Norwich Western Link

Environmental Statement

Chapter 11: Bats

Appendix 11.4: 2021 Bat Activity Report

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Contents

1 Introduction

1.1.1 WSP UK Ltd was commissioned by Norfolk County Council to complete a comprehensive suite of bat activity surveys for the Scheme, including the following works for winter 2020/2021 and summer 2021:

1.1.2 - Vantage point surveys - to identify the behaviour of bats at habitats (grassland, hedgerows, glades, footpaths and country lanes) at risk of severance by the Scheme.

1.1.3 - Winter automated detector surveys - to gain a representative sample of activity to assess the species assemblages and distribution of winter activity at numerous locations across the Survey Area (as defined in Section 1.4 of the report).

1.1.4 - Summer automated detector surveys - to gain a representative sample of activity to assess the species assemblages and distribution of summer activity at numerous locations across the Survey Area (as defined in Section 1.4 of the report).

1.1.5 Given a number of limitations were noted that have the potential to (See Section 2.4), which could limit the range of species recorded and the level of activity of the species recorded. However, given a number of assumptions, it is concluded that a representative level of activity was recorded. The report present the findings of the surveys in a baseline report. The survey findings will be used to inform the impact assessment and proposed mitigation for bat species present across the Proposed Scheme. Details of the impact assessment and mitigation will be included within the Bat Chapter of the Environmental Statement for the Proposed Scheme.

1.1.6 We have included a summary of key information shown in this document in an accessible format. However, some users may not be able to access all technical details. If you require this document in a more accessible format please contact norwichwesternlink@norfolk.gov.uk

Norfolk County Council

Norwich Western Link Road

2021 Bat Activity Report

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1 Introduction

1.1 Project background

1.1.1. The Norwich Western Link Road (NWL) is a highway Scheme linking the A1270 Broadland Northway from its junction with the A1067 Fakenham Road to the A47 trunk road near Honingham.

1.1.2. The NWL, hereafter referred to as the Scheme, will comprise:

- Dualling the A1067 Fakenham Road westwards from its existing junction with the A1270 to a new roundabout located approximately 400m to the northwest.
- Construction of a new roundabout.
- Constructing a dual carriageway link from the new roundabout to a new junction with the A47 near Honingham.

1.1.3. As part of a separate planned Scheme, Highways England proposes to realign and dual the A47 from the existing roundabout at Easton to join the existing dual carriageway section at North Tuddenham. If that Scheme proceeds, it is expected that Highways England will construct the Honingham junction, and the Norwich Western Link will connect to the north-eastern side of that junction.

1.1.4. The Scheme will cross the River Wensum and its flood plain by means of a viaduct. In addition, six other structures are proposed to cross minor roads and to provide habitat connectivity. The Scheme will include ancillary works such as provision for non-motorised users, necessary realignment of the local road network, including the stopping up of some minor roads, and the provision of environmental mitigation measures.

1.2 Ecological background

1.2.1. WSP UK Ltd was commissioned in 2019 to complete baseline bat surveys to inform the route optioneering process (WSP UK Ltd, 2020). This included ground level tree assessments, further bat roost surveys, bat activity surveys, bat radio-tracking and bat hibernation surveys.

1.2.2. Following selection of a preferred route (Route C), a suite of bat surveys was undertaken in 2020 covering a refined survey area in order to obtain baseline data to inform appropriate mitigation measures for the chosen preferred route (herein referred to as the “Scheme”). This included bat-tracking surveys which were conducted in order to maximise the information collected over the 2020 activity period due to the cancellation of planned radio-tracking surveys in August 2020. In June and August 2021 it was possible to complete radio-tracking surveys therefore, bat-tracking surveys were not carried forward as part of the 2021 survey scope.

1.2.3. Survey data from 2020 is reported in an interim bat survey report which covers both roost and activity surveys (WSP UK Ltd, 2021).

1.2.4. This technical report presents the methods and results of bat activity surveys undertaken in 2021, which are presented alongside the results of the 2019 and 2020 bat activity surveys in order to allow interpretation of bat activity over the three years surveyed. This report should be read in conjunction with the bat roost survey report (WSP UK Ltd, 2022a) and bat radio-tracking report (WSP UK Ltd, 2022b), which together with earlier interim reporting, capture the results of survey completed between 2019 to 2021 to inform the Scheme.

1.2.5. Bat surveys have also been completed to inform a separate planned Scheme to realign and dual the A47 to the south of the Scheme (Highways England, 2021a-c), and construction of the Northern Broadway to the north-east of the Scheme (Mott Macdonald, 2020 & 2021; BSG, 2010; Greena Ecological Consultancy, 2013a-b).

1.3 Brief and objectives

1.3.1. WSP UK Ltd was commissioned by NCC to complete a comprehensive suite of bat activity surveys for the Scheme, including the following works for winter 2020/2021 and summer 2021:

- Vantage point surveys - to identify the behaviour of bats at habitats (grassland, hedgerows, glades, footpaths and country lanes) at risk of severance by the Scheme.
- Winter automated detector surveys - to gain a representative sample of activity to assess the species assemblages and distribution of winter activity at numerous locations across the Survey Area (as defined in Section 1.4).
- Summer automated detector surveys - to gain a representative sample of activity to assess the species assemblages and distribution of summer activity at numerous locations across the Survey Area (as defined in Section 1.4).

1.4 Survey areas

1.4.1. The areas covered by each of the survey types are hereafter referred to as the ‘Survey Areas’. The Survey Areas are detailed in Table 1-1 below. The survey approaches are described in Section 2.

Table 1-1 - Summary of Survey Areas for bat activity surveys completed in 2020/2021

Survey type	Survey area
Vantage Point Surveys	Scheme boundary
Winter Automated Detector Surveys	Scheme boundary and connected habitats at risk of severance from the Scheme.

Survey type	Survey area
Summer Automated Detector Surveys	Scheme boundary and connected habitats at risk of severance from the Scheme. A number of additional locations were also surveyed outside of the Scheme boundary in 2021 to enable a comparison of bat activity levels across the broader landscape.

1.5 Description of habitats along the Scheme

1.5.1. Throughout this report, the following areas will be referred to, in order from north to south, the locations of which are shown on Figure A-1.

- River Wensum – a chalk river flowing north-west to south-east, which will be crossed by the Scheme.
- Northern Woodlands – a complex of woodland blocks in the northern extent of the Scheme encompassing Primrose Grove, The Nursery, Rose Carr and Spring Hills (which are individually labelled on Figure A-1). Parts of the Northern Woodlands lie within the Scheme boundary and will be directly impacted by the Scheme.
- Long Plantation – a block of mixed plantation woodland south of the Northern Woodlands and north of Ringland Lane, which is partially within the Scheme boundary and will be directly impacted by the Scheme.
- Ringland Lane – a single-track road connecting Ringland to Weston Longville, which will be crossed by the Scheme.
- Unnamed Woodland South of Ringland Lane – a block of semi-natural broad-leaved woodland, which is partially within the Scheme boundary and will be directly impacted by the Scheme.
- Hedgerow north of Weston Road – a hedgerow running in an east to west orientation, connecting a woodland (east) to a tree-lined public footpath (west). There is a central junction where a perpendicular section of hedge joins it, this section of hedge runs in north-south orientation from Weston Road to the junction with this hedgerow.
- Weston Road - a single-track road lined by hedgerow on both sides, which will be crossed by the Scheme.
- The Broadway – a single-track woodland-lined avenue, which will be crossed by the Scheme.
- Foxburrow Plantation – a strip of broad-leaved plantation woodland bordered to the south by a tributary stream. Foxburrow Plantation is partially within the Scheme boundary and will be directly impacted by the Scheme.
- Foxburrow Stream – a tributary stream, which feeds into the River Tudd which will be crossed by the Scheme.

2 Methods

2.1 Overview

2.1.1. The methodology applied for all survey techniques and bat call analysis was completed with reference to best practice guidance and industry standards (Collins, 2016) (Russ, 2012) (Berthinussen & Altringham, 2015).

2.2 Vantage point surveys

Surveys

2.2.1. A series of vantage point bat surveys were completed between the months of May to September (inclusive) during 2020 and 2021. Designed using the DEFRA guidelines (Berthinussen & Altringham, 2015) these were intended to contribute to the overall bat activity dataset, and specifically gather activity information for barbastelle and *Myotis* species, across the Scheme.

2.2.2. A total of eight vantage point survey locations were confirmed in 2020. These were locations which had been identified as supporting higher levels of bat activity in 2019 recorded by automated bat detectors (WSP UK Ltd, 2020), and where further understanding was required regarding the nature of activity in these areas. The vantage point locations are shown on Figure A-2 and described in Table 2-1.

2.2.3. The aim of the surveys was to observe and to use thermal imagery to determine the direction of flight, activity levels and behaviour of bats, with particular consideration for *Myotis* species and barbastelle. Flight heights were estimated where bats were clearly observed.

2.2.4. All eight locations were subject to surveys in 2020 (WSP, 2021), though access restrictions meant that data collection could not be completed across the full season at a number of locations. The 2021 surveys were therefore in part aimed at filling survey gaps left by the 2020 data collection. As such, not all vantage point locations were surveyed in 2021 and those that were subject to survey were only surveyed on months that could not be completed in 2020 (see Table 2-1 for months/years each location was surveyed). The only exception to this was Vantage Point 5 (VP5). At VP5 additional survey effort was undertaken in order to gain further information on barbastelle activity to inform mitigation requirements in this location given that the 2020 results were inconclusive.

2.2.5. Vantage point surveys began 15 minutes after sunset and continued for 2 hours 45 minutes in total (concluding 3 hours after sunset). The exception to this was Vantage Point 5, where survey start times and durations were altered month to month over the course of the survey season to coincide with periods of peak barbastelle activity recorded at this location from automated detector surveys in 2019 and 2020. This deviation from methods was to gain further information on barbastelle activity to inform mitigation requirements at this location.

2.2.6. Dates, start and end times, and meteorological data of these surveys are provided in Appendix B, Table B-1.

2.2.7. The survey set-up, as detailed in Table 2-1, was determined by the feature being surveyed. In most cases this was determined on the first occasion each vantage point was surveyed in 2020. Occasionally the survey set-up changed between surveys, in order to optimise survey results or due to health and safety reasons (e.g. cattle in field preventing access).

2.2.8. During each survey the surveyors noted the bat species heard and seen, including the time, location, and where possible gathered commentary on behaviour and flight direction. In addition, where bats were observed by the surveyor, approximate height of flight was noted. Surveyors were equipped with bat detectors (EchoMeter Touch (EMT) © Wildlife Acoustics, Inc and BatBox Duet © BatBox) to listen to and record bat activity. Calls registered by the bat detectors were recorded for later analysis using specialist computer software Kaleidoscope Pro (© Wildlife Acoustics, Inc), details are provided below.

2.2.9. As well as bat detectors, surveyors were equipped with a thermal imaging camera (models used were FLIR E60, FLIR E75 and FLIR 90 © Teledyne FLIR LLC) to enable bats to be visualised after dark. As part of the analysis, the thermal imaging footage was matched with seen/heard bats documented by the surveyor in order to comment on the likely behaviour (i.e. commuting/foraging), direction and height of flight, if not detected in the field.

Data analysis

2.2.10. Analysis of vantage point survey data focussed on barbastelle (given that this is an Annex II species, protected under the Habitats Directive (1992), and rare species known to be present within the local area) and *Myotis* species (woodland specialist species, which may be impacted by woodland loss to a greater extent than other more generalist species).

2.2.11. Bat call data recorded on detectors during these surveys were analysed manually by ecologists with experience in bat call analysis. Where both surveyors on a vantage point survey detected and/or recorded a bat species at the same time, this was recorded as a single individual to prevent duplication.

2.2.12. During this analysis, all call files (including noise files) were manually checked for barbastelle and *Myotis* species. The times of calls were recorded and compared with surveyor notes on bats seen/heard to produce a document of barbastelle and *Myotis* sp. call times and observed activity on each survey occasion.

2.2.13. In addition to this, the thermal imaging camera footage was analysed by ecologists. The footage was checked at the times when barbastelle or *Myotis* species were recorded by surveyors or by the detectors in order to pick up the behaviour of these bats (e.g. commuting/foraging, direction of flight and flight height, if not recorded).

2.2.14. The sound files were subject to a quality assurance (QA) process. This involved completing analysing all calls from 10% of the surveys completed (*i.e.* 11 vantage point surveys were completed in 2021, therefore, two of these surveys were subject to QA checks in full).

Table 2-1 - Summary of bat vantage point survey locations (relating Figure A-2)

Reference	Location	Feature	Month/year surveyed	Surveyor setup	Survey objective
Vantage point 1	Track running north to south through the eastern edge of The Nursery at the junction to Rose Carr.	Woodland ride	July, August and September 2020 May and June 2021	Two surveyors sitting back-to-back in the centre of the track, approximately 2m apart, with one facing north, and the other facing south.	To determine the use of the track by commuting and foraging bats. Survey data will feed into the mitigation design at this location.
Vantage point 2*	Grassland between The Nursery and Spring Hills.	Open field between woodland	June, July, August**, September 2020 May 2021	Surveyors sitting approximately 40m apart in the centre of the grassland (equidistant from the woodlands on either side), facing each other and in verbal contact with radio-transmitters.	To determine whether bats commute/forage over the open grassland between The Nursery and Spring Hills woodlands, and the height and direction of this flight.
Vantage point 3*	Grassland between Spring Hills and Long Plantation.	Open field between woodland	June, July, August and September 2020 May and July 2021	Surveyors sitting approximately 40m apart in the centre of the grassland (equidistant from the woodlands on either side), facing each other and in verbal contact with radio-transmitters.	To determine whether bats commute/forage over the open grassland between Long Plantation and Spring Hills woodlands, and the height and direction of this flight.

Reference	Location	Feature	Month/year surveyed	Surveyor setup	Survey objective
Vantage point 4	Ringland Lane.	Hedge lined road	June, July, August and September 2020 May 2021	Surveyors sitting approximately 40m apart alongside Ringland Lane (one surveyor on each edge of the Scheme alignment).	To determine the nature of the use of Ringland Lane by commuting bats, and the height and direction of this flight. This survey data will inform mitigation design in this location.
Vantage point 5	Hedgerow North of Weston Road.	Hedgerow	May – September 2020 May – September 2021	Three surveyors (two on the first survey visit) were positioned evenly along the hedgerow. One surveyor sat on the eastern section of hedgerow, one sat in the central junction, and one sat along the western section of hedgerow, covering the alignment.	To determine the nature of bat activity along this hedgerow. High levels of bat activity were recorded by an automated bat detector on this hedgerow in 2019, so 2020 and 2021 surveys aimed to determine the nature of activity in order to inform mitigation requirements in this location.
Vantage point 6	The Broadway.	Tree-lined Road	May – September 2020	Two surveyors sitting approximately 40m away from each other and in contact with radio-transmitters, positioned on either side of the Scheme alignment.	To determine the nature of use of The Broadway by bats, and the height and direction of this flight. This survey data will inform mitigation design in this location.

Reference	Location	Feature	Month/year surveyed	Surveyor setup	Survey objective
Vantage point 7	The glade within Foxburrow Plantation.	Woodland ride	May – September 2020	Two surveyors sitting approximately 40m away from each other and in contact with radio-transmitters, positioned on either side of the Scheme alignment.	To determine the nature of use of The Broadway by bats, and the height and direction of this flight. This survey data will inform mitigation design in this location.
Vantage point 8	Foxburrow Stream.	Woodland-edge	May – September 2020	Two surveyors sitting approximately 40m away from each other and in contact with radio-transmitters, positioned on either side of the Scheme alignment between Foxburrow Plantation and the stream.	To determine the nature of use of Foxburrow Plantation by bats, and the height and direction of this flight. This survey data will be used to inform mitigation design in this location.

*During vantage points 2 and 3 in June, July and September 2020, surveyors were supplemented with additional automated bat detectors, deployed at regular intervals within the grassland habitat in order to ensure that barbastelle crossing over the grassland (and the Scheme alignment) were recorded and could therefore inform subsequent vantage point surveys.

** Due to poor weather conditions, it was not possible to undertake the survey of Vantage Point 2 in August 2020 and therefore the data was not collected in the correct month. As a result, the data was collected as early as possible in September, with a gap of at least two weeks left before data collection in that month.

2.3 Automated detector deployments

Overview

2.3.1. In addition to vantage point surveys, automated Song Meter 4 (SM4) (© Wildlife Acoustics, Inc) detector surveys were carried out (referred to hereafter as "automated detector surveys") in winter 2020/2021 and summer 2019, 2020 and 2021 to build upon information gained about bat activity.

2.3.2. Winter automated detector surveys were completed across the length the Scheme between October 2020 and April 2021 (inclusive), while summer automated detector surveys were completed between May and September 2019, 2020 and 2021.

2.3.3. Detectors were placed within habitat features considered likely to be used by commuting or foraging bats within the Survey Area. The microphones used were multi-directional, however, they were placed pointing along the feature under survey, at a height between 1.5 – 2m.

2.3.4. The automated detectors were set to commence recording at least 30 minutes before sunset and cease recording 30 minutes after sunrise for both the winter and summer deployments. Calls registered by the automated detectors were recorded for later analysis using the specialist computer software Kaleidoscope Pro (© Wildlife Acoustics, Inc), as detailed below.

2.3.5. Automated detectors recorded for five nights in each month surveyed. In some instances, five nights of deployment, or deployment in certain months, was not possible, as explained in Paragraph 2.4.10. Full details of deployments are provided in Table A-1, Appendix A.

2.3.6. The detector locations were each attributed a label and these are shown for winter, on Figure A-3 and for summer, Figure A-4. A summary of the detector deployments in winter 2020/2021 is shown in Table 2-2, while summer detector deployments between 2019 and 2021 are shown in Table 2-3.

Winter automated detector surveys

2.3.7. The 2020/2021 winter detector locations were deployed using the methodology as described above in paragraphs 2.3.3 to 2.3.6.

2.3.8. These locations were selected to monitor winter bat activity levels at a number of new and existing locations previously monitored in summer 2019 and 2020 to provide thorough coverage of habitats across the length of the Scheme. These are shown on Figure A-3 and a summary of these deployments are provided in Table 2-2 overleaf.

