Sheringham Shoal and Dudgeon Offshore Wind Farm Extension Projects

Environmental Statement
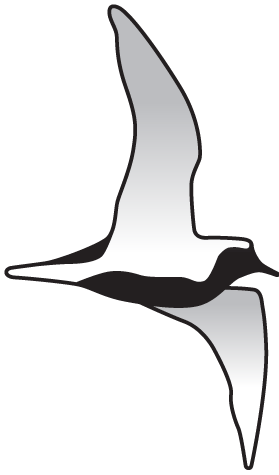
Volume 3

Appendix 20.3 - Bat Activity Survey Report

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WILD FRONTIER ECOLOGY

Sheringham Shoal and Dudgeon Offshore Wind Farm Extension Project

Static bat detector deployed near River Bure

Volume 3, Appendix 20.3: 2020/2021 Static Bat Detector and Bat Transect Survey Report

April 2022

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The data which we have prepared and provided is accurate, and has been prepared and provided in accordance with the CIEEM's Code of Professional Conduct. We confirm that any opinions expressed are our best and professional bona fide opinions.

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This report conforms to the British Standard 42020:2013 Biodiversity – Code of practice for planning and development.

Contents

List of Acronyms

Acronym	Definition
BCT	Bat Conservation Trust
BLE	Brown long-eared (bat)
BTO	British Trust for Ornithology
BS	Beaufort Scale
CSZ	Core Sustenance Zone
DCO	Development Consent Order
DEP	The Dudgeon Offshore Wind Farm Extension Project
ETG	Expert Topic Group
HDD	Horizontal Directional Drilling
NBIS	Norfolk Biodiversity Information Service
OLEMS	Outline Landscape and Ecological Mitigation Strategy
OS	Ordnance Survey
PEIR	Preliminary Environmental Information Report
PEIR boundary	The area subject to survey and preliminary impact assessment to inform the PEIR.
SAC	Special Area of Conservation
SEP	Sheringham Shoal Offshore Wind Farm Extension Project
SM2	SongMeter2 (or SongMeter2+) static bat detector
SM Mini	SongMeter Mini static bat detector
SSSI	Site of Special Scientific Interest
WWE	Wild Wings Ecology Ltd.
WFE	Wild Frontier Ecology Ltd.

Glossary of Terms

Term	Definition
Order Limits	The area subject to the application for development consent, including all permanent and temporary works for SEP and DEP.
Dudgeon Offshore Wind Farm Extension Project (DEP)	The Dudgeon Offshore Wind Farm Extension onshore and offshore sites including all onshore and offshore infrastructure.
DEP onshore site	The Dudgeon Offshore Wind Farm Extension onshore area consisting of the DEP onshore substation site, onshore cable corridor, construction compounds, temporary working areas and onshore landfall area.
European site	Sites designated for nature conservation under the Habitats Directive and Birds Directive. This includes candidate Special Areas of Conservation, Sites of Community Importance, Special Areas of Conservation and Special Protection Areas, and is defined in regulation 8 of the Conservation of Habitats and Species Regulations 2017.
Evidence Plan Process (EPP)	A voluntary consultation process with specialist stakeholders to agree the approach, and information to support, the EIA and HRA for certain topics.
Expert Topic Group (ETG)	A forum for targeted engagement with regulators and interested stakeholders through the EPP.
Horizontal directional drilling (HDD) zones	The areas within the onshore cable route which would house HDD entry or exit points.
Jointing bays	Underground structures constructed at regular intervals along the onshore cable route to join sections of cable and facilitate installation of the cables into the buried ducts.
Landfall	The point at the coastline at which the offshore export cables are brought onshore, connecting to the onshore cables at the transition joint bay above mean high water
Onshore cable corridor	The area between the landfall and the onshore substation sites, within which the onshore cable circuits will be installed along with other temporary works for construction.
Onshore export cables	The cables which would bring electricity from the landfall to the onshore substation. 220 – 230kV.
Onshore Substation	Compound containing electrical equipment to enable connection to the National Grid.
PEIR boundary	The area subject to survey and preliminary impact assessment to inform the PEIR.
Sheringham Shoal Offshore Wind Farm Extension Project (SEP)	The Sheringham Shoal Offshore Wind Farm Extension onshore and offshore sites including all onshore and offshore infrastructure.
SEP onshore site	The Sheringham Shoal Wind Farm Extension onshore area consisting of the SEP onshore substation site, onshore cable corridor, construction compounds, temporary working areas and onshore landfall area.

Study area	Area where potential impacts from the project could occur, as defined for each individual Environmental Impact Assessment (EIA) topic.
The Applicant	Equinor New Energy Limited

Executive Summary

Wild Frontier Ecology Ltd. was commissioned by Equinor New Energy Ltd. to undertake a suite of static bat detector and transect surveys to understand the level of bat activity within areas considered likely to be important for foraging/commuting bats within the onshore cable corridor associated with the onshore elements of the Sheringham Shoal Offshore Wind Farm Extension Project (SEP) and Dudgeon Offshore Wind Farm Extension Project (DEP). Bat surveys were undertaken from June to October 2020 and April to September 2021. The survey effort focused on areas within the onshore cable corridor that had been identified as likely to be key sites for commuting and foraging bats and/or areas where impacts were considered most likely, namely the onshore substation site.

The 2020 surveys covered these potentially important bat sites within the Preliminary Environmental Information Report (PEIR) boundary, which constituted the onshore cable corridor at that time. This was refined (in part, using the results of the ecological surveys to select a corridor with a lower ecological impact) in 2021 to become the Development Consent Order (DCO) boundary.

In 2020, the static bat detector surveys were undertaken between June and October and included the monthly deployment of static bat detectors on six key sites within the PEIR boundary. The static bat detectors were deployed on four occasions in 2020. Most static bat detector surveys from 2020 recorded common or soprano pipistrelles as having the highest frequency of registrations, with over 87% of all recorded bat activity relating to these species. Surveys recorded more registrations of soprano pipistrelle in total (across all surveys) and at individual survey locations on Rivers Wensum, Yare and Tiffey. Common pipistrelle was the most abundantly recorded species at the River Bure, Swannington and Weybourne Woods. In most survey locations, noctule was the most frequently recorded non-pipistrelle bat species. *Myotis* species were recorded at most survey locations, with the highest levels recorded at rivers, particularly at the Wensum. Surveys recorded relatively low numbers of registrations of barbastelle and brown long-eared bat, but across most locations. From the data obtained the areas around the River Wensum and Swannington appear the most important for barbastelle. Other rarer species including Nathusius' pipistrelle and serotine were very rarely recorded, and only at the River Wensum. Results from 2020 therefore indicate that the River Wensum supports a wide range of species and had the highest number of total bat registrations of all locations sampled that year.

In 2021, the static bat detector surveys were completed between April and September, and covered potentially important bat sites within the DCO boundary, which had been refined from the PEIR boundary during the site selection process from 2020 to late 2021. Transect surveys and roost emergence surveys were also completed within this timeframe (bat roost surveys are covered in Appendix 22.10). The static bat detectors were deployed in 10 targeted locations across the survey season. The 2021 static bat detector survey results corroborate the 2020 results, as the majority of registrations recorded across the 10 sites are attributable to pipistrelle species, namely common and soprano pipistrelles. Additionally, noctule remained the most frequently recorded non-pipistrelle species. Other species recorded throughout the deployment periods include a number of *Myotis* species including Daubenton's bat, Natterer's bat and occasional Brandt's bat and whiskered bat. *Myotis* species registrations were highest at the rivers and also in Ringland Covert. Low levels of barbastelle activity were recorded across all sites, of note is the significant number of registrations recorded at Ringland Covert. Serotine was recorded across most sites with the highest frequency of registrations at the River Tud. The data from 2021 suggests that the river sites and Ringland Covert are

important sites for foraging bats, including some rarer species, namely barbastelle, *Myotis* species and serotine.

The transect surveys were undertaken monthly and included surveyors walking a predetermined route to assess bat activity in specific target areas. Transects were undertaken at Weybourne Woods, the River Wensum and fields at the onshore substation site. Results from the surveys found that the River Wensum had the highest number of bat registrations relating to a number of different bat species. Most of the registrations are attributable to soprano pipistrelle, but common pipistrelles were also frequently recorded. There were registrations most months from rarer species including *Myotis* species, barbastelle, Daubenton's bat and Natterer's bat. Transect surveys around Weybourne Woods found that common pipistrelles, soprano pipistrelles and noctules had the highest number of registrations, with low numbers of barbastelle and *Myotis* species. Results from the transect surveys undertaken at the onshore substation site similarly show that common and soprano pipistrelle were most frequently recorded. There were low levels of activity of noctule and *Myotis* species. The transect results therefore indicate that all three sites support foraging bats, with the River Wensum supporting the widest range of species and highest levels of activity.

Further targeted bat surveys may be required pre-construction if construction impacts in particularly sensitive areas for bats cannot be avoided. However, mitigation measures due to be adopted across the SEP and DEP are expected to sufficiently minimise risks to bats such that updated surveys are unlikely to be warranted. The key measure will be the use of Horizontal Directional Drilling (HDD) to avoid/minimise land-take and habitat loss impacts at key bat sites; these have largely been incorporated into the construction programme for SEP and DEP, with most of the surveyed sites due to be avoided through use of HDD installation of the export cables at these locations. Best-practice construction measures will also be adopted, including avoidance of night working during the main bat activity season (May to September inclusive), and controlled night lighting at the construction site (especially at the substation where the construction period is longer). Post-construction habitat reinstatement/management will ensure there are no long-term negative impacts to areas of suitable foraging/commuting habitat within and around the DCO boundary, and in some areas a positive impact on bats is expected to due landscaping and ecological enhancements, such as tree and hedgerow planting.

1. Background

Equinor New Energy Limited (hereafter Equinor) is proposing to extend the existing operational Sheringham Shoal Offshore Wind Farm and Dudgeon Offshore Wind Farm, named the Sheringham Shoal and Dudgeon Offshore Wind Farm Extension Projects (hereafter SEP and DEP). SEP and DEP will consist of a number of offshore and onshore elements including the offshore wind turbines, offshore export cables and offshore substation(s). The offshore export cables will connect to shore on the North Norfolk coast, with onshore infrastructure connecting the offshore wind farms to the National Grid, which will comprise underground cables from landfall to an onshore substation and National Grid connection at Norwich Main. A full description of SEP and DEP is provided within **Chapter 4 Project Description** (document reference 6.1.4).

In June 2020, Wild Frontier Ecology Ltd. (WFE) was commissioned by Equinor to undertake surveys for foraging and commuting bats to inform an ecological impact assessment of the proposed onshore elements of SEP and DEP. The surveys were initially based on the PEIR boundary, which was a relatively wide corridor with extensive scope for route refinement within its limits. The results of the ecological surveys completed from 2020 to early 2021 were then used to inform the site selection process. This process involved ongoing review of the results of the ecological surveys to ensure that habitats and features identified as being of relatively high ecological value were avoided where possible, or subject to reduced impacts (e.g. by minimising the construction footprint or nature of construction activities within certain areas). This process took place from 2020 until late 2021 and lead to the wider PEIR boundary being refined to become the narrower DCO boundary.

This report outlines the aims, methods and results of the static bat detector surveys completed between late June and early October 2020 and also the static bat detector and bat transect surveys completed between April and September 2021.

2. Relevant Policy and Legislation

All bat species are listed under Schedule 2 of the Conservation of Habitats and Species Regulations 2017.

Bats and their roosts also receive protection from disturbance from the Wildlife and Countryside Act 1981 (as amended by the Countryside and Rights of Way Act 2000). This protection extends to both the species and roost sites.

It is an offence to kill, injure, capture, possess or otherwise disturb bats. Bat roosts are protected at all times of the year (making it an offence to damage, destroy or obstruct access to bat roosts), regardless of whether bats are present at the time.

Whilst foraging and commuting bats are not legally protected in the same way as roosting bats, there is still a legal basis for protecting features on which bat populations rely such as key foraging areas or commuting features. This is especially the case for species which are listed under the protection of Schedule 2 of the Habitats Regulations. If, for example, a scheme severed an important bat commuting route, this could potentially prevent bats from accessing a key foraging area and result in the abandonment or long-term decline of a colony/roost, thereby resulting in a legal offence.

3. Survey Methods

3.1 Survey Objectives

The static bat detector and bat transect surveys were required to identify and ascertain the usage by bats of areas anticipated to be of importance for foraging and commuting bats within the onshore cable corridor. During the surveys undertaken in 2020 the PEIR boundary was not sufficiently refined to allow for targeted surveys of crossing points of individual features (such as rivers, woodlands and hedgerows), as the precise onshore cable route and exact crossing points were not finalised at that time. Therefore, the surveys covered the general sections of the PEIR boundary which were initially considered to offer the most suitable habitat for foraging/commuting bats, and/or habitat for relatively rare species such as barbastelle *Barbastella barbastellus*.

By the bat survey season of 2021, the site selection process to define the DCO boundary had started, and this allowed for the identification of sites considered likely to be important for bats. The majority of the DCO boundary overlaps arable habitat, which is not considered to represent an important foraging habitat for bats. Furthermore, arable habitat is abundant in the surrounding landscape, so the effect of loss of this habitat on bats is anticipated to be negligible. Instead, sites which provided relatively high-quality foraging and/or commuting habitat were identified on the basis of the Extended Phase 1 Habitat Survey[1] (EP1HS) data and aerial photographs. Areas such as woodlands, river corridors, scrub, un-improved grasslands and waterbodies will all support higher volume and diversity of invertebrates, which will attract feeding bats. These areas also provide structural diversity (e.g. sheltered and dark areas for foraging and linear features used by bats for navigation) and some habitats (e.g. woodland) may also support roosting bats.

3.2 Static Bat Detector Surveys

The static bat detector surveys used SongMeter SM2, SM2 + and SongMeter Mini static bat detectors, deployed in key locations for at least five consecutive nights per month from June to October (inclusive) 2020 and April to September (inclusive) 2021. SM2 C, E and F are SongMeter SM2, SM2 H, I, J, K and N are SongMeter SM2+ and Mini O, P, R, S and T are SongMeter Mini static bat detectors. The static bat detector surveys followed the BCT guidelines[2] including deploying the detectors in the appropriate season for bats, timing the equipment to start recording at the suitable time and positioning the equipment to maximise potential bat recordings.

The static detectors were deployed on a judgemental basis throughout the target sites. Where there were likely commuting routes (such as along a river or hedgerow) static detectors were deployed at various locations along the commuting route within the DCO boundary. Where there were no specific routes such as in areas of woodland, the static detector was deployed centrally. If there were permanent features such as suitable trees, static detectors were fixed to them with cable ties. Where there were no permanent features, wooden posts were hammered into position and the static bat detector was fixed to the post.

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[1] Wild Frontier Ecology (February) Sheringham Shoal and Dudgeon Wind Farm Extension Projects -Volume 3 (Appendices) - App 20.1: Extended Phase 1 Habitat Survey Report.
[2] Collins, J. (ed) (2016). Bat Surveys for Professional Ecologists – Good Practice Guidelines, 3rd Edition. Bat Conservation Trust, London.

The detectors were pre-programmed to commence recording for bats approximately 30 minutes before sunset and record throughout the night until roughly 30 minutes after sunrise.

Static bat detectors were assigned a unique identification letter (for example SM2 H), in order to keep track of detector deployment locations and their corresponding data.

The static bat detectors were deployed, retrieved and the data was then analysed by WFE ecologists or using the British Trust for Ornithology's (BTO) 'Acoustic Pipeline', an automated bat data analysis service. Further details including the software and techniques used to analyse the data is provided in Section 3.4, below.

3.2.1 Areas of the PEIR boundary surveyed in 2020

Areas of the PEIR boundary were outlined as important based on information provided in the Expert Topic Group (ETG) meeting on the 28th January 2020. During the meeting, Norfolk County Council advised that Swannington and the Wensum are important areas for bats (in particular, barbastelle), and surveys should focus on these areas.

The decision as to which areas warranted surveys was also based on a review of aerial photographs and maps to identify areas/features likely to support relatively high level of invertebrates and therefore are likely to be important areas for foraging bats. The local knowledge of the team of field ecologists was also used to inform the selection of survey locations. However, at the beginning of the surveys in June 2020, landowner access for ecological surveys was continuing to be arranged, which resulted in restricted survey access to certain sections of the PEIR boundary. Over the subsequent surveying months, landowner access became increasingly available, thereby enabling more extensive survey coverage.

In addition to the areas around Swannington and the River Wensum, the static bat detector surveys targeted the PEIR boundary crossings of the Rivers Bure, Tiffey and Yare, as well as the area of woodland and heathland between Bodham and Weybourne (**Figure 1).**

The 2020 static bat detector deployments are separated into four groups of dates, with the areas and deployment time periods summarised in

Table *1: Summary of deployment locations and operational dates for static bat detector surveys in 2020*, below.

The areas covered by the first deployment from the late June to early July 2020 are as follows:

- The eastern part of Weybourne Woods between Bodham and Weybourne (**Figure 2**);
- The River Wensum near Attlebridge **(Figure 5)**;
- Grazing floodplain near the River Wensum at Attlebridge **(Figure 5)**; and,
- The River Tiffey at Barford **(Figure 9).**

The areas covered by the second deployment from late July to early August and the 19th to 25th August are as follows:

- The western part of Weybourne Woods between Bodham and Kelling **(Figure 2;**

- A small pocket of woodland in grazed fields near Swannington, north of the River Wensum **(Figure 4);**
- The River Wensum (**Figure 5**); and,
- A pocket of woodland just north of the River Yare near Colton **(Figure 8).**

The areas covered by the third deployment from late August to early September 2020 are as follows:

- The eastern part of Weybourne Woods **(Figure 2);**
- The River Bure **(Figure 3);**
- An area of scrub adjacent to a woodland near Swannington **(Figure 4);** and,
- The River Wensum **(Figure 5).**

The areas covered by the fourth deployment from late September to early October are as follows:

- A large conservation pond within the western part of Weybourne Woods **(Figure 2);**
- The River Bure **(Figure 3);**
- The River Wensum **(Figure 5);** and,
- The River Tiffey **(Figure 9).**

Table 1: Summary of deployment locations and operational dates for static bat detector surveys in 2020

Deployment Location (**Figure 1**)	Deployment 1	Deployment 2	Deployment 3	Deployment 4
Weybourne Woods (**Figure 2**)	SM2 F 24th June - 8th July	SM2 H 30th July - 11th August	SM2 K 26th August - 10th September	SM2 H 24th September - 2nd October
River Bure (**Figure 3**)	No deployment	No deployment	SM2 N 26th August - 9th September	SM2 J 24th September - 5th October
Swannington (**Figure 4**)	No deployment	SM2 N 30th July - 9th August	SM2 J 26th August - 10th September	No deployment
River Wensum (**Figure 5**)	SM2 E 24th June - 9th July And SM2 I 24th June - 8th July (two detectors were deployed here)	SM2 I 30th July - 1st August and redeployed 19th August - 25th August	SM2 H 26th August - 31st August	SM2 N 24th September - 5th October
River Yare (**Figure 8**)	No deployment	SM2 K 30th July - 10th August	No deployment	No deployment

Deployment Location (**Figure 1**)	Deployment 1	Deployment 2	Deployment 3	Deployment 4
River Tiffey (**Figure 9**)	SM2 K 24th June - 10th July	No deployment	No deployment	SM2 K 24th September - 5th October

Not all deployment periods are identical because on some deployments the detectors ceased recording before they were retrieved. Further detail is provided below.

3.2.2 Deployment dates and durations of the 2020 static bat detector surveys

The first deployment of static bat detectors (SM2 F, SM2 I, SM2 E, SM2 K) was for the following period between June and July:

- SM2 F: 24th June - 8th July 2020 (14 nights)
- SM2 I: 24th June - 8th July 2020 (14 nights)
- SM2 E: 24th June - 9th July 2020 (15 nights)
- SM2 K: 24th June - 10th July 2020 (16 nights)

The first deployment of static bat detectors was for 16 nights in total, although only one detector (SM2 K) remained operational throughout this period. Detectors SM2 F, SM2 I and SM2 E did not record for the full deployments, with detectors SM2 F and SM2 I ceasing to record after 14 full nights and SM2 E ceasing to record after 15 nights. This was due to drained batteries.

Weather conditions throughout this period were mostly mild, with only two days where there was significant rainfall. Winds were mostly below Beaufort scale (BS) 2 and cloud cover was varied. Air temperatures ranged between 29°Celsius (C) and 11°C[3].

The second deployment of static bat detectors was for the following period between July and August:

- SM2 I: 30th July -1st August (2 nights)
- SM2 N: 30th July -9th August (10 nights)
- SM2 K: 30th July -10th August (11 nights)
- SM2 H: 30th July -11th August (12 nights)

The static bat detectors were deployed for 12 nights in total, although only one detector (SM2 H) remained operational throughout this period. Detectors SM2 I, SM2 N and SM2 K did not record for the full deployments, with detector SM2 I ceasing to record after just two full nights. This is thought to be due a technical fault.

Weather conditions throughout this period were mostly mild and warm, with air temperatures ranging from 34°C to 9°C. Only the first few days of August experienced occasional showers and some stronger winds.

As static bat detector SM2 I, which was deployed by the River Wensum, only recorded for two nights, this detector was redeployed later in August, and was operational for seven nights between the following dates:

- SM2 I: 19th August -25th August (7 nights)

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[3] ▮▮▮▮▮▮▮▮▮▮▮▮▮▮

Weather for the redeployment of SM2 I was consistently mild, with air temperatures of 22°C to 11°C.

The third deployment of static bat detectors was for the following periods between August and September:

- SM2 H: 26th August - 31st August (5 nights)
- SM2 N: 26th August - 9th September (14 nights)
- SM2 K: 26th August - 10th September (15 nights)
- SM2 J: 26th August - 10th September (15 nights)

The majority of the static bat detectors were deployed for 15 nights in total, with detectors SM2 J and SM2 K operational throughout this whole period. Static bat detector SM2 N was almost operational throughout the whole deployment but stopped recording one night before the detector was collected. SM2 H was only operational for five nights out of the 15-night deployment. This is thought to be due the aforementioned reasons.

Weather conditions throughout the deployment were varied with air temperatures between 24°C and 6°C. At the beginning of the deployment, Storm Ellen was causing winds which were up to 72 kilometres per hour (kph) and heavy rain. From the 26th August to 2nd September, a second storm (Storm Francis) caused further heavy rain and strong winds up to 88kph. Throughout the beginning of September the weather was mild.

The fourth deployment of static bat detectors was for the following periods between September and October:

- SM2 H: 24th September- 2nd October (8 nights)
- SM2 J: 24th September- 5th October (11 nights)
- SM2 N: 24th September- 5th October (11 nights)
- SM2 K: 24th September- 5th October (11 nights)

The majority of the static bat detectors were deployed for 11 nights in total, with three of the detectors recording throughout the duration of the deployment. One static bat detector, SM2 H, was only operational for eight nights. This is likely due to similar reasons to those listed above.

Weather conditions throughout the deployment were cooler than previous months, but less varied. Air temperatures were between 18°C and 5°C.

3.2.3 Areas of the DCO boundary surveyed in 2021

By the bat survey season of 2021, the site selection process to define the DCO boundary had started. This allowed for specific ecological features (e.g. woodlands and rivers) to be targeted, although exact crossing points were not known at the time (**Figure 1**). A screening exercise was undertaken to identify areas of likely high value for bats within the DCO boundary, based on ecological characteristics including habitats, connectivity, proximity to disturbance and sites of known importance. The nature of the SEP and DEP was also a consideration, with any parts of the DCO boundary likely to be subject to relatively high impacts screened-in for further surveys. Throughout the 2020 surveys, Weybourne Woods, the River Bure, Swannington, the River Wensum, the River Tiffey and the River Yare were surveyed as they were considered important for foraging bats. In 2021 these areas were re-surveyed, and additional sites were added to the survey scope.

