of rarer species such as barbastelle for which East Anglia is considered a hotspot. A review of presence records for barbastelle was undertaken and supported by predictions from habitat suitability models developed to support Natural England's FCS status assessment of the species (Zeale M. R. K. & Natural England (2024)).

3.2.4 As a final factor in how the locations were determined for the ALBST survey, a review of data from ongoing ground level tree assessment surveys was also undertaken to consider the prevalence of potential tree roosts for bat species in the areas affected.

3.2.5 A high-level review of the Project was undertaken to identify high risk and high impact areas requiring ALBST. One area on the border of Essex and Suffolk between Ipswich and Colchester, known as Blackbrook-Langham (Essex)/Stratford St Mary (Suffolk) (Section C), was identified as a site where there was the potential for impacts at a woodland resource level. Two defined woodland areas were surveyed, hereafter referred to as The Coombs (Ordnance Survey Grid Reference: TM 03659 33640) and Glebe Reservoir (Ordnance Survey Grid Reference: TM 03100 32448). These form the Survey Area, as shown on Figure A8.11.1: Survey Locations in Annex A.

3.2.6 Surveys were undertaken to provide information on bat populations so that appropriate mitigation could be developed for the Project.

3.3 Survey Methodology

3.3.1 Due to the challenge of finding bat roosts in trees and determining the presence of barbastelle, which emit low amplitude echolocation calls, by acoustic methods alone, and to determine the contextual importance of the Survey Area within the home range area of bats, advanced survey methods (Collins, J. (ed.) (2023)) were selected as the primary approach to meeting the Project aims. This involved the trapping of free-flying bats in the Survey Area and radio-tracking of individual bats to locate maternity and other roost types, as well as determining the use of the area by individual tagged bats during their nightly foraging and commuting activity.

3.3.2 As the use of a Survey Area can vary depending on the reproductive state of bats, two separate survey sessions were used to examine bat activity during the pre- and post-parturition periods, on 3 to 14 June 2024 and 12 to 23 August 2024, respectively.

3.3.3 Each survey session began with the trapping of bats in the two defined woodland areas within the Project, which are shown on Figure A8.11.1: Survey Locations in Annex A, to determine the bat assemblage and to select suitable bats for tagging. Following release, radio-tagged bats were subsequently followed by radio-tracking to locate roost sites and to examine nocturnal activity, with a focus on collecting data on the movement of bats within the development boundary. Where land access was granted, emergence counts were undertaken at identified roosts to determine the function of the roost and to provide an estimate of population size.

3.3.4 The following methods were undertaken in line with Chapter 9 (Advanced licensed bat survey methods) of Collins, J. (ed.) (2023) and under Natural England project licence 2024-68069-SCI-SCI, which permitted the radio-tagging and ringing of a total of 20 bats across the two survey sessions, including up to ten individuals of the following 'target' species: barbastelle; brown long-eared bat; Natterer's bat *Myotis nattereri*; Daubenton's bat *Myotis daubentonii*; whiskered bat *Myotis mystacinus*; Brandt's bat *Myotis brandtii*; noctule; Leisler's bat *Nyctalus leisleri*; common pipistrelle *Pipistrellus pipistrellus*; and soprano pipistrelle.

Trapping Methods

3.3.5 In 2024, trapping surveys were undertaken on nights 3 to 12 June, and 12 to 14 August by experienced surveyors that were Authorised Persons under the licence. Three 4 m^2 harp traps or 6 to 12 m mist nests were placed within woodland or along tracks or rides where bat activity was expected to be highest. The locations of individual traps used across all trapping surveys are shown on Figure A8.11.2: Trapping Locations in Annex A. A harp trap is a trap type specific to surveying bats, consisting of banks of vertical nylon filaments tightly strung to a free-standing rectangular frame of aluminium poles. Bats that fly into the filaments fall into a canvas holding bag below, from which they can be safely extracted by hand. The use of both harp traps and mist nets was permitted under the licence.

3.3.6 Acoustic lures (e.g., Sussex Autobat) emitting synthesised or pre-recorded bat echolocation and/or social calls were used to improve catch efficiency in woodland (Hill, D. A. & Greenaway, F.G. (2005)). A range of species calls were emitted from lures, but with a focus on barbastelle calls. Lures were placed next to harp traps and mist nets and any bats captured were identified, sexed, aged and the breeding status determined. Any bat not held for the purpose of tagging and radio-tracking was then

immediately released at the location of capture. In compliance with licence conditions, lures were not placed within 50 m of a known bat roost.

3.3.7 Target bats were fitted with lightweight radio-transmitter tags (Lotek Ltd, Wareham, Dorset, United Kingdom) weighing <5% of the weight of the bat using Torbot or Manfred Sauer skin adhesive solution, or similar proven adhesive. Surveys were timed to minimise disturbance to breeding females at the most sensitive period of their reproductive cycle, i.e. late pregnancy and early lactation, and tagging of these bats was avoided. Bats were processed quickly and released within 30 minutes of capture provided the glue attaching the transmitter had cured sufficiently.

3.3.8 Tagged bats were fitted with 2.9 mm or 4.2 mm aluminium rings (Porzana Ltd, Icklesham, East Sussex, United Kingdom) to allow identification of recaptured individuals and prevent repeated tagging of individual bats across different survey sessions (for pseudo replication and welfare reasons). Other bats of target species were also ringed to identify individuals in future should further surveys be undertaken at the Survey Area.

Tracking Methods

3.3.9 Tracking of bats was undertaken for a period of up to ten nights following capture. Bats were located to roosts during the day and were tracked for up to four hours following emergence at dusk to identify key commuting routes through the Survey Area and foraging activity within or immediately outside of the Order Limits. As such, the recording of positional fix data was focussed primarily on those bats that made greatest use of the Survey Area to better determine the impact of the Project on these individuals. Bats that made little use of the area following capture were considered of secondary importance in the context of evaluating impacts.

3.3.10 During tracking, the position of a bat was estimated by close approach (White, G. C. & Garrott, R.A. (1990)) whereby a surveyor obtained positional fixes (latitude and longitude) on a tagged bat by driving or walking in the direction of the strongest signal and remaining as close as possible. Where safe and permitted access was not possible, and close contact with a bat could not be maintained, positional fixes were obtained by triangulation whereby multiple compass bearings were taken around the bat over a short period of time to determine its approximate location, maintaining radio contact with the bat to assess change in location over time. In addition to latitude and longitude, each positional fix included the time of the record, an interpretation of bat behaviour (e.g., roosting, foraging or commuting) and additional observations made by surveyors such as changes in weather conditions.

3.3.11 The accuracy of triangulated locations was assessed to be +/-10 m within the Survey Area boundary, but up to +/-200 m where access on adjacent land was limited. This was based on surveyor experience, knowledge of the area, and the combined use of close approach and triangulation, rather than triangulation alone.

3.3.12 Given the main objective of radio-tracking was to record bat activity within the Order Limits, surveys were inherently biased towards recording bat foraging and commuting fixes on the Survey Area. When bats moved away from the area, they were typically not followed. As such, conventional home range analyses to determine home range areas and core areas of activity were not considered appropriate as the complete pattern of movements of a bat throughout the night was not recorded. Fix data recorded from bats is, therefore, presented as point data only and inferences

about the relative importance of the area to individual bats are made based on these point data.

Roost Emergence

3.3.13 When radio-tagged bats were tracked to accessible roost sites, subsequent roost exit counts were undertaken using infrared cameras (e.g. Canon XA40) with infrared illuminators, and/or thermal cameras (e.g. Infiray 640) 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.

Roost Evaluation Criteria

3.3.14 Ecological features and resources have been evaluated based on the approach described in 'UK Bat Mitigation Guidelines: a guide to impact assessment, mitigation and compensation for developments affecting bats'(Reason, P. F. and Wray, S. (2023)) whereby the value of a biodiversity receptor is determined within a defined geographical context using the following criteria:

- International
- National (England)
- Regional (East)
- County/District (City of Colchester)
- Local (or Parish) (Langham)
- At the site level only.

3.4 Dates of Survey and Personal

3.4.1 The ALBST surveys were conducted in two sessions through the active bat season (April to October, inclusive) these were during pre- and post-parturition periods, on 3 to 14 June 2024 and 12 to 23 August 2024, respectively. These surveys were undertaken by suitably experienced and competent class licensed bat ecologists, all of whom have several years undertaking trapping and tracking surveys. Lead surveyors for trapping using harp traps and acoustic lures held a minimum of Level 4 class licenced bat ecologist (Licence number: 2017-30522-CLS-CLS, 2019-40449-CLS-CLS).

3.4.2 Weather conditions were appropriate throughout trapping, radio-tracking and emergence survey work (i.e. temperatures of 10°C or above and with no persistent heavy rain or strong winds).

3.5 Notes and Limitations

3.5.1 Records held by local ecological record centres are collected on a voluntary basis; the absence of records does not demonstrate the absence of species; it may simply indicate a gap in recording coverage. The data collection is not exhaustive and can be biased towards areas with public access or where surveys have taken place to inform other development projects. It is possible that bats are present within/adjacent to the Order Limits that were not identified during the data searches; undertaking the surveys outlined in this report will ensure this is not a constraint to the impact assessment.

3.5.2 The survey techniques described in this report involve a sampling effort that is considered appropriate for obtaining information on the location of roosts, commuting routes and foraging areas potentially affected by the Project, while ensuring that local bat populations are not disturbed adversely by the survey method itself. 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 period.

3.5.3 Normal scientific best practice avoids using data collected on the night of capture for analysis of ranging behaviour due to the effects of disturbance from the capture/tagging procedure on behaviour of the bats. In this study, data collected during the first night of tracking was incorporated for analysis as some bats were trapped in locations where they were not recorded for the remainder of the study. The exclusion of this information would not have reflected what was known of their ranging behaviour and whilst rigorous scientific approaches have been adopted to objectively record and assess / interpret the radio-tracking data, the study's objectives were to primarily understand as much about the movement of bat species affected by the Project rather than test specific hypotheses.

3.5.4 The accuracy of positional fixes obtained by radiotelemetry can be a common problem in studies of fast-moving bats, particularly those species that have relatively large home ranges. Whilst methods such as triangulation can provide relatively rapid and systematic location data for bats, studies have shown that due to variability of surveyor skill, especially at distance, positional fixes may at times only be accurate to >250 m^2 e.g. (Bontadina *et al*., 2002).

3.5.5 A combination of triangulation and close approach methods were adopted to increase accuracy. Factors such as the landform, safe and permitted access to private land, and time bats spent in an area, can all affect the accuracy of fixes.

4. Results

4.1 Overview

4.1.1 The 2024 radio-tracking surveys, as discussed within Section 3 were undertaken twice over the bat active season (April to October, inclusive), the first session was from 3 to 14 June 2024 and the second session from 12 to 23 August 2024. The results of radio-tracking surveys are presented below. Field survey results are also presented on Figures Figure A8.11.3 to Figure A8.11.10 in Annex A.