Table 2-2 - Summary of winter automated detector locations

Year(s) of survey	Total number	Detector locations
2020/2021	20	C1, C8, C11, C21, C49, C53, C62, C63, C64, C65, C66, C67, C68, C69, C70, C71, C72, C73, C74, C75
TOTAL	**20**	

2.3.9. The automated detectors were grouped into the following habitats for analysis, with the detector locations included in these areas shown in brackets:

- River (C1)
- Hedgerow/treeline (C11, C65, C66, C67, C69)
- Woodland (C53, C64, C68, C71, C72, C73, C74, C75)
- Woodland edge (C21, C49, C62, C63, C70, C8)

Summer automated detector surveys

2.3.10. Surveys were conducted in 2019, 2020 and 2021, using the methodology as described in paragraphs 2.3.3 to 2.3.6 to gather further information about the locations and seasonal use of bat commuting routes which will be affected by the Scheme.

2.3.11. The automated detectors were concentrated in areas where the most activity has been recorded along the Scheme for commuting and foraging bats, as identified from 2019 surveys. These locations have been grouped for analysis with detector locations included in these areas shown in brackets and are labelled on Figure A-4:

- **Group A:** River Wensum and grassland – grassland to the east of the Scheme including a detector location at the River Wensum (C1, C39, D1, M43).
- **Group B:** The Northern Woodlands – a complex of woodlands to the north of the Scheme, including Long Plantation, Rose Carr and The Nursery (C4, C37, C38, C48, C49, C57, C58, C60, C61).
- **Group C:** Grassland between woodlands – a grassland situated between the Northern Woodlands complex and Spring Hills woodland (M46, M47, M50, M51, M52).
- **Group D:** Spring Hills Woodland – woodland located west of the Northern Woodlands complex on the northern edge of the Scheme (C5, C6, C44, C45, C52).
- **Group E:** Long Plantation - block of mixed plantation woodland south of the Northern Woodlands and north of Ringland Lane (C7, C8, C53).
- **Group F:** Woodland south of Ringland Lane – a block of lowland mixed deciduous woodland, which will be severed by the Scheme (C18, C54, C55, C59).
- **Group G:** Hedgerows north of Weston Road – a complex of native hedgerows which will be severed by the Scheme (C11, C33, C35, C56, C78, C79, C80).
- **Group H:** Hedgerows south of Weston Road – a complex of native hedgerows which will be severed by the Scheme (B8, B8i, B9, C12, C28. C34, C81).

- **Group I:** The Broadway – a country lane lined with trees and plantation woodland on either side (B10i, C13, C13i, C20, C21, C22).
- **Group J:** Foxburrow Plantation – a woodland block to the south of the Scheme (B11i, B11ii, C14, C14i, C14ii, C15, C15i, C23, C24, C32, C41 and C42).
- **Group K:** Hedgerows South of Foxburrow Plantation – a group of hedgerows situated south of Foxburrow Plantation and of the Scheme (C25, C26, C29, C31, C40).
- **Group L:** control group (R1, R2, R3, R4, R5, R6, R7)
- **Group M:** Ungrouped locations (C19, C27, C76, C82)

2.3.12. The 2021 summer detector locations were selected with the following objectives:

- To fill data gaps left by the 2020 surveys, where data was missing due to detector failure, access restrictions or new detector locations being added part way through surveys commencing.
- To add new locations, to increase the concentration of detector locations in areas where high levels of bat activity were recorded by automated detectors in 2020, and where further information was required regarding the distribution of bat activity.
- To add new locations outside of the Scheme boundary with the aim of determining barbastelle activity levels across similar habitats outside of the Scheme, and therefore how barbastelle activity levels of the habitats within the Scheme compare with activity levels across the broader landscape.

Table 2-3 - Summary of summer automated detector locations 2019, 2020 and 2021

Year(s) of survey	Total number	Detector locations
2019 only	15	B8, B11ii, C5, C6, C7, C8, C12, C13, C14, C14i, C15, C15i, C20, C22, C26
2019 and 2020	15	B9, B11i, C1, C4, C11, C19, C21, C23, C24, C25, C27, C28, C29, C60, D1
2019 and 2021	5	B10i, C6, C13i, C14ii, C18
2020 only	14	B8i, C31, C32, C33, C34, C39, C40, C42, C48, M43, M46, M50, M51, M52
2020 and 2021	16	C35, C37, C38, C41, C44, C45, C49, C52, C53, C54, C55, C56, C57, C58, C61, M47,
2021 only	13	C76, C78, C79, C80, C81, C82, R1, R2, R3, R4, R5, R6, R7
TOTAL	**78**	

Data analysis

2.3.13. Once triggered by ultrasound, the SM4 and EMT (© Wildlife acoustics) detectors were programmed to record sound files with a duration of 15 seconds, which may contain a number of individual bat calls (or passes), or discrete groups of ultrasound 'pulses'. The assessment of relative bat activity is based on the relative abundance of recorded bat calls of each species within each survey period.

2.3.14. It should be recognised that a series of separate sound files may represent a number of different bats commuting within the range of an automated detector, or a smaller number of bats repeatedly triggering the detector (e.g. bats making repeated foraging passes within the range of a detector).

2.3.15. Where possible, bat calls were identified to species level. However, species of the genus *Myotis* were only identified to genus level as their calls are similar in structure and have overlapping call parameters, making species identification difficult (Russ, 2012). Given the Scheme is outside the current known range of grey long-eared bat *Plecotus austriacus*, each long-eared bat pass has been identified as brown long-eared bat *Plecotus auritus* (JNCC, 2018).

2.3.16. Identification of the genus *Nyctalus* (noctule and Leisler's bat *Nyctalus leisleri*) was based on the following parameters (Russ, 2012):

- noctule <20 KHz;
- *Nyctalus spp.* (noctule or Leisler's bat) >20 KHz.

2.3.17. The following parameters were used to manually identify *Pipistrellus* species (Russ, 2012):

- common pipistrelle *Pipistrellus pipistrellus* ≥40 and ≤49KHz;
- soprano pipistrelle >51KHz;
- *Pipistrellus* species ≥49 and <51KHz;
- Nathusius' pipistrelle *Pipistrellus nathusii* ≤39KHz.

2.3.18. The process for bat call analysis is summarised below:

- Bat calls were run through Kaleidoscope-Pro (© Wildlife acoustics) using the 'Auto-ID' function, which enables identification of species or species groups based on call parameters.
- All bat calls (other than common and soprano pipistrelles for which Auto-ID has a high accuracy (Brabent, Laurent, Dolap, Degraer & Poerink, 2018) were manually checked by ecologists competent in analysing bat calls and experienced in the use of Kaleidoscope software. Where the Auto-ID label was incorrect, the correct species label was attributed to the call.
- Each file may contain calls of multiple bat species; however, the Auto-ID function is only capable of labelling one species. This was corrected during manual checks by duplicating the file and labelling each species separately.

- All files labelled as common or soprano pipistrelle in the Auto-ID process that were below a confidence interval of 0.6 were manually checked. A minimum of 50 common and soprano calls were manually checked per Auto ID file (*i.e.* 40 calls with a confidence interval of <0.6 and then 10 additional calls starting with those at a confidence interval of 0.60 and above).

2.3.19. To allow standardisation and comparison of automated detector survey results the number of bat passes recorded per night (ppn) was calculated for each location, as explained below in Figure 1.

Figure 1 - Bat passes per night calculation

$$Bat\ ppn = \frac{Total\ bat\ passes\ recorded\ at\ a\ SM4\ location}{Number\ of\ nights\ SM4\ Surveyed}$$

2.3.20. As the aims of the automated detector survey was to record a representative sample of bat activity and not a population assessment; no noise files were checked as part of the manual ID process. Noise files consist of any sound which has triggered the detector, which has not been recognised as a bat call, such as crickets or rustling vegetation etc. Occasional bat calls may be present with these, although these are usually short sections of calls from bats which are likely to have been further away from the detector and therefore less relevant to the habitat feature under survey. Although slightly higher numbers of calls of all species may be recorded if the noise files were analysed, this would not alter the results in terms of habitat features with highest/lowest levels of bat activity.

2.3.21. The analysed sound files were subject to a QA process. Ten percent of sound files which were identified as common or soprano pipistrelle and 10% of each non-pipistrelle label were randomly selected for QA checks by a suitably competent analyst experienced in using Kaleidoscope software (© Wildlife acoustics). A minimum of 10 files were subject to QA, if there were less than 10 files analysed in total, then all files were subject to QA.

2.4 Notes and limitations

2.4.1. Every effort has been made to provide a comprehensive set of survey data; however, the following assumptions and limitations apply to the above referenced surveys.

General

2.4.2. Best practice indicates that survey data is generally considered valid for up to 18 months (CIEEM, 2019). The data presented in this report enables an evaluation of bat activity within the Survey Area, which in combination with other surveys is intended to inform an Environmental Impact Assessment of the Scheme. Should the planning submission be delayed, further surveys may be required to verify the baseline data remains representative.

2.4.3. In some cases, due to issues such as poor weather conditions or access restrictions, the data was not collected in the correct month. Where this happened, the data was collected as early as possible in the following month, and a gap of at least two weeks left before data collection in that month.

Vantage point surveys

2.4.4. Due to the limited field of view of thermal imaging cameras, bats were frequently recorded by bat detectors but not observed by surveyors or recorded by the thermal imaging cameras. It is assumed that these bats were not using the linear feature or habitat subject to the surveys and therefore data collected is still considered valid and not a limitation to the survey.

2.4.5. Due to the speed of flight of bats under observation, an estimation of flight height was not possible on all occasions. However, flight heights were able to be estimated for the majority of observations and therefore the data collected is still considered valid and not a limitation to the survey.

2.4.6. The VP5 survey in June 2021 was abandoned 1 hour and 20 minutes early due to heavy rain, prior to which no barbastelle or *Myotis* species had been recorded by surveyors. This however was not thought to pose a significant limitation to the interpretation of bat activity at this location given that this location was surveyed extensively throughout 2020 and 2021.

2.4.7. The VP6 survey in May 2020 was unseasonably cold, with the recorded survey start temperature 4 degrees and the end temperature 1.5 degrees Celsius. Bats, including barbastelle, were still recorded during this survey. All other surveys were completed in appropriate weather conditions and therefore the data collection is still considered valid in the context of the overall survey programme and not a limitation to data interpretation.

2.4.8. The VP2 survey in May 2021 and VP7 survey in May 2020 was undertaken in conditions less than 10 degrees Celsius with survey start temperatures being recorded as 9 degrees Celsius. Bats, including *Myotis* species were still recorded during this survey. All other surveys were completed in appropriate weather conditions and therefore the data collection is still considered valid and not a limitation to data interpretation.

2.4.9. The VP5 survey in May 2021 undertaken in conditions less than 10 degrees Celsius. Bats were recorded, however no *Myotis* species or barbastelle. Start temperature was 9/10 degrees Celsius depending on location and exposure, this is considered a sufficient temperature to conduct the survey and therefore the data collection is still considered valid and not a limitation to data interpretation.

Automated detector surveys

2.4.10. While the 2021 surveys were in part aimed at filling survey gaps left by the 2020 data collection (due to access limitations or detector failures), some of the 2021 automated detector data collection was also limited by access restrictions or detector failure, as detailed in Table A-1, Appendix A. Further notes and limitations associated with the bat activity surveys are as follows:

- With respect to the automated detector surveys; where less than 5 nights of data collected due to detector malfunctions or access issues, this was standardised as explained above (paragraph 2.3.18) to calculate bat passes per night, so this was not considered to limit the value of the data.
- Due to access restrictions, it wasn't possible to deploy automated detectors to provide thorough coverage of habitats across the southernmost extent of the Scheme for the winter automated detector surveys. Despite this, automated detectors were deployed in a number of detector locations in connecting habitat which resulted in a good coverage of habitats across the southern extent of the Scheme as a whole. The data collected is therefore considered representative and valid despite this limitation.
- Some of the summer detector locations, due to access restrictions, were not deployed for the entire deployment period. In these locations, there were often multiple detectors in the surrounding vicinity that resulted in good coverage of the area. Detectors that had significantly reduced deployment have been given special consideration when drawing comparisons through averages and have been discussed as such in the results. Therefore, it is considered that this limitation does not limit the value of the data.
- Noise files were not analysed as part of the bat activity call analysis process for long-term detector surveys. The reasons for this are explained in paragraph 2.3.20. Although it is inevitable that some bat calls (incorrectly labelled as noise files) will have not been assessed and included as a result of this, these are likely to have been calls from bats a further distance from the detector and therefore less relevant to the habitat feature under survey. Additionally, the bat activity surveys were designed to provide representative data and not to record every pass possible. Therefore, this has been achieved utilising the existing methods and is not considered a limitation to this assessment.
- A high level of background noise was recorded occasionally at a number of automated detector locations. This loud background noise can reduce detectability of echolocation calls, especially quieter bats such as barbastelle and brown long-eared bat. The dataset collected however is still considered representative and valid, given that a large number of automated detectors were deployed across the Scheme over a number of survey seasons.

3 Vantage point survey results

3.1.1. The dates and meteorological data of these surveys are provided in Appendix B, Table B-1.

3.1.2. The vantage point locations are shown in Figure A-2 and are described in Table 2-1 (previous section). The results of vantage point surveys are summarised below, and indicative flight lines are shown in Figures B1 – B18.

3.2 Vantage point 1 (Northern Woodlands)

3.2.1. The indicative flight-lines observed at Vantage Point 1 across all five surveys are illustrated in Appendix B. The results of Vantage Point 1 are summarised in Table 3-1 below.

Table 3-1 – Summary of results of vantage point 1

Species	Total recorded passes	% Passes observed of recorded passes	Average height m (height range)	Behaviours observed
Barbastelle	61	29.5	5.2 (4 - 6)	Commuting
Myotis sp.	34	61.8	4.2 (3 - 5)	Foraging and commuting

Barbastelle

3.2.2. A total of 61 barbastelle passes were recorded at VP1. Of these passes, 29.5% (18 passes) were observed by surveyors using this feature, a woodland ride, for commuting.

3.2.3. Barbastelle passes were recorded in all months, however, flight heights, flight lines and behaviour were not observed by surveyors or captured by the thermal imaging camera in May and September surveys. It is likely these bats were flying over/along the edges of the woodland or present within surrounding woodland areas, out of sight and range of surveyors and thermal imaging camera and not using the feature for commuting or foraging purposes.

3.2.4. Flight lines observed during the surveys are shown on Figure B-1 and summarised below:

- Individual bats were observed commuting along the woodland ride at 4 to 6m, from the north (on more than five occasions) and the south (on more than five occasions) and flying back and forth along the ride (on two occasions).
- Individual bats were observed on four occasions commuting south to north along the ride and then following the ride west.
- An individual was observed commuting east to west along the northern ride.
- An individual was observed commuting west to east and following the ride south.

Myotis species

3.2.5. A total of 35 *Myotis* species passes were recorded at VP1. Of these passes, 61.8% (21 passes) were observed by surveyors using this feature, a woodland ride, for commuting and foraging.

3.2.6. *Myotis* species passes were recorded and observed by surveyors or captured by the thermal imaging camera across all the months surveyed.

3.2.7. Flight lines observed during the surveys are shown on Figure B-2 and detailed below.

- Individual bats were observed commuting and foraging along the ride at 3 to 5m, travelling south to north (on six occasions) or south to north (on eight occasions).
- Individual bats were observed commuting east to west (on one occasion) and west to east (on three occasions) and turning south/north along the woodland ride.
- An individual was observed commuting from east to west along the ride intersecting the ride following the eastern edge of The Nursery.

3.3 Vantage point 2 (grassland between the Nursery and Spring Hills)

3.3.1. The indicative flight-lines observed at Vantage Point 2 across all five surveys are illustrated in Appendix B. The results of Vantage Point 2 are summarised in Table 3-2 below.

Table 3-2 – Summary of results of vantage point 2

Species	Total recorded passes	% Passes observed	Average height (height range)	Behaviours observed
Barbastelle	10	50.0	9.6 (4 - 15)	Foraging and commuting
Myotis sp.	14	21.4	9 (3 - 15)	Foraging and commuting

Barbastelle

3.3.2. A total of 10 barbastelle passes were recorded at VP2. Of these passes, 50.0% (5 passes) were observed by surveyors using this feature, an open field between woodland, for foraging and commuting.

3.3.3. No barbastelles were recorded or observed during the May and June surveys. Bats were recorded in the remaining surveys. However, flight heights, lines and behaviour were not observed by surveyors or captured by the thermal imaging camera for the single barbastelle recorded in September.

3.3.4. Flight lines observed during the surveys are shown on Figure B-3 and summarised below.

- Individual bats were observed on three occasions commuting east to west across the grassland between the Nursery and Spring Hills woodlands, at heights ranging from 4 to 10m.
- An individual bat was observed commuting north-east to south-east across the grassland into the Nursery and Spring Hills woodlands at a height of 15m.
- An individual bat was observed foraging south to north and curving to the west into the woodlands at an approximate height of 4m.

Myotis species

3.3.5. A total of 14 *Myotis* species passes were recorded at VP2. Of these passes, 21.4% (3 passes) were observed by surveyors using this feature, an open field between woodland, for foraging and commuting.

3.3.6. *Myotis* species passes were recorded in all months, however, no passes were observed by surveyors or captured by thermal imaging cameras during the May, June and September surveys.

3.3.7. Flight lines observed during the surveys are shown on Figure B-4 and summarised below.

- An individual bat was observed commuting south to north across the grassland at an unknown height.
- An individual bat was observed foraging west to east across the grassland at approximately 3m.
- An individual bat was observed commuting north-east to south-west approximately 15m.

3.4 Vantage point 3 (grassland between Spring Hills and Long Plantation)

3.4.1. The indicative flight lines observed at Vantage Point 3 across all five surveys are illustrated in Appendix B. The results of Vantage Point 3 are summarised in Table 3-3 below.

Table 3-3 – Summary of results of vantage point 3

Species	Total recorded passes	% Passes observed	Average height (height range)	Behaviours observed
Barbastelle	2	50.0	4	Commuting
Myotis sp.	11	45.5	8.8 (3 - 10)	Foraging and commuting

Barbastelle

3.4.2. A total of two barbastelle passes were recorded at VP3. Of these passes, 50.0% (1 pass) were observed by surveyors using this feature, an open field between woodland, for commuting.

3.4.3. A singular flight line observed, in September, comprised a single bat commuting at approximately 4m from south to north across the grassland towards Spring Hills Woodland, as shown on Figure B-5 Myotis species.

3.4.4. A total of 11 *Myotis* species passes were recorded at VP3. Of these passes, 45.5% (5 passes) were observed by surveyors using this feature, an open field between woodland, for foraging and commuting.

3.4.5. No *Myotis* species were recorded of observed during the July surveys. Bats were recorded in all the remaining surveys, however flight heights, lines and behaviour were not observed by surveyors or captured by the thermal imaging camera in August.