The River Tud was included in the static bat detector survey effort as it provides high-quality foraging habitat and may function as a connective corridor.

Furze Meadow (near Ketteringham) and Ringland Covert (near Ringland/Honingham) were also included in the 2021 static bat detector survey scope, as both areas are woodlands with surrounding grassland which provide high quality habitat for foraging bats. These areas of woodland are the two most substantial blocks of woodland habitat intersected by the DCO boundary (apart from Weybourne Woods).

The onshore substation site south of Norwich Main near Dunston is predominantly an area of arable land which is not of particularly notable or high-quality for foraging or commuting bats. However, this area will undergo a long-term change, becoming the new onshore substation. As such, this area was surveyed due to the relatively high impact from this onshore aspect of the SEP and DEP on this particular site. Accordingly, both static bat detector surveys and transect surveys were undertaken here.

The 2021 static bat detector deployments can be separated into six groups of dates, with areas and deployment time periods summarised in **Table 2:** Summary of deployment locations and operational dates for static bat surveys in 2021, below. The areas covered by the static bat detector deployment in April 2021 are as follows:

- The River Bure (SM2 N - **Figure 3**)
- Swannington (SM Mini O - **Figure 4**)
- The River Wensum (SM2 C - **Figure 5**)
- Ringland Covert (SM2 C - **Figure 6**)
- The River Tiffey (SM Mini O - **Figure 9**)
- Furze Meadow (SM Mini P - **Figure 10**)
- Substation (SM2 K - **Figure 11**)

The areas covered by the static bat detector deployment in May 2021 are as follows:

- Weybourne Woods (SM2 F - **Figure 2**)
- Swannington (SM2 K - **Figure 4**)
- The River Wensum (SM Mini P - **Figure 5**)
- Ringland Covert (SM2 J - **Figure 6**)
- The River Tud (SM Mini O - **Figure 7**)
- The River Yare (SM2 N - **Figure 8**)
- The River Tiffey (SM2 - **Figure 9**)
- Furze Meadow (SM2 C – **Figure 10**)
- Substation (SM2 I – **Figure 11**)

The areas covered by the static bat detector deployment in June 2021 are as follows:

- Weybourne Woods (SM2 F - **Figure 2**)
- The River Bure (SM2 I - **Figure 3**)
- Swannington (SM Mini P - **Figure 4**)
- The River Wensum (SM2 K - **Figure 5**)
- Ringland Covert (SM2 H - **Figure 6**)
- The River Tud (SM Mini O - **Figure 7**)
- The River Yare (SM2 N - **Figure 8**)

- The River Tiffey (SM2 H - **Figure 9)**
- Furze Meadow (SM2 F - **Figure 10)**
- Substation (SM2 J) - **Figure 11**)

The areas covered by the static bat detector deployment in July 2021 are as follows:

- The River Bure (SM2 J - **Figure 3**)
- Swannington (SM Mini P - **Figure 4**)
- Ringland Covert (SM Mini T - **Figure 6**)
- The River Tud (SM Mini P - **Figure 7**)
- The River Yare (SM Mini O - **Figure 8)**
- The River Tiffey (SM2 N - **Figure 9**)
- Furze Meadow (SM2 K - **Figure 10**)
- Substation (SM2 I - **Figure 11**)

The areas covered by the static bat detector deployment in August 2021 are as follows:

- Weybourne Woods (SM Mini O - **Figure 2**)
- The River Bure (SM Mini S - **Figure 3**)
- Swannington (SM Mini P - **Figure 4**)
- The River Wensum (SM Mini R - **Figure 5**)
- Ringland Covert (SM2 H - **Figure 6**)
- The River Tud (SM Mini O - **Figure 7**)
- The River Yare (SM2 J - **Figure 8**)
- The River Tiffey (SM2 K - **Figure 9**)
- Furze Meadow (SM2 I - **Figure 10**)
- Substation (SM2 N - **Figure 11**)

The areas covered by the static bat detector deployment in September 2021 are as follows:

- Weybourne Woods (SM Mini O - **Figure 2**)
- The River Bure (SM Mini S - **Figure 3**)
- Swannington (SM2 H - **Figure 4**)
- The River Wensum (SM Mini R - **Figure 5**)
- The River Tud (SM Mini P - **Figure 7**)
- The River Yare (SM Mini T - **Figure 8**)
- The River Tiffey (SM Mini R - **Figure 9**)
- Furze Meadow (SM Mini O - **Figure 10**)
- Substation (SM2 N - **Figure 11**)

Table 2: Summary of deployment locations and operational dates for static bat surveys in 2021

Deployment Location (Figure 1)	April	May	June	July	August	September
Weybourne Woods (Figure 2)	No deployment	SM2 F 19th May - 24th May	SM2 F 10th June - 15th June	Detector malfunction	Mini O 4th August – 9th August	Mini O 10th September – 15th September
River Bure (Figure 3)	SM2 N 21st April – 26th April	Detector malfunction	SM2 I 10th June - 15th June	SM2 J 7th July – 12th July	SM Mini S 4th August – 9th August	SM Mini S 10th September – 15th September
Swannington (Figure 4)	SM Mini O 21st April – 26th April	SM2 K 19th May - 24th May	SM Mini P 10th June - 15th June	SM2 Mini P 7th July – 12th July	SM Mini P 4th August – 9th August	SM2 H 10th September – 15th September
River Wensum (Figure 5)	SM2C C 21st April – 26th April	SM Mini P 19th May - 24th May	SM2 K 10th June - 15th June	Detector malfunction	SM Mini R 4th August – 9th August	SM Mini R 10th September – 15th September
Ringland Covert (Figure 6)	SM2 C 23rd April – 30th April	SM2 J 19th May - 24th May	SM2 K 16th June – 21st June	SM2 Mini T 14th July – 19th July	SM2 H 4th August – 9th August	No deployment
River Tud (Figure 7)	No deployment	SM Mini O 19th May - 24th May	SM2 H 10th June - 15th June	SM2 Mini P 14th July – 19th July	SM Mini O 11th August – 16th August	SM Mini P 10th September – 15th
River Yare (Figure 8)	No deployment	SM2 N 19th May - 24th May	SM2 N 10th June - 15th June	SM2 Mini O 7th July – 12th July	SM2 J 4th August – 9th August	SM Mini T 10th September – 15th September
River Tiffey (Figure 9)	SM Mini O 27th April – 6th May	SM2 H 19th May - 24th May	SM2 H 10th June - 15th June	SM2 N 7th July – 12th July	SM2 K 6th August – 11th August	Mini R 22nd September – 27th September
Furze Meadow (Figure 10)	SM Mini P 21st April – 26th April	SM2 C 19th May - 24th May	SM2 F 16th June – 21st June	SM2 K 7th July – 12th July	SM2 I 4th August – 9th August	SM Mini O 22nd September – 27th September
Substation (Figure 11)	SM2 K 21st April – 26th April	SM2 I 19th May - 24th May	SM2 J 10th June - 15th June	SM2 I 7th July – 12th July	SM2 N 4th August – 9th August	SM2 N 10th September – 15th September

3.2.4 Deployment dates and durations of the 2021 static bat detector surveys

The deployment dates and durations for the 2021 static bat detector surveys are summarised in **Table 2:** Summary of deployment locations and operational dates for static bat surveys in 2021, above.

The first deployment of static bat detectors in 2021 was in April. Most of the static bat detectors (SM Mini O, SM Mini P, SM2 K, SM2 N and SM2 C) were deployed and operational from 21st April to 26th April 2021. Two static bat detectors were deployed later in the month: SM2 C was deployed from 23rd April to 30th April and SM Mini O was deployed from 23rd April to 6th May. Weather conditions throughout this period were mostly cold, with temperatures ranging between 14ºC and -1ºC throughout the duration of the deployment.

The second deployment of static bat detectors in 2021 was in May. All the static bat detectors (SM Mini O, SM Mini P, SM2 H, SM2 N, SM2 C, SM2 F, SM2 I, SM2 J and SM2 K) were deployed from 19th May to 24th May 2021. One detector deployed at the River Bure did not record any bat registrations. Weather conditions throughout this period were mild but there was a high level of rainfall, with temperatures ranging between 17ºC and 4ºC.

The third deployment of static bat detectors in 2021 was in June. Most of the static bat detectors (SM2 F, SM2 H, SM2 I, SM2 J, SM2 K, SM2 N, SM Mini O and SM Mini P) were deployed and operational from 10th June to 15th June 2021. Two static bat detectors were deployed later in the month: SM2 F at Furze Meadow and SM2 H at Ringland Covert were deployed from 16th June to 21st June due to landowner access issues. Weather conditions throughout this period were mild with air temperatures ranging between 26ºC to 10ºC.

The fourth deployment of static bat detectors in 2021 was in July. Most of the static bat detectors (SM Mini O, SM Mini P, SM2 I, SM2 J, SM2 K and SM2 N) were deployed and operational from 7th July to 12th July. Two static bat detectors were deployed later in the month: SM Mini P at River Tud and SM Mini T at Ringland Covert were deployed from 14th July to 19th July due to landowner access issues. The weather conditions were mostly warm with air temperatures ranging between 28ºC and 12ºC.

The fifth deployment of static bat detectors in 2021 was in August. Most of the detectors (SM Mini O, SM Mini P, SM Mini R, SM Mini S, SM2 H, SM2 I, SM2 J and SM2 N) were deployed from 4th August to 11th August 2021. Two static bat detectors were deployed later in the month: SM2 K was deployed at The River Tiffey from 6th August to 11th August and SM Mini O was deployed at the River Tud from 11th August to 16th August 2021 due to landowner access issues. The weather conditions were mild with temperatures ranging between 22ºC and 9ºC.

The sixth deployment of static bat detectors in 2021 was in September. Most of the detectors (SM Mini O, SM Mini P, SM Mini R, SM Mini S, SM Mini T, SM2 H, SM2 K and SM2 N) were deployed from 10th September to 15th September 2021. Two static bat detectors were deployed later in the month: SM Mini O (at Furze Meadow) and SM Mini R (at the River Tiffey) were deployed from 22nd September to 27th September 2021 due to landowner access issues. However, both detectors were only operational for the first two nights. This was due to high levels of noise files created from extensive invertebrate activity nearby. The weather conditions were mild with air temperatures ranging between 23ºC and 11ºC.

3.3 Bat Transect Surveys

The transect surveys involved two surveyors walking a predetermined transect route across selected sections of the DCO boundary (**Figure 12 - Figure 28**) at dusk or dawn whilst using a hand-held AnaBat SD1 bat detector to monitor for and record bats. The dusk surveys started 15 minutes before sunset and continued until two hours after sunset. The dawn surveys started two hours before sunrise and continued until 15 minutes after sunrise. Bat activity declines markedly after the first two hours following sunset or two hours before sunrise (Horn et al., 2008)[4], so manual transect surveys concentrated specifically on these periods.

The transect surveys were undertaken in three key locations: Weybourne Woods (**Figure 12 - Figure 16**), the River Wensum and surrounding habitats (**Figure 17 - Figure 22**), and the onshore substation site and surrounding habitats (**Figure 23 - Figure 28**). These locations were outlined as important for foraging bats based on information provided in the ETG meeting, on local knowledge of the areas, and due to potential high impacts (i.e. at the onshore substation site).

The transect routes incorporated multiple 'listening posts'; static monitoring positions lasting between four and five minutes at key points or features of interest across the sites. Surveys were undertaken on the following dates:

- 28th April 2021 (dusk survey)
- 19th May 2021 (dusk survey)
- 9th June 2021 (dusk survey)
- 8th July 2021 (dusk survey)
- 4th August 2021 (dusk survey)
- 10th September 2021 (dawn survey)

A summary of the surveyors who undertook each transect survey is provided in **Table 3**, below.

Table 3: Summary of surveyors for 2021 transects

Location/ Month	Weybourne Woods (Figure 12 - Figure 16)	River Wensum (Figure 17 - Figure 22)	Substation (Figure 23 - Figure 28)
April	No landowner access	Alice Petherick BA MA and Justin Parry BSc (**Figure 17**)	William Riddett BA ACIEEM and Alex Lowe BSc MArborA (**Figure 23**)
May	Katrina Salmon BSc and Richard Fensom (**Figure 12**)	A. Lowe and Philip Farndon BSc (**Figure 18**)	W. Riddett and Duncan Cullingford FdSc (**Figure 24**)
June	P. Farndon and Susannah Black (**Figure 13**)	A. Lowe and R. Fensom (**Figure 19**)	W. Riddett and D. Cullingford (**Figure 25**)
July	P. Farndon and D. Cullingford (**Figure 14**)	W. Riddett and K. Salmon (**Figure 20**)	A. Petherick and Anna Thomson (**Figure 26**)
August	Adam Stickler BSc	A. Lowe and P. Farndon	A. Petherick and Anna. T

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[4] Horn J.W., Arnett E.B. and Kunz T.H. 2008. Behavioral Responses of Bats to Operating Wind Turbines. Journal of Wildlife Management 72(1): 123-132.

	MSc ACIEEM and Graham Riley BSc ACIEEM **(Figure 15)**	**(Figure 21)**	**(Figure 27)**
September	Ptolemy McKinnon BSc MSc and Alexandra Brighten BSc MSc **(Figure 16)**	J. Parry and A. Lowe **(Figure 22)**	A. Petherick and Jenny Donelan BSc MSc **(Figure 28)**

Each bat echolocation registered on a bat detector during the transect surveys was recorded for:

- Time of occurrence;
- Approximate map location;
- The habitat in the area;
- Estimated number of bats present;
- Estimation of the bat activity exhibited based on the number registrations, the distance away and any special call features (e.g. social calls, feeding buzzes).

Air temperature was measured at the beginning and end of each survey. Wind speed and cloud cover was measured at the start of the survey only, and any periods of precipitation were noted.

All data from the surveys was subsequently downloaded and analysed to reveal the bat species and activities recorded. Details of the sound analysis are provided below.

3.4 Bat Survey Audio Recording Analysis

All sound recordings were reviewed to confirm the full range of bat species recorded.

3.4.1 Audio Recording Analysis From 2020

Data from 2020 was analysed by P. Farndon and checked by Susannah Dickinson BSc MCIEMM (NE class licence # 2016-22497-CLS-CLS). All SM2BAT recordings were analysed using AnalookW software.

Audio analysis of frequency division and time expansion data was achieved by comparing sound characteristics and sonogram shapes and measurements (peak call frequency, call frequency range and mode pulse interval) to reference measurements and/or recordings provided by Russ et al. (2012)[5], Parsons and Jones (2000)[6], the Bat Conservation Trust (2008)[7], Sowler (2010)[8], and Wild Frontier Ecology's in-house call reference library.

As some of the static bat detectors recorded extremely high numbers of registrations/ recordings, AnalookW filters which automatically identify registrations, were used to

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[5] Russ, J. (2012). *British Bat Registrations A Guide to Species Identification*. Pelagic Publishing, Exeter.

[6] Parsons, S. & Jones, G. (2000). Acoustic Identification of Twelve Species of Echolocating Bat by Discriminate Function Analysis and Artificial Neural Networks. *The Journal of Experimental Biology* **203**: 2641-2656.

[7] Bat Conservation Trust (2008). Bat Sound Library. Online at: ███ ██████████

[8] Sowler, S. (2010). Difficult Sonograms and Social Registrations – Advanced Anabat Analysis. Alana Ecology Workshop. Bury St. Edmunds, Suffolk

analyse batches of registrations (namely pipistrelle *Pipistrellus* species registrations) in order to reduce analysis time. Use of filters does not significantly compromise the information presented in this report or the conclusions that have been drawn.

3.4.2 Audio recording Analysis From 2021

Recordings collected from the April static bat detector deployment were analysed by Elizbeth Maxim MBiochem and A. Petherick using AnalookW software using the methods outlined above. The results were checked by K. Salmon.

The majority of the remaining deployments from 2021 were sent to the British Trust for Ornithology (BTO) Acoustic Pipeline for sound analysis. BTO put all of the recordings through a random forest acoustic classifier (the BTO Acoustic Pipeline[9]), built by Bas et al. (2017)[10]. This entails extraction of 150 measures of call characteristics from each bat pass, and a comparison of these against measurements taken from an extensive reference library of over 65,000 known species recordings. The acoustic classifier assigns a species and a probability (continuous values between 0 and 1) to each bat pass that relates to the false positive rate (described in more detail in Barré et al. (2019)[11].

The results from BTO were checked by K. Salmon. Quality control included manually checking bat registrations from rarer species and dismissing some of the results based on the probability of the registration relating to the assigned bat species.

There were occasional deployments throughout 2021 which had low numbers of recordings and so did not warrant automated analysis. These were analysed by E. Maxim and checked by K. Salmon.

Data collected from the transect surveys were analysed by K. Salmon using AnalookW software using the methods outlined above.

3.5 Data Search

A data search for biological records (including of bats) within the DCO boundary and surrounding 2km area was completed with the Norfolk Biodiversity Information Service (NBIS) in January 2021.

In October 2021, Wild Wings Ecology Ltd. provided a summary map of zones and features around the River Wensum, and the importance of these areas for barbastelle bats as classified by Wild Wings Ecology. These classifications of the importance of certain areas is based on Wild Wings Ecology's surveys completed in 2020[12] which radio-tracked barbastelle bats to identify and assess areas of foraging and commuting habitat used by barbastelles, as well as Core Sustenance Zones (CSZ) around any barbastelle maternity sites. Where any features deemed by Wild Wings Ecology as important for barbastelles (such as commuting routes) overlap with areas of the DCO boundary, these are shown in **Figure 5,** below, as taken directly from the summary map provided by Wild Wings Ecology**.**

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[9] ▮▮▮▮▮▮▮▮▮▮▮▮

[10] Bas, Y., Bas, D. & Julien, J.-F. (2017). Tadarida: A Toolbox for Animal Detection on Acoustic Recordings. *Journal of Open Research Software* **5**, 6. DOI: ▮▮▮▮▮▮▮▮▮▮

[11] Barré, K., Le Viol, I., Julliard, R., Pauwels, J., Newson, S.E., Julien, J.F., Fabien, C., Kerbiriou, C. & Bas, Y. (2019). Accounting for automated identification errors in acoustic surveys. *Methods in Ecology and Evolution*. ▮▮▮▮▮▮▮▮▮▮

[12] Wild Wings Ecology Wensum Valley Barbastelle Project (unpublished data)