4.2 Desk Study Results

4.2.1 For details on the desk study results, please refer to Appendix 8.9: Bat Roosting Report (document reference 6.8.A9).

4.3 Survey Results

Bat Trapping

4.3.1 During the two trapping survey sessions, a total of 124 bats from nine species were recorded, as shown in Image A8.11.1, including soprano pipistrelle (n[1]= 57 bats), common pipistrelle (n = 17), Natterer's bat (n = 17), brown long eared bat (n = 9), Daubenton's bat (n = 8), barbastelle (n = 7), noctule (n = 6), Leisler's bat (n = 2), and serotine (n = 1). Details of all bats caught during trapping surveys are provided in Annex B.

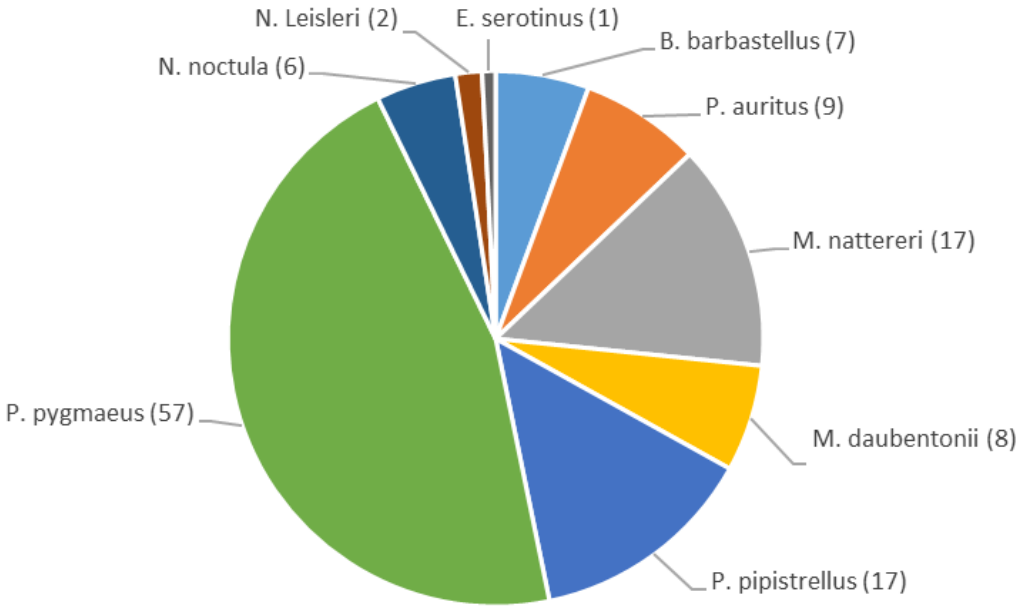
4.3.2 In June 2024, a total of 53 bats were caught. The majority of these were soprano pipistrelle (n = 19) and Natterer's bat (n = 13), followed by brown long-eared bat (n = 7), common pipistrelle (n = 6), Daubenton's bat (n = 4), barbastelle (n = 2), noctule (n = 1) and serotine (n = 1). Of the bats caught in June, 31 were female and 21 were male. Of the 31 females caught, 29 were pregnant comprising all the above species other than barbastelle, noctule and serotine. The single noctule and serotine caught were adult males. Of the two barbastelle caught, one was a non-breeding female which was subsequently radio-tagged and tracked. The other barbastelle escaped from the harp trap before the surveyor could place it in a bag for processing and therefore the sex and reproductive status of this bat was not determined.

4.3.3 In August 2024, a total of 71 bats were caught. Most were soprano pipistrelle (n = 38) and common pipistrelle (n = 11), followed by barbastelle (n = 5), noctule (n = 5), Natterer's bat (n = 4), Daubenton's bat (n = 4), brown long-eared bat (n = 2) and Leisler's bat (n = 2). Of the bats caught in August, 25 were adult female, 21 were adult male, and 25 were juvenile or subadult bats. Breeding females and/or juveniles of all the above species were caught, other than brown long-eared bat of which only adult males were caught.

4.3.4 Of the five barbastelle caught in August, two were adults, including one breeding (post-lactating) female and one non-breeding female, and three were juveniles, including one female and two males. The adult females and the single juvenile female were subsequently radio-tagged and tracked.

[1] 'n' = number of bats

Image A8.11.1 Number of Bats (*n* = 124) by Species Captured Across All Surveys within the Survey Area



Bat Tracking

4.3.5 A total of twenty bats of seven species were fitted with radio transmitters across the two survey sessions, including barbastelle (n = 4), brown long-eared bat (n = 3), Natterer's bat (n = 4), Daubenton's bat (n = 3), noctule (n = 1), Leisler's bat (n = 2), and soprano pipistrelle (n = 3) as shown in Table A8.11.2.

4.3.6 In June 2024, radio-tagged bats included one or more pregnant females of brown-long eared bat, Natterer's bat and Daubenton's bat, and males of Natterer's bat, Daubenton's bat and soprano pipistrelle. The single barbastelle tagged was a non-breeding female.

4.3.7 In August 2024, radio-tagged bats included a single post-lactating female Daubenton's bat and Leisler's bat, a non-breeding female noctule and a single adult male brown long-eared bat, Natterer's bat, Leisler's bat and soprano pipistrelle. Three barbastelle were also radio-tagged, including one post-lactating female, one non-breeding adult female and one juvenile female.

4.3.8 Most of the tagged bats made use of the Survey Area to some extent following release, either for roosting, foraging and/or commuting. Four bats (barbastelle BB16, Daubenton's bat MD19, and Leisler's bats NL13 and NL15) were not recorded again following release despite extensive searches in the surrounding landscape. Two other bats (Daubenton's bat MD09 and soprano pipistrelle PY18) were located to roosts within the area during the day but were not recorded in the area at night. As such few or no fix data were recorded for these bats. Results are shown in Table A8.11.2, and Figure A8.11.2: Trapping Locations in Annex A.

Table A8.11.2 Summary of bats radio-tagged[2]

Bat ref	Species	Sex	Age	Date Captured	Trap ID	n fixes
Survey Session 1 – June 2024						
MN01	*M. nattereri*	Male	Adult	03/06/2024	T8	31
PY02	*P. pygmaeus*	Male	Adult	03/06/2024	T5	48
BL03	*P. auritus*	Female*	Adult	03/06/2024	T11	35
MD04	*M. daubentonii*	Female*	Adult	03/06/2024	T3	38
PY05	*P. pygmaeus*	Male	Adult	04/06/2024	T17	33
MN06	*M. nattereri*	Male	Adult	04/06/2024	T17	45
BL07	*P. auritus*	Female*	Adult	04/06/2024	T17	26
BB08	*B. barbastellus*	Female	Adult	10/06/2024	T10	44
MD09	*M. daubentonii*	Male	Adult	12/06/2024	T2	1
MN10	*M. nattereri*	Female*	Adult	12/06/2024	T18	10
Survey Session 2 – August 2024						
BB11	*B. barbastellus*	Female*	Adult	12/08/2024	T8	34
MN12	*M. nattereri*	Male	Sub-adult	12/08/2024	T14	33
NL13	*N. leisleri*	Male	Adult	12/08/2024	T14	0
BL14	*P. auritus*	Male	Adult	12/08/2024	T11	10
NL15	*N. leisleri*	Female*	Adult	12/08/2024	T11	1
BB16	*B. barbastellus*	Female	Adult	12/08/2024	T14	0
BB17	*B. barbastellus*	Female	Juvenile	14/08/2024	T9	7
PY18	*P. pygmaeus*	Male	Adult	14/08/2024	T20	1
MD19	*M. daubentonii*	Female*	Adult	14/08/2024	T20	1
NN20	*N. noctula*	Female	Adult	14/08/2024	T7	68

** Breeding or post-breeding female*

[2] including trap location where each bat was caught and the total number of radio-tracking fixes recorded for each bat during surveys to identify commuting flight lines and foraging area up to four hours following emergence.

Roost Use

4.3.9 In total, 18 roosts were identified following tracking of radio-tagged bats, with most located within or adjacent to the Survey Area, which are shown in Table A8.11.3 and on Figure A8.11.3: Roost Locations in Annex A. Twelve roosts were identified within The Coombs area and four roosts were identified within or immediately adjacent to the Glebe Reservoir area, none of which are within the Order Limits. Details of all roosts are provided in Annex C.

4.3.10 Within The Coombs, emergence surveys confirmed the presence of barbastelle maternity roosts in trees (R8, R12, R13), brown long-eared bat (R3), Natterer's bat (R1, R2), and noctule (R18). A Natterer's bat maternity roost was also identified in the porch of a church (R10), as shown on Figure A8.11.3: Roost Locations in Annex A.

4.3.11 In addition to maternity roosts, day roosts used by a radio-tagged male Daubenton's bat (R9) and Natterer's bat (R11, R14) were identified within The Coombs, as well as a night roost used by a female noctule (R15) that may also have served as a mating roost based on the behaviour of the bat and the time of year the roost was used (August), and its temporary use only during the night. A male soprano pipistrelle (PY02) also made use of the Natterer's bat maternity roost, R2, as a day roost prior to it being occupied by Natterer's bats), as show on Figure A8.11.3: Roost Locations in Annex A. Table A8.11.3 summarises the roosts occupied by radio-tagged bats and provides a summary of the roost attribute, including number of bats (Count) recorded in the roost by emergence survey, the known or suspected roost type, and the use of roosts by radio-tagged bats (Use). Further details and plates of each roost are provided in Annex C: Details of roosts and shown on Figure A8.11.3: Roost Locations in Annex A.

Table A8.11.3 Roosts occupied by radio-tagged bats and summary roost attributes

Roost	Date Found	Species	Grid Reference	Roost Type	Count	Use	Distance from Order Limits (m)
R1*	04/06/2024	*Mnat*	TM 03917 33560†	Sycamore	27	MN01	373
R2*	04/06/2024	*Mnat, Ppyg*	TM 03696 33673†	Sycamore	6	MN01, PY02	356
R3*	04/06/2024	*Paur*	TM 03936 33406†	Oak	13	BL03	248
R4***	05/06/2024	*Ppyg*	TM 03080 32510	Building	-	PY05	26
R5**	05/06/2024	*Paur*	TM 02908 32571	Building	-	BL07	81
R6**	05/06/2024	*Mnat, Ppyg*	TM 02957 32248	Building	-	MN06, MN10, PY05	73
R7**	07/06/2024	*Mdau*	TM 04142 33101‡	Tree	-	MD04	350

Roost	Date Found	Species	Grid Reference	Roost Type	Count	Use	Distance from Order Limits (m)
R8*	10/06/2024	*Bbar*	TM 03768 33560†	Oak	33	BB08, BB11	278
R9***	13/06/2024	*Mdau*	TM 03677 33622†	Sycamore	1	MD09	302
R10*	13/06/2024	*Mnat*	TM 03447 33692	Church	12	MN01	346
R11***	13/08/2024	*Mnat*	TM 03767 33571†	Oak	1	MN12	287
R12*	15/08/2024	*Bbar*	TM 03810 33607†	Oak	7	BB17	341
R13*	15/08/2024	*Bbar*	TM 03954 33542†	Sycamore	19	BB11	375
R14***	15/08/2024	*Mnat*	TM 03675 33673†	Scots pine	1	MN12	352
R15****	15/08/2024	*Nnoc*	TM 03600 33746†	Poplar	-	NN20	327
R16**	15/08/2024	*Paur*	TM 05580 33159	Building	-	BL14	1776
R17***	15/08/2024	*Ppyg*	TM 03271 32544†	Tree	1	PY18	74
R18*	15/08/2024	*Nnoc*	TM 03435 33939†	Ash	53	NN20	108

** Confirmed maternity roost; ** suspected maternity roost; *** day roost; **** night/mating roost.*

† Location accurate to 20 m^2 for accessible roosts as based on Global Positioning Systems (GPS) signal under tree canopy.