3.4.6. Flight lines observed during the surveys are shown on Figure B-6 and summarised below.

- Individual bats were observed on two occasions, commuting south to north across the grassland at 3m to 7m.
- An individual bat was observed commuting north to south at 10m across the grassland.
- An individual bat was observed commuting south-east to north-west at 10m across the grassland.
- An individual bat was observed commuting south-west to north-east at over 10m across the grassland.

3.5 Vantage point 4 (Ringland Lane)

3.5.1. The indicative flight-lines observed at Vantage Point 4 across all five surveys are illustrated in Appendix B. The results of Vantage Point 4 are summarised in Table 3-4 below.

Table 3-4 – Summary of results of vantage point 4

Species	Total recorded passes	% Passes observed	Average height (height range)	Behaviours observed
Barbastelle	4	50.0	6.5 (6 - 7)	Commuting
Myotis sp.	3	33.3	10	Commuting

Barbastelle

3.5.2. A total of four barbastelle passes were recorded at VP4. Of these passes, 50.0% (two passes) were observed by surveyors using this feature, a hedge lined road, for commuting.

3.5.3. No barbastelle were recorded during the May, June or July 2020 surveys. In September, barbastelle were recorded by detectors but not observed by surveyors or captured by the thermal imaging camera.

3.5.4. Flight lines observed during the surveys are shown on Figure B-7 and summarised below.

- An individual bat was observed commuting east to west at 6m, following the northern hedgerow on Ringland road.

- An individual bat was observed commuting south to north across the hedgerow at 7m, appearing to fly towards Long Plantation.

Myotis species

3.5.5. A total of three *Myotis* species passes were recorded at VP4. Of these passes, 33.3% (one pass) were observed by surveyors using this feature, a hedge lined road, for commuting.

3.5.6. No *Myotis* species were recorded during the May, June and July 2020 surveys. In September, *Myotis* species were recorded by detectors but not observed by surveyors or captured by the thermal imaging camera.

Only one flight line was observed during the surveys in August, this comprised a single *Myotis* species commuting along the northern hedgerow from west to east at 10m, as shown on Figure B-8.

3.6 Vantage point 5 (the hedgerow north of Weston Road)

2020 Results

3.6.1. The indicative flight-lines observed at Vantage Point 2020 surveys across all five surveys are illustrated in Appendix B.

3.6.2. The 2020 survey results have not been represented in table format as per 2021 results due to the difference in methods used for each survey. The results have been retained from the previous survey report for informative purposes below.

Barbastelle

3.6.3. Observed barbastelle activity was associated with the hedge during all five survey months.

Flight lines observed during the surveys are shown on Figure B-9.

3.6.4. Activity included barbastelle flying along the south-eastern section of hedge (in both directions) and flying to and from the central junction of hedge from the centre of the field to the south-east (likely foraging activity). Flight was usually at tree height when flying along the hedgerow.

Myotis species

3.6.5. No *Myotis* species were recorded during the May survey. In July and September, *Myotis* species were recorded by the detector but were not observed by surveyors or recorded by the thermal imaging camera.

3.6.6. Flight lines observed during the surveys are shown on Figure B-10 and the most commonly observed flight lines are summarised below.

- An individual was observed was foraging on the north-western section of the south hedge, before flying north-west across the field.
- An individual was observed was foraging in the field south of the north-western section of hedge, close to the hedge.

- Individuals were observed on several occasions, flying close to the ground along the hedge, between 1m to 4m high.
- Individuals were also observed foraging within the field to the south or flying north across the hedge.

2021 Results

3.6.7. The indicative flight-lines observed at Vantage Point 5 2021 surveys across all five surveys are illustrated in Appendix B. The results of Vantage Point 5 are summarised in Table 3-5 below:

Table 3-5 – Summary of results of vantage point 5

Species	Total recorded passes	% Passes observed	Average height (height range)	Behaviours observed
Barbastelle	108	25%	5.3 (1.5 – 8)	Foraging and commuting
Myotis sp.	32	21.9%	8.25 (1.5 – 10)	Foraging and commuting

Barbastelle

3.6.8. Vantage Point 5 recorded the highest number of barbastelle passes across the Scheme, totalling 108 across the five surveys undertaken in 2021. Of these passes, 25% (27 passes) were observed by surveyors using the feature, a hedgerow, for foraging and commuting.

3.6.9. No barbastelle passes were recorded during the May surveys.

Both foraging and commuting activity was recorded at this location. Many flights were observed, most frequently associated with the hedgerow north of Weston Road and the hedgerow north of VP5, as shown on Figure B-11.

3.6.10. Bats were most frequently observed commuting along the hedgerow at heights ranging from 1.5m to 8m. Bats were observed either flying north-west to south-east (13 occasions) or south-east to north-west (6 occasions). On two occasions, bats were recorded foraging back and forth along the hedgerow.

Further flight lines were also observed during the surveys, these were observed on single occasions throughout of the duration of these surveys and are shown on Figure B-11.

Myotis species

3.6.11. Vantage Point 5 recorded the highest number of *Myotis* species passes across the Scheme, totalling 32 across the five surveys undertaken in 2021. Of these passes, 21.9% (7 passes) were observed by surveyors using the feature, a hedgerow, for foraging and commuting.

3.6.12. No *Myotis* species were recorded during the May surveys.

3.6.13. Flight lines observed during the surveys are shown on Figure B-12 and summarised below:

- Individual bats were observed commuting along the hedgerow either north-west to south-east (one occasion) or south-east to north-west (two occasions)
- Individual bats were observed, on two occasions, commuting at heights of 8m along the hedgerow north-west to south-east and then turning north across the field.
- Individual bats were observed foraging in circles to the north-east of the hedgerow and also foraging back and forth across the hedgerow from north to south.

3.7 Vantage point 6 (The Broadway)

3.7.1. The indicative flight-lines observed at Vantage Point 6 across all five surveys are illustrated in Appendix B. The results of Vantage Point 6 are summarised in Table 3-6 below:

Table 3-6 - Summary of results of vantage point 6

Species	Total recorded passes	% Passes observed	Average height (height range)	Behaviours observed
Barbastelle	103	20.4	7 (3 - 20)	Foraging and commuting
Myotis sp.	11	27.3	3	Foraging and commuting

Barbastelle

3.7.2. Vantage Point 6 recorded the second highest number of barbastelle passes across the Scheme, totalling 103 passes across the five surveys. Of these passes, 20.4% (21 passes) were observed by surveyors using the feature, a tree-lined road, for foraging and commuting.

3.7.3. Higher numbers of barbastelle were recorded by bat detectors during all the surveys, particularly during the September survey where 58 barbastelle calls were recorded. Not all of these passes were observed by surveyors or captured by thermal imaging. No passes observed by surveyors in May; whilst within the optimal survey period, conditions during the survey visit were below 4.5 degrees. It is likely that these bats were flying over/along the edges of the woodland or present within surrounding woodland areas.

3.7.4. Flight lines observed during the surveys are shown on Figure B-13 and are summarised below.

- Individual bats were observed commuting along the Broadway at 3 to 10m, with five seen commuting east and ten seen commuting west. Foraging behaviour was also recorded.
- Individual bats were observed on two occasions commuting south to north across the road at 7m.
- An individual bat was observed commuting north to south across the road at 7 to 20m.
- An individual bat was observed commuting north to south across the road before continuing east at 5m.

- An individual bat was observed commuting north to south of the road before continuing west at 6m.
- A single barbastelle was also recorded foraging in circles in the vicinity of the vantage point.

Myotis species

3.7.5. A total of 11 *Myotis* species passes were recorded at VP6. Of these passes, 27.3% (three passes) were observed by surveyors using this feature, a tree-lined road, for foraging and commuting.

3.7.6. No *Myotis* species were recorded or observed during the May and June surveys. In July, *Myotis* species were recorded by detectors but not observed by surveyors or captured by the thermal imaging camera.

3.7.7. Two flight lines were recorded during the surveys in August and September. These consisted of bats commuting along the Broadway, commuting east to west on two occasions and commuting west to east at 3m on one occasion.

3.8 Vantage point 7 (the glade within Foxburrow Plantation)

3.8.1. The indicative flight-lines observed at Vantage Point 7 across all five surveys are illustrated in Appendix B. The results of Vantage Point 7 are summarised in Table 3-7 below.

Table 3-7 – Summary of results of vantage point 7

Species	Total recorded passes	% Passes observed	Average height (height range)	Behaviours observed
Barbastelle	55	50.9	6.6 (3 - 10)	Foraging and commuting
Myotis sp.	22	31.8	6.3 (4 - 10)	Foraging and commuting

Barbastelle

3.8.2. A total of 55 barbastelle passes were recorded at VP7. Of these passes, 50.9% (28 passes) were observed by surveyors using this feature, a woodland ride, for commuting.

3.8.3. No barbastelles were recorded by detector or observed by surveyors during the May 2020 survey.

3.8.4. Flights lines observed during the surveys are shown on Figure B-15 and the most regularly observed flight lines are summarised below.

- Individual bats were observed commuting and foraging along the glade. On 12 occasions bats were observed flying east to west at 3 to 10m, and on six occasions bats were observed flying east to west at 5 to 10m.
- Individual bats were observed commuting north-east to south-west, crossing the glade, at approximately canopy height.

Myotis species

3.8.5. Vantage Point 7 recorded the second highest number of *Myotis* species passes across the Scheme, totalling 22 across the five surveys undertaken in 2020. Of these passes, 31.8% (7 passes) were observed by surveyors using the feature, a woodland ride, for foraging and commuting.

3.8.6. In May, June and August, *Myotis* species was recorded by detectors but not observed by surveyors or captured by the thermal imaging camera. It is likely that these passes were from bats flying above the canopy or within the woodland.

3.8.7. Flight lines observed during the surveys are shown on Figure B-16 and summarised below.

- An individual was observed flying north across the track.
- Individuals were observed on two occasions commuting along the track (one east above the canopy and the other west, approximately 4m high).
- An individual was observed flying south across the track through the canopy.
  An individual was observed flying south from the canopy before continuing west along the track.

3.9 Vantage point 8 (Foxburrow Plantation stream)

3.9.1. The indicative flight-lines observed at Vantage Point 8 across all five surveys are illustrated in Appendix B. The results of Vantage Point 8 are summarised in Table 3-8 below.

Table 3-8 – Summary of results of vantage point 8

Species	Total recorded passes	% Passes observed	Average height (height range)	Behaviours observed
Barbastelle	39	28.2	7.2 (3 - 10)	Commuting
Myotis sp.	19	31.6	3.6 (2 - 5)	Foraging and commuting

Barbastelle

3.9.2. A total of 39 barbastelle passes were recorded at VP8. Of these passes, 28.2% (11 passes) were observed by surveyors using this feature, a stream, for commuting.

3.9.3. Barbastelle were recorded and observed in all surveys. However, in July, August and September some barbastelle passes were recorded but not observed by surveyors or captured by thermal imaging. These were likely present within the woodland or foraging out of view.

3.9.4. Flights lines observed during the surveys are shown on Figure B-17 and are detailed below.

- Individual bats were observed on two occasions commuting north-east to south-west at 3 to 10m across the stream.

- Individual bats were observed on seven occasions commuting south-east to north-west at 7m along the edge of Foxburrow Plantation.
- An individual bats was observed commuting north-west to south-east along the Foxburrow Plantation.
- An individual bats was observed commuting south-west to north-east into Foxburrow Plantation.

Myotis species

3.9.5. A total of 19 *Myotis* species passes were recorded at VP8. Of these passes, 31.6% (six passes) were observed by surveyors using this feature, a stream, for foraging and commuting.

3.9.6. No *Myotis* species were recorded during the August 2020 survey. In July, *Myotis* species passes were recorded by detectors but not observed by surveyors or captured by thermal imaging cameras.

3.9.7. Several flight lines of individual bats were observed during the survey, as shown on Figure B-18. These consisted of individual *Myotis sp*:

- commuting east to west below the stream, then continuing south;
- commuting east to west along the woodland edge, then continued north into the Foxburrow Plantation;
- flying from the woodland, foraging briefly over the stream, then commuting back into the Foxburrow Plantation;
- commuting south to north towards the Foxburrow Plantation from the meadow (approximately 4m high);
- commuting north to south out of Foxburrow Plantation (approximately 2m high); and

flying south-east (potentially from Foxburrow Plantation), foraged briefly over the meadow and then flew northwest back towards Foxburrow Plantation (approximately 5m high).

4 Winter automated detector survey results

4.1 Overview

4.1.1. At least eight bat species were recorded using habitats within the Survey Area during the winter automated bat detector surveys. The following species and species groups were confirmed and will be discussed as follows:

- barbastelle;
- common pipistrelle;
- soprano pipistrelle;
- Nathusius' pipistrelle;
- *Myotis* species;
- noctule;
- *unidentified Nyctalus* species (noctule or Leisler's bat*)*;
- brown long-eared bat; and
- serotine *Eptesicus serotinus*.

4.1.2. The passes per night recorded during the automated detector surveys each month are summarised in Table C-1, Appendix C. Bat Activity Index Values for each species at each location are shown on Figure C-1 to Figure C-10, Appendix C.

4.1.3. Graphs for the average passes per night for each species in each broad habitat type has been calculated and presented on Figure C-10, Appendix C.

4.1.4. A total of 56,069 call registrations were recorded across the winter deployment period. Of these calls the most commonly registered species was soprano pipistrelle accounting for 56.79% of the total bat passes. The least commonly registered species was Nathusius' pipistrelle, accounting for only 0.01% of the total bat passes.

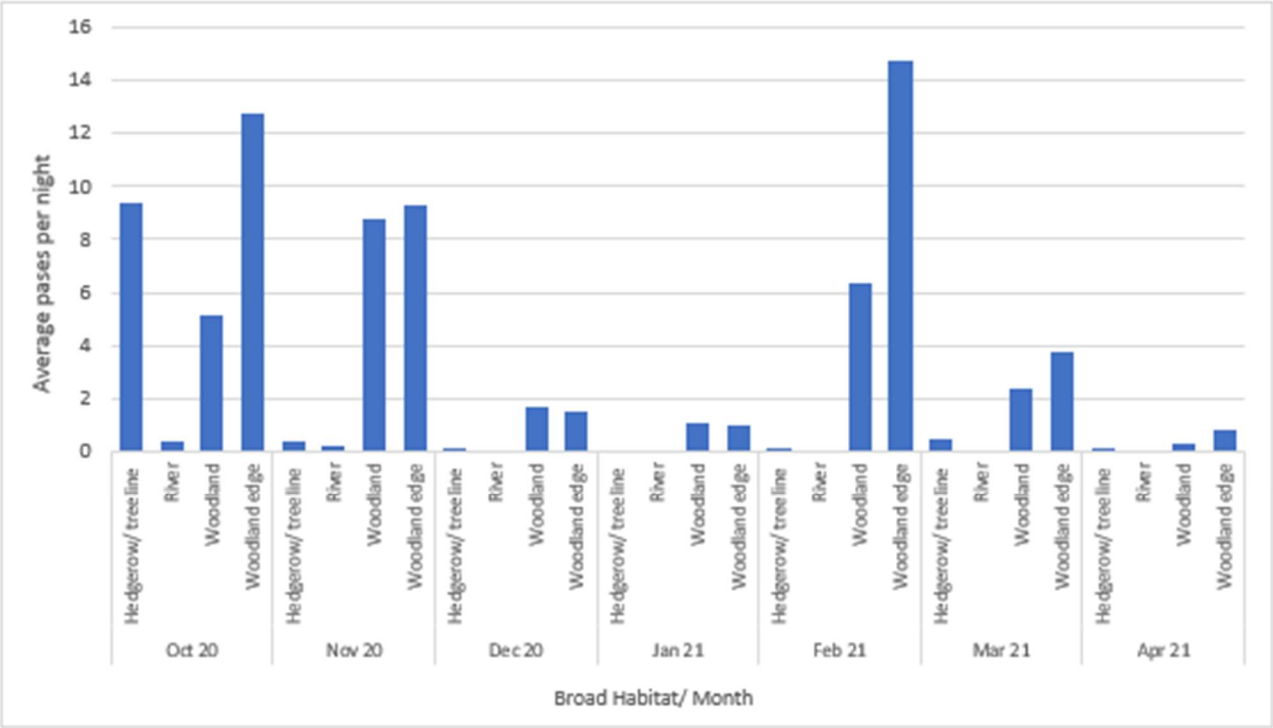
4.1.5. Locations C70, C21 and C75 saw the highest number of call registrations, accounting for 16.35%, 14.8% and 14.01% of the total calls respectively. The locations with lowest total call registrations for all species was C66 accounting for <0.01% of total calls.

4.1.6. October was the most active month, with a total call registration of 32,532 accounting for over half (58%) the call registrations across the deployment period. The month with least call registrations was January with 571 passes, accounting for approximately 0.01% of total call registrations.

4.2 Barbastelle

4.2.1. The graph showing average barbastelle ppn per broad habitat is shown on Figure 4-1 overleaf and BAIV for barbastelle at each detector location are shown on Figure C-1.

Figure 4-1 – Average passes per night for barbastelle per broad habitat type



4.2.2. Barbastelle activity levels across the deployment period at all the locations within the Survey Area was 3.73ppn, with a peak of activity in October recording an average 8.25ppn. Similar activity levels were also recorded in November and February, with averages of 6.40ppn and 6.99ppn respectively.

4.2.3. Detector locations situated within woodland edge habitat recorded the highest activity across the Survey Area, recording an average 6.30ppn across the deployment period. Peak activity was recorded in February with an average of 14.80ppn. Activity over the remaining months of the deployment period ranged from 12.77ppn in October to 0.83ppn in April.

4.2.4. Woodland edge location C21, located on the edge of The Broadway woodland, recorded the highest activity of all locations in the Survey Area. An average of 19.66ppn was recorded across the deployment period. Activity at this location peaked in November, recording 44.80ppn, with similarly high levels in October (34.20ppn) and February (39.20ppn). Activity levels, for the most part, stayed higher at this location compared to other locations throughout the winter deployment period.

4.2.5. Detector locations situated within woodland recorded on average 3.66ppn across the deployment period. Activity peaked in November, averaging 8.80ppn. The remaining average monthly activity ranged from 6.33ppn in February to 0.30ppn in April.

4.2.5.1 Woodland locations C68, C75 and C73 recorded the highest average activity with 7.05ppn 7.11ppn and 6.09ppn on average, Locations C68, located in the woodland south of Ringland Lane, and C75, located in Rose Carr, recorded the highest activity within the habitat type in November, recording peaks of 30.00ppn and 28.40ppn respectively. Activity at these locations varied across the months but remained lower than 9.00ppn per month. Location C73, located in the Nursery, recorded higher levels of activity than most locations every month, recording a peak of activity in 14.80ppn in February.