Figure 1: Map showing overview of target survey areas
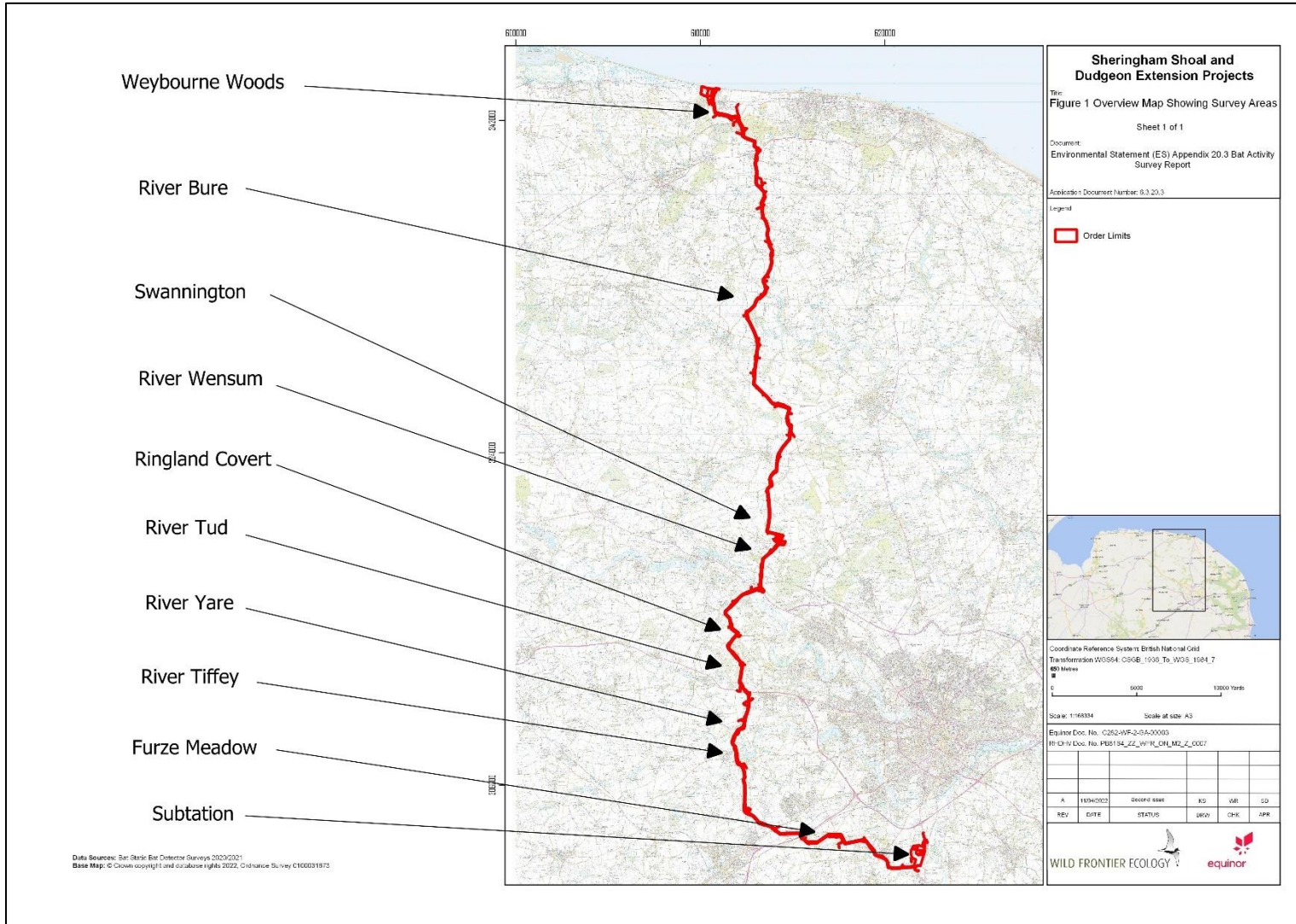
Figure 2: Map showing static bat detector deployment locations at Weybourne Woods
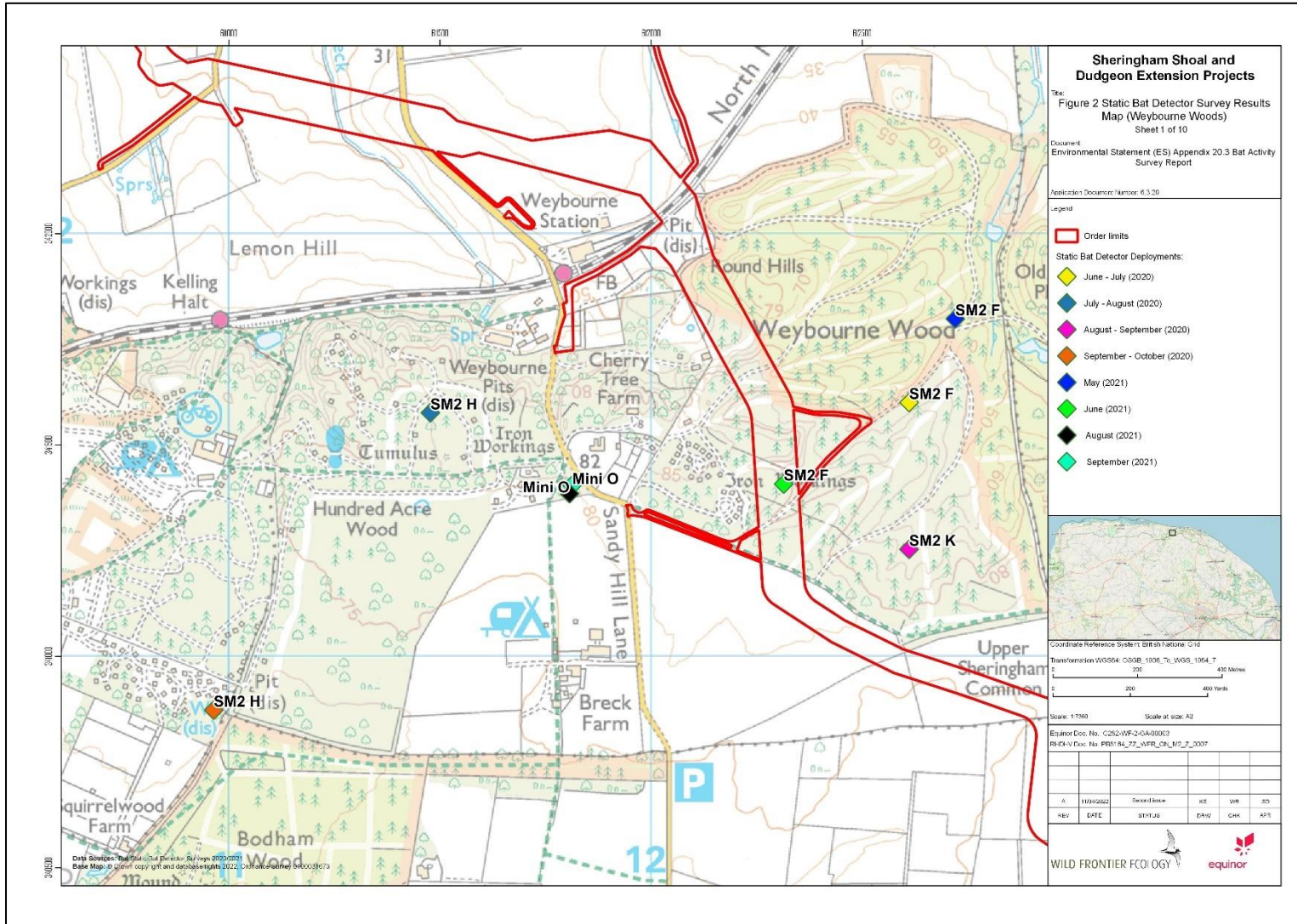
Figure 3: Map showing static bat detector deployment locations at the River Bure
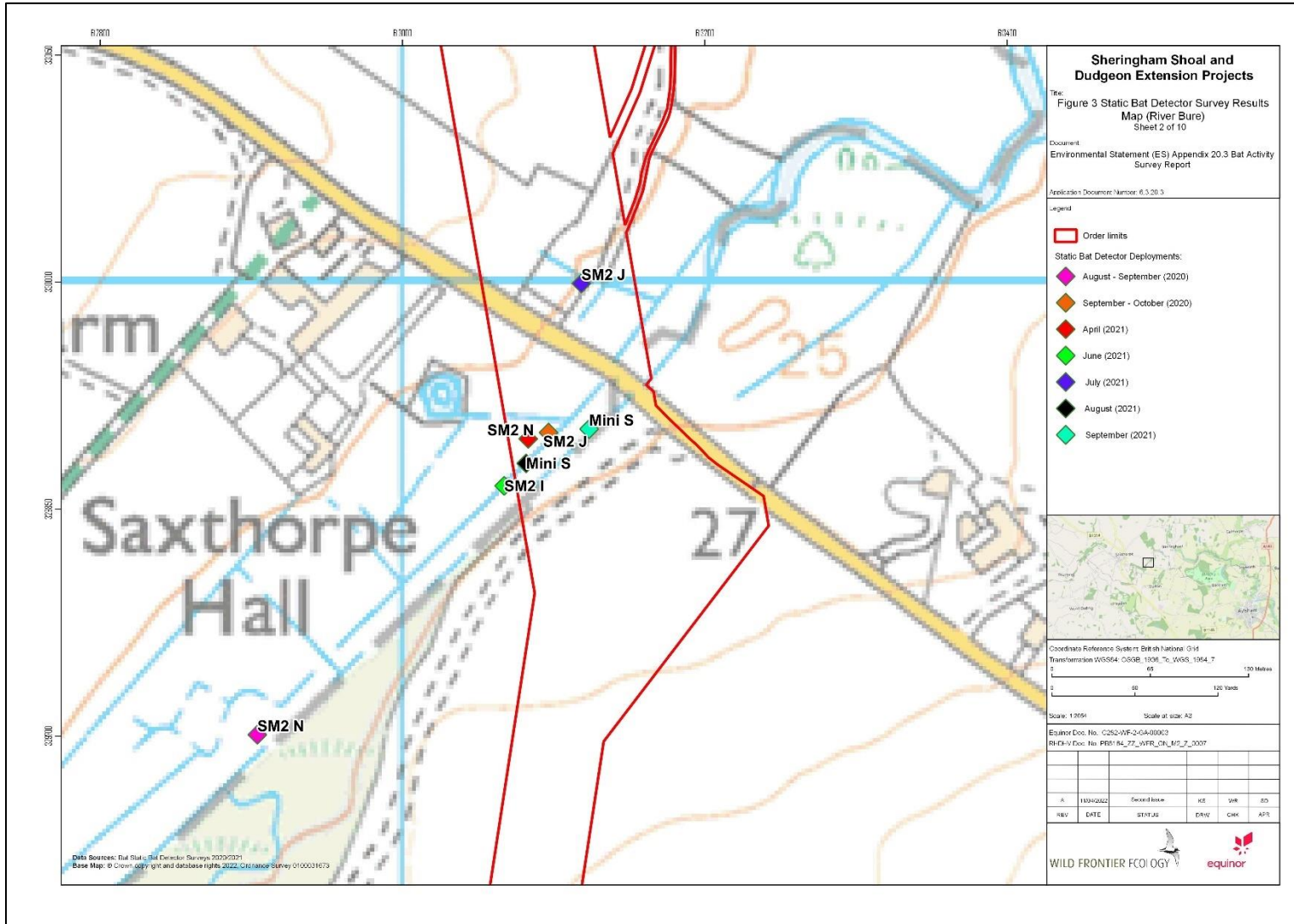
Figure 4: Map showing static bat detector deployment locations at Swannington