‡ Location accurate to 100-250 m^2 for triangulated non-accessible roosts.

4.3.12 Within the Glebe Reservoir area, breeding female brown long-eared and Natterer's bats were tracked to suspected maternity roosts in farm buildings at Springfield Farm (R5) and Grove Farm (R6), respectively. Emergence surveys could not be carried on these roosts due to access restrictions.

4.3.13 In addition, day roosts for male soprano pipistrelles (R4, R17) were also identified with the Glebe Reservoir area, including in the same farm building at Grove Farm (R6) occupied by Natterer's bats.

4.3.14 Two additional roosts were identified further away from the Survey Area. A suspected Daubenton's bat maternity roost in an unconfirmed tree (R7) was triangulated from distance to an area of woodland at Gun Hill Place approximately 500 m east of the Project. In addition, a suspected brown long-eared bat maternity roost was located in a residential building (R16) approximately 2 km east of the Project. Due to access restrictions, emergence surveys were not carried out on either of these roosts.

Bat Activity Patterns

4.3.15 Most of the radio-tagged bats spent time foraging and commuting within the woodland of the Survey Areas, to a great or lesser extent, at either The Coombs or the Glebe Reservoir, or both. However, none of the bats foraged exclusively within these areas, as each were absent from the Survey Area at stages throughout the radio-tracking survey periods (typically up to four hours after sunset), i.e., the woodland probably represents only a portion of the total foraging areas of these bats.

4.3.16 Many of the foraging fixes recorded within the Survey Area were from bats within an hour or so following emergence, before ambient light levels fell sufficiently for bats to commute further away to other foraging areas.

4.3.17 Radio-tagged barbastelle (BB08, BB11, BB17) foraged and commuted through the Survey Area at both The Coombs and the Glebe Reservoir. BB11 foraged primarily outside the Order Limits to the east while BB08 commuted from The Coombs to the Glebe Reservoir after emergence and foraged primarily within and adjacent to the Order Limits at the Reservoir. Few positional fixes were recorded for BB17, and these were primarily records of the bat commuting north away from, or back towards the roosts at The Coombs, as shown on Figure A8.11.4: Radio-tracking data for *B. barbastelle* in Annex A.

4.3.18 Brown long-eared bats (BL03, BL07) were recorded foraging and commuting within the Survey Area at both The Coombs and Glebe Reservoir, albeit most of the foraging fixes recorded for bats were outside boundary. Key areas of activity were within woodland immediately adjacent to the Survey Area within the Coombs and an area of woodland (The Grove) 500 m to the south-west of the Order Limits at the Glebe Reservoir. A third tagged bat (BL14) was recorded little following release, with only a handful of foraging and commuting fixes recorded for the individual outside of the Order Limits to the east and as far as roost R16, approximately 2 km from the Survey Area as shown on Figure A8.11.5: Radio-tracking data for *P. auratus* in Annex A.

4.3.19 Natterer's bats (MN01, MN06, MN12) spent considerable time flying within or adjacent to the Survey Area at both The Coombs and the Glebe Reservoir. Individual bats were recorded commuting across the Survey Area at both The Coombs and the Glebe Reservoir. A fourth tagged bat (MN10) was recorded little in the Survey Area following release. The positional fixes recorded for this individual were focussed within woodland immediately adjacent to the Survey Area boundary at the Glebe Reservoir, as shown on Figure A8.11.6: Radio-tracking data for *M. nattereri* in Annex A.

4.3.20 A single Daubenton's bat (MD04) was recorded foraging within the Survey Area close to roosts at The Coombs following emergence. Commuting fixes suggest the main area of activity for this bat was to the north of the Survey Area. The main commuting flightlines used were along woodland corridors and treelines to the east outside of the Order Limits, as shown on Figure A8.11.7 Radio-tracking data for *M. daubentoniid* in Annex A.

4.3.21 Two soprano pipistrelles (PY02, PY05) spent significant time flying close to roosts at The Coombs (PY02) and the Glebe Reservoir (PY05). PY02 was also observed commuting north away from The Coombs along the same flight corridor used by MD04, as shown on Figure A8.11.8: Radio-tracking data for *P. pygmaeus* in Annex A.

4.3.22 The single tagged noctule (NN20) spent considerable time flying within or over the woodland inside the Survey Area at The Coombs, close to identified roosts (Annex A, Radio-tracking data for *N. noctula*). This bat also commuted north and away from the area at times, using similar flight lines as MD04 and PY02, as shown on Figure A8.11.9: Radio-tracking data for *N. noctula* in Annex A.

4.3.23 A composite of key commuting areas and flight lines for all bats combined is shown on Figure A8.11.10: Bat Radio-tracking Commuting Flightlines in Annex A.

5. Discussion

5.1.1 Trapping surveys revealed the Survey Area to be used by a wide range of bat species and is likely to be important for supporting maternity colonies of barbastelle, brown long-eared bat, Natterer's bat, Daubenton's bat, noctule, soprano pipistrelle and common pipistrelle. The presence of breeding Leisler's bats has also been confirmed, but the value of the area in supporting local populations of this species remains unclear as the two individuals that were radio-tagged, one post-lactating female and one adult male in August, were not recorded in the Survey Area again following release and bats during this period of the season can fly long distances from their roost sites.

5.1.2 Maternity roosts in trees have been confirmed located close to, but outside, the Order Limits boundary for barbastelle and Natterer's bat, and all the tree roosts identified within the Project were located within The Coombs area. All roosts identified within the Glebe Reservoir area were located close to, but outside, the Order Limits, as shown on Figure A8.11.3: Roost Locations in Annex A.

5.1.3 Of the seven roost trees that lie within The Coombs area, two are barbastelle maternity roosts considered to be of regional importance (Reason, P. F. and Wray, S. (2023)). One of these roosts (R8), was occupied during surveys in both June (maximum count of 18 bats) and August (maximum count of 33 bats), and the other roost (R12) was found to be occupied by 19 bats during an emergence survey in August. While both roosts are important for supporting the maternity colony, roost R8 may have particular importance for the population at the current time given the recorded repeated use.

5.1.4 Barbastelle are known to switch roosts frequently and as often as every 1 to 3 days, usually later in the breeding season when juvenile bats are flying, and a single maternity colony may use as many as 50 different tree roosts in a single breeding season (Zeale, M. R. K., Davidson-Watts, I. & Jones, G. (2012)). As such, while two roosts were identified on the border of the Order Limits during these surveys, it should be considered likely that many other trees are used by this population within and adjacent to the Project, wherever suitable roost features are available. In addition, as barbastelle typically use more ephemeral roosts, such as flaking bark, and therefore rely on new roost features developing regularly within roost woodlands, the roost resource within the Order Limits should be understood to be the whole woodland rather than a collection of known roost trees and potential roost features identified in the Survey Area at a given time.

5.1.5 Similarly, while a single Natterer's bat maternity roost (R2) has been identified within the Survey Area, radio-tracking provides only a snapshot of roost use by bats and so where other suitable roost features are available the species is expected to make use of those features. The single Natterer's bat maternity roost within the Survey Area is considered of County importance given the species is understood to be widespread in many areas in East Anglia although not abundant in all, and the maximum emergence count for the roost was 27 bats in June 2024, which is not atypically large for the species (Reason, P. F. and Wray, S. (2023)).

5.1.6 Other roosts identified within the Survey Area include day roosts for male Natterer's bat (R11, R14) and Daubenton's bat (R9), and a night roost/potential mating roost for noctule (R15). Each of these day roosts are of Local importance (Reason, P. F. and Wray, S. (2023)).

5.1.7 Without further confirmation of the function of the noctule night roost/mating roost, it is unclear what the importance of this roost is, based on the evidence to date, the roost is of precautionary local importance.

5.1.8 Beside roosting, the woodland areas in both The Coombs and The Glebe Reservoir Survey Areas provide valuable foraging and commuting habitat for barbastelle, brown long-eared bat, Natterer's bat, Daubenton's bat, soprano pipistrelle and noctule. Radio-tagged individuals of each of these species foraged within and commuted through woodland.

5.1.9 While none were radio-tracked, given the number of common pipistrelle bats caught during trapping surveys, it should be assumed that the Survey Area also provided valuable foraging and commuting habitat for this species. Common pipistrelle are also likely to be roosting within the woodland (based on DWE Unpublish data on use of other sites by common pipistrelle).

5.1.10 As only low numbers of Leisler's bat and serotine were caught in the Survey Area, and the two radio-tagged Leisler's bats did not make use of the Survey Area following release, the value of the habitats to these species remains unclear.

6. Conclusion

6.1.1 The evaluation of the importance of the area for bats is considered here in the context of the results of the trapping and radio-tracking surveys alone and does not consider other survey data collected on site, such as those from automated static surveys and/or GLTA surveys, or survey information collected outside of the trapping and radio-tracking survey sessions.

6.1.2 Of the nine bat species caught in the Survey Area, three species (common pipistrelle, soprano pipistrelle and brown long-eared bat) are considered widespread in East Anglia, three species (Natterer's bat, Daubenton's bat and noctule) are considered widespread in many geographies but not abundant in all, two species (Leisler's bat and serotine) are considered to be rarer with a restricted geographic distribution, and one (barbastelle) is a rare Annex II species, as shown in Table 3.1 in Reason, P. F. and Wray, S. (2023).

6.1.3 Following Reason, P. F. and Wray, S. (2023) for assessing the importance of the bat assemblage on a site, trapping data alone provide an assemblage score of 19 (68%) of a maximum possible 28 for locations within East Anglia. As such, based on results of the trapping and radio-tracking surveys alone, the area is considered to be of regional importance overall (scores of 55 to 70%) with respect to the assemblage of bats present and the value of the supporting habitats present.