4.2.6. Detector locations situated within hedgerow/treeline recorded an average 1.48ppn across the deployment period. Activity peaked in October, recording an average of 9.36ppn. Activity was lower between November and April, reaching no higher than 0.44ppn.

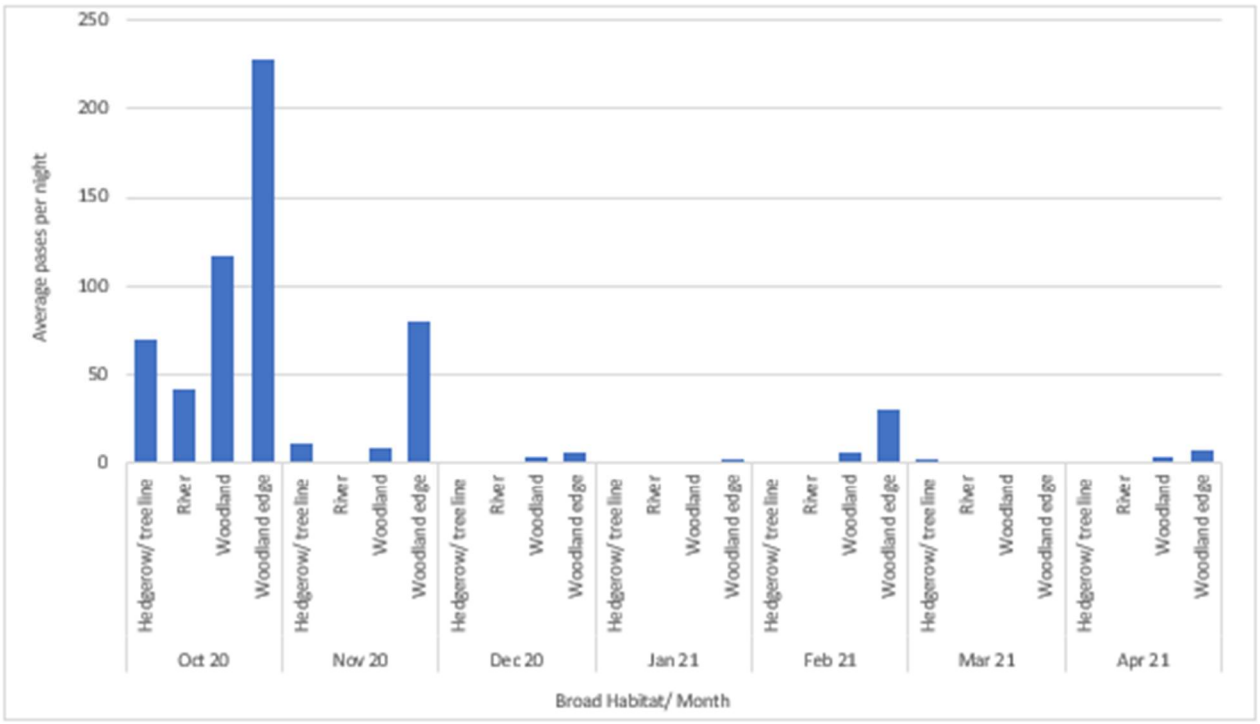
4.2.7. Detectors situated in hedgerow/treeline habitat recorded on average 1.48ppn, with a particularly noticeable peak in October of 9.36ppn on average across the locations. This peak was inflated due to a lone peak in activity at location C65, located within the hedgerows south of Weston Road, of 41.60ppn. All other hedgerow locations in October averaged between 0.20ppn and 2.60ppn. Additionally, from November onwards, activity levels at this location did not rise above 0.20ppn.

4.2.8. Little to no activity, less than 0.40ppn, was recorded by the automated detector deployed on the River Wensum.

4.3 Common pipistrelle

4.3.1. The graph showing average common pipistrelle ppn per broad habitat type is shown on Figure 4-2 below and BAIV for each detector location are shown on Figure C-2.

Figure 4-2 - Average passes per night for common pipistrelle per broad habitat type



4.3.2. Common pipistrelle activity across deployment period at all locations within the Survey Area was 26.64ppn with a peak of activity in October, recording 134.63ppn. Activity was lower in November, recording 30.57ppn. However, November activity was still higher than the remaining months, which recorded average activity of less than 4.00ppn, with the exception of February that recorded 12.06ppn on average.

4.3.3. The highest activity levels were recorded at the woodland edge locations, with an average 50.80ppn across the deployment period. The peak was recorded in October, recording an average of 228.17ppn. Activity in the remaining months was lower, with November and February recording 80.07ppn and 30.63ppn, respectively. The remaining months activity remaining below 7.00ppn.

4.3.4. Locations C21 and C70 recorded, on average, the highest activity across the woodland edge habitat and across the Scheme, recording 92.43ppn and 112.03ppn, respectively. Both locations recorded high activity in October of 527.20ppn (C21) and 357.00ppn (C70). Location C21 activity remained lower for the remaining months, with the exception of February where it recorded the highest activity that month (90.80ppn). Location C70 recorded another peak in November of 419.20ppn and then recorded activity no higher than 8.00ppn for the remaining deployment period.

4.3.5. Detectors placed within woodland habitat recorded, on average, 20.16ppn. The peak month of activity was October, recording on average 116.45ppn, whilst the remaining months recorded activity below 10.00ppn.

4.3.6. Locations C72 recorded a large peak in October of 442.60ppn, with remaining location in October recording no more than 150.00ppn. For the remaining months, activity was not recorded above 22.00ppn with the exception of C64 in February (43.00ppn).

4.3.7. Detector locations situated within hedgerow/treeline recorded on average 12.09ppn, across the deployment period. Activity peaked in October, recording 70.00ppn. Location C11 and C67 recorded the highest activities in October, averaging 150.20ppn and 150.00ppn, respectively. For the remaining months, little to no activity was recorded at the detectors, no more than 2.50ppn, with the exception of C67 in November (55.00ppn) and March (10.80ppn).

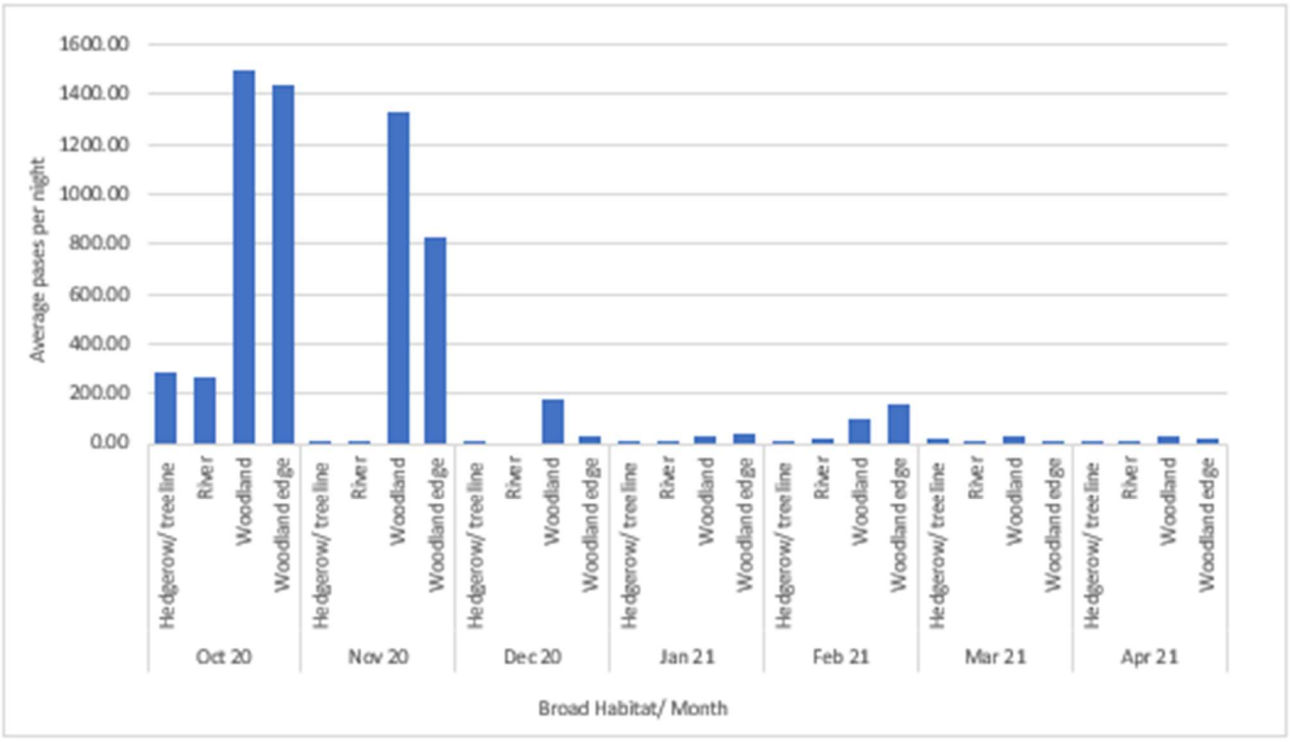
4.3.8. The detector placed along the river, C1, recorded 50.60ppn (Common pipistrelle 6.23ppn, Soprano pipistrelle 43.66ppn and Pipistrelle species 0.37ppn). The peak month, October, at this location recorded 42.00ppn. Little to no activity, no higher than 1.0ppn, was recorded between November to April.

4.3.9. A total of 72 *Pipistrellus* species calls were unable to be identified to species level during analysis. In the case that all these unidentified calls were common pipistrelle calls, it has been calculated that these would have accounted for 0.38% of all common pipistrelle calls.

4.4 Soprano pipistrelle

4.4.1. The graph for soprano pipistrelle ppn per broad habitat type is shown on Figure 4-3 and BAIV for each detector location are shown on Figure C-3.

Figure 4-3 - Average passes per night for soprano pipistrelle per broad habitat type



4.4.2. Soprano pipistrelle activity across the deployment period at all locations within the Survey Area comprised a collective average of 45.49ppn with a peak of activity in October, recording an average of 175.03ppn. Activity levels remained high in November, recording an average of 108.56ppn. Levels from December onwards were lower than October and November with averages ranging from 14.42ppn (February) to 2.84ppn in (April).

4.4.3. Detectors placed at woodland edge locations, recorded on average 60.50ppn across the deployment period. The peak was recorded in October, averaging 240.50ppn. Activity in November remained high with activity averaging 138.63ppn. Remaining monthly activity ranged from 2.60ppn (March) to 27.27ppn (February). Locations C21 and C70 recorded the highest average activity of the woodland edge habitats, recording 122.80ppn and 144.17ppn, respectively. Location C21 recorded a single large peak in October of 741.60ppn, whilst location C70 recorded two peaks in October and November of 373.00ppn and 618.20ppn, respectively.

4.4.4. Detectors placed within woodland habitat recorded, on average 57.25ppn. The peak month of activity was October, recording on average 186.75ppn. Activity in November remained high, recording 166.93. Remaining monthly activity ranged from 3.60ppn (April) to 22.20ppn (December). Location C75 recorded the highest monthly activity in November, most likely inflating the overall average activity for woodland with 1040.20ppn. Activity levels in October were lower but most consistent over several locations, C72, C73, C74 and C75, ranging from 255.00ppn (C75) to 516.80ppn (C74) in October. Activity for the remaining months was lower, below 50.00ppn, with the exception of a small peak in December at location C74 with 139.20ppn.

4.4.5. Detector locations situated within hedgerow/treeline recorded on average 9.01ppn across the deployment period. Activity peaked in October, recording 58.28ppn. Much lower activity, reaching no higher than 4.00ppn, was recorded for the remaining deployment months.

4.4.6. Location C65 recorded the highest activity within the hedgerow/treeline habitat with an average of 24.91ppn. All locations within this habitat recorded peaks in October, with C65 recording 166.80ppn. Location C11 recorded the second highest peak in October for hedgerow/treeline habitat of 78.80ppn.

4.4.7. The single detector placed along the river, C1, recorded 43.66ppn. The peak month, October, at this location recorded 272.20ppn. Little to no activity, no higher than 1.60ppn, was recorded from November to January. Activity from February to April was marginally higher ranging from 21.60ppn (February) to 3.80ppn (April).

4.4.8. A total of 72 *Pipistrellus* species calls were unable to be identified to species level during analysis. In the case that all these unidentified calls were common pipistrelle calls, it has been calculated that these would have accounted for 0.23% of all common pipistrelle calls.

4.5 Nathusius' pipistrelle

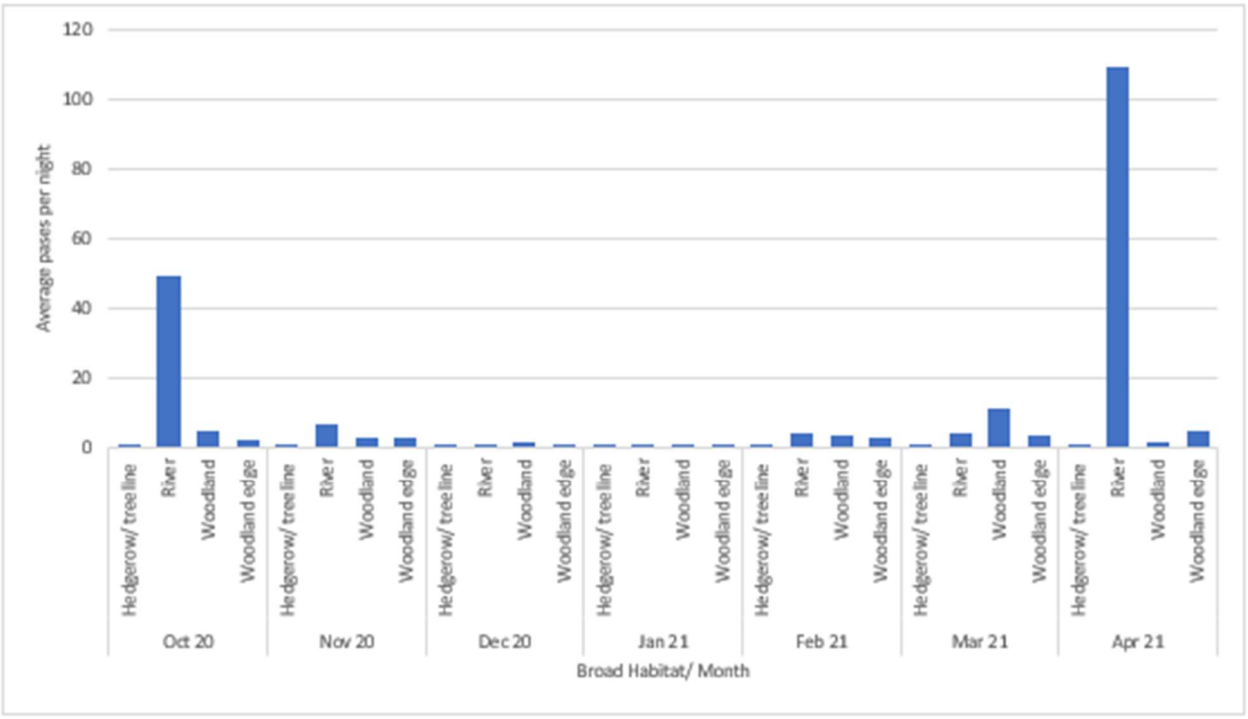
4.5.1. The graph showing Nathusius' pipistrelle ppn per broad habitat type is shown on Figure C-5 and BAIV for each detector location are shown on Figure C-4.

4.5.2. Nathusius' pipistrelle activity was low across all detectors in all months. Bat passes were only recorded in automated detector locations associated with woodland edge habitat and hedgerow/tree line habitat in the following locations and months: C21 in October, C65 in November and C67 in October. Passes per night in any given month did not exceed 0.20ppn at any of these locations.

4.6 *Myotis* species

4.6.1. The graph for Myotis species ppn per broad habitat type is shown on Figure 4-4 and BAIV for each detector location are shown on Figure C-6.

Figure 4-4 - Average passes per night for *Myotis* species per broad habitat type



4.6.2. *Myotis* species activity across the deployment period in all locations within the Survey Area was 3.64ppn, with peak activity recorded in April, recording average of 7.59ppn. March and October also recorded similar activity, with averages of 5.85ppn and 5.18ppn respectively.

4.6.3. Detector locations situated within woodland edge locations recorded on average 2.42ppn across the deployment period. Activity levels were low across the deployment period ranging from 0.23ppn (January) to 5.00ppn (April).

4.6.4. Noticeable peaks in monthly woodland edge activity were recorded in location C49 in April, recording 26.80ppn. C49 was located along the edge of the Northern Woodlands.

4.6.5. Detector locations situated within woodland locations recorded on average 3.81ppn across the deployment period. Activity levels were low across the deployment period ranging from 1.00ppn (January) to 11.18ppn (March).

4.6.6. Noticeable peaks in monthly woodland activity were recorded at location C73 in March, recording 42.20ppn. C73 was located in The Nursery woodland.