Figure 5: Map showing static bat detector deployment locations and areas outlined as important commuting routes for barabstelles at the River Wensum
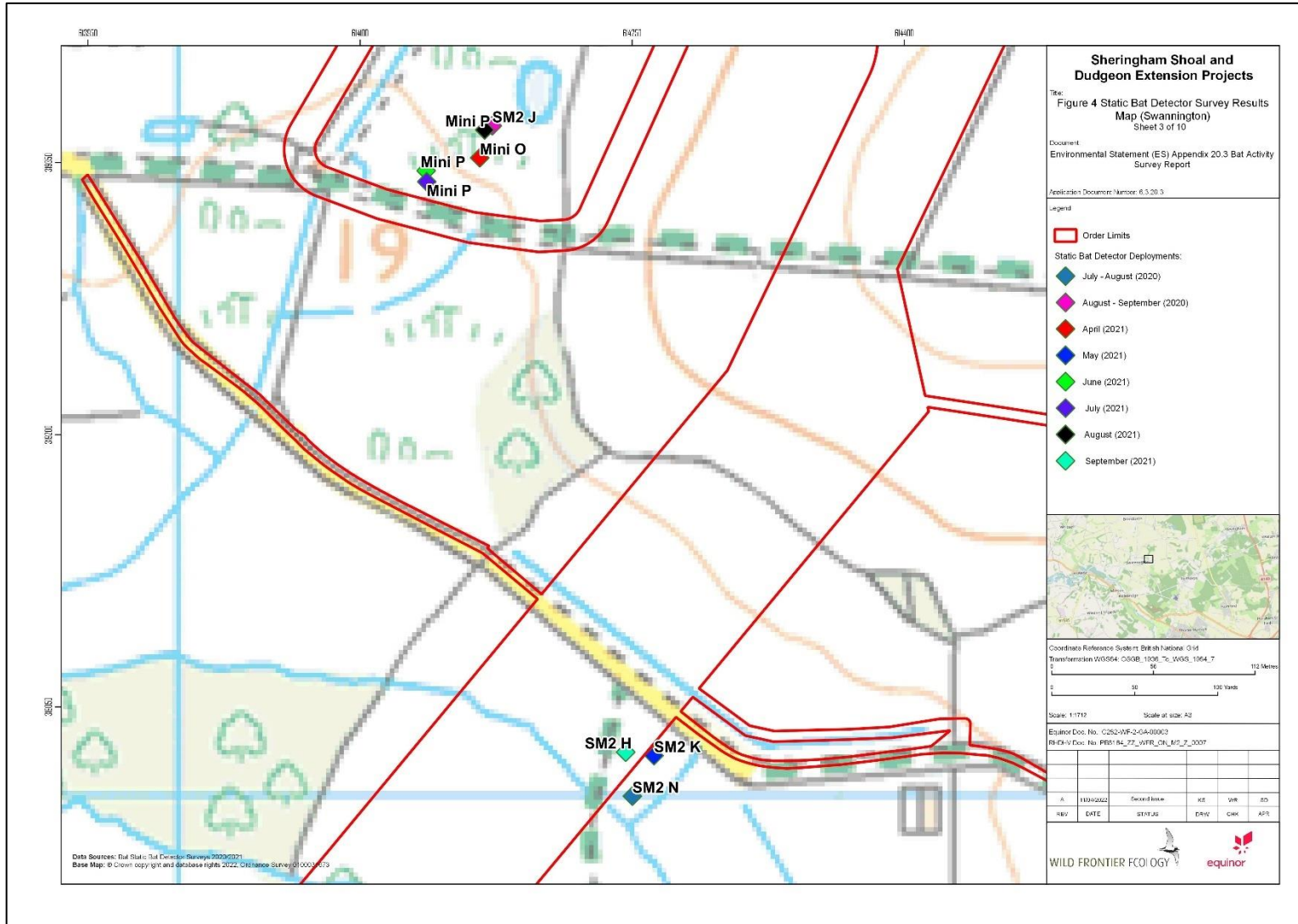
Figure 6: Map showing static bat detector deployment locations at Ringland Covert
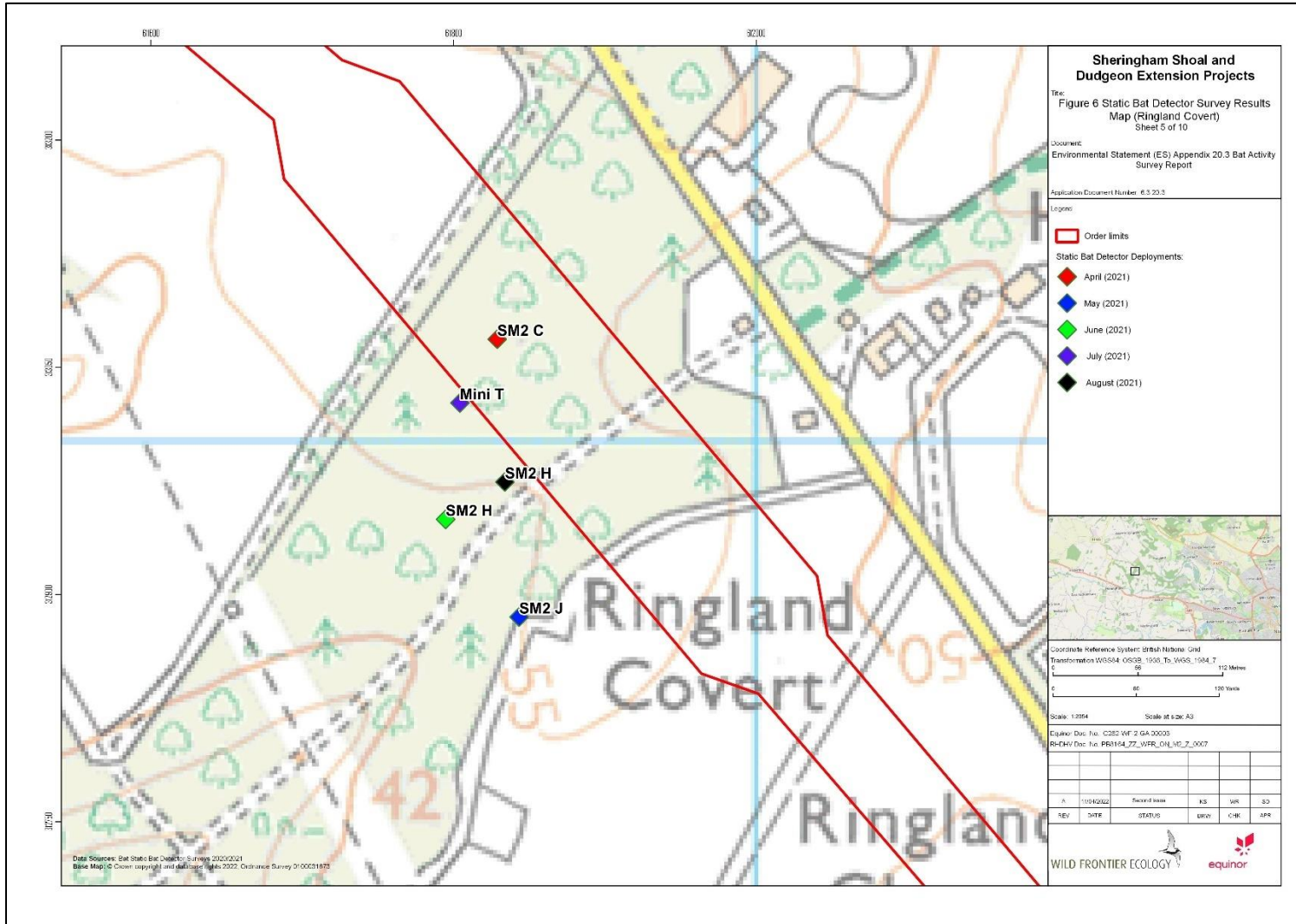
Figure 7: Map showing static bat detector deployment locations at the River Tud
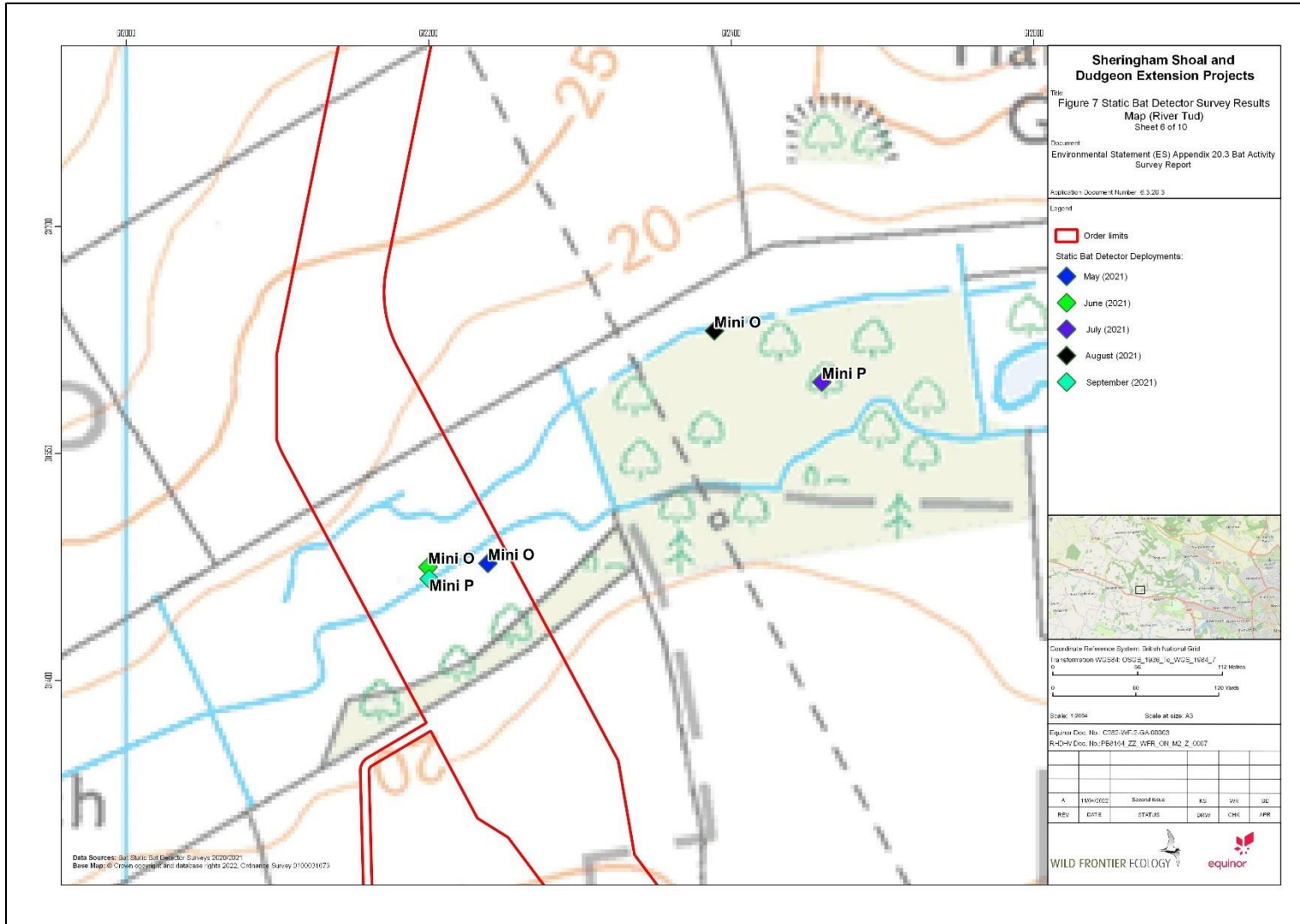
Figure 8: Map showing static bat detector deployment locations at the River Yare
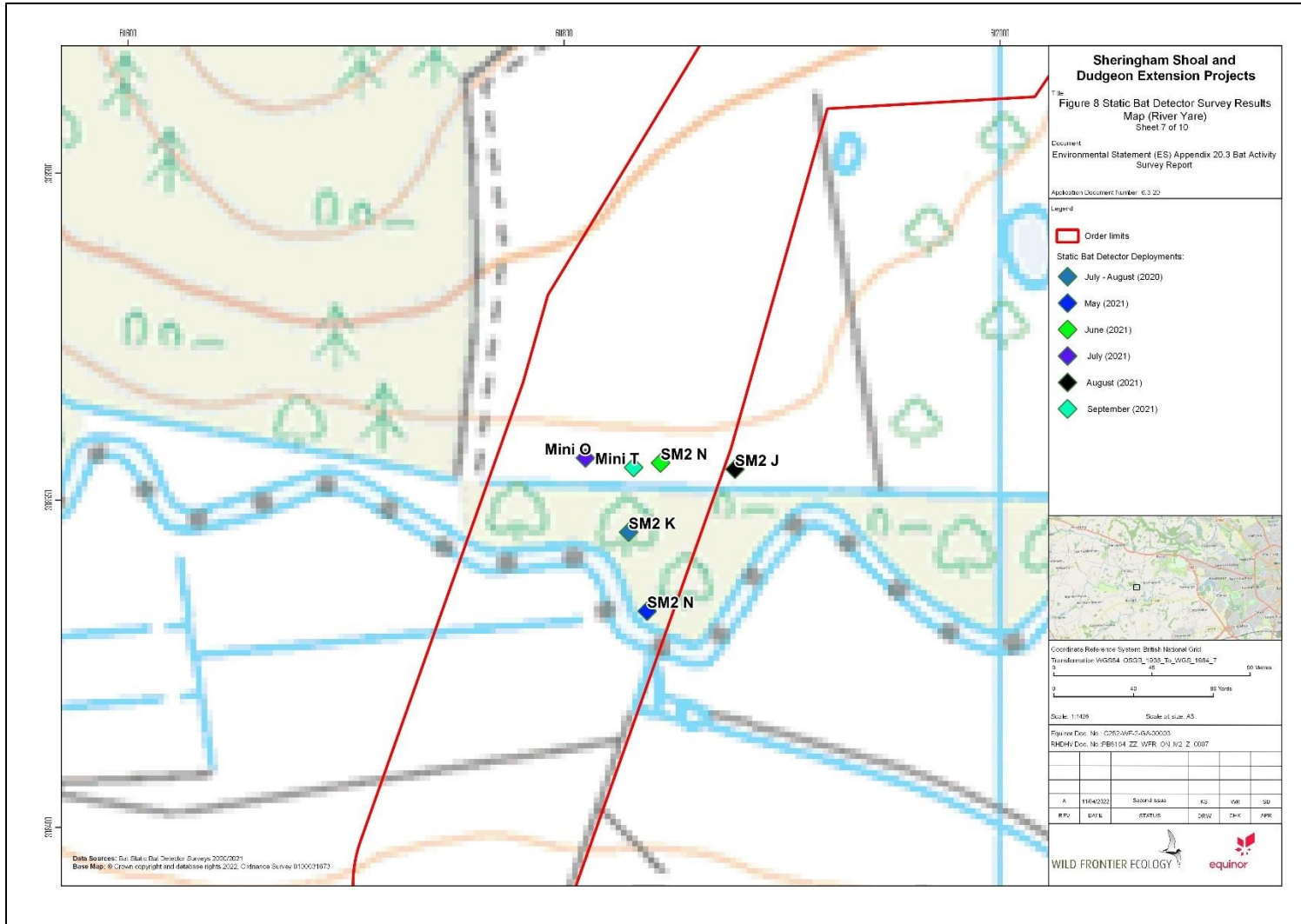
Figure 9: Map showing static bat detector deployment locations at the River Tiffey
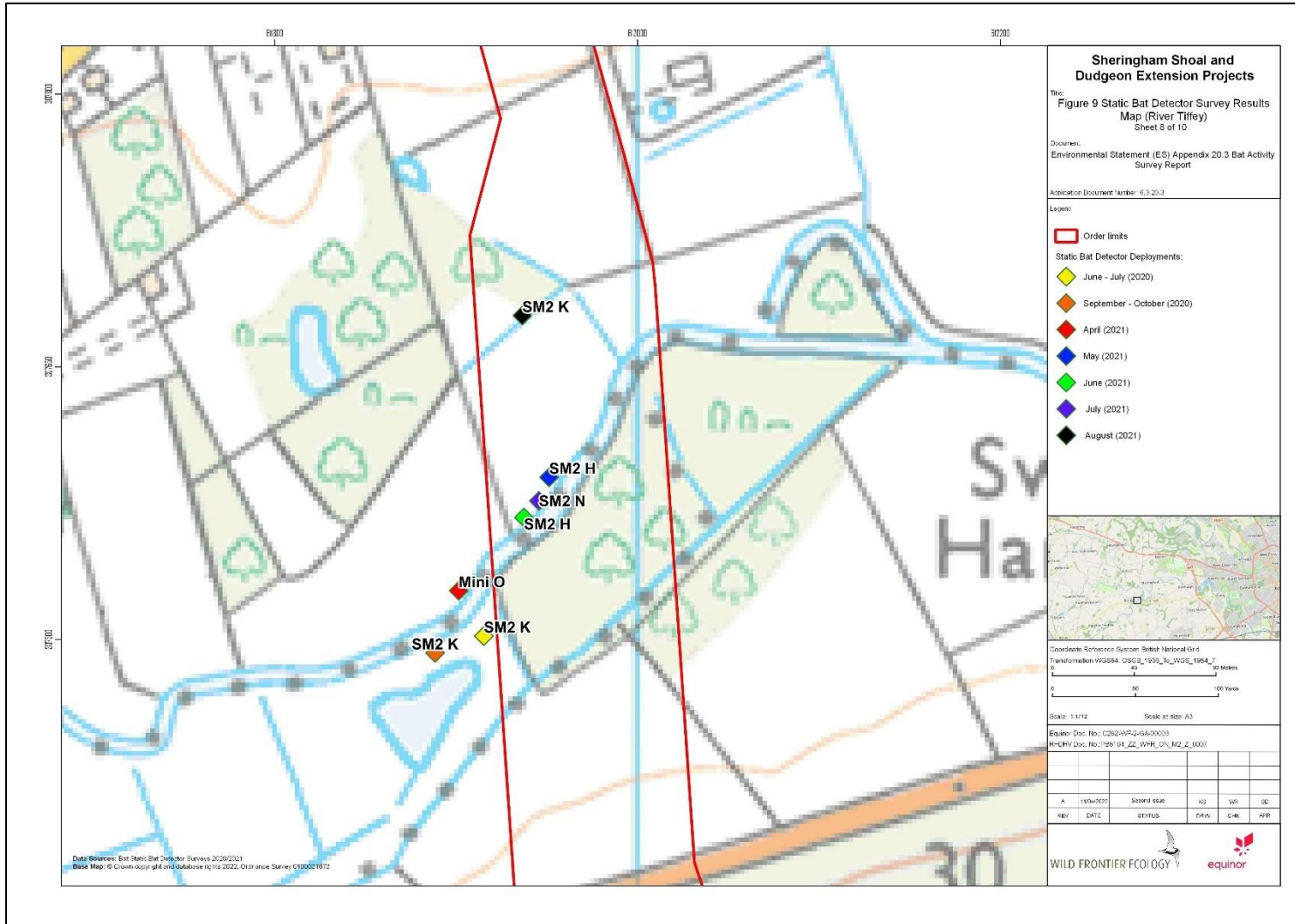
Figure 10: Map showing static bat detector deployment locations at Furze Meadow
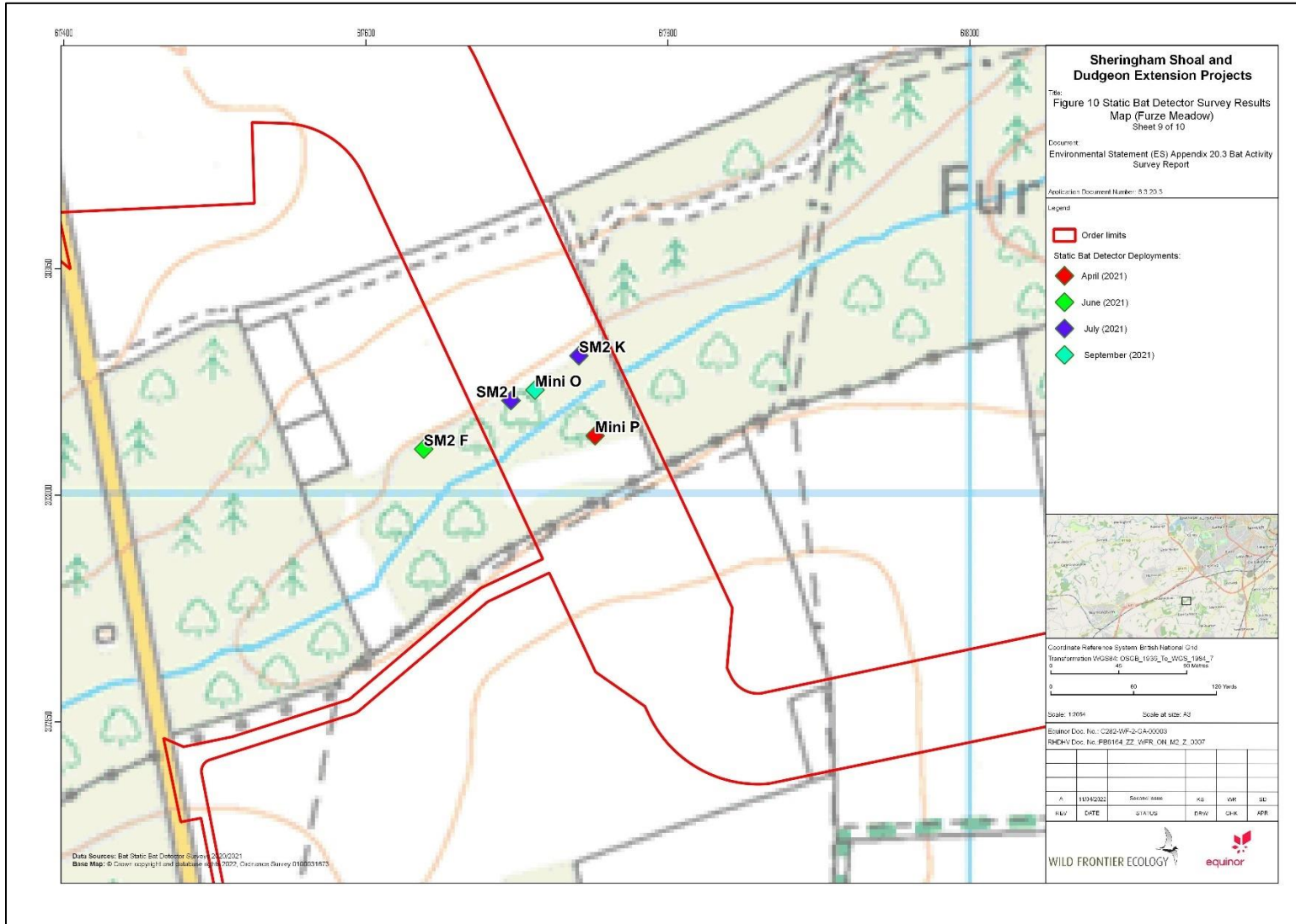
Figure 11: Map showing static bat detector deployment locations at the substation
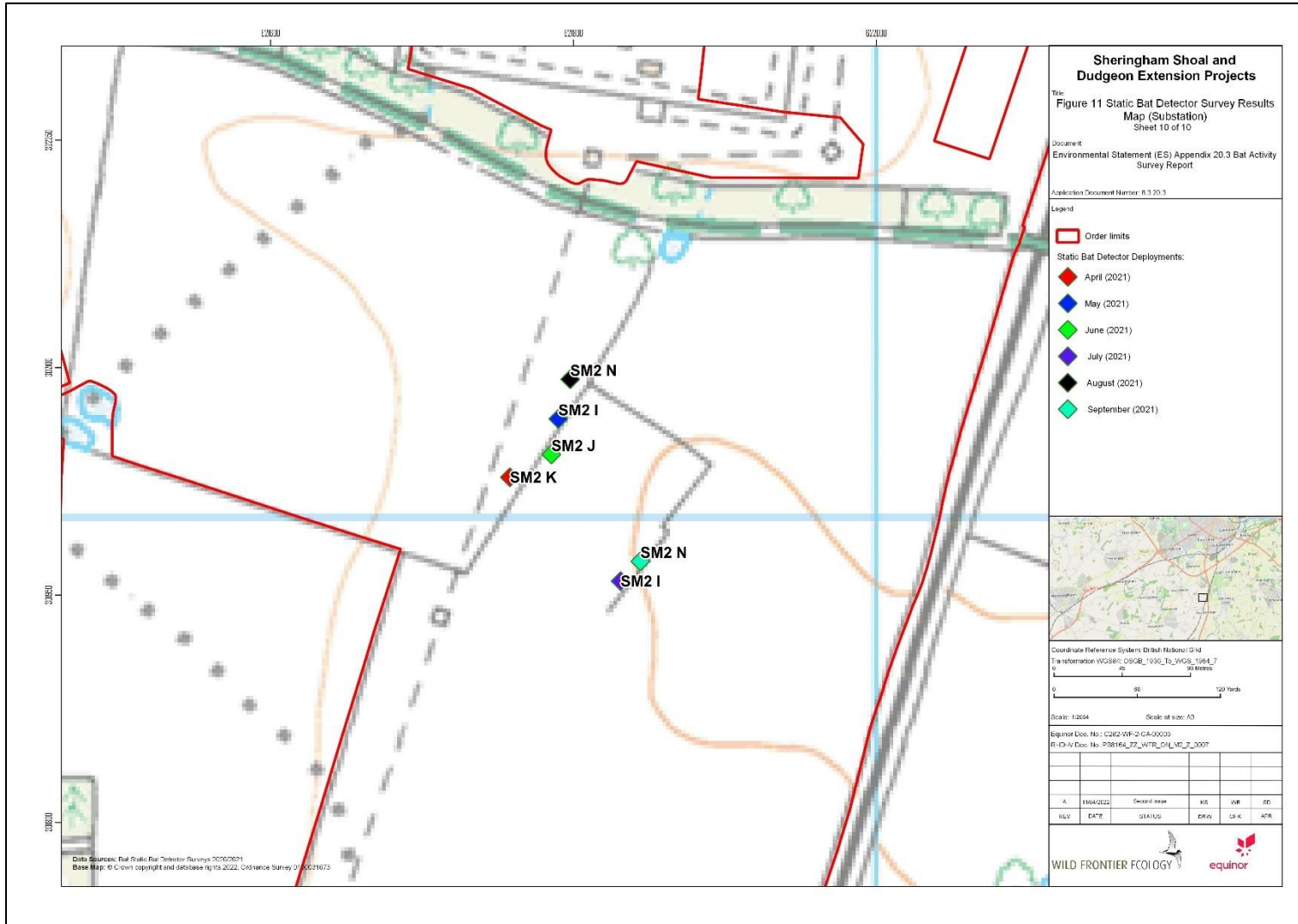
Figure 12: Transect survey results (single passes of bats) at Weybourne Woods in May