Abbreviations

Abbreviation	Full Reference
ALBST	Advanced licence bat survey techniques
CSE	Cable Sealing End
DCO	Development Consent Order
EIA	Environmental Impact Assessment
ES	Environmental Statement
FCS	Favourable Conservation Status
GLTA	Ground Level Tree Assessment
GPS	Global Positioning Systems
NERC	Natural Environment and Rural Communities Act 2006
SAC	Special Areas of Conservation
WCA 1981	WCA 1981 Wildlife and Countryside Act 1981 (as amended)

Glossary

Term	Description
Biodiversity	The variability among living organisms from all sources including terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part: this includes diversity within species, between species and of ecosystems.
Cable	An insulated conductor designed for underground installation.
Cable Sealing End Compound	Electrical infrastructure used as the transition point between overhead lines and underground cables. A compound on the ground acts as the principal transition point.
Ecosystem	A dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit.
Environmental Impact Assessment (EIA)	An assessment of the likely effects of a development project on the environment, which is reported in an Environmental Statement that is publicised and consulted on and taken into account in the decision on whether a project should proceed.
Environmental Statement (ES)	The main output from the EIA process, an ES is the report required to accompany an application for development consent (under the Infrastructure Planning (EIA) Regulations 2017) to inform public and stakeholder consultation and the decision on whether a project should be allowed to proceed. The EIA Regulations set out specific requirements for the contents of an ES for Nationally Significant Infrastructure Projects.
European Protected Species	Animals and plants listed under the Habitats Directive and protected under the Conservation of Habitats and Species Regulations 2017, as amended.
European Protected Species Licence	The licence issued to permit an activity affecting European Protected Species that would otherwise be an offence under the Habitats Regulations.
Fauna	All the animals in a given area.
Flora	The plants within a particular habitat or region.
Habitat	The natural home or environment of an animal, plant, or other organism.
Landscape	An area, as perceived by people, the character of which is the result of the action and integration of natural and/or human factors.
Mitigation	The action of reducing the severity and magnitude of change (impact) to the environment.
National Planning Policy Framework	The National Planning Policy Framework is a key part of the government's reforms to make the planning system less complex and

Term	Description
	more accessible. It vastly simplifies the number of policy pages about planning. The planning practice guidance to support the framework is published online and regularly updated.
Order Limits	The maximum extent of land within which the authorised development may take place.
Overhead Line	Conductor (wire) carrying electric current, strung from pylon to pylon.
Special Area of Conservation	Protected sites designated under the Habitats Directive, representing internationally important, high-quality conservation sites.
Species	A group of living organisms consisting of similar individuals capable of exchanging genes or interbreeding.
Statutory designated site	A site which receives protection by means of legislation in recognition of its biodiversity value.
Substation	Substations are used to control the flow of power through the electricity system. They are also used to change (or transform) the voltage from a higher to lower voltage to allow it to be transmitted to local homes and businesses.
Underground cabling	An insulated conductor carrying electric current designed for underground installation. Underground cables link together two Cable Sealing End compounds.

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Annex A. Figures

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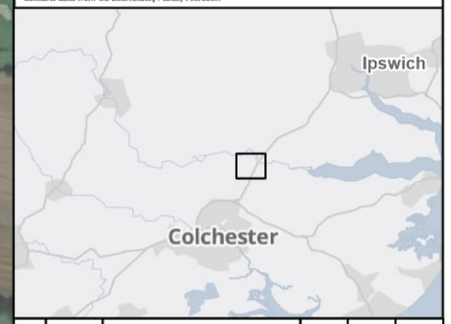
Doc Ref: 6.8.A11

Order limits

Bat radio-tracking survey

Survey areas

Note: For further details regarding the design, please refer to Figures 4.1 (document reference 6.4.F1) and 4.2 (document reference 6.4.F2).



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PROJECT: Norwich to Tilbury

Planning Inspectorate App Number: EN020027
Regulation 5(2)(a)

Title:

Figure A8.11.1 - Ecology and Biodiversity
Bat radio-tracking- Survey Locations

Designed	V. Handby	Date	21 Aug 25
Drawn	N. Banu	Date	21 Aug 25
Checked	A. Fell	Date	21 Aug 25
Approved	K. Burrows	Date	21 Aug 25
Scale:	1:10,000	Datum:	AOD
Original Size:	A3	Grid:	OS
Suitability Code:	A2	Project Number:	10059280

Suitability Description:
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Drawing Number: 10059280-ARC-EBD-ZZ-DR-ZZ-00304

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Order limits

Bat trapping

Trapping locations

Note: For further details regarding the design, please refer to Figures 4.1 (document reference 6.4.F1) and 4.2 (document reference 6.4.F2).

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PROJECT: Norwich to Tilbury

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Title:

Figure 8.11.2 - Ecology and Biodiversity
Bat radio-tracking- Trapping Locations

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Original Size:	A3	Grid:	OS
Suitability Code:	A2	Project Number:	10059280

Suitability Description:
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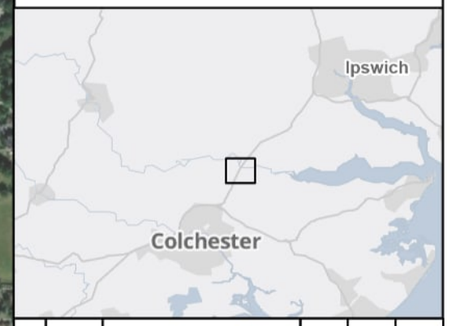
Order limits

Roost

Roost locations

Note: For further details regarding the design, please refer to Figures 4.1 (document reference 6.4.F1) and 4.2 (document reference 6.4.F2).



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A	Aug 2025	FOR DCO APPLICATION	NB	AF	KB

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Regulation 5(2)(a)

Title:

Figure 8.11.3 - Ecology and Biodiversity
Bat radio-tracking- Roost Locations

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Suitability Description:
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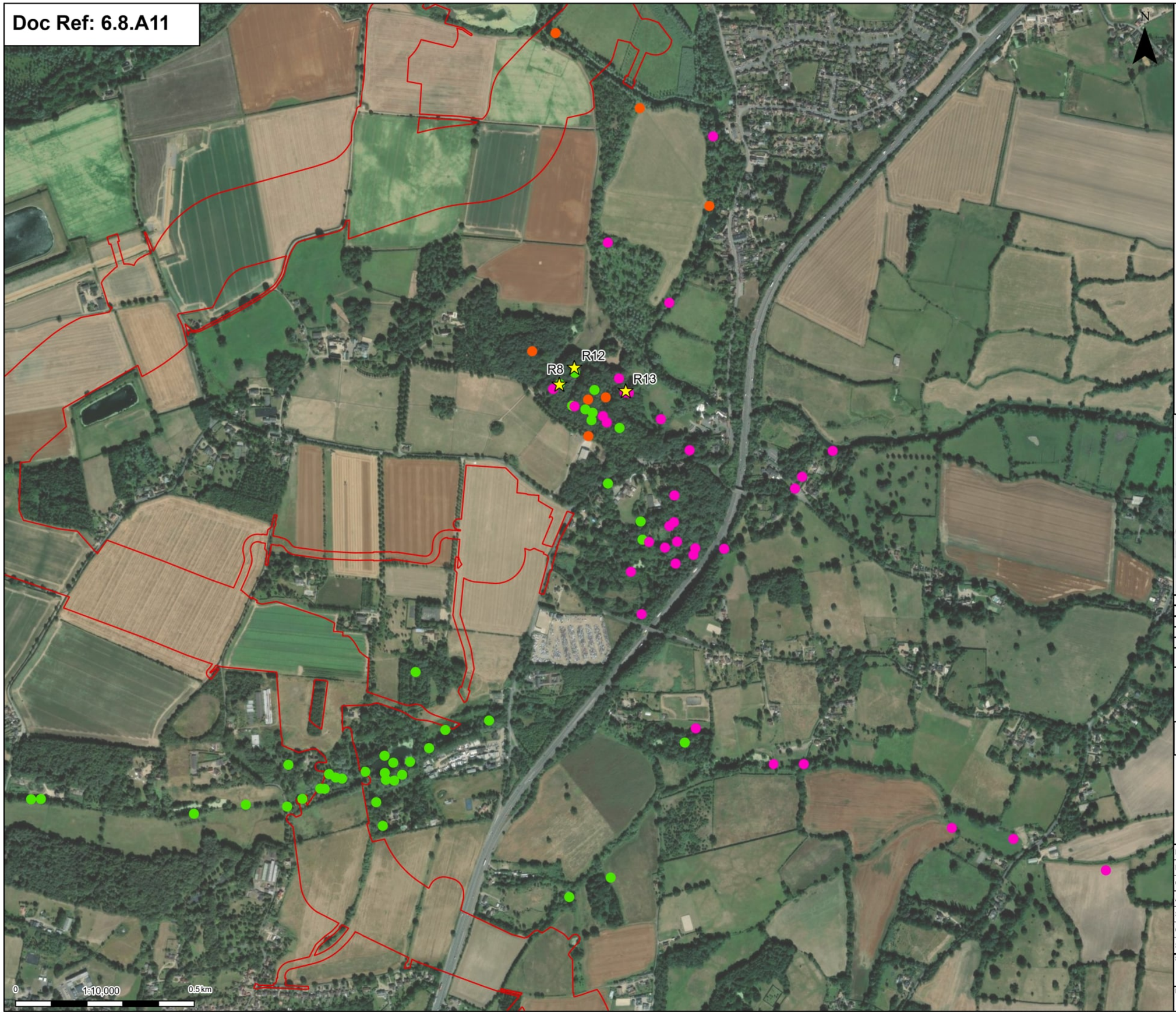

Order limits

Roost and Tagged bat locations

Roost

Barbastelle roost

Tagged bats activity

Barbastelle 08

Barbastelle 11

Barbastelle 17

Note: For further details regarding the design, please refer to Figures 4.1 (document reference 6.4.F1) and 4.2 (document reference 6.4.F2).