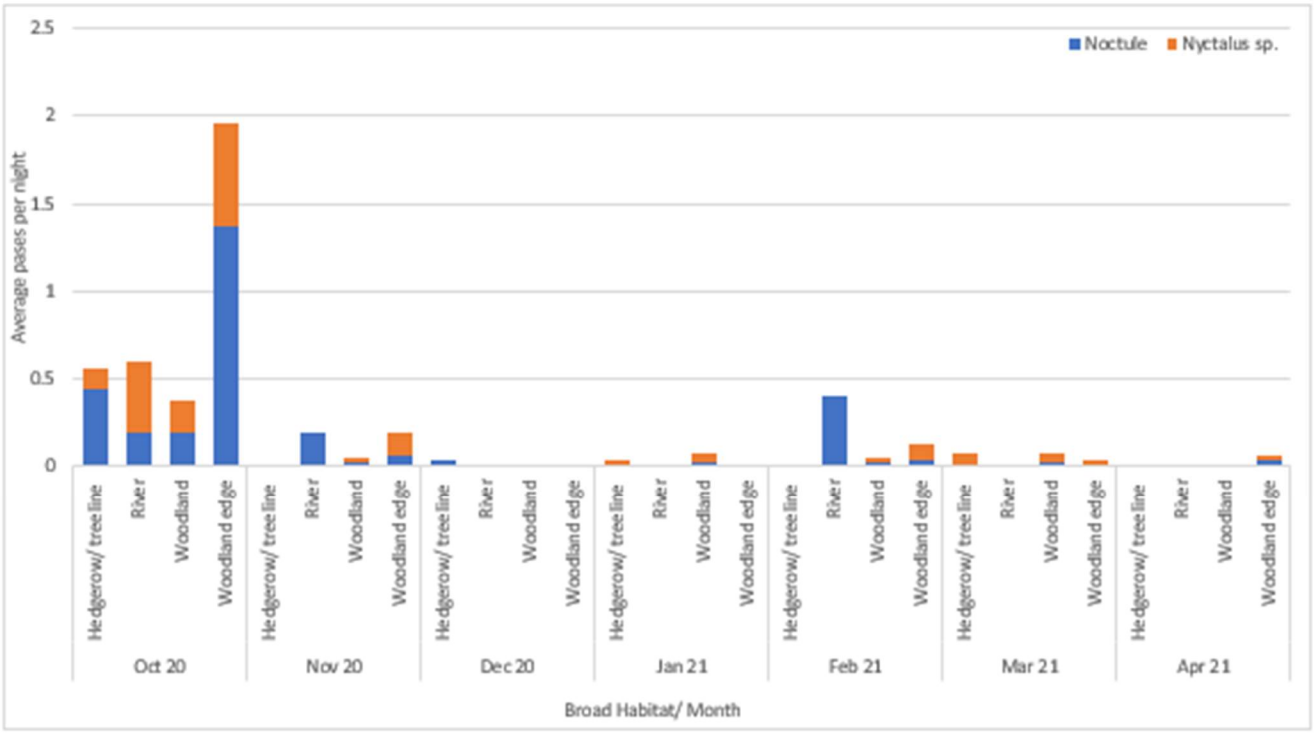
4.6.7. Detector locations situated within the hedgerow/treeline locations recorded an average of 0.57ppn across the deployment period. Activity levels were low across the deployment period ranging from 0.04ppn (January) to 1.04ppn (November). The highest peak was recorded at C69, located in the hedgerow along Ringland Lane, with 2.40ppn in October.

4.6.8. Activity was highest at the deployment location situated within river habitat. The single detector, C1, recorded an average of 24.89ppn across the deployment period. Peak months at this location were April and October, recording 109.40ppn and 49.20ppn respectively. Remaining survey months at this location recorded no more than 6.40ppn.

4.7 *Nyctalus* species (noctule and Leisler's bat)

4.7.1. The graph for Nyctalus species (noctule and Leisler's bat) ppn per broad habitat type is shown on Figure 4-5 below and BAIV for each detector location are shown on Figure C-7.

Figure 4-5 - Average passes per night for *Nyctalus* species per broad habitat type



4.7.2. Activity for *Nyctalus* species during the deployment period was relatively low, with the average activity across all locations within the Survey Area equating to 0.17ppn. The peak of activity occurred in October, with an average of 0.91ppn recorded. *Nyctalus* sp calls were registered during every month of the remaining months of the winter deployment period, but activity remained low, rising no higher than 0.09ppn.

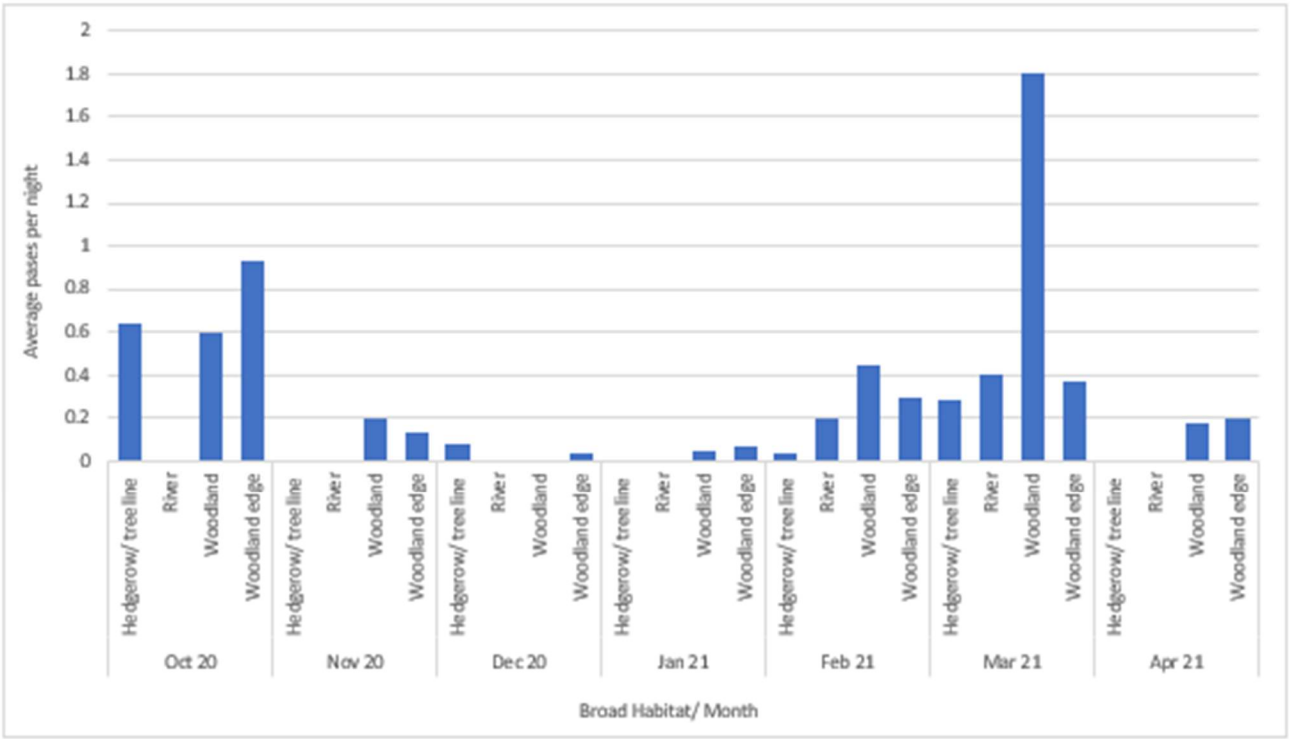
4.7.3. Average activity levels between habitats were relatively similar recording the following averages 0.34ppn (woodland edge), 0.09ppn (woodland), 0.10ppn (hedgerow/treeline) and 0.17 (river). However, there was a particularly noticeable peak in activity in October for detector locations situated in woodland edge habitat, recording, on average, 1.97ppn.

4.7.4. Location C49, situated at the edge of the Northern Woodlands between two large grasslands, is likely the reason behind the noticeable peak for woodland edge habitat in October, recording a noticeable peak of 8.0ppn. Low activity levels were recorded from the remaining months and locations across the survey Area, recording no more than 1.6ppn per month.

4.8 Brown long-eared bat

4.8.1. The graph for brown long-eared bat ppn per broad habitat type is shown on Figure 4-6 below and BAIV for each detector location are shown on Figure C-8.

Figure 4-6 - Average passes per night for brown long-eared bat per broad habitat type



4.8.2. Brown long-eared bat activity during the deployment period remained relatively low, with the average activity across the Survey Area comprising 0.32ppn. March recorded the peak activity averaging 0.92ppn and the remaining months ranging from 0.03ppn (December) to 0.68ppn (October).

4.8.3. Average activity levels between habitats were relatively similar recording the following averages 0.47ppn (woodland), 0.29ppn (woodland edge), 0.15ppn (hedgerow/treeline) and 0.09 (river). However, there was a particularly noticeable peak in activity in February for detector locations situated in woodland habitat, recording, on average, 1.80ppn.

4.8.4. Average activity per location ranged from 0.03ppn (C67 and C68) to 0.86ppn (C74) with C73 recording the peak average activity of 1.54ppn. Peak monthly activity across the survey area was recorded in March at C73 and C74, recording 8.20ppn and 4.80ppn respectively. These locations were situated in within woodland habitat and more specifically within the Northern Woodlands complex.

4.9 Serotine

4.9.1. The graph for serotine ppn per broad habitat type is shown on Figure C-10 and BAIV for each detector location are shown on Figure C-9.

4.9.2. Serotine activity was low across the Survey Area throughout the deployment period. Bat passes were only recorded in October or February at the following locations: C21, C62, C64, C70, C71 and C74. Across all of these areas, activity levels did not reach higher than 0.20ppn, with the exception of location C62, where activity peaked at 0.40ppn in October. These locations were only associated with woodland or woodland edge habitat, no passes were recorded at the hedgerow/treeline or river habitat locations.

5 Summer automated detector survey results

5.1 Survey results - overview

5.1.1. A least nine bat species were recorded using habitats within the Survey Area during the summer automated bat detector surveys. The following species and species groups were confirmed and will be discussed as follows:

- barbastelle;
- common pipistrelle;
- soprano pipistrelle;
- Nathusius' pipistrelle.
- *Myotis* species;
- noctule
- Leisler's bat;
- brown long-eared bat; and
- serotine bat.

5.1.2. The calls recorded during the automated detector surveys each month are presented in Table D-1, Appendix D. Bat activity index values for each species at each location are shown on Figure D-1 to Figure D-13, Appendix D.

5.2 Survey results – within group (area) comparison by species

5.2.1. This section describes species activity recorded within the area groups (A-M) and, particular records for detector locations within these groups.

Barbastelle

Group A: River Wensum and grassland

5.2.2. The average activity for barbastelle across all the locations and months within Group A was 2.67ppn. Location M43 was only deployed between June and September. The remaining locations were deployed for the full deployment period May to September.

5.2.3. The location with the highest average activity over the deployment period was M43, recording an average of 6.30ppn over the it's deployment period. Location M43 had higher activity levels than the other group locations, recording noticeably higher peaks in August and September, recording 7.60ppn and 14.00ppn respectively.

5.2.4. Average activity at the remaining locations was similar, ranging from 1.60ppn to 1.92ppn. Monthly activity ranged from 6.00ppn at C1 in May to 0.20ppn at D1 in May and C1 in September.

Group B: Northern Woodlands

5.2.5. The average activity for barbastelle across all locations and months within Group B was 18.17ppn. Location C48 was only deployed in August and September and C4 was deployed in all months May to September, except August. The remaining locations were deployed for the full deployment period May to September.

5.2.6. Location C38 had the highest activity, recording an average of 59.48ppn over its deployment period, May to September. This location recorded higher activity than other group locations from June to September, with a noticeable peak in September of 138.60ppn, followed by August with 82.00ppn. Location C58 also recorded a peak in activity in September, recording 63.20ppn.

5.2.7. Monthly activity at the remaining locations remained lower than 40.00ppn, ranging from 34.80ppn at C57 in August to 1.60ppn at C4 in May. No barbastelle passes were recorded C57 in May. Location C4 and C37 recorded the lowest activity of the group, with monthly activity remaining below 8.00ppn and recording an average activity of 4.40ppn and 4.24ppn, respectively.

Group C: Grassland between woodlands

5.2.8. The average activity for barbastelle across all locations and months within Group C was 6.19ppn. All locations in this group, with the exception of M47 which was deployed from May to September, were deployed from July to September.

5.2.9. Location M51 recorded the highest average activity of 18.93ppn across the deployment period. Activity levels at M51 were higher than every location within group during its deployment period, August and September were particularly high recording 26.60ppn and 20.60ppn respectively.

5.2.10. Monthly activity at the remaining locations ranged from 9.20ppn at M50 in August to no recorded bat passes at M47 in May and June. As such, M47 recorded the lowest activity across the group, with an average of 0.48ppn.

Group D: Spring Hills Woodland

5.2.11. The average activity for barbastelle across all locations and months within Group D was 9.16ppn. All locations in this group were deployed from May to September.

5.2.12. Location C45 had the highest average activity of the deployment period recording 22.68ppn and a notable peak in activity in August of 70.20ppn.

5.2.13. Remaining months had average activity of less than 10ppn, with C52 resulting in the lowest activity across the Group D with an average of 2.48ppn. Although C52 had the lowest average activity, it still recorded passes every month of the deployment period. Locations C44 and C6, in May and June respectively, recorded the lowest activity of these months, recording no barbastelle passes.

Group E: Long plantation

5.2.14. The average activity across all three locations and months within Group E was 14.78ppn. All locations in this group were deployed from May to September.

5.2.15. Location C8 recorded the highest average activity recording 24.04ppn. When comparing locations by monthly activity, C8 actually recorded the lowest activity in June (no recorded bat passes) and July (0.20ppn) of the group but also recorded the highest activity of the group in August with 106.80ppn. Location C7 also recorded high activity in August with 53.40ppn.

5.2.16. Monthly activity for the remaining locations did not exceed 17.00ppn. The location with the lowest activity of the group was C53, recording an average of 8.04ppn across the deployment period.

Group F: woodland south of Ringland Lane

5.2.17. The average activity for barbastelle across all locations and months within Group F was 11.03ppn. All locations in this group were deployed from May to September, with the exception of location C59 which was deployed between July and September.

5.2.18. Location C59 had the highest average activity across the group, with 18.00ppn. This location recorded similar levels of activity to the other locations, and likely has an inflated average as it was only deployed for the most active months July to September. Location C59 and C54 both recorded high activity in August of 31.80ppn and 30.40ppn respectively, whilst Location C18 recorded the highest overall activity across the group, also in August, with 40.10ppn.

5.2.19. For the remaining months, activity remained lower than 15.00ppn, with the exception of C59 in September recording 19.40ppn. The location with the lowest activity was C55 recording an average of 5.00ppn across the deployment period.

Group G: hedgerows north of Weston Road

5.2.20. The average activity across all locations and months within Group G was 5.07ppn. All locations in this group were deployed from May to September.

5.2.21. Location C78 had recorded the highest activity of the group with an average of 13.52ppn. Activity at Location C78 remained similar to the activity levels at the other group locations from May to June, with the exception of a large peak of 55.4ppn in September.

5.2.22. Monthly activity at the remaining locations, ranged from 25.20ppn at C11 in August to no recorded bat passes at C33 in June and C78 in May. Locations C33, C35, C79 and C80 all recorded similar average levels of activity between 1.80ppn to 2.24ppn across the deployment period.

Group H: hedgerows south of Weston Road

5.2.23. The average activity across all locations and months within Group H was 3.79ppn. Location B8 was only deployed in May and Location C34 was only deployed between June and September. The remaining locations were deployed for the full deployment period, May to September.

5.2.24. Location C81 had the highest activity, recording an average of 8.60ppn. This location recorded no bat passes to 5.60ppn from May to August but had a noticeable peak in September of 36.60ppn.

5.2.25. The location with the lowest activity was C34, recording an average of 0.25ppn. This location had very low activity, less than 0.40ppn from June to September with no barbastelle call registrations in July. Other locations including B9, C12 and C34 also recorded no barbastelle registrations across several of the deployment months.

Group I: The Broadway

5.2.26. The average activity across all locations and months within Group I was 8.58ppn. Location C13 was only deployed in June and Location C22 was only deployed between June and September. The remaining locations were deployed for the full deployment period, May to September.

5.2.27. Locations B10i and C21 had higher average activity levels than the other locations, recording 11.92ppn and 12.48ppn respectively. These locations recorded higher activity than other locations from June to September, recording peaks of activity in August of 16.20ppn (B10i) and 21.20ppn (C21). C20 also recorded a noticeable peak in August recording 21.00ppn.

5.2.28. Monthly Activity at the remaining locations ranged from 11.80ppn in June at C13i to 1.00ppn at C13 in June and C22 in September. The location with the lowest activity was C13 recording 1.00ppn in June (the only month it was deployed).

Group J: Foxburrow Plantation

5.2.29. The average activity across all locations and months within Group J was 8.63ppn. Locations C14 and C15 were only deployed in June and Locations B11ii, C14i and C15i were deployed between June and September. The remaining locations were deployed for the full deployment period May to September.

5.2.30. Location C41 had the highest activity recording on average 30.36ppn across the deployment period. This location has high activity compared to the other locations across all months with a noticeable peak was in June, recording 60.00ppn. The location C14 had the least activity recording an average 0.60ppn in June (the only month it was deployed).

Group K: hedgerows south of Foxburrow Plantation

5.2.31. The average activity across all locations and months within Group K was 1.62ppn. Location C26 was deployed between June and September. The remaining locations were deployed for the full deployment period, May to September.

5.2.32. Of the five locations, location C29 had the highest activity recording on average 3.72ppn. This location had similar levels of activity to the locations in the group but peaked in May (9.60ppn).

5.2.33. Remaining locations had average activity below 4.00ppn, the lowest activity at C26 with an average of 0.58ppn. Monthly activity for the locations ranged from no recorded bat passes to 3.00ppn.

Group L: control group

5.2.34. Group L detectors were deployed as a control group across a range of habitats outside of the Scheme. Therefore, detectors in this group are not directly comparable as a group and as such have been displayed in Table 5-1 below.

Table 5-1 – Average PPN and peak activity for barbastelle at Group L

Location	Habitat	Average PPN	Peak Month	Peak Activity
R1	Hedgerow	15.92	August	47.20
R2	Woodland	0.56	September	0.80
R3	Woodland	0.12	August	0.40
R4	Woodland	5.20	August	10.40
R5	Woodland	0.80	August	2.40
R6	Woodland	8.80	June	26.90
R7	Woodland	3.08	September	3.00

Group M: Ungrouped locations

5.2.35. Group M detectors are locations that did not fit in the previous groups. They cover locations across the Scheme and are not directly comparable as a group, results for these locations are displayed in Table 5-2 below.

Table 5-2 – Average PPN and peak activity for barbastelle at Group M

Location	Habitat	Average PPN	Peak Month	Peak Activity
C19	Hedgerow on Weston Lane	6.73	August	32.30
C27	Hedgerow between Foxburrow Plantation and The Broadway	1.32	August	3.40
C76	Treeline east of Spring Hills	1.60	September	3.60
C82	Hedgerow North of Fakenham Road	8.48	September	13.80

Common Pipistrelle

5.2.36. A total of 1180 Pipistrellus species calls were unable to be identified to species level during analysis. In the case that all these unidentified calls were common pipistrelle calls, it has been calculated that these would have accounted for 0.34% of all common pipistrelle calls.

Group A: River Wensum and grassland

5.2.37. The average activity for common pipistrelle across all locations and months within Group A was 44.27ppn. Location M43 was only deployed between June and September. The remaining locations were deployed for the full deployment period May to September.

5.2.38. Location C1, located adjacent to the River Wensum, and M43, located in the grassland nearest Northern Woodlands, had the highest activity with averages of 77.44ppn and 67.05ppn respectively. The peak month for C1 was May, resulting in 191.40ppn and the peak month for M43 was September recording 130.40ppn.