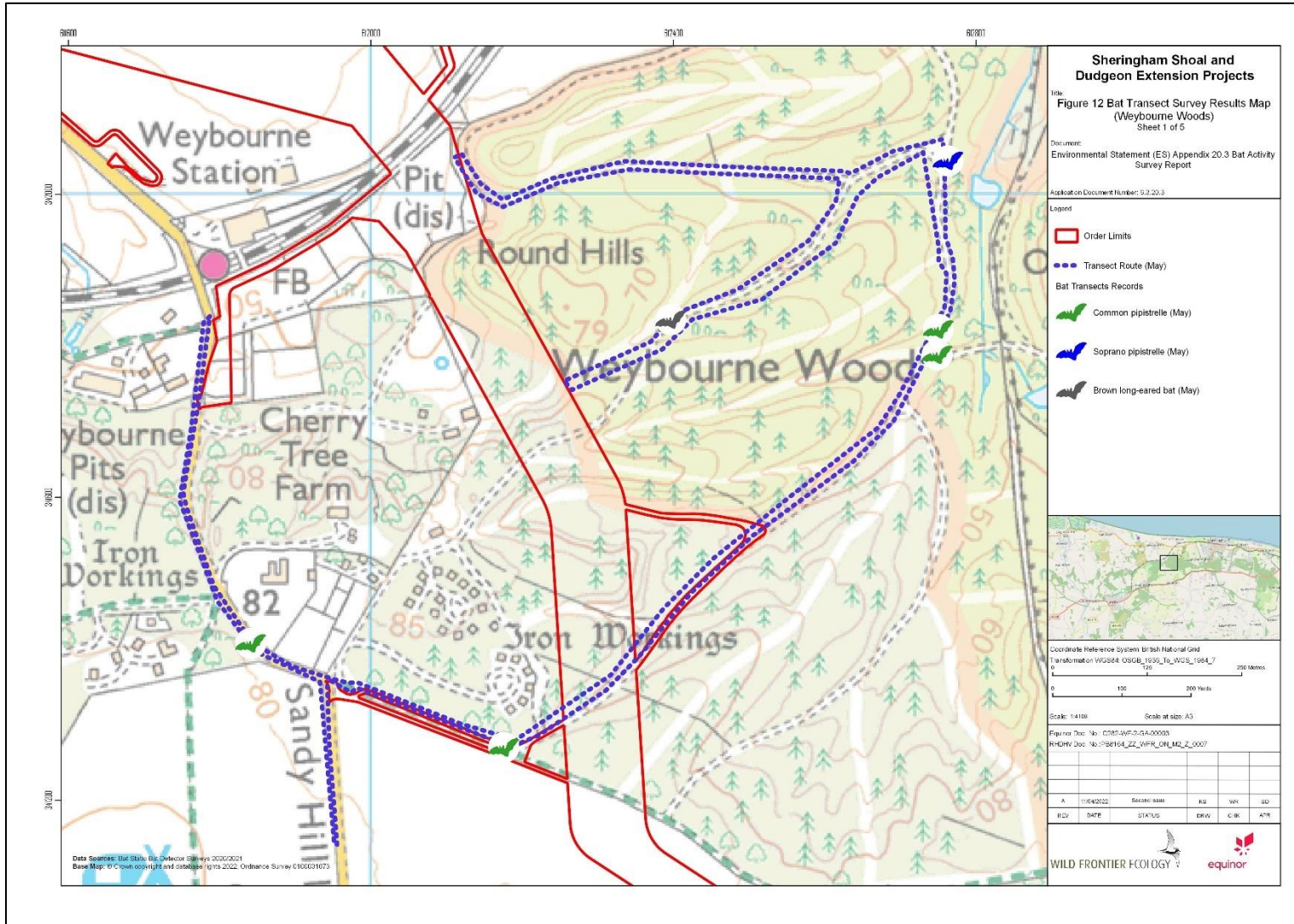
Figure 13: Transect survey results (single passes of bats) at Weybourne Woods in June
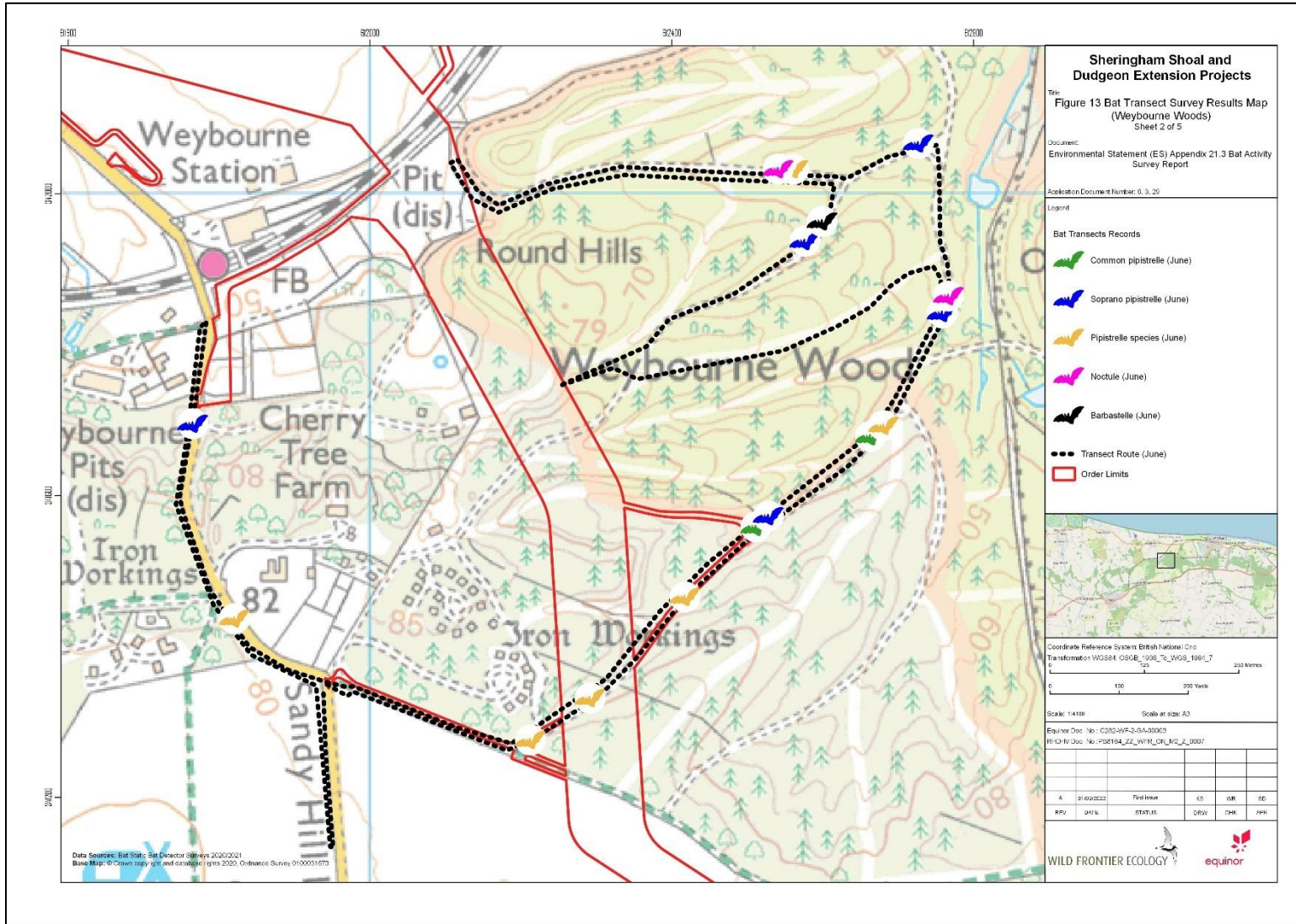
Figure 14: Transect survey results (single passes of bats) at Weybourne Woods in July
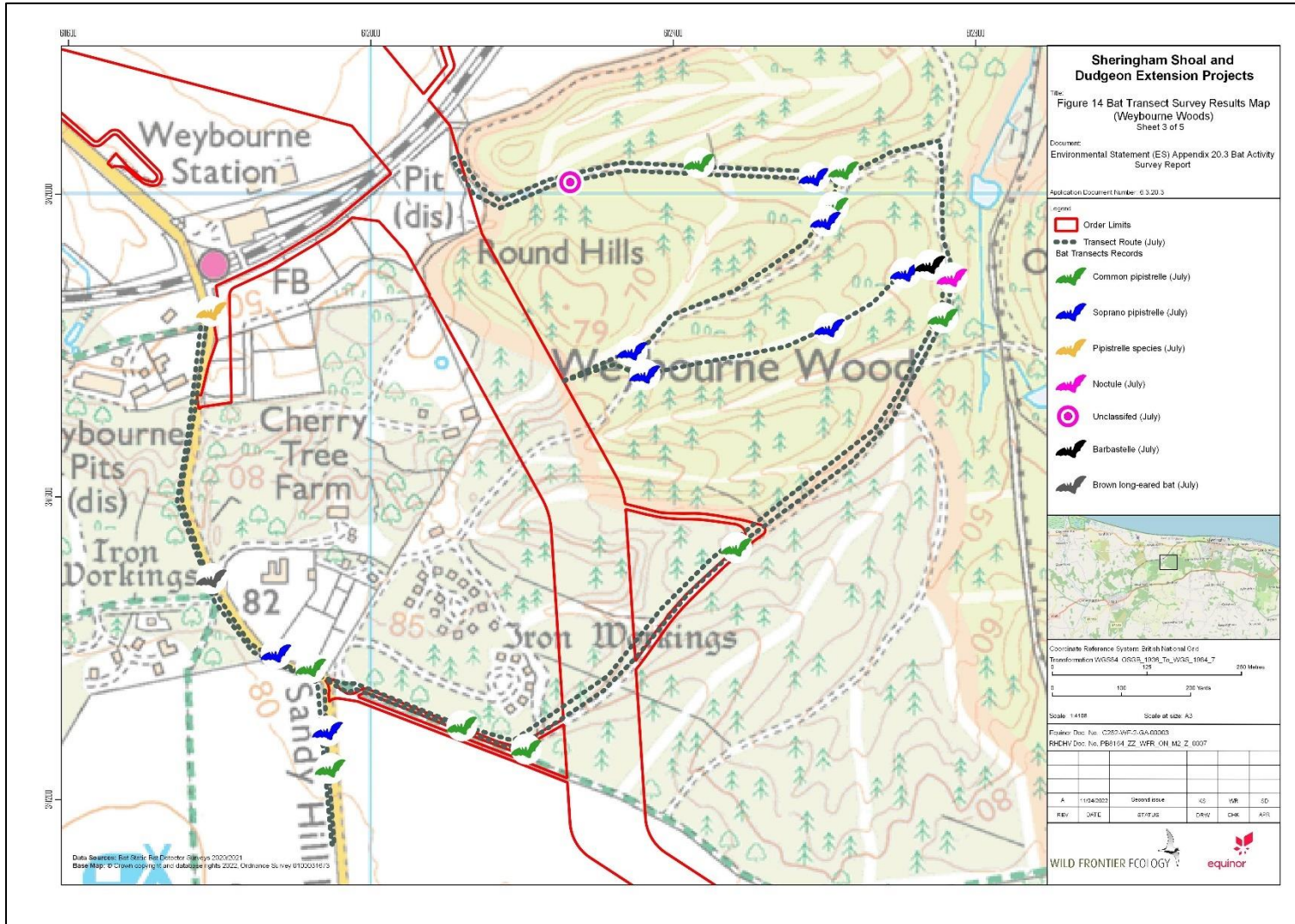
Figure 15: Transect survey results (single passes of bats) at Weybourne Woods in August
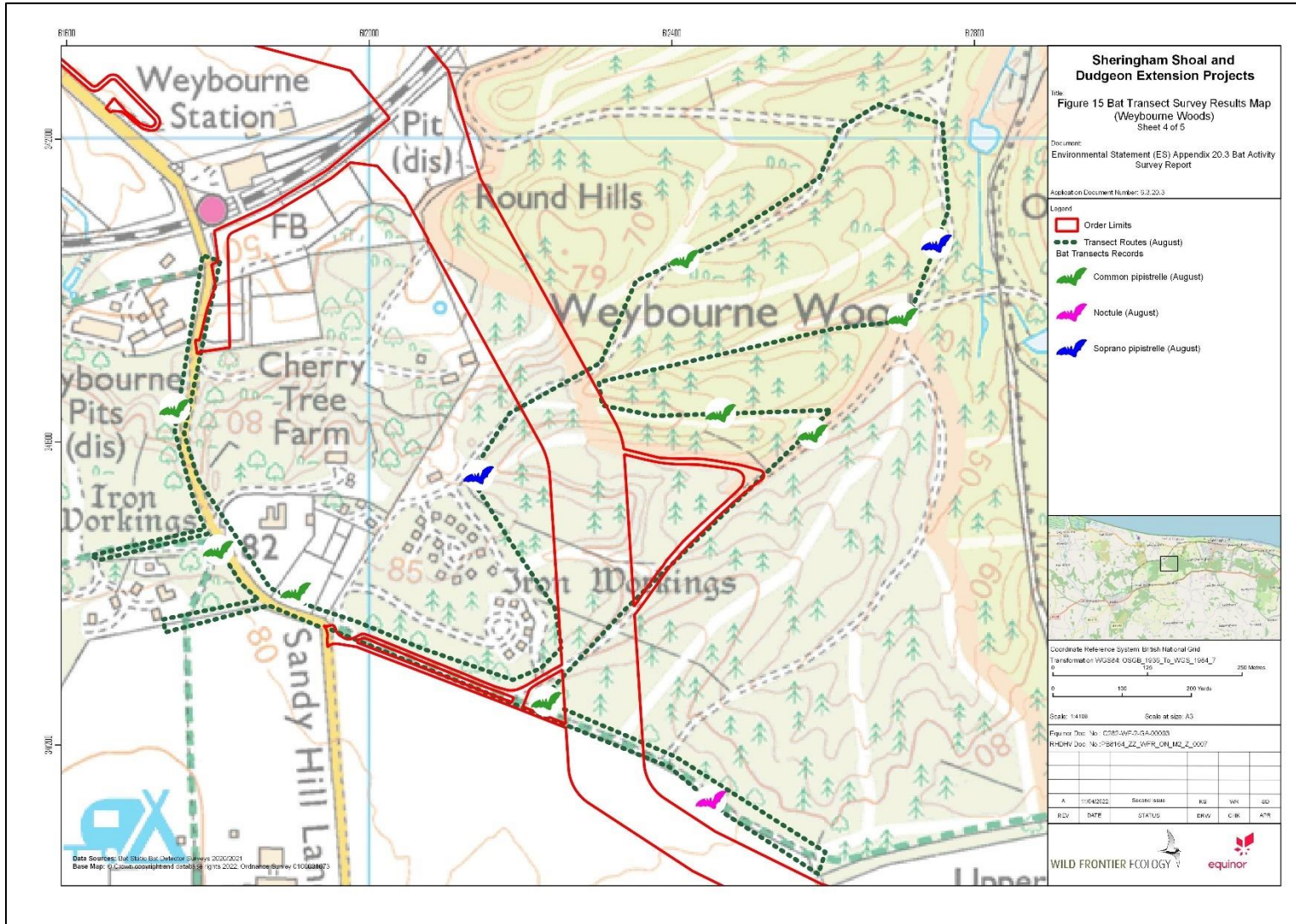
Figure 16: Transect survey results (single passes of bats) at Weybourne Woods in September
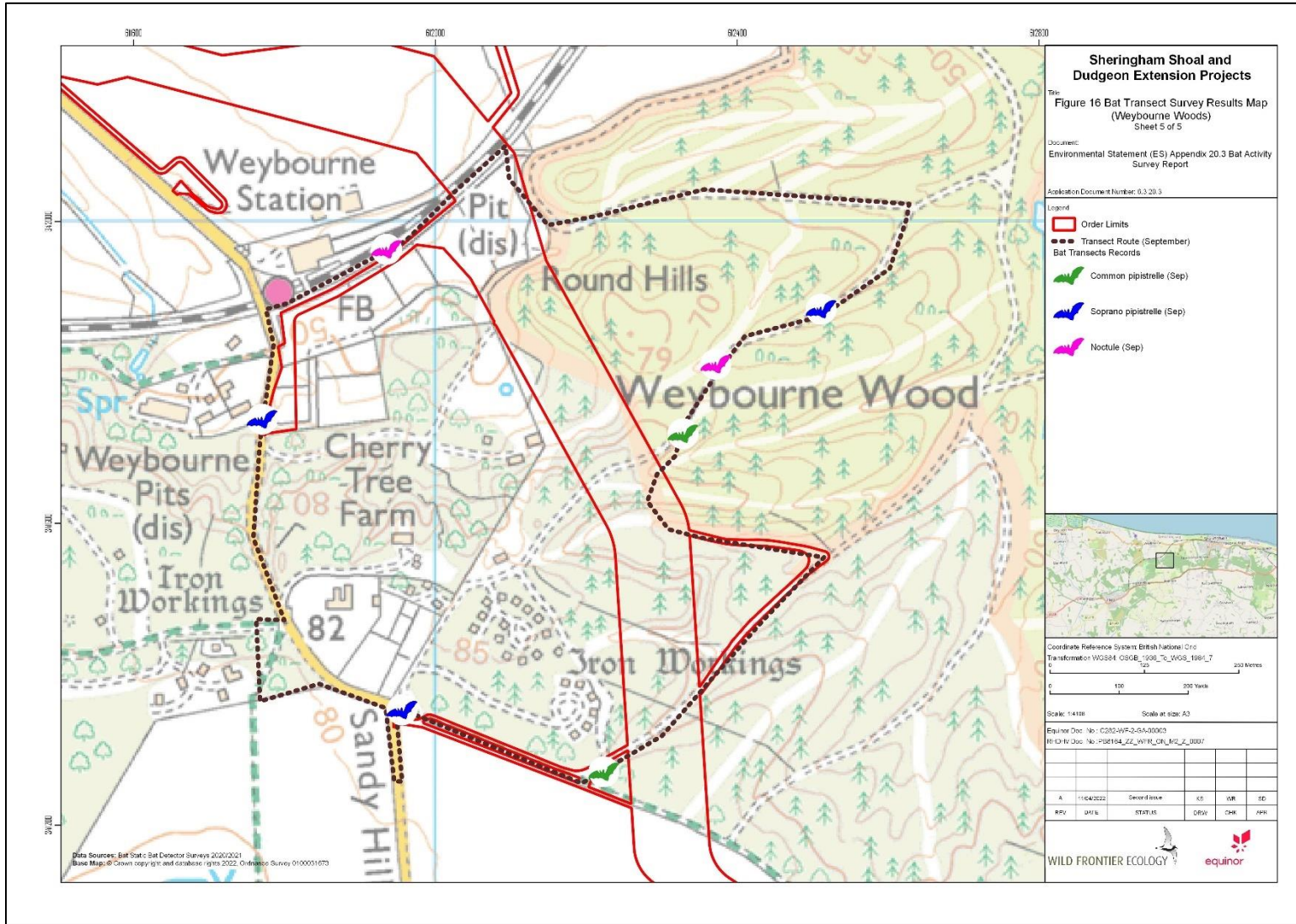
Figure 17: Transect survey results (single passes of bats) at the River Wensum in April
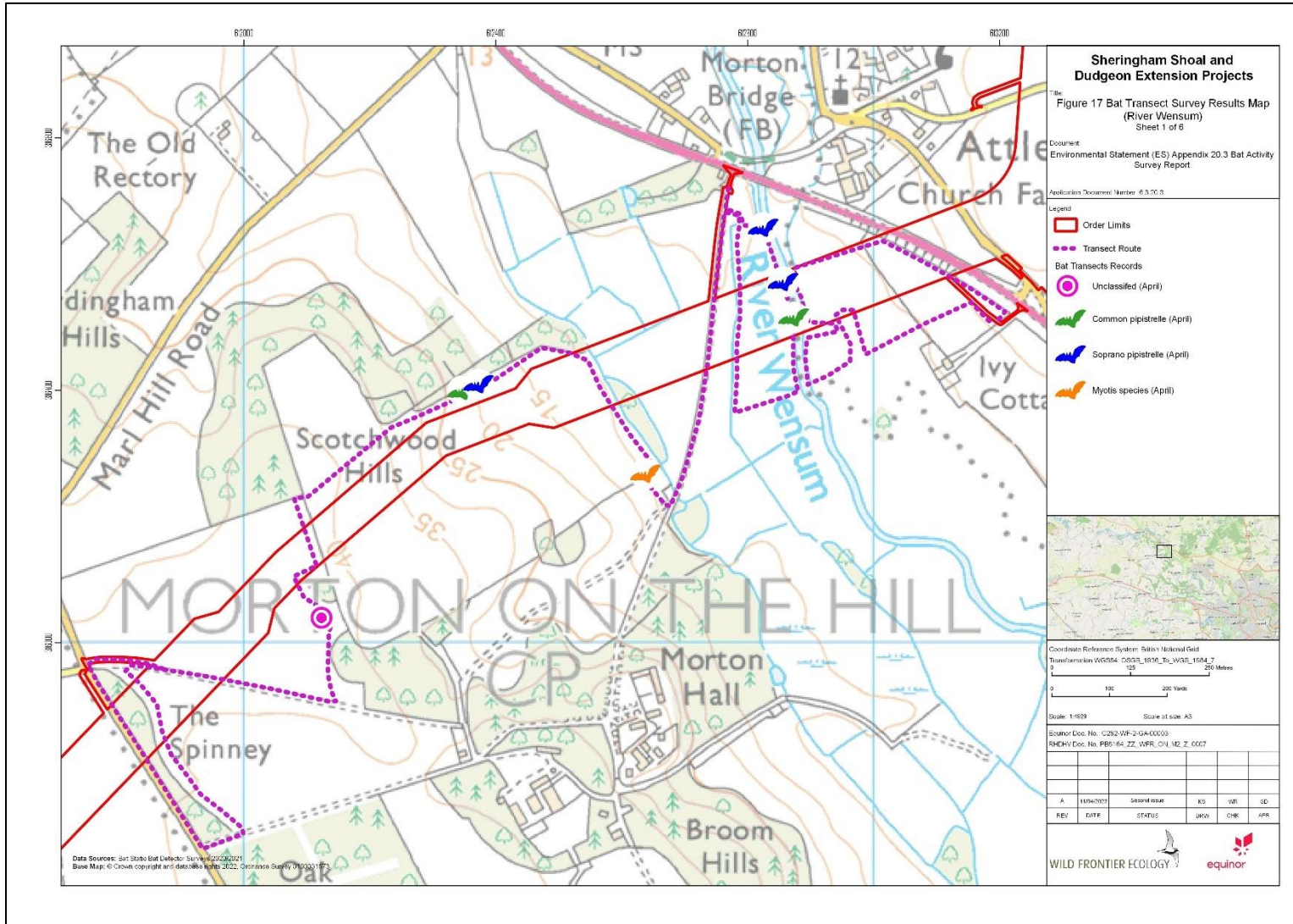
Figure 18: Transect survey results (single passes of bats) at the River Wensum in May
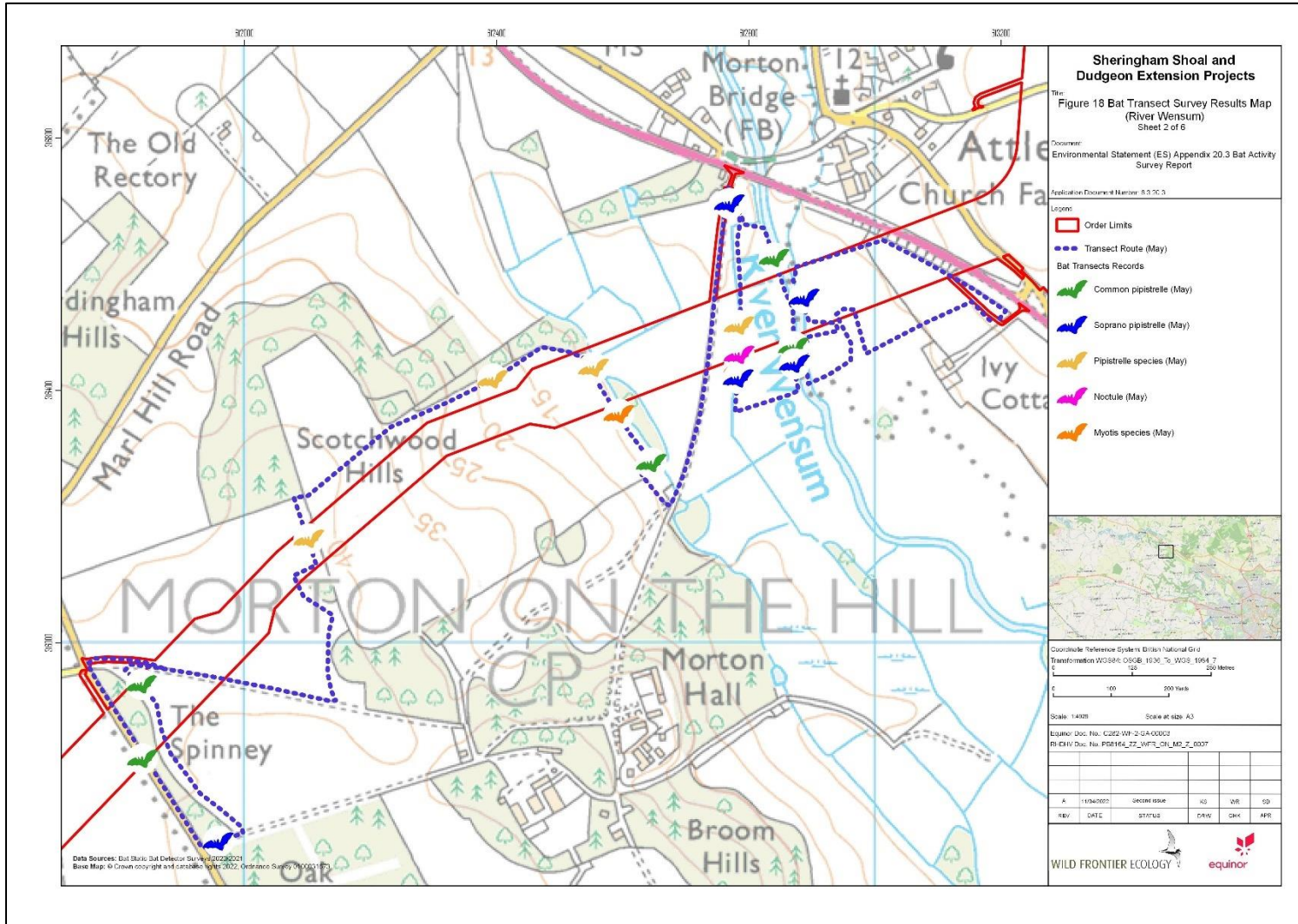
Figure 19: Transect survey results (single passes of bats) at the River Wensum in June
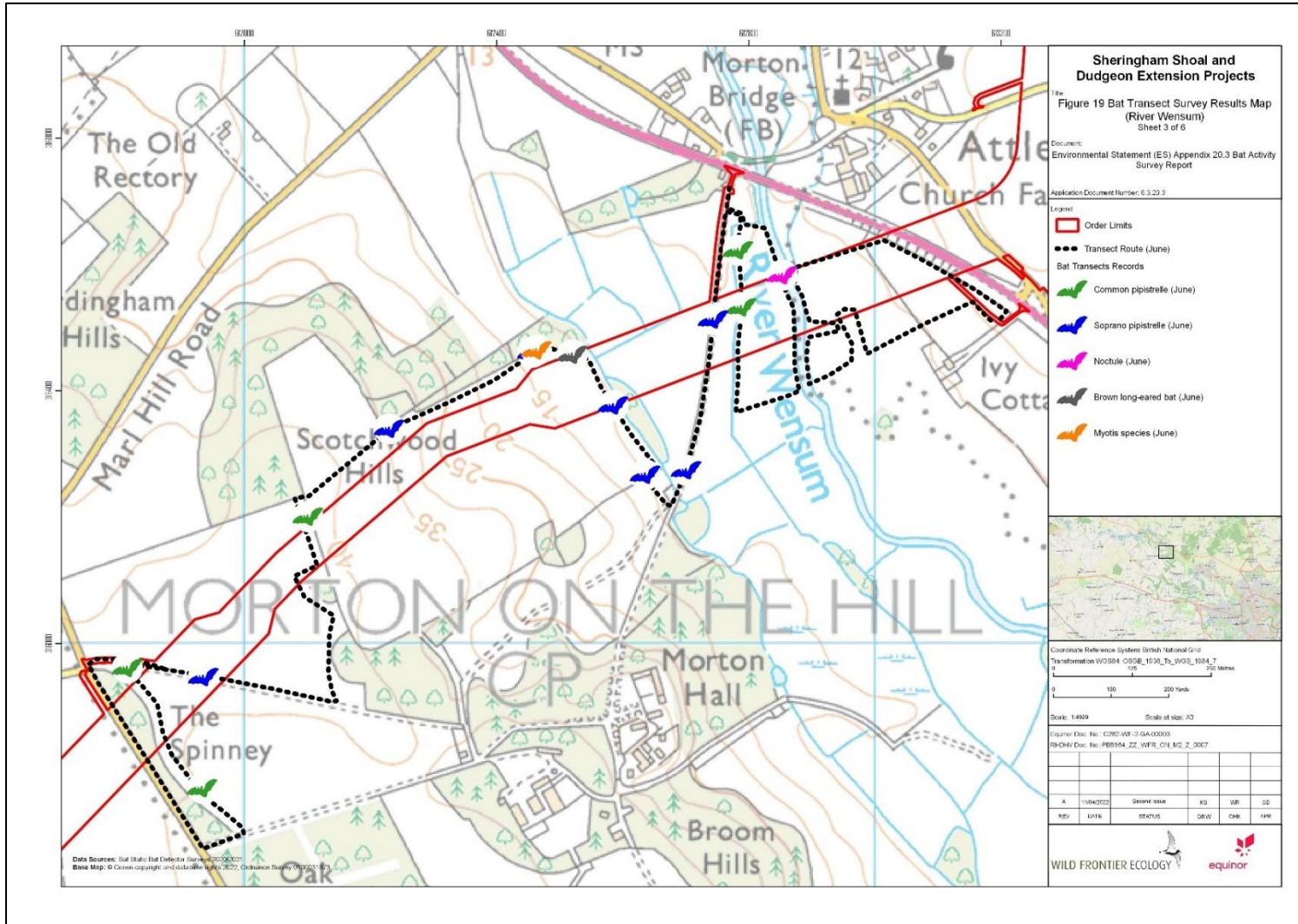
Figure 20: Transect survey results (single passes of bats) at the River Wensum in July