Rev	Date	Description	Drawn	Check	Approv
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Figure 8.11.4 - Ecology and Biodiversity
Bat radio-tracking
Radio Tracking Data for Barbastelle

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Original Size:	A3	Grid:	OS
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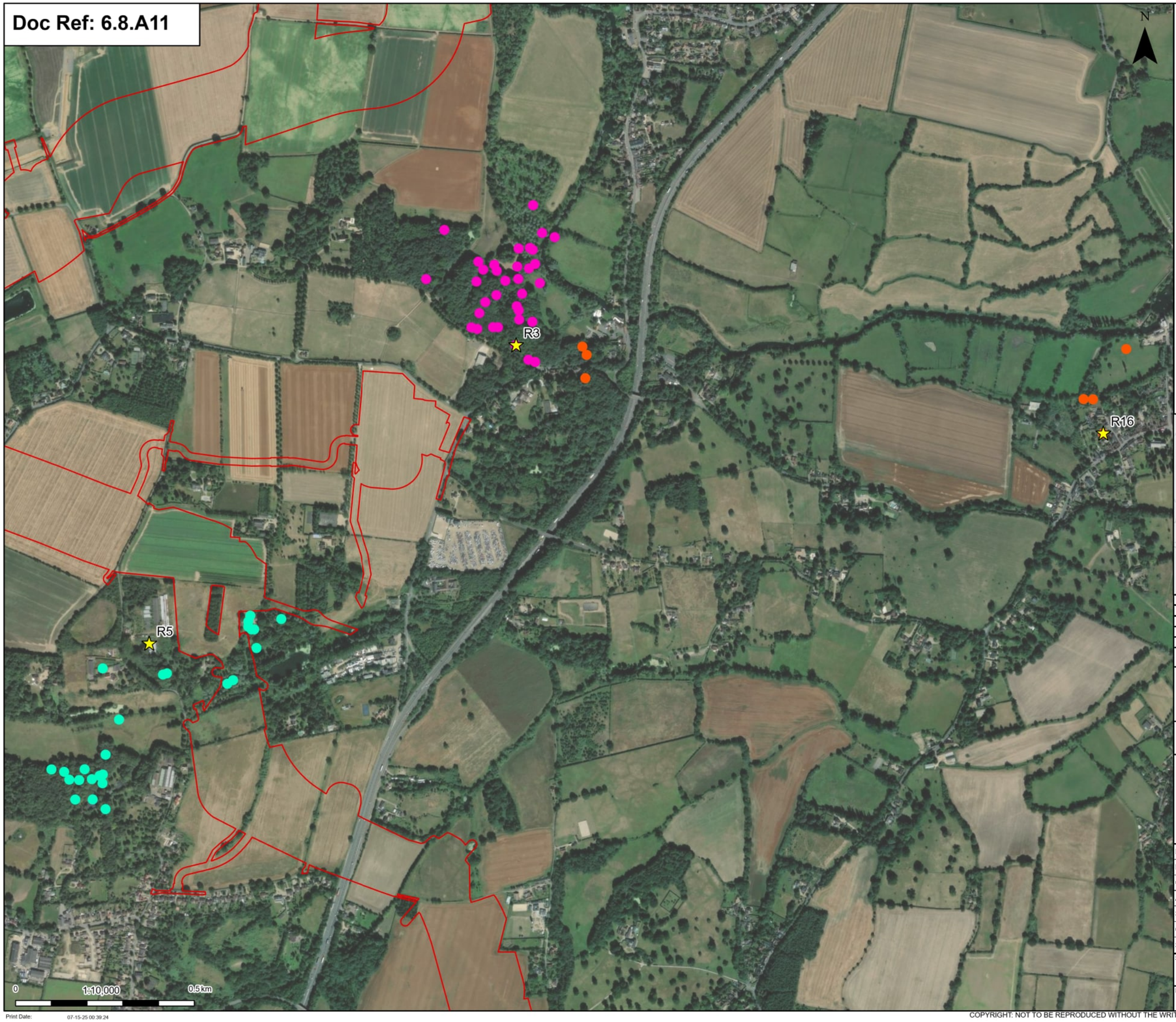

Order limits

Roost and Tagged bat locations

Roost

Brown Long-eared Bat roost

Tagged bats activity

Brown Long-eared Bat 03

Brown Long-eared Bat 07

Brown Long-eared Bat 14

Note: For further details regarding the design, please refer to Figures 4.1 (document reference 6.4.F1) and 4.2 (document reference 6.4.F2).

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PROJECT: Norwich to Tilbury

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Regulation 5(2)(a)

Title:

Figure 8.11.5 - Ecology and Biodiversity
Bat radio-tracking Data for
Brown Long-eared Bat

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Original Size:	A3	Grid:	OS
Suitability Code:	A2	Project Number:	10059280

Suitability Description:

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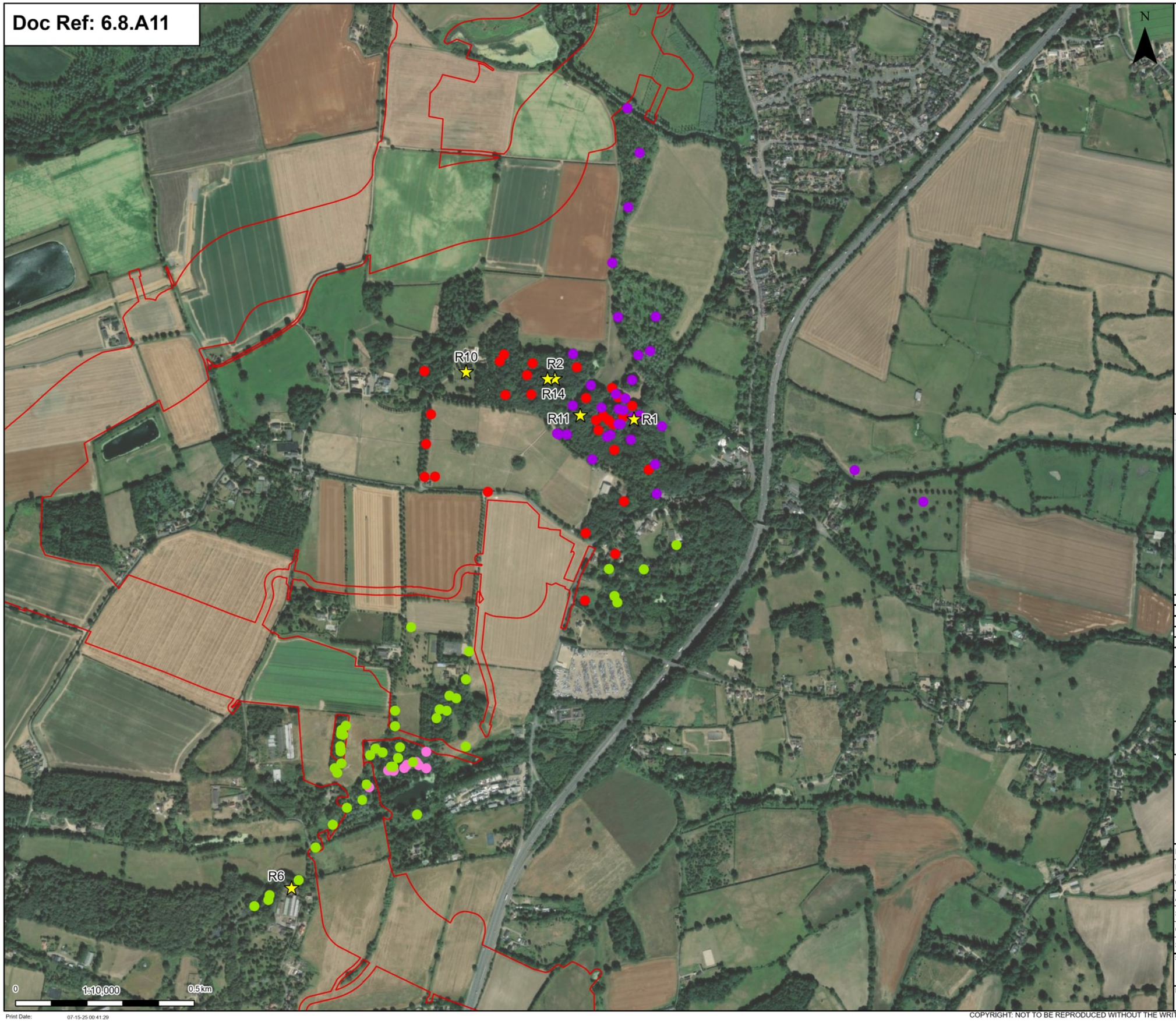

Order limits

Roost and Tagged bat locations

Roost

Natterer's bat roost

Tagged bats activity

Natterer's 01

Natterer's 06

Natterer's 10

Natterer's 12

Note: For further details regarding the design, please refer to Figures 4.1 (document reference 6.4.F1) and 4.2 (document reference 6.4.F2).

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PROJECT: Norwich to Tilbury

Planning Inspectorate App Number: EN020027
Regulation 5(2)(a)

Title:

Figure 8.11.6 - Ecology and Biodiversity
Bat radio-tracking Data for Natterer's bat

Designed	V. Handby	Date	21 Aug 25
Drawn	N. Banu	Date	21 Aug 25
Checked	A. Fell	Date	21 Aug 25
Approved	K. Burrows	Date	21 Aug 25
Scale:	1:10,000	Datum:	AOD
Original Size:	A3	Grid:	OS
Suitability Code:	A2	Project Number:	10059280

Suitability Description:
Accepted as Concept Stage

Drawing Number: 10059280-ARC-EBD-ZZ-DR-ZZ-00309

Revision: A

Print Date: 07-15-25 00:41:29

Doc Ref: 6.8.A11

Order limits

Roost and Tagged bat locations

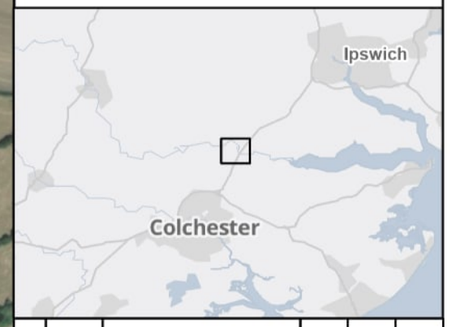
Roost

Daubenton's bat roost

Tagged bats activity

Daubenton's 04

Note: For further details regarding the design, please refer to Figures 4.1 (document reference 6.4.F1) and 4.2 (document reference 6.4.F2).



Rev	Date	Description	Drawn	Check	Approv
A	Aug 2025	FOR DCO APPLICATION	NB	AF	KB

nationalgrid

PROJECT: Norwich to Tilbury

Planning Inspectorate App Number: EN020027
Regulation 5(2)(a)

Title:

Figure 8.11.7 - Ecology and Biodiversity
Bat radio-tracking Data for Daubenton's bat

Designed	V. Handby	Date	21 Aug 25
Drawn	N. Banu	Date	21 Aug 25
Checked	A. Fell	Date	21 Aug 25
Approved	K. Burrows	Date	21 Aug 25
Scale:	1:10,000	Datum:	AOD
Original Size:	A3	Grid:	OS
Suitability Code:	A2	Project Number:	10059280