5.2.39. All other locations and months did not have activity levels above 45.00ppn.

Group B: Northern Woodlands

5.2.40. The average activity for common pipistrelle across all locations and months within Group B was 155.72ppn. Location C48 was only deployed in August and September and C4 was deployed in all months May to September, except August. The remaining locations were deployed for the full deployment period May to September.

5.2.41. Location C38 had the highest activity with an average of 385.84ppn. The peak months were July and September resulting in 755.40ppn and 497.60ppn respectively. Despite this, location C60 recorded the highest activity across the group in May, with 815.60ppn. Remaining monthly activity across all locations remained below 325.00ppn.

5.2.42. Location C4 and C57 recorded the lowest activity across the group, recording no more than 210.00ppn in any month, and recording 57.75ppn and 55.32ppn respectively.

Group C: grassland between woodlands

5.2.43. The average activity for common pipistrelle across all locations and months within Group C was 36.42ppn. All locations in this group, with the exception of M47 which was deployed from May to September, were deployed from July to September.

5.2.44. Location M51 had the highest activity, with an average of 89.13ppn across the deployment period, July to September. There was high activity across the three months deployment period at this location, recording the following 96.00ppn, 97.40ppn, 74.00ppn in July, August and September, respectively.

5.2.45. Location M47 had the lowest activity of the group, recording an average of 15.32ppn with activity ranging from 2.40ppn in May to 40.60ppn in August.

Group D: Spring Hills Woodland

5.2.46. The average activity for common pipistrelle across all locations and months within Group D comprised an average of 144.23ppn. All locations in this group were deployed from May to September.

5.2.47. Location C52 had the highest activity averaging 382.20ppn. High activity was recorded in June and July, recording 757.20ppn and 552.00ppn, respectively.

5.2.48. The majority of locations and months recorded activity below 175.00ppn. However, location C44 in July recorded a peak of 333.20ppn and location C6 in August and September recorded 226.00ppn and 255.80ppn, respectively. The location that recorded the lowest activity was C5, recording 33.29ppn.

Group E: Long Plantation

5.2.49. The average activity for common pipistrelle across all locations and months within Group E was 430.27ppn. All locations in this group were deployed from May to September.

5.2.50. Location C53 had the highest activity averaging 967.92ppn. Activity noticeably peaked at this location and the group in September, recording 2406.00ppn.

5.2.51. Activity at the remaining locations and months ranged from 6.40ppn at C8 in May to 882.60ppn at C7 in August). The location with the lowest activity over the deployment period was C8 with an average of 60.58ppn.

Group F: woodland south of Ringland Lane

5.2.52. The average activity for common pipistrelle across all locations and months within Group F was 195.66ppn. All locations in this group were deployed from May to September, with the exception of location C59 which was deployed between July and September.

5.2.53. Location C55 had the highest activity averaging 476.64ppn. Activity at this location peaked in September, registering a total of 1164.60ppn. Activity was also high in June registering 843.60ppn.

5.2.54. Activity at the remaining locations ranged from 11.40ppm at C54 in June to 641.40ppn at C54 in August. The location with the lowest activity over the deployment period was C18, with activity not exceeding 50.00ppn in any of the months. These activity levels result in an average of 24.92ppn over the deployment period.

Group G: hedgerows north of Weston Road

5.2.55. The average activity for common pipistrelle across all locations and months within Group G was 81.32ppn. All locations in this group were deployed from May to September.

5.2.56. Location C56 had the highest activity averaging 226.76ppn. Activity at this location peaked in July, registering 534.80ppn.

5.2.57. Activity at the remaining locations ranged from 245.40ppn at C78 in August to 1.20ppn at C79 in May. The location with the lowest activity over the deployment period was C79 with an average of 10.52ppn.

Group H: hedgerows south of Weston Road

5.2.58. The average activity for common pipistrelle across all locations and months within Group H was 57.16ppn. Location B8 was only deployed in May and Location C34 was only deployed between June and September. The remaining locations were deployed for the full deployment period, May to September.

5.2.59. Location B8 had the highest activity across the group recording 279.20ppn during its deployment in May alone. Locations B8i, C12 and C28, C81 had the next highest activities recording, on average, 55.44ppn, 68.54ppn, 67.80ppn and 54.48ppn, respectively. These locations had similar activity levels across the deployment period, however, C28 recorded the highest peak of the four locations with 165.60ppn.

5.2.60. The location with the lowest activity over the deployment period was C34 with an average of 1.75ppn.

Group I: The Broadway

5.2.61. The average activity for common pipistrelle across all locations and months within Group I was 328.35ppn. Location C13 was only deployed in June and Location C22 was only deployed between June and September. The remaining locations were deployed for the full deployment period, May to September.

5.2.62. Locations B10i and C13i, all had similar average activities of 444.36ppn and 425.68ppn respectively. Location B10i recorded the highest activity of the group, recording 699.40ppn in July. Location C22 had the lowest average activity levels of 64.70ppn.

5.2.63. Activity at the remaining locations ranged from 654.80ppn at C20 in September to 46.20ppn at C22 in June.

Group J: Foxburrow Plantation

5.2.64. The average activity for common pipistrelle across all locations and months within Group J comprised an average 510.72ppn. Locations C14 and C15 were only deployed in June and Locations B11ii, C14i and C15i were deployed between June and September. The remaining locations were deployed for the full deployment period May to September.

5.2.65. Location C41 had the highest average activity, recording on average 1025.20ppn. Activity at this location was consistently high, ranging from 699.40ppn in July to 1273.80ppn in May. Despite this, location C15i recorded the highest monthly activity across all locations within the group recording 2007.00ppn in July.

5.2.66. Activity at the remaining locations ranged from 1504.40ppn at C23 in July to 30.40ppn at C32 in May. The location with the lowest activity across the deployment period was C32 with 63.92ppn on average.

Group K: hedgerows south of Foxburrow Plantation

5.2.67. The average activity for common pipistrelle across all locations and months within Group K comprised an average 83.10ppn. Location C26 was deployed between June and September. The remaining locations were deployed for the full deployment period, May to September.

5.2.68. Location C29 had the highest activity level of the group recording, on average, 165.08ppn. Location C29 had a notable peak of activity in May with a 682.80ppn and C25 had a notable peak in June with 392.00ppn.

5.2.69. Activity at the remaining months ranged from 178.80ppn at C25 in August to 8.00ppn at C26 in September. The locations with the lowest activity across the deployment period were C26 and C31 recording on average 29.21ppn and 31.12ppn respectively.

Group L: control group

5.2.70. Group L detectors were deployed as a control group across a range of habitats outside of the Scheme. Therefore, detectors in this group are not directly comparable as a group and as such have been displayed in Table 5-3 below.

Table 5-3 – Average PPN and peak activity for *Pipistrellus* species in Group L

Location	Habitat	Average PPN	Peak month	Peak activity
R1	Hedgerow	241.08	September	519.2
R2	Woodland	127.72	May	404.2
R3	Woodland	24.88	September	56.4
R4	Woodland	161.76	September	300.6
R5	Woodland	640.2	September	1161.6

Location	Habitat	Average PPN	Peak month	Peak activity
R6	Woodland	66.95	July	152
R7	Woodland	167.32	May	342.8

Group M: Ungrouped locations

5.2.71. Group M detectors are locations that did not fit in the previous groups. They cover locations across the Scheme and are not directly comparable as a group, results for these locations are displayed in Table 5-4 below.

Table 5-4 – Average PPN and peak activity for common pipistrelle in Group M

Location	Habitat	Average PPN	Peak month	Peak activity
C19	Hedgerow on Weston Lane	11.05	July	19.8
C27	Hedgerow between Foxburrow Plantation and The Broadway	32.52	June	49.6
C76	Treeline east of Spring Hills	159.64	September	648
C82	Hedgerow North of Fakenham Road	78.64	June	95

Soprano pipistrelle

5.2.72. A total of 1180 *Pipistrellus* species calls were unable to be identified to species level during analysis. In the case that all these unidentified calls were soprano pipistrelle calls, it has been calculated that these would have accounted for 0.50% of all soprano pipistrelle calls.

Group A: River Wensum and grassland

5.2.73. The average activity for soprano pipistrelle across all locations and months within Group A was 175.71ppn. Location M43 was only deployed between June and September. The remaining locations were deployed for the full deployment period May to September.

5.2.74. Location C1, located adjacent to the River Wensum, had the highest activity, with an average of 517.92ppn. The peak months were May and August resulting in combined totals of 973.60ppn and 1352.60ppn, respectively.

5.2.75. All other locations and months did not have activity levels above 225.00ppn.

Group B: Northern Woodlands

5.2.76. The average activity for soprano pipistrelle across all locations and months within Group B was 219.88ppn. Location C48 was only deployed in August and September and C4 was deployed in all months May to September, except August. The remaining locations were deployed for the full deployment period May to September.

5.2.77. Location C61 and C38 had the highest activity with averages of 545.36ppn and 509.76ppn respectively. Both locations recorded over 500.00ppn between July and September. Location C61 recorded a peak of 792.00ppn in August, as well as high activity in July, recording 757.40ppn. Location C38 recorded its peak in September of 732.80ppn and also recorded high activity in July, registering 720.20ppn.

5.2.78. Location C4 and C57 recorded the lowest activity across the group, recording no more than 70.00ppn in any month, and recording and overall average of 34.60ppn and 33.76ppn, respectively.

Group C: grassland between woodlands

5.2.79. The average activity for soprano pipistrelle across all locations and months within Group C was 27.87ppn. All locations in this group, with the exception of M47 which was deployed from May to September, were deployed from July to September.

5.2.80. Location M51 had the highest activity, with a collective average of 66.27ppn across its deployment period, July to September. There was high activity across the three months deployment period at this location, recording the following 43.00ppn, 76.80ppn, 79.00ppn in July, August and September respectively. Location M46 also recorded a peak in August of 75.60ppn.

5.2.81. Location M47 had the lowest activity of the group, recording an average of 10.12ppn with activity ranging from 1.80ppn in May to 30.80ppn in August.

Group D: Spring Hills Woodland

5.2.82. The average activity for soprano pipistrelle across all locations and months within Group D was 154.81ppn. All locations in this group were deployed from May to September.

5.2.83. Location C52 had the highest activity averaging 492.40ppn. In June, August and September, activity exceeded 500.00ppn. The peak of the activity was recorded in June with 698.6ppn.

5.2.84. Activity at the remaining locations remained below 350.0ppn. The location that recorded the lowest activity was C5 recording on average 31.63ppn.

Group E: Long Plantation

5.2.85. The average activity for soprano pipistrelle across all locations and months within Group E was 85.55ppn. All locations in this group were deployed from May to September.

5.2.86. Location C53 had the highest activity averaging 161.32ppn. Activity noticeably peaked at this location and the group in September, recording 648.00ppn.

5.2.87. Activity at the remaining locations remained below 100.00ppn with the exception of C7 in August which recorded 225.20ppn. The location with the lowest activity over the deployment period was C8 with an average of 18.50ppn.

Group F: woodland south of Ringland Lane

5.2.88. The average activity for soprano pipistrelle across all locations and months within Group F was 138.11ppn. All locations in this group were deployed from May to September, with the exception of location C59 which was deployed between July and September.

5.2.89. Location C55 had the highest activity averaging 443.52ppn. Activity at this location peaked in September, registering 1016.80ppn. Activity was also high in June registering 641.00ppn.

5.2.90. Activity at the remaining locations ranged from 5.00ppn at C54 in June to 201.80ppn at C59 in September. The location with the lowest activity over the deployment period was C18, activity at this location did not reach above 100.00ppn in any of the months, resulting in an average of 29.18ppn over the deployment period.

Group G: hedgerows north of Weston Road

5.2.91. The average activity for soprano pipistrelle across all locations and months within Group G was 20.83ppn. All locations in this group were deployed from May to September.

5.2.92. Location C78 had the highest activity averaging 42.64ppn. Activity remained similar to other locations in the group, with the exception of a peak in August of 161.20ppn. Location C80 had the second highest activity averaging 34.64ppn. Similar to location C78, location C80 recorded similar activity levels to other locations in the group, with the exception of a peak in July of 158.20ppn.

5.2.93. Activity at the remaining locations ranged from 81.40ppn at C33 in August to no recorded bat passes at C79 in May. The location with the lowest activity over the deployment period was C79 with an average of 6.36ppn.

Group H: hedgerows south of Weston Road

5.2.94. The average activity for soprano pipistrelle across all locations and months within Group H was 22.38ppn. Location B8 was only deployed in May and Location C34 was only deployed between June and September. The remaining locations were deployed for the full deployment period, May to September.

5.2.95. Location B8 had the highest activity across the group with an average of 37.80ppn. It is likely this average is inflated due to the detector being deployed in May alone. Location C81 had the next highest activity across the group with an average of 53.12ppn. Activity at this location peaked in August with 206.60ppn. Location B9 also had a notable peak in July of 161.80ppn.

5.2.96. Activity at the remaining locations ranged from 24.00ppn at C28 in May to no recorded bat passes at C34 in June. The location with the lowest activity over the deployment period was C34 with an average 0.90ppn.

Group I: The Broadway

5.2.97. The average activity for soprano pipistrelle across all locations and months within Group I was 121.49ppn. Location C13 was only deployed in June and Location C22 was only deployed between June and September. The remaining locations were deployed for the full deployment period, May to September.

5.2.98. Location C20 had the highest activity, averaging 202.70ppn. Location C20 recorded a peak in September of 452.60ppn.

5.2.99. Activity at the remaining locations ranged from 278.00ppn at C21 in August to 8.40ppn at C13 in June. Location C13 also recorded the lowest activity of the group, in part due to only being deployed in June, with an average of 8.40ppn.

Group J: Foxburrow Plantation

5.2.100. The average activity for soprano pipistrelle across all locations and months within Group J was 293.11ppn. Locations C14 and C15 were only deployed in June and Locations B11ii, C14i and C15i were deployed between June and September. The remaining locations were deployed for the full deployment period May to September.

5.2.101. Location C15i had the highest activity recording, on average 678.81ppn. Activity at this location peaked in September with a total of 903.50ppn. The highest monthly activity, however, was actually recorded at location C23 with 941.40ppn in July.

5.2.102. Activity at the remaining locations ranged from 811.00ppn at C42 in June to 12.60ppn at C32 in May. The location with the lowest activity on average across the deployment period was C14 with 39.20ppn

Group K: hedgerows south of Foxburrow Plantation

5.2.103. The average activity for soprano pipistrelle across all locations and months within Group K comprised an average 27.87ppn. Location C26 was deployed between June and September. The remaining locations were deployed for the full deployment period, May to September.

5.2.104. Location C29 and C25 had the two highest activity levels of the group with 42.12ppn and 58.29ppn respectively. Location C29 had a notable peak of activity in May with 133.00ppn and C25 recorded the highest peak of the group with 240.75ppn in June.

5.2.105. Activity at the remaining months and locations ranged from 54.00ppn at C40 in August to 1.20ppn at C31 in May. The location with the lowest activity on average across the deployment period was C26 with an average 8.37ppn.

Group L: control group

5.2.106. Group L detectors were deployed as a control group across a range of habitats outside of the Scheme. Therefore, detectors in this group are not directly comparable as a group and as such have been displayed in Table 5-5 below.

Table 5-5 – Average PPN and peak activity for soprano pipistrelle in Group L

Location	Habitat	Average PPN	Peak month	Peak activity
R1	Hedgerow	26.00	September	36.20
R2	Woodland	151.96	August	252.40
R3	Woodland	3.60	August	6.40
R4	Woodland	74.20	July	108.80
R5	Woodland	686.36	September	1016.60
R6	Woodland	30.85	July	77.80
R7	Woodland	73.64	May	251.40

Group M: Ungrouped locations

5.2.107. Group M detectors are locations that did not fit in the previous groups. They cover locations across the Scheme and are not directly comparable as a group, results for these locations are displayed Table 5-6 below.

Table 5-6 – Average PPN and peak activity for soprano pipistrelle in Group M

Location	Habitat	Average PPN	Peak month	Peak activity
C19	Hedgerow on Weston Lane	9.41	May	15.60
C27	Hedgerow between Foxburrow Plantation and The Broadway	21.76	June	61.20
C76	Treeline east of Spring Hills	104.24	September	193.20
C82	Hedgerow North of Fakenham Road	155.20	July	242.80

Nathusius' pipistrelle

5.2.108. Nathusius pipistrelle were present at low frequency at most locations across the Survey Area, as shown on Figure D-7, Appendix D. The following locations did not record any call registrations for Nathusius pipistrelle across their respective deployment periods:

- C39 (Group A);
- C37 (Group B);

- M51 (Group C);
- C53 (Group E);
- C33 (Group G);
- C79 (Group G);
- C34 (Group H);
- R2 (Group L); and
- R3 (Group L).

5.2.109. Nathusius pipistrelle activity was most commonly associated with hedgerows (1.56ppn on average) and woodland (1.20ppn on average). River and grassland habitat recorded much lower activity (0.20ppn and 0.30ppn respectively).

5.2.110. Group H (hedgerows south of Weston Road) recorded the highest activity on average (3.38ppn). Average activity was highest in this group at Location B8 (29.20ppn). The average is skewed from this location with it being deployed for May only. However, it still remained the second highest monthly activity recorded across the group. Location C12 recorded the next highest average activity for Nathusius' pipistrelle (11.13ppn) in this group, recording peaks in activity in June (34.20ppn) and July (18.00ppn). Remaining locations in this group did not record monthly activity above 1.5pnn per month, with exception of B9 in June (11.40ppn).

5.2.111. Group J (Foxburrow Plantation) recorded the next highest activity on average (2.81ppn). Average activity was highest in this Group at Location C15 (52.20ppn). The average is skewed from this location with it being deployed in June only, however, when comparing activity across the months, Location C15 recorded the highest activity across the group. Location B11i recorded the next highest average activity (5.24ppn), recording a peak in August of 14.20ppn. Remaining locations in this group recorded monthly activity below 8.5ppn, with the majority of activity remaining below 4.00ppn.

5.2.112. Group G (hedgerows north of Weston Road) and Group I (the Broadway) recorded the next two highest average activities (1.59ppn and 1.46ppn respectively). The remaining groups recorded activity below 1.00ppn. The hedgerow control and woodland control locations (Group L) recorded 0.04ppn and 0.18ppn respectively).

Myotis species

Group A: River Wensum and grassland

5.2.113. The average activity for *Myotis* species across all locations and months within Group A was 12.58ppn. Location M43 was only deployed between June and September. The remaining locations were deployed for the full deployment period May to September.

5.2.114. Location C1, located adjacent to the River Wensum, had the highest activity recording, on average 32.72ppn. This location recorded noticeable peaks in May (85.40ppn) and August (64.40ppn).