Figure 21: Transect survey results (single passes of bats) at the River Wensum in August
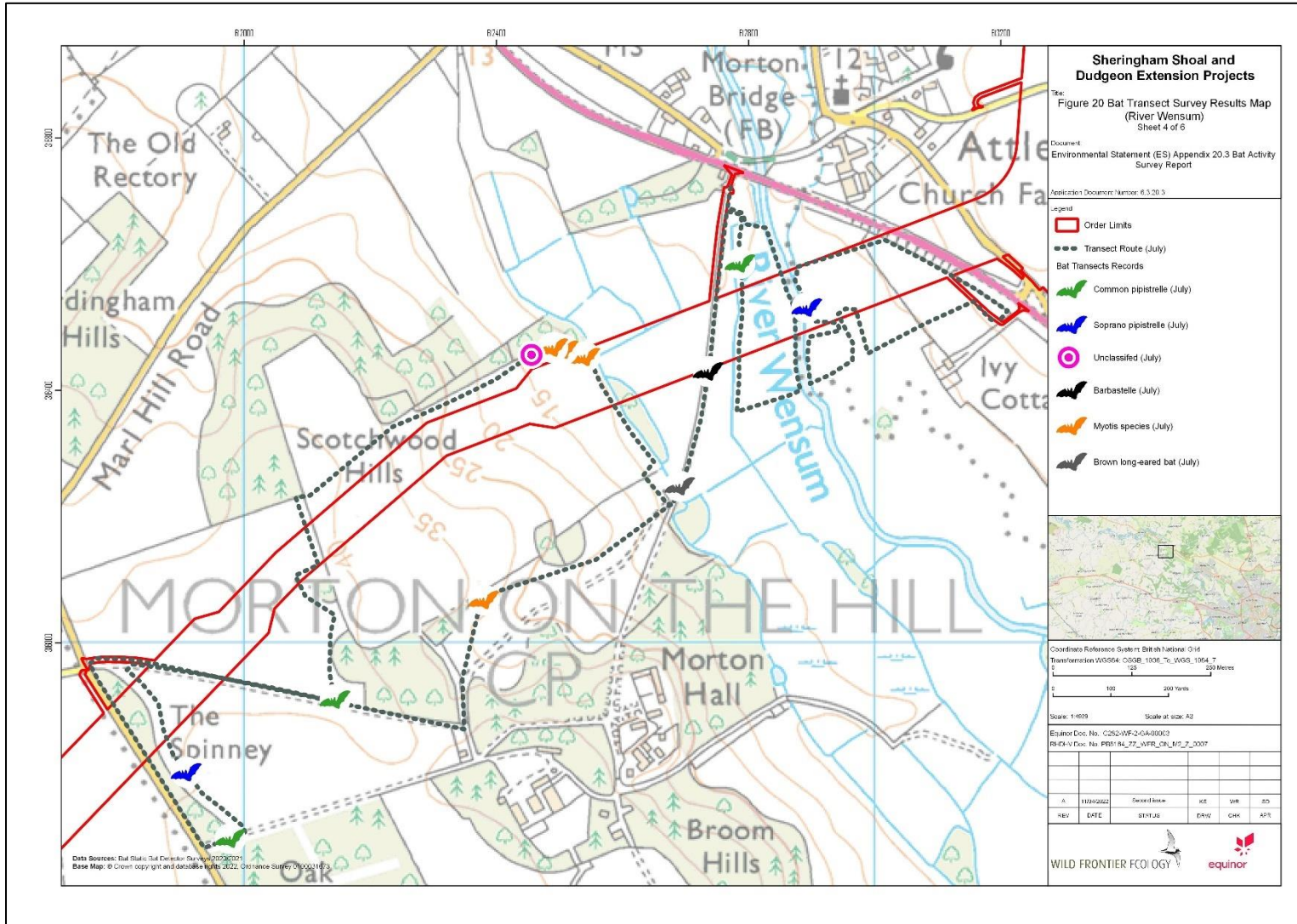
Figure 22: Transect survey results (single passes of bats) at the River Wensum in September
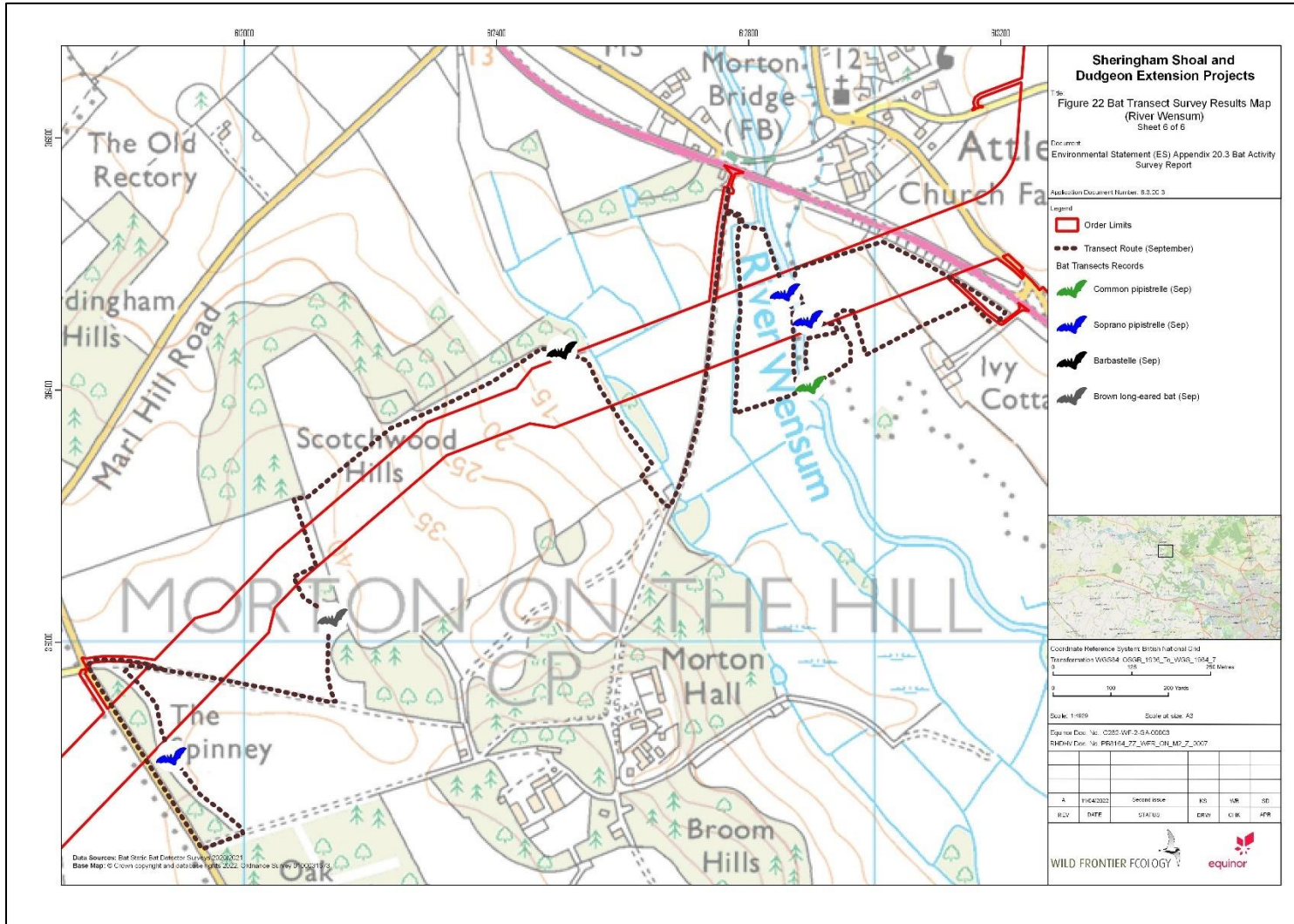
Figure 23: Transect survey results (single passes of bats) at the Substation in April
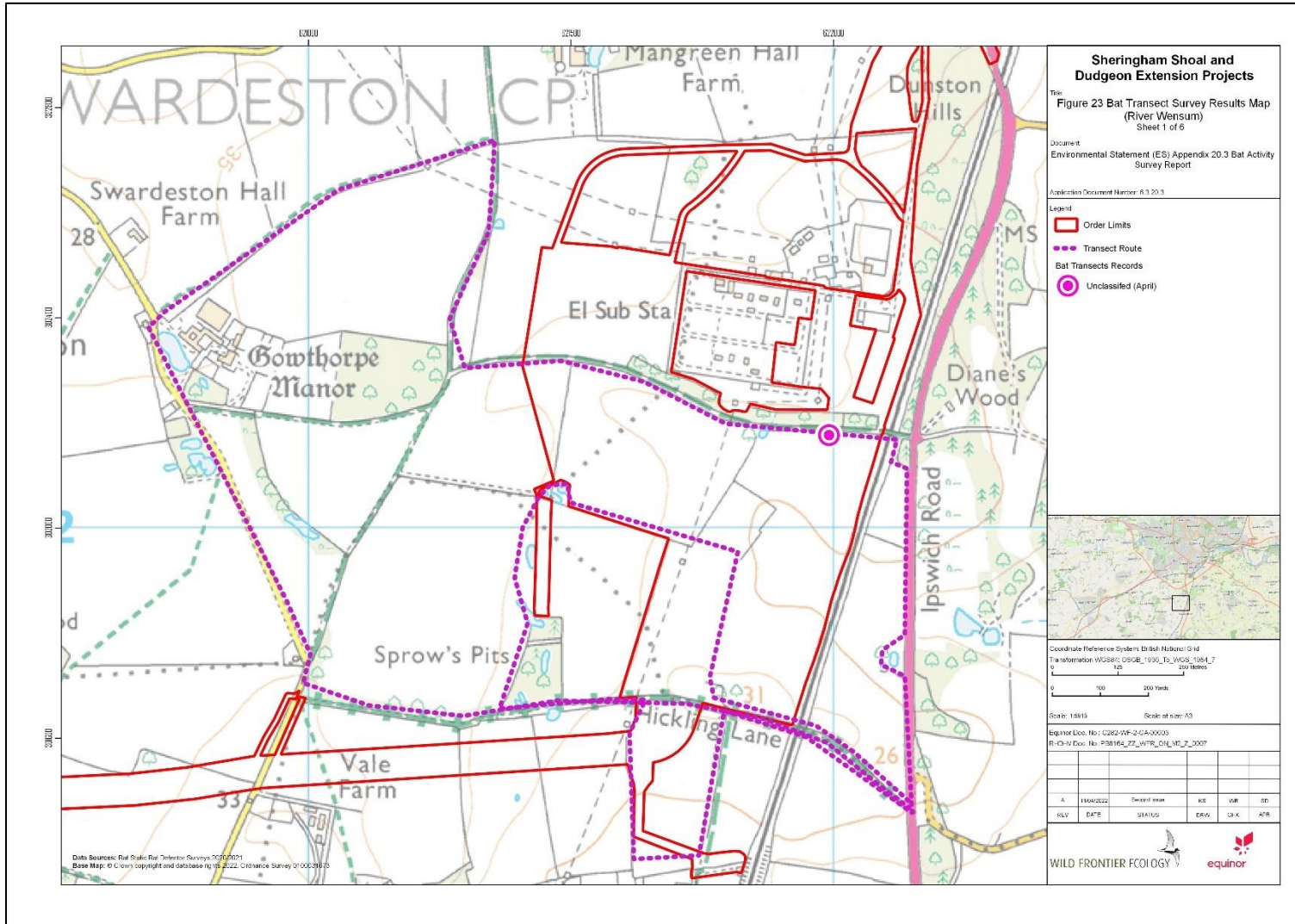
Figure 24: Transect survey results (single passes of bats) at the Substation in May
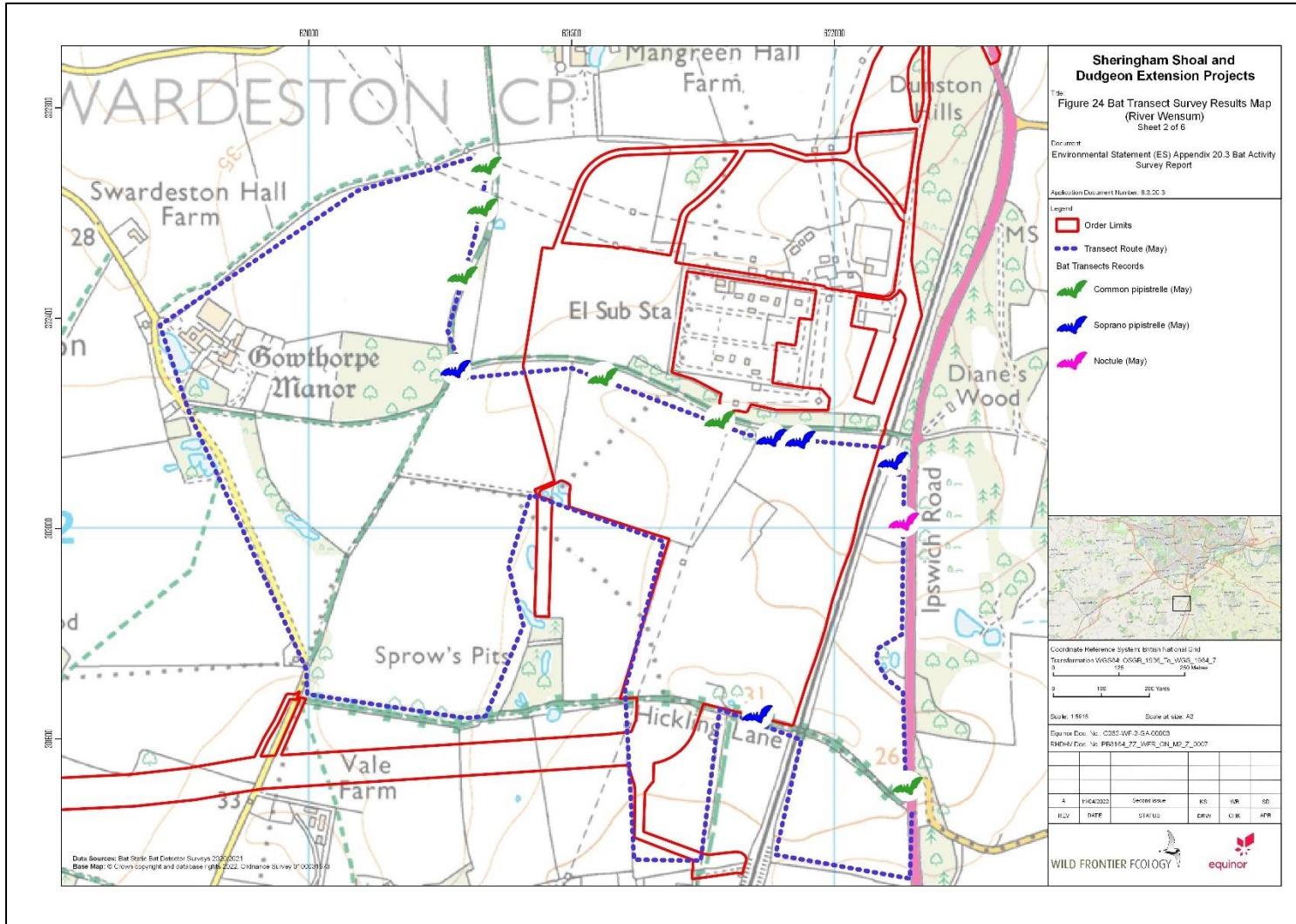
Figure 25: Transect survey results (single passes of bats) at the Substation in June
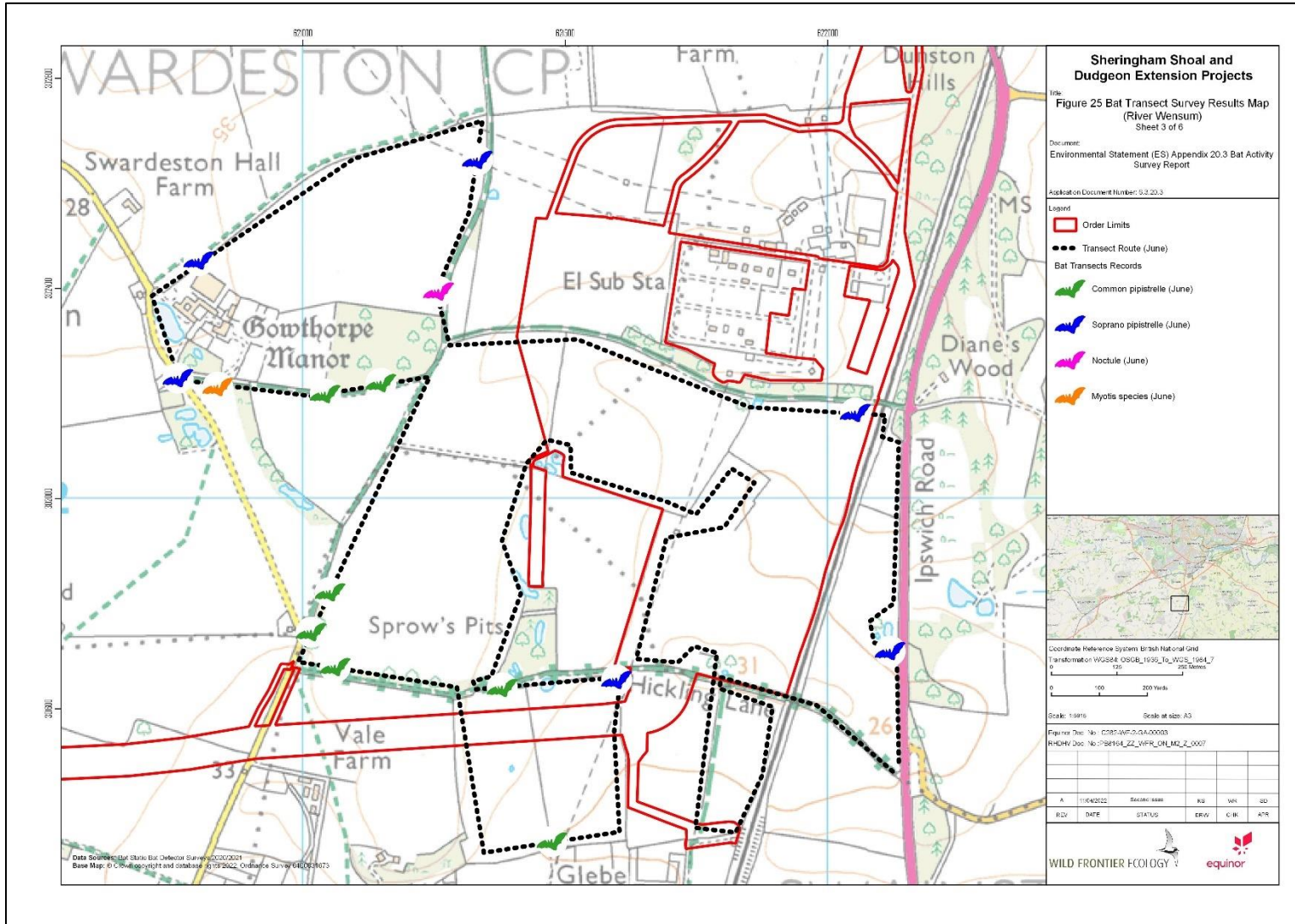
Figure 26: Transect survey results (single passes of bats) at the Substation in July
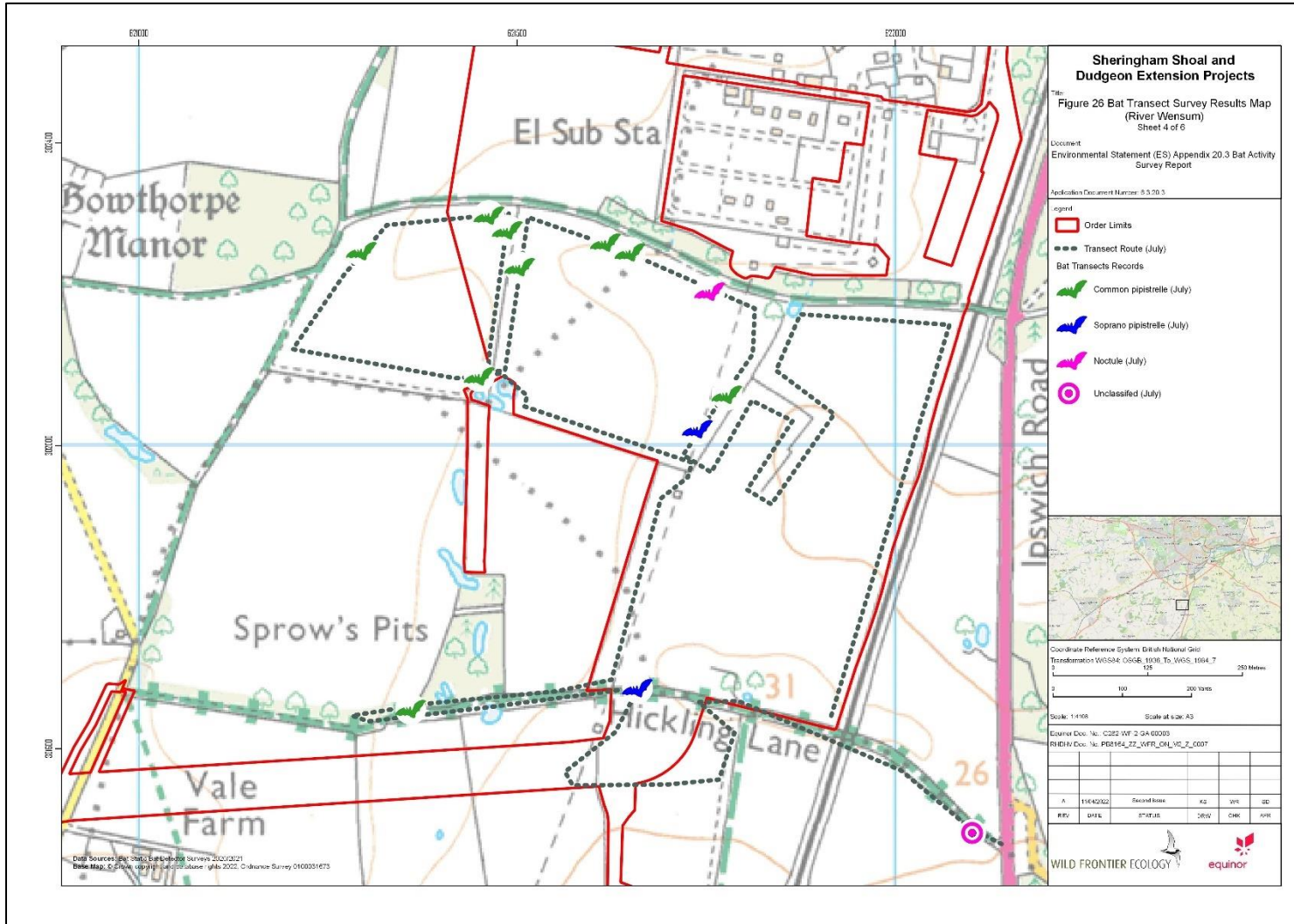
Figure 27: Transect survey results (single passes of bats) at the Substation in August
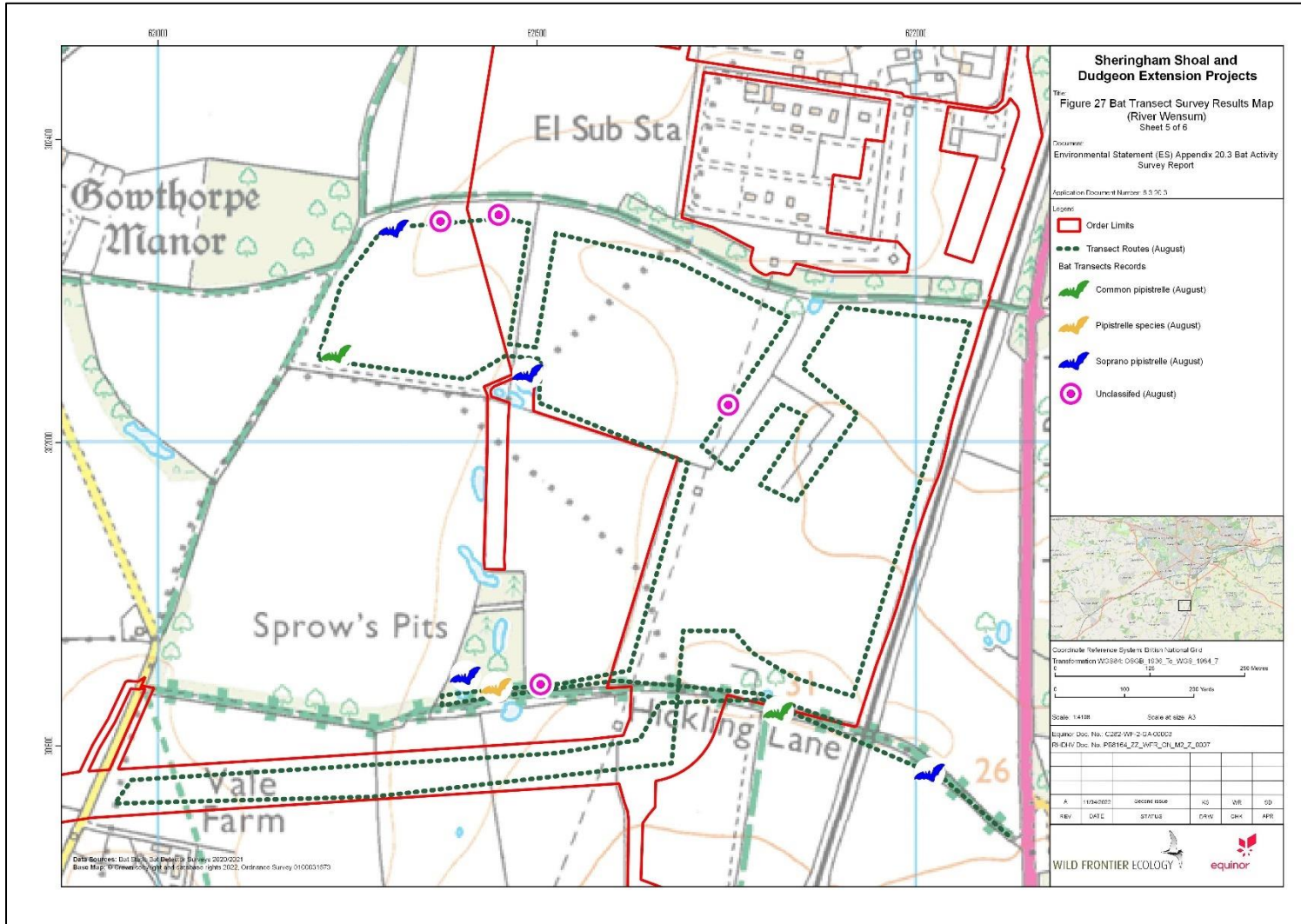
Figure 28: Transect survey results (single passes of bats) at the Substation in September
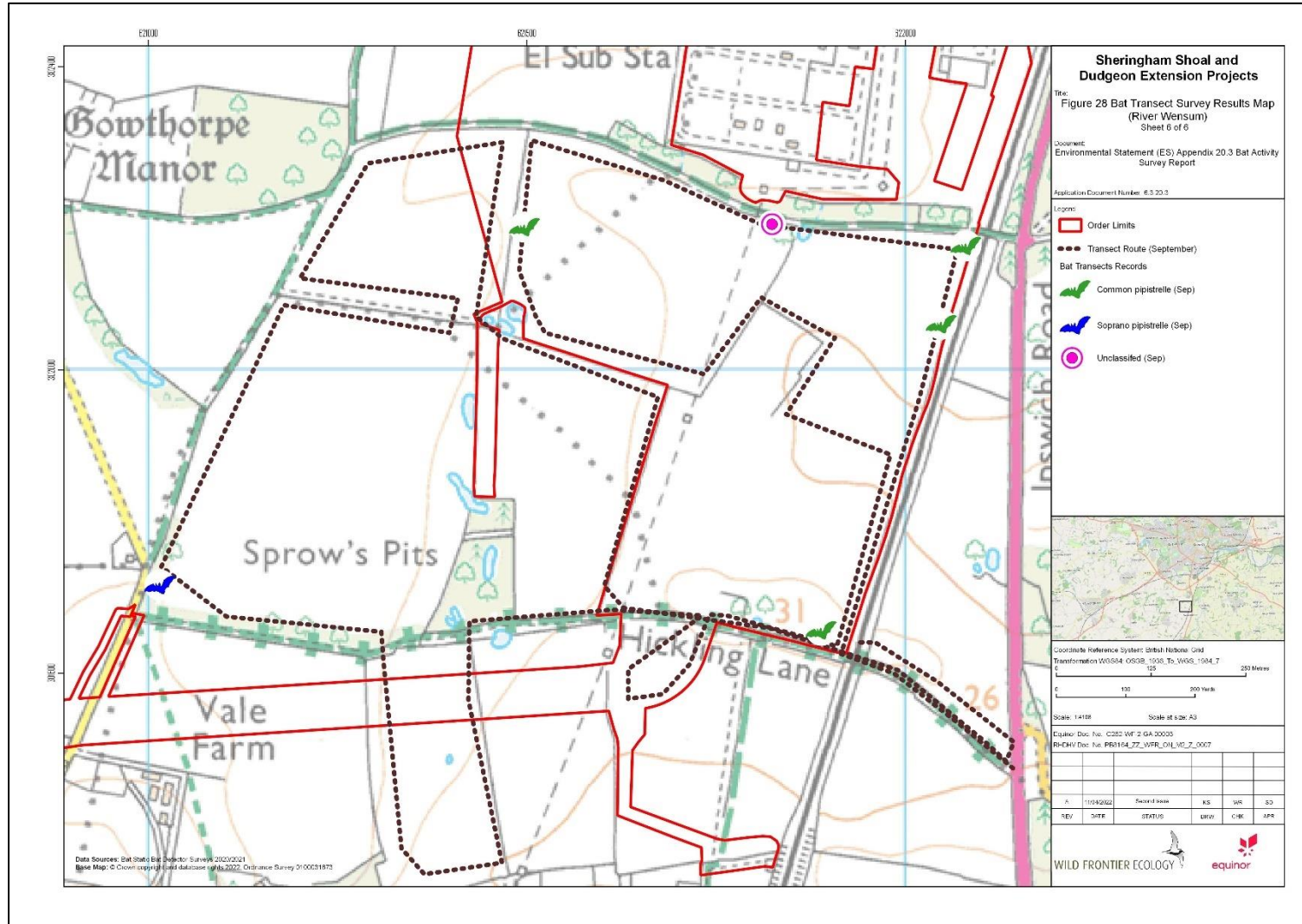
4. Results