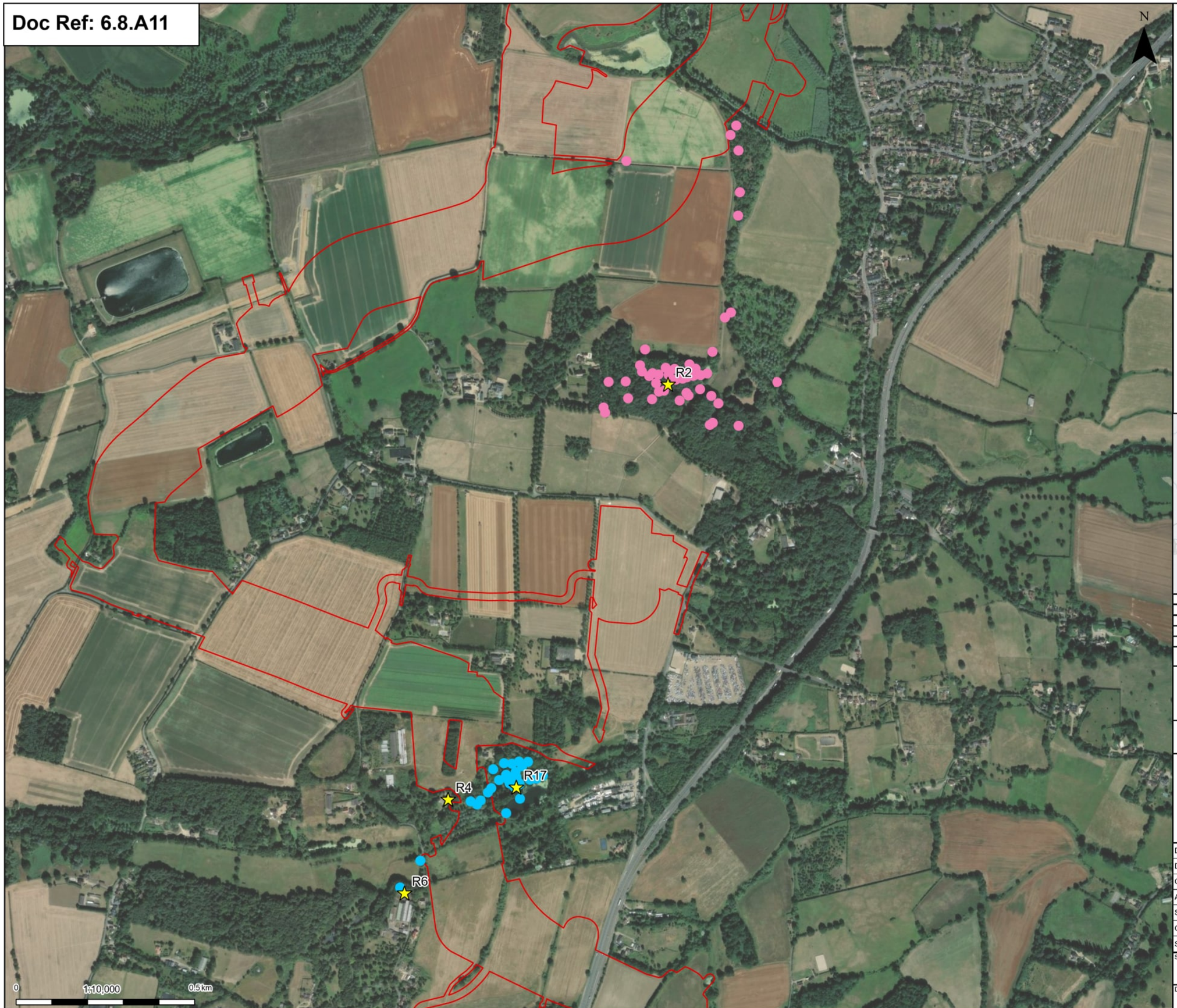
Suitability Description:
Accepted as Concept Stage

Drawing Number: 10059280-ARC-EBD-ZZ-DR-ZZ-00310

Revision: A

Print Date: 07-15-25 00:45:08

Doc Ref: 6.8.A11



Order limits

Roost and Tagged bat locations

Roost

Soprano Pipistrelle Bat roost

Tagged bats activity

Soprano Pipistrelle Bat 02

Soprano Pipistrelle Bat 05

Note: For further details regarding the design, please refer to Figures 4.1 (document reference 6.4.F1) and 4.2 (document reference 6.4.F2).

Rev	Date	Description	Drawn	Check	Approv
A	Aug 2025	FOR DCO APPLICATION	NB	AF	KB

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PROJECT: Norwich to Tilbury

Planning Inspectorate App Number: EN020027
Regulation 5(2)(a)

Title:

Figure 8.11.8 - Ecology and Biodiversity
Bat radio-tracking Data for
Soprano Pipistrelle Bat

Designed	V. Handby	Date	21 Aug 25
Drawn	N. Banu	Date	21 Aug 25
Checked	A. Fell	Date	21 Aug 25
Approved	K. Burrows	Date	21 Aug 25
Scale:	1:10,000	Datum:	AOD
Original Size:	A3	Grid:	OS
Suitability Code:	A2	Project Number:	10059280

Suitability Description:
Accepted as Concept Stage

Drawing Number: 10059280-ARC-EBD-ZZ-DR-ZZ-00311

Revision: A

Print Date: 07-15-25 00:47:44

Doc Ref: 6.8.A11

Order limits

Roost and Tagged bat locations

Roost

Noctule bat roost

Tagged bats activity

Noctule 20

Note: For further details regarding the design, please refer to Figures 4.1 (document reference 6.4.F1) and 4.2 (document reference 6.4.F2).

Rev	Date	Description	Drawn	Check	Approv
A	Aug 2025	FOR DCO APPLICATION	NB	AF	KB

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PROJECT: Norwich to Tilbury

Planning Inspectorate App Number: EN020027
Regulation 5(2)(a)

Title:

Figure 8.11.9 - Ecology and Biodiversity
Bat radio-tracking for Noctule

Designed	V. Handby	Date	21 Aug 25
Drawn	N. Banu	Date	21 Aug 25
Checked	A. Fell	Date	21 Aug 25
Approved	K. Burrows	Date	21 Aug 25
Scale:	1:10,000	Datum:	AOD
Original Size:	A3	Grid:	OS
Suitability Code:	A2	Project Number:	10059280

Suitability Description:
Accepted as Concept Stage

Drawing Number: 10059280-ARC-EBD-ZZ-DR-ZZ-00312

Revision: A

Print Date: 07-15-25 00:52:14

Doc Ref: 6.8.A11

Order limits

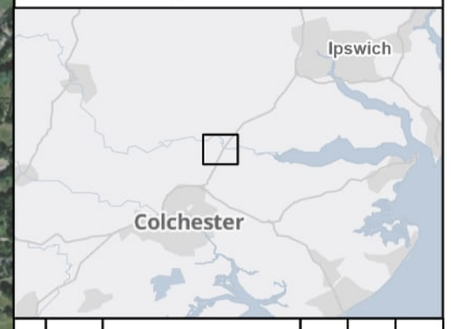
Tagged bat commuting routes

Bat roosts

Commuting Flightline

Foraging Area

Note: For further details regarding the design, please refer to Figures 4.1 (document reference 6.4.F1) and 4.2 (document reference 6.4.F2).



Rev	Date	Description	Drawn	Check	Approv
A	Aug 2025	FOR DCO APPLICATION	NB	AF	KB

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PROJECT: Norwich to Tilbury

Planning Inspectorate App Number: EN020027
Regulation 5(2)(a)

Title:

Figure 8.11.10 - Ecology and Biodiversity
Bat radio-tracking
Commuting Flightlines

Designed	V. Handby	Date	21 Aug 25
Drawn	N. Banu	Date	21 Aug 25
Checked	A. Fell	Date	21 Aug 25
Approved	K. Burrows	Date	21 Aug 25
Scale:	1:12,000	Datum:	AOD
Original Size:	A3	Grid:	OS
Suitability Code:	A2	Project Number:	10059280

Suitability Description:
Accepted as Concept Stage

Drawing Number: 10059280-ARC-EBD-ZZ-DR-ZZ-00313

Revision: A

Print Date: 07-14-25 17:53:34

Annex B.
Bat Trapping Records

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Annex B
Bat Trapping Records

Table A8.11.4 Bat trapping records

Date at Start	Time	Species	Sex	Age Class	Rep Status	Bat Reference	Ring No.	Trap Location	Processed by
03/06/2024	22:34	*M. nattereri*	Male	Adult		MN01	J6417	T8	SB
03/06/2024	22:44	*P. pygmaeus*	Male	Adult			J30098	T5	MB
03/06/2024	22:45	*P. pygmaeus*	Male	Adult		PY02	No ring*	T5	MB
03/06/2024	23:15	*P. auritus*	Female	Adult	Pregnant		J30070	T11	SB
03/06/2024	23:15	*P. auritus*	Female	Adult	Pregnant	BL03	J5416	T11	SB
03/06/2024	23:15	*P. auritus*	Female	Adult	Pregnant		J5420	T11	SB
03/06/2024	23:15	*P. auritus*	Female	Adult	Pregnant		J23896	T11	SB
03/06/2024	23:39	*N. noctula*	Male	Adult				T3	MB
03/06/2024	23:59	*P. pygmaeus*	Male	Adult				T8	SB
03/06/2024	00:15	*P. auritus*	Male	Adult			J30068	T8	SB
03/06/2024	00:15	*P. auritus*	Male	Adult			J30069	T11	SB
03/06/2024	00:30	*P. pygmaeus*	Female	Adult	Pregnant			T3	MB
03/06/2024	00:30	*E. serotinus*	Male	Adult				T14	SB
03/06/2024	00:31	*M. daubentonii*	Female	Adult	Pregnant	MD04	J30071	T3	MB
03/06/2024	01:27	*P. pygmaeus*	Female	Adult	Pregnant			T5	MB

Date at Start	Time	Species	Sex	Age Class	Rep Status	Bat Reference	Ring No.	Trap Location	Processed by
03/06/2024	02:39		Female	Adult	Nulliparous			T11	SB
04/06/2024	21:30	*P. pygmaeus*	Female	Adult	Pregnant			T21	SB
04/06/2024	21:41	*P. pipistrellus*	Male	Adult				T20	SB
04/06/2024	21:44	*P. pygmaeus*	Female	Adult	Pregnant			T20	SB
04/06/2024	21:58	*P. pipistrellus*	Male	Adult				T20	SB
04/06/2024	22:26	*P. pygmaeus*	Male	Adult				T21	SB
04/06/2024	22:39	*P. pygmaeus*	Female	Adult	Pregnant			T20	SB
04/06/2024	23:16	*P. pygmaeus*	Female	Adult	Pregnant			T20	SB
04/06/2024	23:47	*P. pygmaeus*	Male	Adult		PY05	No ring*	T17	MB
* Bat too light to carry both radio-tag and ring									
04/06/2024	23:47	*P. auritus*	Female	Adult	Pregnant	BL07	J23795	T17	MB
04/06/2024	23:47	*M. nattereri*	Male	Adult		MN06	J30067	T17	MB
04/06/2024	23:52	*P. pygmaeus*	Female	Adult	Pregnant			T19	SB
04/06/2024	00:02	*P. pygmaeus*	Female	Adult	Pregnant			T21	SB
04/06/2024	00:03	*P. pipistrellus*	Female	Adult	Pregnant			T21	SB
04/06/2024	01:20	*P. pygmaeus*	Female	Adult	Pregnant			T17	MB
04/06/2024	01:20	*P. pygmaeus*	Female	Adult	Pregnant			T17	MB
04/06/2024	02:54	*P. pygmaeus*	Male	Adult				T21	SB
10/06/2024	21:53	*B. barbastellus*	Female	Adult	Nulliparous	BB08	J23794	T10	MB