5.2.115. Activity at the remaining locations ranged from 14.00ppn at D1 in September to 0.8ppn at C39 in June. The location with the lowest average activity over the deployment period was C39, averaging 2.12ppn.

Group B: Northern Woodlands

5.2.116. The average activity for *Myotis* species across all locations and months within Group B was 9.91ppn. Location C48 was only deployed in August and September and C4 was deployed in all months May to September, except August. The remaining locations were deployed for the full deployment period May to September.

5.2.117. Location C61 recorded the highest activity averaging 24.76ppn. This location recorded similar activity to other locations within the group, no more than 18.60ppn, with the exception of a large peak in September of 67.20ppn. Location C38 recorded the next highest peak in June (38.00ppn).

5.2.118. Activity at the remaining locations ranged from 23.40ppn at C49 in June to 1.80ppn at C60 in June. Location C4 and C60 recorded the lowest activity across the group, recording no more than 4.00ppn and recording, on average, 2.90ppn and 2.10ppn, respectively, across the deployment period.

Group C: grassland between woodlands

5.2.119. The average activity for *Myotis* species across all locations and months within Group C was 8.34ppn. All locations in this group, with the exception of M47 which was deployed from May to September, were deployed from July to September.

5.2.120. Location M51 recorded the highest activity averaging 14.33ppn. This location recorded the two highest months of activity in July and September, totalling 17.60ppn and 16.40ppn respectively.

5.2.121. Activity at the remaining locations ranged from 14.40ppn at M50 in September to 1.80ppn at M47 in May. The location with the lowest average activity over the deployment period was M47, averaging 3.96ppn.

Group D: Spring Hills woodland

5.2.122. The average activity for *Myotis* species across all locations and months within Group D was 5.45ppn. All locations in this group were deployed from May to September.

5.2.123. All locations recorded averages over 5.00ppn across the deployment period, with the exception of C45 which recorded, on average, 3.68ppn.

5.2.124. The most noticeable peaks in activity were at C6 in August, totalling 18.80ppn and C44 in September, totalling 15.60ppn. Activity in the remaining months and locations ranged from 10.20ppn at C5 in July to 1.40ppn at C44 in June. The lowest averaged activity over the deployment period was recorded at C45 with an average of 3.68ppn.

Group E: Long Plantation

5.2.125. The average activity for *Myotis* species across all locations and months within Group E was 4.53ppn. All locations in this group were deployed from May to September.

5.2.126. Location C7 had the highest activity averaging 8.08ppn. Activity noticeably peaked in August at this location, totalling 28.20ppn. Activity at the remaining locations ranged from 9.20ppn at C53 in September to 0.25ppn at C8 in June. The location with the lowest average activity was C8, recording an average of 1.67ppn.

Group F: woodland south of Ringland Lane

5.2.127. The average activity for *Myotis* species across all locations and months within Group F was 1.80ppn. All locations in this group were deployed from May to September, with the exception of location C59 which was deployed between July and September.

5.2.128. Location C55 recorded the highest activity averaging 2.76ppn. Activity noticeably peaked in August and September at this location, recording 5.00ppn and 5.80ppn respectively. C55 also recorded the lowest activity in July, with no call registration recorded. Activity at the remaining locations remained below 3.00ppn, ranging from 3.00ppn at C59 in August to 0.20ppn at C54 in May.

Group G: hedgerows north of Weston Road

5.2.129. The average activity for *Myotis* species across all locations and months within Group G was 2.98ppn. All locations in this group were deployed from May to September.

5.2.130. Location C11 recorded the highest average activity recording 5.37ppn. Activity noticeably peaked in June at this location, recording a total of 14.40ppn. Activity at the remaining locations ranged from 8.40ppn at C33 in September to no recorded passes at C33 in June and C79 in August. The location with the lowest average activity was C79, recording an average of 1.28ppn.

Group H: hedgerows south of Weston Road

5.2.131. The average activity for *Myotis* species across all locations and months within Group H was 1.03ppn. Location B8 was only deployed in May and C34 was deployed between June and September. The remaining locations were deployed for the full deployment period, May to September.

5.2.132. Location C81 recorded the highest average activity recording 4.08ppn. Activity noticeably higher at this location than any of the remaining locations. Activity peaked in July, recording a total of 7.40ppn. The remaining months at this location ranged from 4.40ppn in June to 4.20 in May and September to 0.20ppn in August. Activity at the remaining locations ranged from 1.20ppn at B9 in August to no recorded passes at B9, C12 and C28 in May, B8i and C34 in June. B8i, B9, C12 C28 and C34 all recorded similar levels of average activity ranging from 0.30ppn (C34) to 0.50ppn (B9).

Group I: The Broadway

5.2.133. The average activity for *Myotis* species across all locations and months within Group I was 1.84ppn. Location C13 was only deployed in June and Location C22 was only deployed between June and September. The remaining locations were deployed for the full deployment period May to September.

5.2.134. Location B10i the highest average activity across the deployment period recording 2.68ppn on average. This location had a noticeable peak in May of 9.20ppn. Activity at the remaining locations ranged from 4.80ppn at C13i in July to 0.00ppn at B10i and C22 in June and July respectively. There was no noticeable low activity within this group, with C13, C21, C22 recording similar average activities of 1.20ppn, 1.24ppn and 1.30ppn respectively.

Group J: Foxburrow Plantation

5.2.135. The average activity for *Myotis* species across all locations and months within Group J was 5.84ppn. Locations C14 and C15 were only deployed in June, location C14i was deployed between July and September and locations B11ii, and C15i were deployed between June and September. The remaining locations were deployed for the full deployment period, May to September.

5.2.136. Location C15 and C14 were among the locations with the highest average activity, however as these locations were deployed in the more active months, the averages are skewed and therefore are not directly comparable when looking at average ppn across the deployment period.

5.2.137. Locations C23 and C41 had similar average activities of 10.08ppn and 9.76ppn respectively. Location C23 recorded the highest peak activity of the group in July, recording a total of 33.00ppn. The next two highest peaks were recorded in C41 in May (23.60ppn) and C42 in August (25.20ppn). Activity at the remaining locations ranged from 17.40ppn at C15 in June to 0.33ppn at C14ii in September. The location that recorded the lowest levels of activity was C32, recording an average of 1.80ppn across the deployment period.

Group K: hedgerows south of Foxburrow Plantation

5.2.138. The average activity for *Myotis* species across all locations and months within Group K was 1.26ppn. Location C26 was deployed between June and September. The remaining locations were deployed for the full deployment period, May to September.

5.2.139. Location C29 had the highest average activity recording 3.12ppn. This location had no call registrations in June and July but a notable peak in August of 13.20ppn. Activity at the remaining locations did not reach above 2.44ppn with C26 in July also not recording any call registrations for *Myotis* species.

Group L: control group

5.2.140. Group L detectors were deployed as a control group across a range of habitats outside of the Scheme. Therefore, detectors in this group are not directly comparable as a group and as such have been displayed in Table 5-7 below.

Table 5-7 – Average PPN and peak activity for *Myotis* in Group L

Location	Habitat	Average PPN	Peak month	Peak activity
R1	Hedgerow	3.28	August	7.60
R2	Woodland	7.24	September	3.60
R3	Woodland	2.84	September	6.80
R4	Woodland	2.84	September	3.60
R5	Woodland	12.68	August	27.40
R6	Woodland	1.75	September	2.40
R7	Woodland	3.88	May	9.20

Group M: Ungrouped locations

5.2.141. Group M detectors are locations that did not fit in the previous groups. They cover locations across the Scheme and are not directly comparable as a group, results for these locations are displayed Table 5-8 below.

Table 5-8 – Average PPN and peak activity for *Myotis* Group M

Location	Habitat	Average PPN	Peak month	Peak activity
C19	Hedgerow on Weston Lane	1.05	May	2.60
C27	Hedgerow between Foxburrow Plantation and The Broadway	4.00	June	13.60
C76	Treeline east of Spring Hills	6.12	June	10.00
C82	Hedgerow North of Fakenham Road	15.32	August	28.20

Nyctalus species (Noctule, Leisler's bat and unidentified *Nyctalus* species)

Group A: River Wensum and grassland

5.2.142. The average activity for *Nyctalus* species across all locations and months within Group A was 9.16ppn, of which 83.68% of passes were confidentially identified as noctule and 0.8% as Leisler's. Location M43 was only deployed between June and September. The remaining locations were deployed for the full deployment period May to September.

5.2.143. Location C1 had the highest combined activity of the group, recording an average of 16.32ppn. Monthly activity at this location was higher than most other locations within the group, with a notable peak in June where a total of 29.20ppn was recorded, followed by July at 21.20ppn.

5.2.144. Activity at the remaining locations ranged from 19.00ppn at M43 in August to 0.80ppn at D1 in September. Locations C39 and D1 recorded the lowest average activities of 5.44ppn and 5.04ppn respectively.

Group B: Northern Woodlands

5.2.145. The average activity for *Nyctalus* species across all locations and months within Group B comprised a combined average of 6.82ppn, of which 74.07% of passes were confidentially identified as noctule and 2.80% as Leisler's bat. Location C48 was only deployed in August and September and C4 was deployed in all months May to September, except August. The remaining locations were deployed for the full deployment period May to September.

5.2.146. Location C49 had the highest activity recording a combined average of 15.56ppn. Activity at this location was largely similar to the other locations within the group, with the exception of a large peak in June of 55.00ppn, followed by 14.20ppn in July. All remaining months for C49 were 4.20ppn or below.

5.2.147. Activity at the remaining locations ranged from 20.80ppn at C57 in August to no recorded bat passes at C57 and C61 in May. The location with the lowest activity across the deployment period was C61 recording an average of 1.56ppn.

Group C: grassland between woodlands

5.2.148. The average activity for *Nyctalus* species across all locations and months within Group C was 13.29ppn, of which 62.48% of passes were confidentially identified as noctule and 0.27% as Leisler's bat. All locations in this group, with the exception of M47 which was deployed from May to September, were deployed from July to September.

5.2.149. Locations M50, M51 and M52 recorded similar levels of activity averaging 16.23ppn, 14.60ppn and 16.33ppn respectively across the deployment period. Activity at these three locations peaked noticeably in July and August ranging from 21.40ppn (M50 August) and 17.00ppn (M51 July), however it is worth noting these detectors were not deployed in May and June. No calls were registered by M47 in May for any *Nyctalus* species.

Group D: Spring Hills Woodland

5.2.150. The average activity for *Nyctalus* species across all locations and months within Group D was 5.90ppn, of which 76.09% of passes were confidentially identified as noctule and 1.37% as Leisler's bat. All locations in this group were deployed from May to September.

5.2.151. Locations C5 and C45 had the highest activity levels averaging 9.00ppn and 7.44ppn across the deployment period respectively. Location C45 had similar activity levels to the other locations within the group, with the exception of a large peak in activity in June, recording 25.80ppn. Location C5, in contrast, had relatively higher activity than other detectors in the group with a slightly smaller peak in July of 18.00ppn.

5.2.152. Activity for the remaining months and locations ranged from 13.20ppn at C6 in August to no recorded calls at C44 and C52 in May. The lowest activity across the deployment period was recorded at C52 with an average of 0.92ppn.

Group E: Long Plantation

5.2.153. The average activity for *Nyctalus* species across all locations and months within Group E was 4.03ppn, of which 51.01% of passes were confidentially identified as noctule and 24.50% as Leisler's bat. All locations in this group were deployed from May to September.

5.2.154. Location C7 had the highest activity of the group, recording an average of 9.44ppn across the deployment period. Activity at this location was consistently higher than the other locations in the group between July and September, recording a noticeable peak in July of 22.00ppn, followed by 15.00ppn in August.

5.2.155. Locations C8 and C53, in contrast, recorded much lower activity levels, recording, on average, 1.25ppn and 1.28ppn across the deployment period respectively. Monthly activity levels at these two locations did not reach above 3.00ppn. None of the three locations within the group recorded bat calls in May.

Group F: woodland south of Ringland Lane

5.2.156. The average activity for *Nyctalus* species across all locations and months within Group F was 2.89ppn, of which 64.44% of passes were confidentially identified as noctule and 0.91% as Leisler's bat. All locations in this group were deployed from May to September, with the exception of location C59 which was deployed between July and September.

5.2.157. Location C59 had the highest activity of the group, recording average of 6.60ppn across the deployment period. Activity at this location was higher than the other locations in only two of the months that it was deployed, recording peaks in July and August of 7.80ppn and 11.00ppn respectively.

5.2.158. Monthly activity at the remaining locations ranged from 8.80ppn at C54 in August to no call registrations at C55 in May and August. The location with the lowest activity across the group was C55, recording on average 0.68ppn.

Group G: hedgerows north of Weston Road

5.2.159. The average activity for *Nyctalus* species across all locations and months within Group G was 1.94ppn, of which 74.63% of passes were confidentially identified as noctule and 2.06% as Leisler's bat. All locations in this group were deployed from May to September.

5.2.160. Location C56 had the highest activity of the group, recording an average of 3.28ppn across the deployment period. This location recorded the peak of activity in July with 11.00ppn, whilst recording similar activity levels to other locations in the group in the remaining months it was deployed. Location C35 also recorded a noticeable peak in August, recording 10.20ppn. This location also recorded similar, if not lower, activity levels per month for the remaining months it was deployed when compared to other locations in the group.

5.2.161. Monthly activity at the remaining locations ranged from 5.80ppn at C11 in July to no recorded passes at C35, C56, C79 and C80 in May. The location with the lowest activity was C79, recording on average 0.68ppn across the deployment period.

Group H: hedgerows south of Weston Road

5.2.162. The average activity for *Nyctalus* species across all locations and months within Group H was 2.03ppn, of which 83.16% of passes were confidentially identified as noctule and 3.37% as Leisler's bat. Location B8 was only deployed in May and C34 was deployed between June and September. The remaining locations were deployed for the full deployment period, May to September.

5.2.163. Location C81 had the highest activity of the group, recording an average of 6.84ppn across the deployment period. Monthly activity at this location was similar to the other locations within the group with the exception of July, recording 25.80ppn and, following that, 5.80ppn in September.

5.2.164. Monthly activity at the remaining locations ranged from 3.00ppn at C34 in June to no recorded passes at B9, C12 and C81 in May and C34 in July. Location B8, recorded the lowest activity of the group, recording no bat passes in the only month it was deployed, May.

Group I: The Broadway

5.2.165. The average activity for *Nyctalus* species across all locations and months within Group I was 6.38ppn, of which 67.45% of passes were confidentially identified as noctule and 22.35% as Leisler's bat. Location C13 was only deployed in June and Location C22 was only deployed between June and September. The remaining locations were deployed for the full deployment period May to September.

5.2.166. Location C20 had the highest activity of the group, recording an average of 14.30ppn across the deployment period. This location recorded a noticeable peak in August of 43.00ppn, after a peak in July of 11.40ppn. All locations, with the exception of C13 and B10ii, recorded high activity in August with C13i, C21 and C22 recording the following 23.40ppn, 39.60ppn and 11.60ppn. Activity for the remaining months ranged from 11.40ppn at C20 in July to no recorded passes at B10i in May and June and C22 and C13i in June. Location B10i recorded the lowest activity, averaging 1.28ppn across the deployment period.

Group J: Foxburrow Plantation

5.2.167. The average activity for *Nyctalus* species across all locations and months within Group J was 14.74ppn, of which 66.22% were confidentially identified as noctule and 8.31% as Leisler's bat. Locations C14 and C15 were only deployed in June, location C14i was deployed between July and September and locations B11ii, and C15i were deployed between June and September. The remaining locations were deployed for the full deployment period, May to September.

5.2.168. Locations B11i, C14ii and C24 recorded similar activity levels across the deployment period of 26.08ppn, 26.90ppn and 24.00ppn respectively. Activity at these locations were relatively similar to the other locations within the group but recorded noticeable peaks in August of 87.40ppn, 91.00ppn and 93.60ppn respectively.

5.2.169. Monthly activity at the remaining locations ranged from 57.00ppn at C32 in August to no recorded passes at C32 in May. Lowest activity across the group was recorded at C15 (0.80ppn) and C14 (1.60ppn), both of which were only deployed in June.

Group K: hedgerows south of Foxburrow Plantation

5.2.170. The average activity for *Nyctalus* species across all locations and months within Group K was 3.32ppn, of which 70.92% were confidentially identified as noctule and 3.83% as Leisler's bat. Location C26 was deployed between June and September. The remaining locations were deployed for the full deployment period, May to September.

5.2.171. Locations C25, C29 and C31 had similar levels of activity, recording on average 3.29ppn, 4.28ppn and 4.16ppn respectively. Location C25 and C29 regularly recorded high levels of activity throughout the deployment period, with C25 ranging from 0.60ppn in May to 5.60ppn in July and C29 ranging from 6.40ppn in May and July to 0.60ppn in June.

5.2.172. Location C31 recorded high levels of activity in August and September recording 11.00ppn and 7.40ppn respectively. Location C40 also recorded noticeably higher activity in August of 10.60ppn, but recorded little activity for the remaining months, no more than 0.60ppn, and no *Nyctalus* species call registrations in May and July.

Group L: Control group

5.2.173. Group L detectors were deployed as a control group across a range of habitats outside of the Scheme. Therefore, detectors in this group are not directly comparable as a group and as such have been displayed in Table 5-9 below.

Table 5-9 – Average PPN and peak activity for *Nyctalus* species in Group L

Location	Habitat	Average PPN	Peak month	Peak activity
R1	Hedgerow	2.72	August	5.40
R2	Woodland	0.68	September	1.60
R3	Woodland	1.40	July/ August	2.40
R4	Woodland	11.12	August	29.00
R5	Woodland	1.64	June	3.20
R6	Woodland	4.90	September	7.00
R7	Woodland	3.60	September	9.20

Group M: Ungrouped locations

5.2.174. Group M detectors are locations that did not fit in the previous groups. They cover locations across the Scheme and are not directly comparable as a group, results for these locations are displayed in Table 5-10 below.

Table 5-10 - Average PPN and peak activity for *Nyctalus* species in Group M

Location	Habitat	Average PPN	Peak month	Peak activity
C19	Hedgerow on Weston Lane	0.95	July	2.80
C27	Hedgerow between Foxburrow Plantation and The Broadway	1.80	July	3.40
C76	Treeline east of Spring Hills	17.72	June	39.20
C82	Hedgerow North of Fakenham Road	23.72	July	70.00

Brown long-eared bat

Group A: River Wensum and grassland

5.2.175. The average activity for brown long-eared bat across all locations and months within Group A was 4.87ppn. Location M43 was only deployed between June and September. The remaining locations were deployed for the full deployment period May to September.