4.1 Weybourne Woods Results

Weybourne Woods was surveyed across 2020 and 2021, with a number of static bat detector survey and transect surveys. The surveys found that common pipistrelle and soprano pipistrelle were the most commonly recorded species, with the average earliest and latest registration times suggesting that there could be roosts located in the vicinity. A number of rarer species were also recorded at Weybourne Woods, including *Myotis* species, barbastelle, serotine and Nathusius's pipistrelle. The data search also showed a number of barbastelle and noctule records within the woodland. The rarer species were not consistently recorded throughout the surveys, but given their presence and overall use of the woodland by bats, the site is considered to be of **Local** scale conservation importance for bats.

4.1.1 June-July 2020 Weybourne Woods static bat detector results (SM2 F)

SM2 F was deployed centrally in a section of woodland near 100 Acre Wood in Kelling (**Figure 2**). The detector was operational for 14 nights between the evening of 24th June and the morning of 8th July 2020. The detector recorded a total of four bat registrations consisting of one noctule *Nyctalus noctula* and three common pipistrelle *Pipistrellus pipistrellus*. The results are summarised in **Table 4,** below. The sunset/sunrise times and weather for the dates of the records are displayed in **Table 80** in Appendix 1.

Table 4: SM2 F June-July 2020 static bat detector results

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
Common pipistrelle	3	0.21	0.30	0.09	03:14	04:09
Noctule	1	0.07	0.47	0.14	21:49	21:49

4.1.2 July-August 2020 Weybourne Woods static bat detector results (SM2 H)

SM2 H was deployed centrally in Weybourne Woods, on the edge of a woodland ride. (**Figure 2**). It recorded for 12 consecutive nights from the evening of 30th July to the morning of 11th August 2020.

Across the 12-night period a total of 70 bat registrations were recorded. Pipistrelle species account for 69 of these registrations, 55 of which relate to common pipistrelle and 14 of which relate to soprano pipistrelle.

There was one *Myotis* species registration recorded over the July-August deployment.

The results are summarised in **Table 5**, below. The sunset/sunrise times and weather for the dates of the records are displayed in **Table 81** in Appendix 1.

Table 5: SM2 H July-August 2020 Weybourne Woods static bat detector results

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
Common pipistrelle	55	4.58	3.85	1.07	21:25	05:17
Soprano pipistrelle	14	1.17	1.12	0.31	20:31	05:51
Myotis sp.	1	0.08	0.28	0.08	04:10	04:10

4.1.3 August–September 2020 Weybourne Woods static bat detector results (SM2 K)

SM2 K was deployed in the east of Weybourne Woods, on the edge of the woodland (**Figure 2**). It was deployed and operational for 15 nights from the evening of 26th August to the morning of 10th September 2020.

The detector recorded 1,381 registrations relating to at least five species of bats. The highest frequency of registrations relates to common pipistrelles, with 857 recordings. Soprano pipistrelle was the second most frequently recorded species, with 457 registrations. There are three *Pipistrellus* species records which are attributable to either common pipistrelle, soprano pipistrelle or Nathusius' pipistrelle.

There were 26 *Myotis* species registrations, 30 of noctule, seven registrations of barbastelle and one which was unidentifiable.

The results are summarised in **Table 6**, below. The sunset/sunrise times and weather for the dates of the records are displayed in **Table 83** in Appendix 1.

Table 6: SM2 K August-September 2020 Weybourne Woods static bat detector results

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
Common pipistrelle	857	57.13	45.94	11.49	19:28	05:43
Soprano pipistrelle	457	30.47	48.64	12.16	19:26	06:06
Noctule	30	2	2.83	0.71	19:20	06:02
Myotis sp	26	1.73	1.50	0.38	20:34	05:12
Barbastelle	7	0.47	0.51	0.13	21:11	04:59
Pipistrelle sp.	3	0.20	0.40	0.10	21:13	05:16
Unidentified	1	0.07	0.25	0.06	05:59	05:59

4.1.4 September-October 2020 Weybourne Woods static bat detector results (SM2 H)

SM2 H was located near a large pond within the western side of Weybourne Woods (**Figure 2**). The static bat detector was operational for eight nights from the evening of 24th September to the morning of 2nd October 2020.

The detector recorded 337 registrations relating to two species of bats. The highest frequency of registrations relates to soprano pipistrelles, with 315 recordings. Common pipistrelles were the second most frequently recorded species, with 22 registrations.

The results are summarised in **Table 7**, below. The sunset/sunrise times and weather for the dates of the records are displayed in **Table 84** in Appendix 1.

Table 7: SM2 H September - October 2020 Weybourne Woods static bat detector results

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
Soprano pipistrelle	315	39.38	37.11	14.03	18:19	06:56
Common pipistrelle	22	1.47	2.73	1.03	18:35	06:29

4.1.5 May 2021 Weybourne Woods static bat detector results (SM2 F)

SM2 F was deployed in the west of Weybourne Woods, on the edge of a woodland ride (**Figure 2**). It was deployed and operational for five nights from the evening of 19th May to the morning of 24th May 2021.

The static detector was operational throughout the deployment but there was only one recording, a noctule registration.

The results are summarised in **Table 8,** below. The sunset/sunrise times and weather for the dates of the records are displayed in **Table 88** in Appendix 1.

Table 8: SM2 F May 2021 static bat detector results

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
Noctule	1	0.2	0.41	0.17	04:19	04:19

4.1.6 June 2021 Weybourne Woods static bat detector results (SM2 F)

SM2 F was deployed close to a footpath in the west of Weybourne Woods (**Figure 2**). It was deployed and operational for five nights from the evening of 10th June to the morning of 15th June 2021.

The majority of records were of pipistrelle species, with a similar number of registrations attributable to both common pipistrelle (70) and soprano pipistrelle (87).

Records of note include one barbastelle registration and several *Myotis* species Registrations.

The results are summarised in **Table 9**, below. The sunset/sunrise times and weather for the dates of the records are displayed in **Table 89** in Appendix 1.

Table 9: SM2 F June 2021 Weybourne Woods static bat detector results

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
Soprano pipistrelle	87	17.4	4.04	1.81	21:43	03:40
Common pipistrelle	70	14	6.08	2.72	21:41	03:37
Myotis sp.	12	2.4	2.07	0.93	03:40	05:00
50 kHz *Pipistrellus sp.*	5	1	1.00	0.45	03:53	04:05
Barbastelle	1	0.2	0.45	0.20	04:55	04:55
Daubenton's bat	1	0.2	0.45	0.20	03:55	03:55

4.1.7 August 2021 Weybourne Woods static bat detector results (SM Mini O)

SM Mini O was deployed to the south of Kelling Heath Holiday Park, in the east side of Weybourne Woods (**Figure 2**). It was deployed and operational for five nights from the evening of 4th August to the morning of 9th August 2021.

The detector recorded 413 bat registrations relating to eight species of bat across the five-night period. The majority of registrations were of common pipistrelle (360).

Records of note include registrations of barbastelle (3) and Nathusius' pipistrelle (2) There was also a number *Myotis* species registrations including Natterer's bat (21).

The results are summarised in **Table 10**, below. The sunset/sunrise times and weather for the dates of the records are displayed in **Table 95** in Appendix 1.

Table 10: SM Mini O August 2021 Weybourne Woods static bat detector results

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
Common pipistrelle	360	72	56.74	23.16	21:02	04:59
Natterer's bat	21	4.2	6.22	2.54	23:24	03:59
Noctule	19	3.8	3.54	1.45	20:57	05:07
Soprano pipistrelle	5	1	0.98	0.40	21:07	05:01
Barbastelle	3	0.6	0.84	0.34	01:48	02:55

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
Brown long-eared bat	2	0.4	0.82	0.33	21:59	22:41
Nathusius' pipistrelle	2	0.4	0.52	0.21	04:51	04:53
Serotine	1	0.2	0.41	0.17	22:27	22:27

4.1.8 September 2021 Weybourne Woods static bat detector results (SM Mini O)

SM Mini O was deployed attached to a tree within a section of Weybourne Woods east of Kelling Heath Holiday Park (**Figure 2**). It was deployed and operational for five nights from the evening of 10th September to the morning of 15th September 2021.

The detector recorded 573 bat registrations across the five-night period. The majority of registrations were of common pipistrelle (450).

Records of note include registrations of barbastelle (3) and Nathusius' pipistrelle (1).

The results are summarised in **Table 11**, below. The sunset/sunrise times and weather for the dates of the records are displayed in **Table 98** in Appendix 1.

Table 11: SM Mini O September 2021 Weybourne Woods static bat detector results

Species	Total registrations	Average registrations per night	Standard deviation	Standard deviation	Earliest registration	Latest registration
Common pipistrelle	450	90	125.50	51.23	19:17	05:52
Noctule	58	11.6	16.79	6.85	19:09	06:04
Soprano pipistrelle	34	6.8	10.46	4.27	19:39	05:48
Natterer's bat	19	3.8	6.40	2.61	20:20	05:29
Brown long-eared bat	8	1.6	2.16	0.88	19:43	00:11
Barbastelle	3	0.6	0.84	0.34	22:17	01:22
Nathusius' pipistrelle	1	0.2	0.45	0.20	23:39	23:39

4.1.9 Weybourne Woods transect results

The transects at Weybourne Woods were undertaken monthly from May to September (inclusive) 2021. A transect was not undertaken in April as access had not been agreed with the landowner at that stage. The results are summarised in **Table 12** below and shown in **Figure 12 - Figure 16**.

Table 12: Weybourne Woods 2021 transect results

Month	Weather	Species	Total No. Registrations	Earliest Registration
May (19/05/21) Sunset: 20:54	Start Temp: 13ºC End Temp: 8ºC Cloud cover: 40% Wind Speed (BS): 0-1 No precipitation	Common pipistrelle	13	21:10
		Soprano pipistrelle	1	21:39
June (09/06/21) Sunset: 21:18	Start Temp: 19ºC End Temp: 17ºC Cloud cover: 1% Wind Speed (BS): 0-1 No precipitation	Common pipistrelle	74	21:30
		Soprano pipistrelle	15	21:41
		Noctule	4	21:47
		Barbastelle	1	22:20
July (08/07/21) Sunset: 21:20	Start Temp: 16ºC End Temp: 13.3ºC Cloud cover: 50% Wind Speed (BS): 1-2 No precipitation	Common pipistrelle	40	21:50
		Soprano pipistrelle	18	21:52
		Barbastelle	2	22:15
		Indeterminate bat call	1	23:03
		Myotis sp.	1	23:05
August (04/08/21) Sunset: 20:45	Start Temp: 16ºC End Temp: 13ºC Cloud cover: 5% Wind Speed (BS): 1 No precipitation	Common pipistrelle	73	21:01
		Soprano pipistrelle	9	21:41
		Noctule	1	20:53
		Barbastelle	1	21:52
September (10/09/21) Sunrise: 06:20	Start Temp: 16ºC End Temp: 16ºC Cloud cover: 70 % Wind Speed (BS): 2-3 No precipitation	Common pipistrelle	11	05:22*
		Soprano pipistrelle	8	06:04*
		Noctule	3	06:01*
		Barbastelle	2	04:44*

*Results from the dawn transect survey show the last bat registration recorded rather than the first.

4.2 River Bure Results

At the River Bure, a suite of static bat detector surveys was undertaken across 2020 and 2021. The surveys focussed on the north side of the river where there are small pockets of woodland and meadows which provide suitable foraging habitat for bats. Common pipistrelle was the most frequently recorded bat species, with average earliest and latest registration times close to sunset/sunrise times, indicating there could be roosts located nearby. Of particular note are the levels of barbastelle and serotine records at this location. The River Bure has the second highest average registrations per night recorded for barbastelles across the 10 target sites. In addition, there were low levels of other rarer species including Brandt's bat and Natterer's bat. Given the high levels of barbastelle recorded and the presence of other rarer species, the River Bure is considered to be of **District** scale conservation importance for bats.

4.2.1 August-September 2020 River Bure static bat detector results (SM2 N)

SM2 N was deployed in a small pocket of woodland near the River Bure (**Figure 3**). The detector was operational for 14 nights from the evening of 26th August to the morning of 9th September 2020.

The detector recorded 157 registrations relating to at least six species of bats. The highest frequency of registrations relates to common pipistrelles, with 79 registrations. Soprano pipistrelles were the second most frequently recorded species, with 19 registrations.

There were 12 *Myotis* species registrations.

The detector recorded 40 registrations of noctule. There were also a further three registrations which may have been noctule, serotine or Leisler's bat, but the registrations do not allow confident species classification.

There were three registrations of barbastelles and one of brown long-eared bat.

The results are summarised in **Table 13**, below. The sunset/sunrise times and weather for the dates of the records are displayed in **Table 83** in Appendix 1.

Table 13: SM2 N August - September 2020 River Bure static bat detector results

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
Common pipistrelle	79	5.64	4.67	1.25	21:00	05:04
Noctule	40	2.86	3.13	0.84	21:10	04:15
Soprano pipistrelle	19	1.35	3.41	0.91	20:57	03:02
Myotis sp.	12	0.86	1.41	0.38	20:58	03:15
Unidentified	7	0.50	0.65	0.17	21:24	04:40
Nyctalus sp.	3	0.21	0.58	0.15	20:49	04:15
Barbastelle	3	0.21	0.80	0.21	20:49	01:47
Brown long-eared bat	1	0.07	0.27	0.07	21:45	21:45

4.2.2 September-October 2020 River Bure static bat detector results (SM2 J)

SM2 J was deployed in a small section of woodland adjacent to the River Bure (**Figure 3**). The static bat detector was operational and deployed for 11 nights from the evening of 24th September to the morning of 5th October 2020.

The detector recorded 485 registrations relating to at least six species of bats. The highest frequency of registrations relates to common pipistrelles, with 245 recordings. Soprano pipistrelles were the second most frequently recorded species, with 86 registrations. There are two *Pipistrellus* species records which are attributable to either common pipistrelle, soprano pipistrelle or Nathusius' pipistrelle.

There were 21 *Myotis* species registrations, 86 noctule registrations, seven registrations of barbastelles and one record which was unidentifiable.

The results are summarised in **Table 14,** below. The sunset/sunrise times and weather for the dates of the records are displayed in **Table 84** in Appendix 1.

Table 14: SM2 J September-October 2020 River Bure static bat detector results

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
Common pipistrelle	245	22.27	28.42	8.57	18:35	06:36
Soprano pipistrelle	86	7.81	10.39	3.13	18:44	06:47
Noctule	86	7.81	8.68	2.75	18:36	06:46
Barbastelle	28	2.54	2.84	0.86	19:02	05:13
Myotis sp.	21	1.91	1.70	0.51	19:38	05:13
Unidentified	11	1.00	1.41	0.43	19:28	06:01
Brown long-eared bat	5	0.45	0.69	0.21	19:16	04:45
Pipistrelle sp.	2	0.18	0.40	0.12	19:25	19:25
Nyctalus sp.	1	0.09	0.30	0.09	06:22	06:22

4.2.3 April 2021 River Bure static bat detector results (SM2 N)

SM2 N was deployed to the north of the River Bure (**Figure 3**). The static bat detector was operational and deployed for five nights from the evening of 21st April to the morning of 26th April 2021.

The detector recorded 20 *Pipistrelle* registrations, 11 common pipistrelle registrations and nine relating to soprano pipistrelle. There was one *Myotis* registration (likely a Daubenton's bat given the deployment location is by a river) and two registrations relating to brown long-eared bat.

The results are summarised in **Table 15,** below. The sunset/sunrise times and weather for the dates of the records are displayed in **Table 85** in Appendix 1.

Table 15: SM2 N April 2021 River Bure static bat detector results

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
Common pipistrelle	11	2.2	1.92	0.86	20:29	21:26
Soprano pipistrelle	9	1.8	2.05	0.92	20:31	21:31
Brown long-eared bat	2	0.4	0.89	0.4	21:08	23:27
Myotis sp.	1	0.2	0.48	0.2	23:27	23:27

4.2.4 June 2021 River Bure static bat detector results (SM2 I)

SM2 I was deployed on the north bank of the River Bure (**Figure 3**). It was deployed and operational for five nights from the evening of 10th June to the morning of 15th 2021.

The detector recorded 990 registrations relating to nine bat species across the five-night period. The majority of registrations were of common pipistrelle (763). Records of note include registrations of barbastelle (16) and serotine (49). There were also several *Myotis* species registrations.

The results are summarised in **Table 16**, below. The sunset/sunrise times and weather for the dates of the records are displayed in **Table 89** in Appendix 1.

Table 16: SM2 I June River Bure static bat detector results

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
Common pipistrelle	763	152.6	66.42	27.12	21:42	04:05
Soprano pipistrelle	143	28.6	13.04	5.33	21:50	03:59
Serotine	49	9.8	12.94	5.28	23:54	02:35
Barbastelle	16	3.2	1.97	0.80	22:13	03:31
Daubenton's bat	6	1.2	1.10	0.45	22:14	03:42
Noctule	6	1.2	1.67	0.68	22:05	04:20
Brandt's bat	5	1	0.98	0.40	22:49	03:42
Brown long-eared bat	1	0.2	0.41	0.17	22:03	22:03
Natterer's bat	1	0.2	0.41	0.17	03:12	03:12

4.2.5 July 2021 River Bure static bat detector results (SM2 J)

SM2 J was deployed on the north bank of the River Bure (**Figure 3**). It was deployed and operational for five nights from the evening of 7th July to the morning of 12th July 2021.

The detector recorded 859 bat registrations across the five-night period. The majority of registrations were of common pipistrelles (790).

Records of note include registrations of barbastelles (4) and serotine (2).

The results are summarised in **Table 17**, below. The sunset/sunrise times and weather for the dates of the records are displayed in **Table 92** in Appendix 1.

Table 17: SM2 J River Bure static bat detector results

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
Common pipistrelle	790	158	120.17	49.06	21:35	04:20
Soprano pipistrelle	57	11.4	12.79	5.22	22:07	04:15
Barbastelle	4	0.8	1.03	0.42	00:38	03:22
Noctule	4	0.8	1.03	0.42	21:44	22:44
Serotine	3	0.6	0.84	0.34	01:04	02:44
Brown long-eared bat	1	0.2	0.41	0.17	23:30	23:30

4.2.6 August 2021 River Bure static bat detector results (SM Mini S)

SM Mini S was deployed on the north bank of the River Bure (**Figure 3**). It was deployed and operational for five nights from the evening of 4th August to the morning of 9th August 2021.

The detector recorded 1,446 bat registrations relating to seven species across the five-night period. The majority of registrations were of common pipistrelle (1,055).

Records of note include registrations of barbastelle (70). There were also a number *Myotis* species recorded including Daubenton's Bat (20) and Natterer's bat (7).

The results are summarised in **Table 18**, below. The sunset/sunrise times and weather for the dates of the records are displayed in **Table 95** in Appendix 1.

Table 18: SM Mini S River Bure static bat detector results

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
Common pipistrelle	1,055	211	185.95	75.91	20:53	04:41
Soprano pipistrelle	225	45	45.19	18.45	20:45	04:55
Barbastelle	70	14	9.42	3.84	21:20	04:37
Noctule	58	11.6	11.72	4.79	20:51	04:55
Daubenton's bat	20	4	2.94	1.20	21:13	04:30
Brown long-eared bat	11	2.2	1.72	0.70	21:34	04:06
Natterer's bat	7	1.4	1.33	0.54	23:44	03:02

4.2.7 September 2021 River Bure static bat detector results (SM Mini S)

SM Mini S was deployed on the north bank of the River Bure (**Figure 3**). It was deployed for five nights from the evening of 10th September to the morning of 15th September 2021.

The detector recorded 21 bat registrations across the five-night period. The majority of registrations were of common pipistrelle (9) and soprano pipistrelle (7).

Records of note include registrations of barbastelle (1) and *Myotis* species (2).

The results are summarised in **Table 19**, below. The sunset/sunrise times and weather for the dates of the records are displayed in **Table 98** in Appendix 1.

Table 19: SM Mini S River Bure static bat detector results

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
Common pipistrelle	9	1.8	2.07	0.85	19:50	05:04
Soprano pipistrelle	7	1.4	1.60	0.65	19:36	05:57
Myotis sp.	2	0.4	0.82	0.33	02:10	04:51
Noctule	2	0.4	0.52	0.21	19:31	20:07
Barbastelle	1	0.2	0.41	0.17	20:05	20:05

4.3 Swannington Results

For the static bat detector surveys undertaken at Swannington in 2020 and 2021, the surveys focussed on two key areas: a pocket of woodland located within grazing pasture and a meadow with varied structure which included a small stream and was adjacent to a plantation woodland. Across 2020, common pipistrelle was the most frequently recorded bat species compared to 2021 where noctule was the most frequently recorded. For both species, the average earliest and latest registration was close in time to the sunset/sunrise time, suggesting roosts could be located nearby. There were low levels of rarer species recorded including barbastelle, serotine and *Myotis* species. Given the site is frequently used by noctules and includes low levels of rarer species of bats, this site is considered to be of **District** scale conservation importance for bats.

4.3.1 July-August 2020 Swannington static bat detector results (SM2 N)

SM2 N was deployed in a small pocket of woodland, which is situated in a grazed pasture area to the north-west of Swannington (**Figure 4**). The detector was operational for 10 nights from the evening of 30th July to the morning of 9th August 2020 (the detector was not retrieved until 11th August, but it had ceased recording two nights earlier).

SM2 N recorded 981 bat registrations in total, with the majority (724) relating to common pipistrelles. There were 201 soprano pipistrelle registrations and one registration categorised as 50kHz *Pipistrellus* that could have been from an atypical registration of common pipistrelle or a soprano pipistrelle but cannot be confidently assigned to either species.

There were three *Myotis* species registrations and 51 noctule registrations.

There was one registration which could be allocated as any bat species and was classified as 'unidentified'.

The results are summarised in **Table 20**, below. The sunset/sunrise times and weather for the dates of the records are displayed in **Table 81** in Appendix 1.

Table 20: SM2 N July-August 2020 Swannington static bat detector results

Species	Total registrations	Average registrations per night	Standard deviation	Standard deviation	Earliest registration	Latest registration
Common pipistrelle	724	72.40	37.67	11.91	20:53	05:01
Soprano pipistrelle	201	20.10	17.34	5.48	20:57	04:38
Noctule	51	5.10	6.37	2.01	20:53	04:47
Myotis sp.	3	0.30	0.48	0.15	22:23	02:21
Unidentified	1	0.10	0.32	0.10	23:04	23:04

4.3.2 August-September 2020 Swannington static bat detector results (SM2 J)

SM2 J was deployed in an area of scrub/ rank grassland, grazed by cattle and part of a large network of grazed fields and woodlands east of Swannington (**Figure 4**). The detector was deployed and operational for 15 nights from the evening of 26th August to the morning of 10th September 2020.

The detector recorded 2,039 registrations relating to at least six species of bats. The highest frequency of registrations relates to common pipistrelles, with 1,533 recordings. Soprano pipistrelles were the second most frequently recorded species, with 379 registrations. There are 13 *Pipistrellus* species records which are attributable to either common pipistrelle, soprano pipistrelle or Nathusius' pipistrelle.

There were four *Myotis* species registrations.

The detector recorded 83 registrations of noctule. There were also a further three registrations which may have been noctule, serotine or Leisler's bat, but the registrations do not allow confident species classification. One registration is from noctule or Leisler's.

There were 16 registrations of barbastelle, one of brown long-eared bat and six records which were unidentifiable.

The results are summarised in **Table 21**, below. The sunset/sunrise times and weather for the dates of the records are displayed in **Table 83** in Appendix 1.