Date at Start	Time	Species	Sex	Age Class	Rep Status	Bat Reference	Ring No.	Trap Location	Processed by
10/06/2024	00:15	*M. nattereri*	Female	Adult	Pregnant			T4	SB
10/06/2024	00:15	*M. daubentonii*	Male	Adult				T4	SB
10/06/2024	00:57	*M. nattereri*	Female	Adult	Pregnant			T3	SB
10/06/2024	00:59	*B. barbastellus**	-	-				T12	MB
10/06/2024	02:06	*M. nattereri*	Male	Adult				T10	MB
11/06/2024	21:32	*P. pipistrellus*	Female	Adult	Pregnant			T13	MB
11/06/2024	22:40	*M. nattereri*	Male	Adult				T15	MB
11/06/2024	23:36	*M. nattereri*	Female	Adult	Pregnant			T16	MB
11/06/2024	01:39	*M. nattereri*	Female	Adult	Pregnant			T9	SB
11/06/2024	01:39	*M. nattereri*	Female	Adult	Pregnant			T9	SB
11/06/2024	01:39	*M. nattereri*	Female	Adult	Pregnant			T9	SB
11/06/2024	03:26	*P. pipistrellus*	Male	Adult				T9	SB
11/06/2024	03:29	*M. nattereri*	Female	Adult	Pregnant			T10	SB
11/06/2024	03:29	*M. daubentonii*	Female	Adult	Pregnant			T10	SB
12/06/2024	22:12	*P. pygmaeus*	Female	Adult	Pregnant			T2	SB
12/06/2024	23:07	*P. pygmaeus*	Male	Adult		PY05 (r)		T18	MB
12/06/2024	23:30	*M. daubentonii*	Male	Adult		MD09	J30066	T2	SB
12/06/2024	00:50	*P. pipistrellus*	Male	Adult				T1	SB

* Barbastelle escaped from trap; (r) recapture of tagged bat PY05, first caught and radio-tagged on 4th June 2024

Date at Start	Time	Species	Sex	Age Class	Rep Status	Bat Reference	Ring No.	Trap Location	Processed by
12/06/2024	01:51	*M. nattereri*	Female	Adult	Pregnant	MN10	J23793	T18	MB
12/06/2024	02:10	*P. pygmaeus*	Female	Adult	Pregnant			T19	MB
12/08/2024	21:43	*B. barbastellus*	Female	Adult	Post lactating	BB11	J23787	T8	SB
12/08/2024	22:12	*M. nattereri*	Male	Juvenile				T11	MB
12/08/2024	22:12	*P. auritus*	Male	Adult		BL14	J23780	T11	MB
12/08/2024	22:12	*N. Leisleri*	Female	Adult	Post lactating	NL15	B9787	T11	MB
12/08/2024	22:16	*P. pygmaeus*	Male	Sub-adult				T9	SB
12/08/2024	22:30	*M. nattereri*	Male	Sub-adult		MN12	J23788	T14	RJ
12/08/2024	22:35	*N. Leisleri*	Male	Adult		NL13	B9788	T14	SB
12/08/2024	23:42	*N. noctula*	Female	Juvenile			B9786	T14	SB
12/08/2024	23:57	*P. pygmaeus*	Female	Adult	Post lactating			T14	SB
12/08/2024	00:01	*P. pygmaeus*	Female	Adult	Lactating			T14	SB
12/08/2024	00:03	*P. pygmaeus*	Female	Adult	Post lactating			T14	SB
12/08/2024	00:09	*B. barbastellus*	Female	Adult	Nulliparous	BB16	J23782	T14	SB
12/08/2024	00:19	*P. pygmaeus*	Male	Adult				T6	MB
12/08/2024	00:19	*P. pygmaeus*	Female	Juvenile				T6	MB

Date at Start	Time	Species	Sex	Age Class	Rep Status	Bat Reference	Ring No.	Trap Location	Processed by
12/08/2024	00:24	*P. pygmaeus*	Female	Adult	Post lactating			T9	SB
12/08/2024	00:34	*M. daubentonii*	Male	Adult				T11	MB
12/08/2024	00:35	*P. auritus*	Male	Adult				T6	MB
12/08/2024	00:36	*M. nattereri*	Male	Adult				T11	MB
12/08/2024	00:37	*P. pipistrellus*	Female	Juvenile				T11	MB
12/08/2024	00:44	*P. pipistrellus*	Male	Adult				T9	SB
12/08/2024	00:44	*P. pygmaeus*	Female	Adult	Lactating			T9	SB
12/08/2024	00:45	*P. pipistrellus*	Female	Adult	Post lactating			T14	SB
12/08/2024	00:45	*P. pygmaeus*	Female	Adult	Post lactating			T14	SB
12/08/2024	00:45	*P. pygmaeus*	Female	Adult	Post lactating			T14	SB
14/08/2024	20:57	*P. pygmaeus*	Female	Juvenile				T21	SB
14/08/2024	20:58	*P. pygmaeus*	Male	Adult				T21	SB
14/08/2024	20:58	*P. pygmaeus*	Male	Juvenile				T21	SB
14/08/2024	21:11	*B. barbastellus*	Female	Juvenile		BB17	J23779	T9	MB
14/08/2024	21:12	*P. pygmaeus*	Male	Juvenile				T20	SB
14/08/2024	21:13	*P. pipistrellus*	Female	Adult	Nulliparous			T20	SB
14/08/2024	21:15	*P. pygmaeus*	Female	Adult	Nulliparous			T20	SB

Date at Start	Time	Species	Sex	Age Class	Rep Status	Bat Reference	Ring No.	Trap Location	Processed by
14/08/2024	21:15	*P. pygmaeus*	Female	Juvenile				T20	SB
14/08/2024	21:16	*P. pygmaeus*	Female	Juvenile				T20	SB
14/08/2024	21:17	*P. pygmaeus*	Female	Adult	Post lactating			T20	SB
14/08/2024	21:18	*P. pygmaeus*	Female	Juvenile				T20	SB
14/08/2024	21:19	*P. pipistrellus*	Female	Juvenile				T20	SB
14/08/2024	21:20	*P. pygmaeus*	Female	Adult	Nulliparous			T20	SB
14/08/2024	21:20	*P. pygmaeus*	Female	Juvenile				T20	SB
14/08/2024	21:21	*P. pygmaeus*	Female	Juvenile				T20	SB
14/08/2024	21:22	*P. pygmaeus*	Female	Adult	Nulliparous			T20	SB
14/08/2024	21:22	*P. pygmaeus*	Female	Adult	Post lactating			T20	SB
14/08/2024	21:31	*P. pygmaeus*	Male	Adult				T20	SB
14/08/2024	21:34	*P. pygmaeus*	Male	Adult				T20	SB
14/08/2024	21:35	*P. pygmaeus*	Male	Adult				T20	SB
14/08/2024	21:37	*P. pygmaeus*	Male	Adult				T20	SB
14/08/2024	21:44	*P. pygmaeus*	Male	Adult		PY18	No ring*	T20	SB
14/08/2024	21:49	*M. daubentonii*	Female	Adult	Post lactating	MD19	J23789	T20	SB
14/08/2024	22:10	*P. pipistrellus*	Male	Adult				T20	SB
14/08/2024	22:10	*P. pygmaeus*	Male	Adult				T20	SB

Date at Start	Time	Species	Sex	Age Class	Rep Status	Bat Reference	Ring No.	Trap Location	Processed by
14/08/2024	22:10	*P. pygmaeus*	Male	Adult				T20	SB
14/08/2024	22:16	*M. nattereri*	Male	Adult				T11	MB
14/08/2024	22:40	*P. pipistrellus*	Male	Adult				T21	SB
14/08/2024	22:46	*P. pipistrellus*	Female	Adult	Post lactating			T20	SB
14/08/2024	23:18	*P. pipistrellus*	Female	Juvenile				T11	MB
14/08/2024	23:37	*P. pygmaeus*	Male	Juvenile				T20	SB
* Bat too light to carry both radio-tag and ring									
14/08/2024	23:41	*M. daubentonii*	Male	Adult			J23783	T20	RJ
14/08/2024	00:03	*P. pygmaeus*	Female	Adult	Post lactating			T20	SB
14/08/2024	00:03	*P. pipistrellus*	Female	Juvenile				T20	SB
14/08/2024	00:03	*P. pipistrellus*	Female	Juvenile				T20	SB
14/08/2024	00:21	*P. pygmaeus*	Male	Adult				T21	RJ
14/08/2024	00:29	*N. noctula*	Female	Juvenile			B9785	T20	RJ
14/08/2024	00:33	*B. barbastellus*	Male	Juvenile				T10	MB
14/08/2024	00:33	*B. barbastellus*	Male	Juvenile				T10	MB
14/08/2024	00:35	*N. noctula*	Female	Adult	Nulliparous	NN20	B9781	T7	MB
14/08/2024	00:55	*P. pygmaeus*	Female	Juvenile				T20	SB
14/08/2024	01:00	*P. pygmaeus*	Female	Adult	Post lactating			T20	SB

Date at Start	Time	Species	Sex	Age Class	Rep Status	Bat Reference	Ring No.	Trap Location	Processed by
14/08/2024	01:00	*P. pygmaeus*	Male	Juvenile				T20	SB
14/08/2024	01:02	*P. pygmaeus*	Female	Adult	Post lactating			T20	RJ
14/08/2024	01:06	*N. noctula*	Female	Adult	Nulliparous		B9782	T20	RJ
14/08/2024	01:37	*M. daubentonii*	Male	Adult			J23785	T21	RJ
14/08/2024	02:20	*N. noctula*	Female	Adult	Post lactating		B9783	T20	SB

Annex C. Description of Bat Roosts

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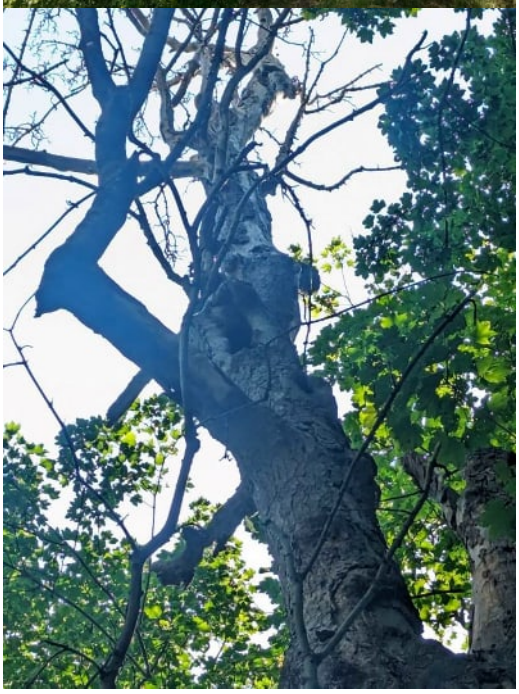
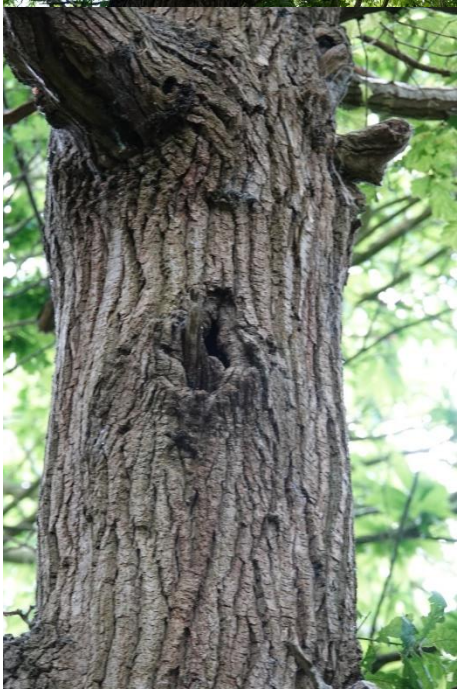
Annex C
Description of Bat Roosts