5.2.176. Location M43 had the highest activity recording on average 15.70ppn. This location had higher activity per month than the other locations in the group, with the peak month being September, totalling 38.60ppn, followed by August at 12.80ppn.

5.2.177. Activity at the remaining locations ranged from 10.20ppn at D1 in September to no recorded bat passes at C39 in May. Location C39 recorded the lowest activity of the group, with an average of 0.88ppn.

Group B: Northern Woodlands

5.2.178. The average activity for brown long-eared bat across all locations and months within Group B was 3.74ppn. Location C48 was only deployed in August and September and C4 was deployed in all months May to September, except August. The remaining locations were deployed for the full deployment period May to September.

5.2.179. Location C57 recorded the highest activity averaging 11.60ppn with high peaks in July, August and September recording totals of 13.60ppn, 18.40ppn and 23.20ppn respectively. Location C58 also recorded high activity June, recording a total of 16.00ppn.

5.2.180. Activity at the remaining locations ranged from 9.00ppn at C48 in August to 0.20ppn at C60 in July. Locations C37, C38, C4, C57 and C61 did not record brown long-eared passes in May. The location with the lowest average activity across the deployment period was C60 recording 1.25ppn.

Group C: grassland between woodlands

5.2.181. The average activity for brown long-eared bat across all locations and months within Group C was 12.74ppn. All locations in this group, with the exception of M47 which was deployed from May to September, were deployed from July to September.

5.2.182. Location M51 recorded the highest activity across the group recording an average of 18.73ppn. This location recorded high activity levels in August and September, totalling 24.40ppn and 22.20ppn respectively. Despite this, the peak month of activity was actually recorded at M50 in August, with a total of 25.80ppn. Location M52 also recorded a peak activity in August with 24.60ppn.

5.2.183. Location M47 recorded the lowest activity, recording on average 4.52ppn over the deployment period and recording no activity in May.

Group D: Spring Hills Woodland

5.2.184. The average activity for brown long-eared bat across all locations and months within Group D was 3.27ppn. All locations in this group were deployed from May to September.

5.2.185. Location C44 recorded the highest activity averaging 5.24ppn across the deployment period. This location had the most noticeable peak within the group, recording a total of 23.00ppn in September. Monthly activity at the remaining locations did reach above 10.00ppn ranging from 9.20ppn at C52 in September to 0.00ppn at C45 and C52 in May, C6 in June and C44 in August.

Group E: Long Plantation

5.2.186. The average activity for brown long-eared bat across all locations and months within Group E was 1.55ppn. All locations in this group were deployed from May to September.

5.2.187. Location C7 recorded the highest activity with an average of 2.96ppn across the deployment period. The was a noticeable peak at this location in August, recording a total of 11.80ppn compared to the remaining months which recorded less than 2.00ppn. Location C53 also recorded a noticeable peak within its deployment period, recording a total of 4.20ppn in June, whilst the remaining months did not record over 1.50ppn. Location C8 recorded the lowest activity, with an average of 0.42ppn across the deployment period.

Group F: woodland south of Ringland Lane

5.2.188. The average activity for brown long-eared bat across all locations and months within Group F was 2.17ppn. All locations in this group were deployed from May to September, with the exception of location C59 which was deployed between July and September.

5.2.189. Location C18 had the highest average activity recording 3.04ppn. This location had higher levels of activity in all months in comparison to the other locations within the group, with the exception of a noticeable peak in September of 6.40ppn. Location C54 also recorded high activity in June and August (5.00ppn and 5.80ppn respectively), but for the remaining months recorded similar activity to other two locations in the group.

5.2.190. Activity at the remaining locations ranged from 2.40ppn at C59 in August to no recorded passes at C54 in July and C55 in June. The location with the lowest overall activity was C55, with an average of 0.60ppn across the deployment period.

Group G: hedgerows north of Weston Road

5.2.191. The average activity for brown long-eared bat across all locations and months within Group G was 3.33ppn. All locations in this group were deployed from May to September.

5.2.192. Location C56 recorded the highest activity, with an average of 5.08ppn across the deployment period. Activity notably peaked in August, recording a total of 12.00ppn. Activity at the remaining locations ranged from 8.00ppn at C35 in August to no recorded bat passes at C33 in June. The location with the lowest average activity was C33, recording 0.88ppn on average across the deployment period.

Group H: hedgerows south of Weston Road

5.2.193. The average activity for brown long-eared bat across all locations and months within Group H was 2.77ppn. Location C13 was only deployed in June and Location C22 was only deployed between June and September. The remaining locations were deployed for the full deployment period May to September.

5.2.194. Location B8i recorded the highest activity across the deployment period, with an average of 5.48ppn. This location recorded high activity across the deployment period with a noticeable peak in May, totalling 11.00ppn. Activity across the remaining locations ranged from 8.63ppn at B9 in September to 0.20ppn at B9 in August. The location with the lowest average activity was C12, recording an average of 0.46ppn across the deployment period. No call registrations for brown long-eared bat were recorded at B9 in May and June and B12 in May.

Group I: The Broadway

5.2.195. The average activity for brown long-eared bat across all locations and months within Group I was 1.88ppn. Location C13 was only deployed in June and Location C22 was only deployed between June and September. The remaining locations were deployed for the full deployment period May to September.

5.2.196. Location C13i recorded the highest average activity across the deployment period, with 4.24ppn. Activity at this location was higher than most the other locations with two noticeable peaks in May and July recording a total of 6.00ppn and 6.20ppn respectively. Despite this, C20 recorded the highest number of calls across the group, recording 7.00ppn in July.

5.2.197. Activity at the remaining locations ranged from 2.00ppn at B10i in July and at C22 in September to 0.00ppn at B10i in May and June. Despite this, the location with the lowest average activity across the deployment period was C21, recording 0.48ppn.

Group J: Foxburrow Plantation

5.2.198. The average activity for brown long-eared bat across all locations and months within Group J was 5.07ppn. Locations C14 and C15 were only deployed in June, location C14i was deployed between July and September and locations B11ii, and C15i were deployed between June and September. The remaining locations were deployed for the full deployment period, May to September.

5.2.199. Location B11i had the highest activity recording 27.44ppn on average across the deployment period. This due to a very noticeable peak in August, where a total of 127.00ppn were recorded. Remaining months at this location did not record above 4.80ppn.

5.2.200. Activity at the remaining locations ranged from 10.20ppm at C42 in August to no recorded passes at C24 in May and C32 in May and September. The location with lowest activity was C14i, with an average of 0.47ppn across the deployment period and recording peak activity in July of only 0.60ppn.

Group K: hedgerows south of Foxburrow Plantation

5.2.201. The average activity for brown long-eared bat across all locations and months within Group K was 1.51ppn. Location C26 was deployed between June and September. The remaining locations were deployed for the full deployment period, May to September.

5.2.202. Location C31 had the highest activity, recording 3.48ppn on average across the deployment period. Activity in this location was relatively similar to the other locations within the group, with exception of a large peak in July of 11.80ppn.

5.2.203. Activity at the remaining locations ranged from 2.40ppn at C40 in August to no recorded passes at C40 in May and C25 in June. The location with the lowest overall activity was C25, recording on average 0.63ppn across the deployment period and recording a peak in August of 1.20ppn.

Group L: control group

5.2.204. Group L detectors were deployed as a control group across a range of habitats outside of the Scheme. Therefore, detectors in this group are not directly comparable as a group and as such have been displayed in Table 5-11 below.

Table 5-11 - Average PPN and peak activity for brown long-eared bats in Group L

Location	Habitat	Average PPN	Peak month	Peak activity
R1	Hedgerow	3.88	August	7.60
R2	Woodland	0.76	June	2.20
R3	Woodland	1.88	August	4.00
R4	Woodland	2.56	August	6.40
R5	Woodland	2.88	August	4.60
R6	Woodland	1.15	July	1.60
R7	Woodland	1.32	September	4.20

Group M: Ungrouped locations

5.2.205. Group M detectors are locations that did not fit in the previous groups. They cover locations across the Scheme and are not directly comparable as a group, results for these locations are displayed in Table 5-12 below.

Table 5-12 - Average PPN and peak activity for brown long-eared bats in Group M

Location	Habitat	Average PPN	Peak month	Peak activity
C19	Hedgerow on Weston Lane	1.77	May	4.60
C27	Hedgerow between Foxburrow Plantation and The Broadway	1.00	August	2.20
C76	Treeline east of Spring Hills	3.00	September	6.60
C82	Hedgerow North of Fakenham Road	9.76	September	22.80

Serotine

5.2.206. Serotine were present at low frequency at most locations across the Survey Area, as shown on Figure D-13, Appendix D.

5.2.207. The only location where this species was not recorded was B8 (Group H).

5.2.208. Serotine activity was most commonly associated with woodland (3.05ppn). The remaining habitats recorded average activity of less than 0.75ppn (grassland 0.67ppn, hedgerow 0.65ppn and river 0.48ppn).

5.2.209. Group J (Foxburrow Plantation) recorded the highest activity on average (4.75ppn). Activity at the locations within this group was generally higher than the locations in the other groups, with average activity ranging from 0.40ppn (C14) to 9.12ppn (C42). Locations C42, C41 and C32 recorded the highest activity on average (9.12ppn, 8.16ppn and 6.04ppn respectively), recording peaks in either August (C32 29.20ppn) or September (C41 24.80ppn, C42 27.60ppn). Remaining locations in this group recorded monthly activity below 14.00ppn, with the majority of activity remaining below 10.00ppn.

5.2.210. Group I (the Broadway) recorded the next highest activity on average (3.36ppn). Average activity was highest in this Group at Location C20 (6.05ppn) and C21 (4.56ppn), both recording peaks in August of 20.00ppn and 20.40ppn respectively. Monthly activity at the remaining locations within this group remained below 5.00ppn, with the exception of C13i in May (10.40ppn) and C22 in August (8.00ppn).

5.2.211. Group L (woodland control) recorded the highest activity on average (7.01ppn). Average activity was highest in this group at Location R4 (27.08ppn) and R5 (10.60ppn). Both these locations recorded low activity throughout their deployment periods, with the exception of one large peak in September for R4 (128.80ppn) and August for R5 (50.20ppn). Activity for the remaining locations remained below 5.00ppn, with the exception of R1 in August (5.60ppn).

5.2.212. The remaining groups recorded average activity for serotine below 1.50ppn.

5.3 Results – between groups (areas) comparison and observations in relation to habitat type

5.3.1. This section considers differences in species activity between groups (areas) and habitat types throughout the Survey Area.

5.3.2. Due to the lower levels of activity recorded, Nathusius' pipistrelle and serotine are sufficiently detailed within Section 5.6 and are therefore not included within this section.

Barbastelle

5.3.3. Woodland habitats recorded the most barbastelle activity on average at 10.63ppn. Northern Woodlands (Group B) and Long Plantation (Group E) recorded the highest activity, with an average of 18.17ppn and 14.78ppn, respectively. The remaining groups located within woodland habitats ranged from 8.58ppn (Group I: The Broadway) to 11.03ppn (Group F: woodland south of Ringland Lane) The automated detectors within the control group (Group L) located within the woodland, resulted in an average activity of 2.90ppn, ranging from 8.80 (R6) to 0.12ppn (R3).

5.3.4. Only one automated detector was deployed in the river habitat within Group A River Wensum and grassland, activity at this location was the lowest of all the groups for barbastelle (1.60ppn).

5.3.5. Locations within grassland recorded an average of 4.77ppn, ranging from 6.19ppn (Group C: grassland between woodlands) to 3.06ppn (Group A: River Wensum and grassland).

5.3.6. Locations within hedgerows recorded an average of 4.39ppn, ranging from 5.07ppn (Group G: hedgerows north of Weston Road) to 1.62ppn (Group K: hedgerows south of Foxburrow Plantation). Group M (ungrouped detectors) recorded a range from 8.48ppn (C82) to 1.32ppn (C27). It is worth noting that the single automated detector within the Group L control automated detector positioned within hedgerow habitat recorded seemingly high activity (15.92ppn). This high barbastelle activity at a single location may not be a representative control.

Common pipistrelle

5.3.7. Woodland habitats recorded the most common pipistrelle activity on average with 285.07ppn. Group J (Foxburrow Plantation) had the most activity across the Survey Area, recording on average 510.72ppn. The remaining locations within the woodland habitats ranged from 430.27ppn (Group E: Long Plantation) to 144.23ppn (Group D: Spring Hills Woodland). The woodland control (Group L) recorded an average of 202.66ppn, ranging from 640.20ppn (R5) to 24.88ppn (R3).

5.3.8. The single location located at the river in Group A (River Wensum and Grassland) recorded 77.44ppn.

5.3.9. Locations within grassland habitat recorded on average, 34.62ppn, ranging from 36.42ppn (Group C: grassland between woodlands) to 32.43ppn (Group A: River Wensum and Grassland).

5.3.10. Locations within hedgerow habitat recorded 80.97ppn on average, ranging from 81.32ppn (Group G: hedgerows north of Weston Road) to 57.16ppn (Group H: hedgerows south of Weston Road). Group M (ungrouped detectors) recorded a range from 159.64ppn (C76) to 11.05ppn (C19). The hedgerow control (Group L) recorded 241.08ppn. As mentioned previously, this single location may not be a representative control.

Soprano pipistrelle

5.3.11. Woodland habitats recorded, on average 191.92ppn. Woodland activity levels ranged from 293.11ppn at Group J (Foxburrow Plantation) to 85.55ppn (Group E: Long Plantation). The woodland control (Group L) recorded an average of 174.90ppn, ranging from 686.36ppn (R5) to 3.60ppn (R3).

5.3.12. The single location located at the river in Group A (River Wensum and Grassland) recorded the highest activity of 517.92ppn.

5.3.13. The grassland habitat groups recorded an average 39.44ppn. Groups within grassland habitat recorded activity of 27.87ppn (Group C: grassland between woodlands) and 53.49ppn (Group A: River Wensum and Grassland).

5.3.14. Locations within hedgerow habitat recorded an average of 32.24ppn. Activity in these groups ranged from 26.00ppn (Group G: hedgerows north of Weston Road) to 27.87 (Group K: hedgerows south of Foxburrow). Group M (ungrouped detectors) recorded a range from 155.20ppn (C82) to 9.41ppn (C19). The hedgerow control group (Group L) recorded 26.00ppn. As mentioned previously, this single location may not be a representative control.

Myotis species

5.3.15. Woodland habitats recorded 5.58ppn on average, ranging from 9.91ppn (Group B: Northern woodlands) to 1.80ppn (Group F: woodland south of Ringland Road). The woodland control group (Group L) recorded 5.32ppn, ranging from 12.68 (R5) to 1.75 (R6).

5.3.16. Activity seemingly was centred around the single location at the river, (Group A: River Wensum and grassland) recording 32.72ppn. As only one automated detector was deployed in this habitat, the activity level may be artificially inflated.

5.3.17. Locations within grassland habitats recorded the next highest activity on average with 7.01ppn, with activity ranging from 8.34ppn (Group C: grassland between woodlands) to 5.39ppn (Group A: River Wensum and Grassland).

5.3.18. Locations within hedgerow habitats recorded the lowest *Myotis* activity, recording 2.78ppn on average, ranging from 2.98ppn (Group G: hedgerows north of Weston Road) to 1.03ppn (Group H: hedgerows south of Weston Road). Group M (ungrouped detectors) recorded a range from 15.32 (C82) to 1.05 (C19). The hedgerow control group (Group L) recorded 3.28ppn. As mentioned previously, this single location may not be a representative control.

Nyctalus species

5.3.19. Locations within woodland habitats recorded on average 7.38ppn, despite this Group J (Foxburrow Plantation) recorded the highest activity of the woodland locations, with an average of 14.74ppn. The remaining woodland location activity remained below 7.00ppn with activity ranging from 6.82ppn (Group B: Northern Woodlands) to 2.89ppn (Group F: woodland south of Ringland Lane). Activity at the woodland control locations (Group L) averaged 3.86ppn, ranging from 0.68ppn (R2) to 11.12ppn (R4).

5.3.20. The single location located at the river in Group A (River Wensum and Grassland) recorded the highest activity of 16.32ppn. As only one automated detector was deployed in this habitat, the activity level may be artificially inflated.

5.3.21. Locations within grassland habitats recorded on average 10.27ppn. Grassland between woodlands (Group C) recorded the highest of the two groups with 13.29ppn and River Wensum and grassland (Group A) recording 6.60ppn.

5.3.22. Locations within in hedgerow habitats, recorded on average 3.92ppn. Activity ranged from 3.32ppn (Group K: hedgerows south of Foxburrow) and 1.94ppn (Group G: hedgerows north of Weston Road). Group M (ungrouped detectors) recorded a range from 23.72ppn (C82) to 0.95 (C19). The hedgerow control group (Group L) recorded on 2.72ppn. As mentioned previously, this single location may not be a representative control.

Brown long-eared bat

5.3.23. Activity at the woodland locations averaged 3.16ppn, ranging from 5.07ppn (Group J: Foxburrow Plantation) to 1.55ppn (Group E: Long Plantation). The woodland control (Group L) recording an average 1.78ppn, ranging from 2.88 (R5) to 0.76 (R2).

5.3.24. The single location located at the river in Group A (River Wensum and Grassland) recorded 1.44ppn.

5.3.25. The habitat most associated with Brown long-eared bat activity was grassland (9.74ppn on average). Group C (grassland between woodlands) recorded the highest activity across all of the groups (12.74ppn). The grassland locations in Group A (River Wensum and grassland) recorded the second highest activity of 6.10ppn.

5.3.26. Locations within hedgerows recorded on average 2.93ppn, ranging from 3.33ppn (Group G: hedgerows north of Weston Road) to 1.51 (Group K: hedgerows south of Foxburrow) with the control hedgerow location (Group L) recording 3.88ppn. Group M (ungrouped detectors) recorded a range from 9.76ppn (C82) to 1.00 (C27). As mentioned previously, this single location may not be a representative control.

6 References

6.1 Project references

6.1.1. BSG (2010). Norwich Northern Distributor Road; Bat Activity and Radio-tracking Surveys 2009.

6.1.2. Greena Ecological Consultancy (2013a). Report on a bat radio-tracking study of Barbastelle bats; Norwich Northern Distributor Road, 2013 (25th July 2013).

6.1.3. Greena Ecological Consultancy (2013b). Report on a bat radio-tracking study of Barbastelle bats; Norwich Northern Distributor Road, 2012 (V1A 23 January 2013).

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