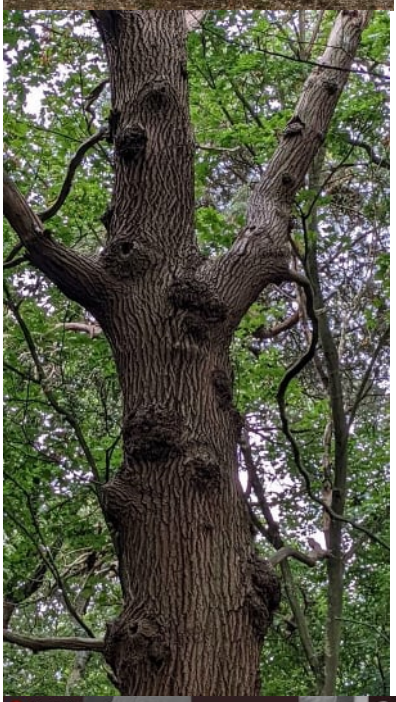
Table A8.11.5 Description of bat roosts

Bat Roost Ref	Species and Roost Type	Description	Photograph
R1	Confirmed Natterer's bat maternity roost.	Natterer's bat roost in dead sycamore *Acer pseudoplatanus*. Roost feature is in a knot hole on limb, 7 m above ground level, north facing. Used by bat MN01 (adult male Natterer's bat) between 4 and 7 June 2024. Maximum emergence count of 27 bats on 5 June 2024.	 

Bat Roost Ref	Species and Roost Type	Description	Photograph
R2	Suspected Natterer's bat maternity roost and confirmed soprano pipistrelle day roost.	Natterer's bat and soprano pipistrelle roost in sycamore (tree tag 7620). Multiple knot holes present. Used by PY02 (adult male soprano pipistrelle) between 4 and 7 June 2024, and by MN01 (adult male Natterer's bat) between 10 and 12 June 2024. Maximum count of six Natterer's bats on 10 June 2024. Maximum count of one bat when PY02 present.	 

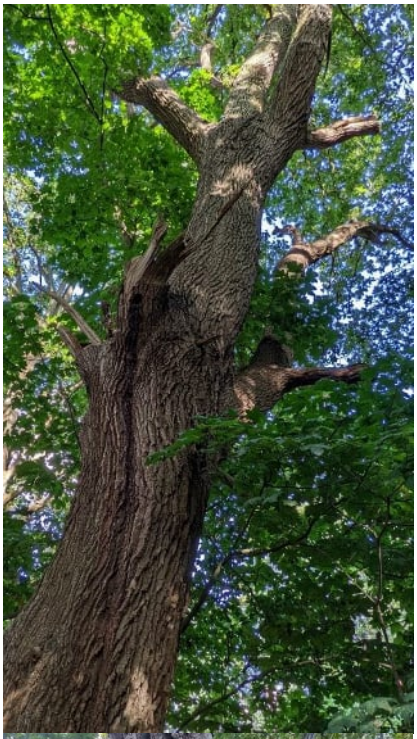
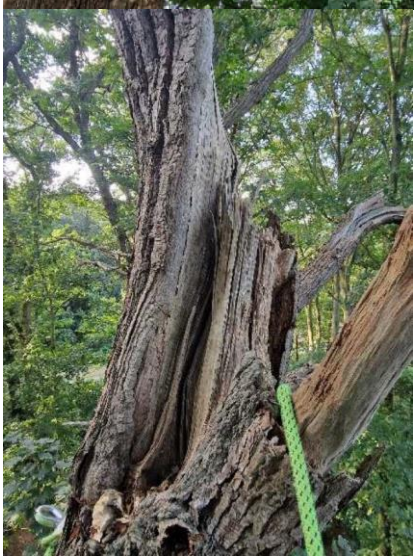
Bat Roost Ref	Species and Roost Type	Description	Photograph
R3	Confirmed brown long-eared bat maternity roost	Brown-long eared bat roost in oak. Lots of features on tree but feature used confirmed as branch collar. Used by BL03 (pregnant female brown long-eared bat) between 4 and 7 June 2024. Maximum emergence count of 13 bats on 4 June 2024.	 
R4	Likely soprano pipistrelle day roost.	Soprano pipistrelle roost in residential building. No emergence survey undertaken so precise roost feature not confirmed, however lots of features present that are suitable for pipistrelles. Used by PY05 (adult male soprano pipistrelle) between 5 and 10 June 2024.	

Bat Roost Ref	Species and Roost Type	Description	Photograph
R5	Likely brown long-eared bat maternity roost.	Brown long-eared bat roost in farm building at Springfield Farm. Location not accessible so individual building and precise roost location not confirmed. Used by BL07 (pregnant female brown long-eared bat) between 5 and 6 June 2024.	
R6	Likely soprano pipistrelle and Natterer's bat day roost, and suspected Natterer's bat maternity roost.	Natterer's bat roost in farm building at Grove Farm. Location not accessible so individual building and precise roost location not confirmed. Used by MN06 (adult male Natterer's bat) between 5 and 11 June 2024 and MN10 (pregnant female Natterer's bat) on 13 June 2024. Also used by PY05 (adult male soprano pipistrelle) between 11 and 13 June 2024.	
R7	Unconfirmed daubentons roost (suspected maternity roost).	Daubenton's bat roost in woodland at Gun Hill Place. Land not accessible so location triangulated from distance. Roost assumed to be in a tree. Used by MD04 (pregnant female Daubenton's bat) on 7 June 2024.	[No image, refer to Annex A for location]

Bat Roost Ref	Species and Roost Type	Description	Photograph
R8	Confirmed barbastelle maternity roost	Barbastelle roost in dead oak. Feature confirmed as flaking bark. Used by BB08 (adult non-breeding female barbastelle) between 10 to13 June 2024. Roost also used by BB11 (post-lactating female barbastelle) between 13 and 14 August 2024. Maximum emergence counts of 18 bats on 12 and 13 June 2024 and 33 bats on 14 August 2024.	  

Bat Roost Ref	Species and Roost Type	Description	Photograph
R9	Likely Daubenton's bat day roost.	Daubenton's bat roost in sycamore. Feature not confirmed during emergence survey but strongly suspected to be cavity on one of the stems. Used by DB09 (adult male Daubenton's bat) on 13 June 2024. Maximum emergence count of one bat (DB09) on 13 June 2024.	 

Bat Roost Ref	Species and Roost Type	Description	Photograph
R10	Likely Natterer's bat maternity roost.	Natterer's bat roost in porch of church, between roof timbers and external church wall. Used by MN01 (adult male Natterer's bat) on 13 June 2024. Maximum emergence count of 12 bats on 13 June 2024. Church warden confirmed significant numbers of bats use the roost each year.	 
R11	Likely Natterer's bat day roost.	Natterer's bat roost in oak. Feature not confirmed during emergence survey, but multiple suitable features present on tree. Used by MN12 (sub-adult male Natterer's bat) between 13 and 14 August 2024. Maximum emergence count of one bat (MN12) on 14 August 2024.	

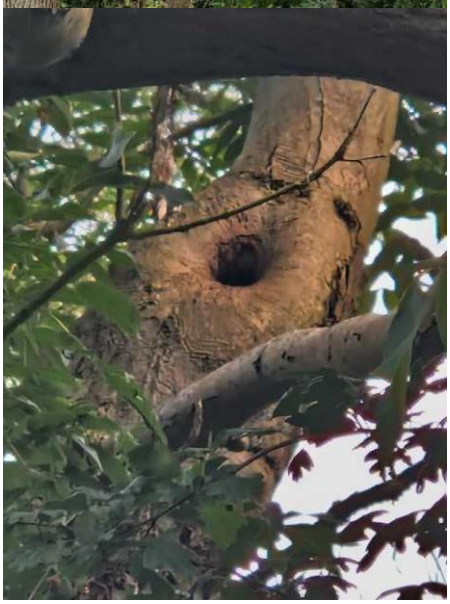
Bat Roost Ref	Species and Roost Type	Description	Photograph
R12	Confirmed barbastelle maternity roost.	Barbastelle roost in oak. Precise feature not confirmed during emergence survey due to poor visibility, but several truncated limbs present with cracks that provide roosting opportunities. Used by BB17 (juvenile female barbastelle) between 15 and 22 August 2024. Maximum emergence count of seven bats on 20 August 2024.	 

Bat Roost Ref	Species and Roost Type	Description	Photograph
R13	Confirmed barbastelle maternity roost.	Barbastelle roost in dead sycamore. Roost feature under loose bark. Used by BB11 between 15 and 16 August 2024. Maximum emergence count of 19 bats on 16 August 2024.	  

Bat Roost Ref	Species and Roost Type	Description	Photograph
R14	Likely Natterer's bat day roost.	Natterer's bat roost in Scots pine. Roost feature not confirmed during emergence survey as multiple features present along a torsional crack along the stem. Used by MN12 (sub-adult male Natterer's bat) between 15 and 16 August 2024. Maximum emergence count of one bat (MN12) on 15 August 2024.	 

Bat Roost Ref	Species and Roost Type	Description	Photograph
R15	Confirmed noctule night roost and suspected noctule mating roost.	Noctule roost in large poplar. Used by NN20 during the night. Not used during the day.	
R16	Suspected brown long-eared bat maternity roost.	Brown long-eared bat roost in residential building. Roost feature not confirmed as no emergence survey undertaken due to access restrictions. Used by BL14 (adult male brown long-eared bat) between 15 and 21 August 2024).	

Bat Roost Ref	Species and Roost Type	Description	Photograph
R17	Confirmed soprano pipistrelle day roost.	Soprano pipistrelle roost in standing dead tree. Precise roost feature not confirmed during emergence survey but suspected to be one of multiple desiccation fissures present on the tree. Used by PY18 (adult male soprano pipistrelle) between 15 and 16 August 2024 and separately on 22 August 2024. Maximum emergence count of one bat (PY18) on 15 August 2024.	

Bat Roost Ref	Species and Roost Type	Description	Photograph
R18	Confirmed noctule maternity roost.	Noctule roost in ash. Roost feature confirmed as knot hole on main stem. Used by NN20 (non-breeding adult female noctule) between 15 and 22 August 2024. Maximum emergence count of 53 bats on 21 August 2024.	 

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