Table 21: SM2 J August- September 2020 Swannington static bat detector results

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
Common pipistrelle	1,533	102.2	102.04	25.51	19:45	05:49
Soprano pipistrelle	379	25.27	36.32	9.08	19:31	05:50
Noctule	83	5.53	7.19	1.80	19:23	06:00
Barbastelle	16	1.06	1.59	0.40	20:24	02:18
Pipistrelle sp.	13	0.87	2.40	0.60	21:28	21:28
Unidentified	6	0.40	0.62	0.15	20:14	04:55
Myotis sp.	4	0.27	0.45	0.11	21:15	00:37
Nyctalus sp.	3	0.20	0.54	0.14	21:46	04:26
Serotine/ Leisler's/ Noctule	1	0.06	0.25	0.06	21:23	21:23
Brown long-eared bat	1	0.06	0.25	0.06	05:20	05:20

4.3.3 April 2021 Swannington static bat detector results (SM Mini O)

SM Mini O was deployed in a grazed pasture to the east of Swannington (**Figure 4**). The static bat detector was operational and deployed for five nights from the evening of 21st April to the morning of 26th April 2021.

The detectors recorded six registrations relating to four species of bats. The highest frequency of registrations relates to common pipistrelle and noctule, both with two registrations.

The other registrations relate to one soprano pipistrelle and one *Myotis* species bat.

The results are summarised in **Table 22**, below. The sunset/sunrise times and weather for the dates of the records are displayed in **Table 85** in Appendix 1.

Table 22: SM Mini O April 2021 Swannginton static bat detector results

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
Noctule	2	0.4	0.55	0.24	20:38	20:38
Common pipistrelle	2	0.4	0.45	0.2	20:18	22:28
Myotis sp.	1	0.2	0.45	0.2	01:47	01:47
Soprano pipistrelle	1	0.2	0.89	0.4	20:28	20:28

4.3.4 May 2021 Swannington static bat detector results (SM2 K)

SM2 K was deployed centrally in a small woodland within grazing pastures to the east of Swannington (**Figure 4**). It was operational and deployed for five nights from the evening of 19th May to the morning of 24th May 2021.

All of the registrations (472) are from pipistrelle species, with common pipistrelle accounting for the majority and occasional registrations for soprano pipistrelle.

The results are summarised in **Table 23**, below. The sunset/sunrise times and weather for the dates of the records are displayed in **Table 88** in Appendix 1.

Table 23: SM2 K May 2021 Swannington static bat detector results

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
Common pipistrelle	468	93.6	118.04	52.79	21:20	04:23
Soprano pipistrelle	4	0.8	0.84	0.37	21:26	00:15

4.3.5 June 2021 Swannington static bat detector results (SM Mini P)

SM Mini P was deployed in a grazing pasture to the east of Swannington, just south of Moegoe's Plantation (**Figure 4**). It was deployed and operational for five nights from the evening of 10th June to the morning of 15th June 2021.

The static bat detector recorded 863 registrations across the five-night period from at least eight species of bat. The majority of records were from noctules (705).

Records of note include five registrations of barbastelle and four registrations of serotine.

There were records of several different *Myotis* species bats including Daubenton's bat (10) and Natterer's bat (14).

The results are summarised in **Table 24**, below. The sunset/sunrise times and weather for the dates of the records are displayed in **Table 89** in Appendix 1.

Table 24: SM Mini P June 2021 Swannington static bat detector results

Species	Total registrations	Average registrations per night	Standard deviation	Standard deviation	Earliest registration	Latest registration
Noctule	705	141	91.08	37.18	21:21	04:06
Common pipistrelle	82	16.4	11.55	4.72	21:54	04:18
Natterer's bat	23	4.6	3.92	1.60	22:49	02:43
Soprano pipistrelle	22	4.4	3.20	1.31	22:10	03:17
Brown long-eared bat	10	2	1.63	0.67	22:21	03:39

Species	Total registrations	Average registrations per night	Standard deviation	Standard deviation	Earliest registration	Latest registration
Daubenton's bat	10	2	1.63	0.67	23:08	02:40
Barbastelle	5	1	1.33	0.54	22:59	00:48
Serotine	4	0.8	1.21	0.49	00:55	02:23

4.3.6 July 2021 Swannington static bat detector results (SM Mini P)

SM Mini P was deployed on grazing pasture to the west of Swannington (**Figure 4**). It was deployed and operational for five nights from the evening of 7th July to the morning of 12th July 2021.

The detector recorded 236 bat registrations from five species of bat across the five-night period. The majority of registrations were of noctule (167).

Records of note include registrations of Natterer's bat (8).

The results are summarised in **Table 25**, below. The sunset/sunrise times and weather for the dates of the records are displayed in **Table 92** in Appendix 1.

Table 25: SM Mini P July 2021 Swannington static bat detector results

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
Noctule	167	33.4	39.44	16.10	21:26	04:17
Common pipistrelle	50	10	5.13	2.09	21:59	03:53
Soprano pipistrelle	7	1.4	1.51	0.61	22:14	03:58
Natterer's bat	8	1.6	0.75	0.31	22:14	02:00
Brown long-eared bat	4	0.8	0.82	0.33	22:23	02:38

4.3.7 August 2021 Swannington static bat detector results (SM Mini P)

SM Mini P was deployed in a grazing pasture to the west of Swannington (**Figure 4**). It was deployed and operational for five nights from the evening of 4th August to the morning of 9th August 2021.

The detector recorded 226 bat registrations across the five-night period. The majority of registrations were of common pipistrelle (100).

Records of note include registrations of barbastelle (1) and serotine (2). There was also a number *Myotis* species recorded including Natterer's bat (4) and Daubenton's bat (2).

The results are summarised in **Table 26**, below. The sunset/sunrise times and weather for the dates of the records are displayed in **Table 95** in Appendix 1.

Table 26: SM Mini P August 2021 Swannington static bat detector results

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
Common pipistrelle	100	20	24.18	10.81	21:19	04:36
Noctule	94	18.8	7.34	3.00	20:41	05:10
Soprano pipistrelle	19	3.8	3.13	1.28	21:08	04:44
Brown long-eared bat	4	0.8	1.03	0.42	22:25	01:32
Natterer's bat	4	0.8	0.52	0.21	21:48	02:21
Daubenton's bat	2	0.4	0.52	0.21	22:25	01:40
Serotine	2	0.4	0.52	0.21	23:33	00:39
Barbastelle	1	0.2	0.41	0.17	22:34	22:34

4.3.8 September 2021 Swannington static bat detector results (SM2 H)

SM2 H was deployed in a woodland located within grazing pastures to the east of Swannington (**Figure 4**). It was deployed for five nights from the evening of 10th September to the morning of 15th September 2021.

The detector recorded 1,250 bat registrations across the five-night period. The majority of registrations were of common pipistrelle (1,071).

The results are summarised in **Table 27**, below. The sunset/sunrise times and weather for the dates of the records are displayed in **Table 98** in Appendix 1.

Table 27: SM2 H September 2021 static bat detector results

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
Common pipistrelle	1,071	214.2	132.71	54.18	19:31	06:09
Soprano pipistrelle	174	34.8	14.31	5.84	19:28	05:58
Brown long-eared bat	5	1	1.17	0.48	20:42	23:37

4.4 River Wensum Results

Both static bat detector surveys and transect surveys were undertaken across 2020 and 2021. Surveys focussed on collecting data for bats using the River Wensum for commuting and for the surrounding floodplains. The static detectors recorded a high frequency of calls by soprano pipistrelle, with a peak of over 11,000 registrations in the first static deployment of 2020. Across all surveys soprano pipistrelle was the most

frequently recorded species. The earliest/latest registration times are similar to sunset/sunrise times, suggesting there could be a roost located nearby. A range of rarer species were recorded at this site including barbastelle, serotine, Nathusius's pipistrelle and *Myotis* species. Given the high number of registrations of soprano pipistrelles and the range of rarer bats recorded at the site, the site is considered to be of **District** scale conservation importance for bats.

The data search also returned records for barbastelle, Nathusius's pipistrelle and noctule recorded in the surrounding area. Additionally, unseen bat survey data collected by Wild Wings Ecology purports to show a 'super-colony' or meta-population of barbastelle bats, considered to be of international importance, located around the River Wensum corridor and nearby woodlands in the general area between Lenwade and the A47. It should be noted that the Wild Wings Ecology data on which the barbastelle meta-population conclusion is based has not been reviewed by WFE and it remains unpublished. Barbastelles are classified as near threatened on the IUCN Red List of Threatened Species in 2016[13] and populations throughout Europe have been declining. Given the summary maps from Wild Wing Ecology highlights the use of the river and surrounding woodlands as important for foraging and commuting bats and within core substance zones of barbastelle maternity roosts, the River Wensum is considered to be of **European** scale conservation importance for bats.

4.4.1 June-July 2020 River Wensum static bat detector results (SM2 I)

SM2 I was deployed south of Attlebridge and positioned on the south bank of the River Wensum (**Figure 5**). The detector was operational for 14 nights between the evening of 24th June and the morning of 8th July 2020. This detector had the highest number of registrations of all the detectors deployed across the June/July period, with a total of 15,739 registrations. June accounted for more registrations, with 9,391 total bat registrations recorded over the seven-night period, in comparison to 6,348 registrations recorded across the seven nights in July.

Soprano pipistrelles *Pipistrellus pygmaeus* had the highest number of registrations in total with 11,331. Common pipistrelles had the second highest total number of registrations, with 2,132. 184 registrations were assigned as 50kHz *pipistrellus,* as these registrations could not be classified to one of either common or soprano pipistrelles. There were some registrations of pipistrelle calls with peak frequency at 40-42kHz, which may have been low range registrations from common pipistrelles, or possibly Nathusius' pipistrelle *Pipistrellus nathusii*. There were another 47 *Pipistrellus* species records which are attributable to either common pipistrelle, soprano pipistrelle or Nathusius' pipistrelle.

613 registrations were attributed to *Myotis* bat species, for which the echolocation registrations do not allow accurate speculation on the particular species. Considering the location of the detector close to a river, it is reasonable to expect that a significant proportion (or possibly all) of these records relate to Daubenton's bat *Myotis daubentonii*.

There were 696 bat registrations which cannot be classified to a particular species, typically because they are too fragmented or faint to allow a confident classification. These unidentified bat registrations are possibly attributable (at least in part) to brown long-eared bat *Plecotus auritusis*, *Myotis* species or barbastelle.

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[13] Piraccini, R. 2016. Barbastella barbastellus. The IUCN Red List of Threatened Species 2016: e.T2553A22029285. ████████████████████
Accessed on 07 March 2022.

The detector recorded 651 registrations of noctule. There were also a further 32 registrations which may have been noctule, serotine *Eptesicus serotinus* or Leisler's bat *Nyctalus leisleri*, but the registrations do not allow confident species classification.

There were two registrations clearly identifiable as serotine, 26 attributable to brown long-eared bat and 21 attributable to barbastelle.

The results are summarised in **Table 28**, below. The weather and sunset times are summarised in **Table 80** in Appendix 1.

Table 28: SM2 I June - July 2020 River Wensum static bat detector results

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
Soprano pipistrelle	11,331	809.36	404.15	101.04	21:31	04:18
Common pipistrelle	2,132	152.29	112.79	28.20	21:43	04:16
Unidentified	696	49.71	34.31	8.58	22:20	04:13
Noctule	651	46.5	23.03	5.76	21:28	04:40
Myotis sp.	613	43.79	22.60	5.65	22:16	03:55
50 kHz *Pipistrellus sp.*	184	13.14	33.16	8.29	22:11	03:55
Pipistrellus sp.	47	3.36	4.02	1.01	22:30	03:44
Nyctalus sp.	32	2.21	2.85	0.71	22:19	03:39
Brown long-eared bat	26	1.86	3.71	0.93	22:13	03:57
Barbastelle	21	1.5	1.85	0.46	22:35	03:07
40-42 kHz Pipistrelle	4	0.29	0.58	0.14	23:49	02:24
Serotine	2	0.14	0.34	0.09	02:54	02:54

4.4.2 June-July 2020 River Wensum static bat detector results (SM2 E)

SM2 E was deployed alongside a ditch between two small woodlands in grazing floodplains to the south of the River Wensum (**Figure 5**). The static detector was operational for 15 nights between the evening of 24th June and the morning of 9th July 2020. It recorded far fewer registrations than SM2 I and SM2 F, with only 16 registrations recorded in total. Ten of these registrations were in June and six were in July. All 16 registrations were of noctule.

The results are summarised in **Table 29**, below. The sunset, sunrise times and weather are shown in **Table 80**, above.

It should be noted that when this detector was collected it was found to have been knocked over (most likely by cattle grazing in the field) and was lying in dense vegetation. It is likely that the sensitivity of this detector was constrained by the dense

vegetation, possibly explaining why it only recorded noctule registrations, as these species are fairly loud and easily detectable calls in relation to other bat species.

Table 29: SM2 E June-July 2020 River Wensum static bat detector results

Species	Total registrations	Average registrations per night	Standard error	Standard error	Earliest registration	Latest registration
Noctule	16	1.10	1.54	0.43	21:41	03:43

4.4.3 July-August 2020 River Wensum static bat detector results (SM2 I)

SM2 I was deployed on the edge of the River Wensum (**Figure 5**) and was active for two nights from the evening of 30th July to the morning of 1st August 2020. This was a much shorter time period than the other bat detectors were active for, as the detector experienced a fault and ceased recording after just two nights. The bat detector was redeployed at the same location later in August, to ensure that this area was fully surveyed as required. The results of the re-deployment are provided in Section 4.2.4, below.

The static bat detector recorded 666 registrations relating to at least four species across the two nights. There were 374 soprano pipistrelle registrations and 156 common pipistrelle registrations. There were 42 *Pipistrellus* species records which are attributable to either common pipistrelle, soprano pipistrelle or Nathusius' pipistrelle.

There were 19 *Myotis* species registrations, which cannot be confidently classified to species level. However, given the location of the detector close to a river, there is a high likelihood that these records relate to Daubenton's bat.

The detector also recorded 72 noctule registrations.

There were three bat registrations which could not be classified to a particular species; these are listed as 'Unidentified'.

The results are summarised in **Table 30**, below. The sunset/sunrise times and weather for the dates of the records are displayed in **Table 81** in Appendix 1.

Table 30: SM2 I 30th July - 1st August 2020 River Wensum static bat detector results

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
Soprano pipistrelle	374	187	99.62	57.52	21:32	04:42
Common pipistrelle	156	78	41.90	24.19	21:29	04:46
Noctule	72	36	24.02	13.87	22:15	04:52
Pipistrellus sp.	42	21	10.58	6.11	21:32	04:41
Myotis sp.	19	9.50	3.21	1.86	21:47	04:05
Unidentified	3	1.50	1.00	0.58	23:06	03:38

4.4.4 19th August - 25th August 2020 River Wensum static bat detector results (SM2 I)

SM2 I was re-deployed at the same location on the edge of the River Wensum (**Figure 5**), as the first time it was deployed in July/ August, it was only operational for two nights. The detector was deployed and operational for six nights from the evening of the 19th August until the morning of 25th August 2020.

The static bat detector recorded 1,486 registrations relating to at least four bat species across the six nights. The highest frequency of registrations is from soprano pipistrelles, with 1,244 registrations. There were 51 common pipistrelle registrations and there were 92 *Pipistrellus* sp. registrations which are attributable to either common pipistrelle, soprano pipistrelle or Nathusius' pipistrelle.

There were 20 *Myotis* sp. registrations, which cannot be confidently classified to species level. However, given the location of the detector close to a river, there is a high likelihood that these records relate to Daubenton's bat.

The detector recorded 52 noctule registrations. There were 18 barbastelle registrations and three brown long-eared bat registrations.

There were three bat registrations which could not be classified to a particular species; these are listed as 'Unidentified'.

The results are summarised in **Table 31**, below. The sunset/sunrise times and weather for the dates of the records are displayed in **Table 82** in Appendix 1.

***Table 31**: SM2 I August 19th - August 25th 2020 River Wensum static bat detector results*

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
Soprano pipistrelle	1,244	207.33	148.67	56.19	21:00	05:01
Pipistrellus sp.	95	15.83	12.79	4.83	21:32	05:02
Common pipistrelle	52	8.67	4.65	1.76	20:58	05:21
Noctule	52	8.67	4.11	1.55	21:00	05:11
Myotis sp.	29	4.83	1.35	0.51	20:40	05:02
Barbastelle	18	3.00	3.05	1.15	20:42	04:53
Brown long-eared bat	3	0.50	0.53	0.20	21:50	23:44
Unidentified	3	0.50	0.79	0.30	21:41	04:46

4.4.5 August 2020 River Wensum static bat detector results (SM2 H)

SM2 H was deployed by the River Wensum, north of the A1067 Fakenham Road (**Figure 5**). The detector was deployed from the evening of 26th August to the morning of 10th September, but it was only operational for five nights between 26th August and 31st August 2020.

The detectors recorded 1,875 registrations relating to at least four species of bats. The highest frequency of registrations relates to soprano pipistrelle, with 1,468 recordings. Common pipistrelles were the second most frequently recorded species, with 398 registrations. There are four *Pipistrellus* species records which are attributable to either common pipistrelle, soprano pipistrelle or Nathusius' pipistrelle.

There were four *Myotis* species registrations, which cannot be confidently classified to species level. However, given the location of the detector close to a river, there is a high likelihood that these records relate to Daubenton's bat.

The detector recorded one registration of noctule.

The results are summarised in **Table 32**, below. The sunset/sunrise times and weather for the dates of the records are displayed in **Table 83** in Appendix 1.

Table 32: SM2 H August 2020 River Wensum static bat detector results

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
Soprano pipistrelle	1,468	293.6	232.52	94.93	19:59	05:41
Common pipistrelle	398	79.6	78.43	32.02	20:26	05:46
Pipistrelle sp.	4	0.8	0.82	0.33	21:03	21:03
Myotis sp.	4	0.8	1.21	0.49	20:56	20:56
Noctule	1	0.2	0.41	0.17	20:27	20:27

4.4.6 September-October 2020 River Wensum static bat detector results (SM2 I)

SM2 N was deployed adjacent to the River Wensum (**Figure 5**). The static bat detector was operational and deployed for 11 nights from the evening of 24th September to the morning of 5th October 2020.

The detectors recorded 971 registrations relating to at least five species of bats. The highest frequency of registrations relates to *Myotis* species, with 771 registrations.

Common pipistrelles were recorded, with a total of 48 registrations. Soprano pipistrelles were also recorded, with 37 registrations. There are two *Pipistrellus* species records which are attributable to either common pipistrelle, soprano pipistrelle or Nathusius' pipistrelle.

The detector recorded 103 registrations of noctule, two registrations of barbastelles and eight which were unidentifiable.

The results are summarised in **Table 33,** below. The sunset/sunrise times and weather for the dates of the records are displayed in **Table 84** in Appendix 1.

Table 33: SM2 N September-October 2020 River Wensum static bat detector results

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
Myotis sp.	771	70.09	71.93	22.74	18:54	06:18
Noctule	103	9.36	8.54	2.70	18:27	07:00
Common pipistrelle	48	4.36	6.83	2.16	18:56	05:39
Soprano pipistrelle	37	3.36	4.08	1.29	18:50	06:22
Unidentified	8	0.73	1.32	0.42	19:46	00:12
Pipistrelle sp.	2	0.18	0.42	0.13	19:08	19:08
Barbastelle	2	0.18	0.42	0.13	19:37	02:02

4.4.7 April 2021 River Wensum static bat detector results (SM2 C)

SM2 C was deployed to the west of the River Wensum in a small band of woodland with an adjacent drain (**Figure 5**). The static bat detector was operational and deployed for five nights from the evening of 21st April to the morning of 26th April 2021.

The detector recorded 40 registrations from at least five species in total across the five nights. The majority of registrations are of soprano pipistrelle. There are 12 Daubenton's bat registrations and six registrations attributable to Natterer's bat *Myotis nattereri*.

The results are summarised in **Table 34,** below. The sunset/sunrise times and weather for the dates of the records are displayed in **Table 85** in Appendix 1.

Table 34: SM2 C April 2021 River Wensum static bat detector results

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
Soprano pipistrelle	15	3	3.74	1.67	20:21	21:23
Daubenton's bat	12	4	2.61	1.17	20:48	03:00
Common pipistrelle	6	1.2	1.64	0.73	20:24	21:12
Natterer's bat	4	1.2	0.84	0.37	21:07	02:44
Myotis sp.	3	0.6	1.34	0.60	20:49	22:02

4.4.8 May 2021 River Wensum static bat detector results (SM Mini P)

SM Mini P was deployed on the west side of the River Wensum at Attlebridge, adjacent to a wet drainage ditch (**Figure 5**). The static bat detector was operational and deployed for five nights from the evening of 19th May to the morning of 24th May 2021.

The static bat detector recorded 1,370 registrations across the five-night period. The majority of records were common pipistrelle registrations (956).

Records of note include four barbastelle registrations and records of several different *Myotis* species Bats including Daubenton's bat (56), whiskered bat *Myotis mystacinus* (5) and Brandt's bat (1).

The results are summarised in **Table 35**, below. The sunset/sunrise times and weather for the dates of the records are displayed in **Table 88** in Appendix 1.

Table 35: SM Mini P May 2021 River Wensum static bat detector results

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
Common pipistrelle	956	191.2	242.65	99.06	21:04	04:29
Soprano pipistrelle	326	65.2	39.49	17.66	21:01	04:41
Daubenton's bat	56	11.2	7.58	3.09	21:04	04:29
Noctule	18	3.6	4.65	1.90	21:29	23:06
Whiskered bat	5	1	0.75	0.31	21:28	03:47
Barbastelle	4	0.8	1.30	0.58	21:36	03:31
Brown long-eared bat	4	0.8	1.63	0.67	01:09	02:17
Brandt's bat	1	0.2	0.45	0.20	00:57	00:57

4.4.9 June 2021 River Wensum static bat detector results (SM2 K)

SM2 K was deployed on the west side of the River Wensum near Attlebridge, attached to a tree in a small strip of woodland adjacent to a drainage ditch (**Figure 5**). It was deployed and operational for five nights from the evening of 10th June to the morning of 15th June 2021.

The detector recorded 2,819 bat registrations from eight species across the five-night period. The majority of registrations are from soprano pipistrelle (2,422).

Records of note include registrations of barbastelle (3) and Nathusius' pipistrelle (1). There were also several *Myotis* species registrations.

The results are summarised in **Table 36**, below. The sunset/sunrise times and weather for the dates of the records are displayed in **Table 89** in Appendix 1.

Table 36: *SM2 K June 2021 River Wensum static bat detector results*

Species	Total registrations	Average registrations per night	Standard deviation	Standard deviation	Earliest registration	Latest registration
Soprano pipistrelle	2,422	484.4	291.33	118.94	21:40	04:06
Common pipistrelle	345	69	60.87	24.85	21:45	04:05
Daubenton's bat	33	6.6	2.43	0.99	22:05	03:45
Brandt's bat	8	1.6	1.37	0.56	22:15	03:27
Brown Long-eared bat	5	1	1.17	0.48	22:15	03:41
Barbastelle	3	0.6	0.84	0.34	22:31	03:23
Noctule	2	0.4	0.52	0.21	21:47	22:31
Nathusius' pipistrelle	1	0.2	0.41	0.17	22:33	22:33

4.4.10 August 2021 River Wensum static bat detector results (SM Mini R)

SM Mini R was deployed attached to a tree in a small woodland to the west of the River Wensum at Attlebridge (**Figure 5**). It was deployed from the evening of 4th August to the morning of 9th August 2021 but was only operational for the first two nights.

The detector recorded 256 bat registrations across the two-night period. The majority of registrations are soprano pipistrelle (142) and common pipistrelle (103).

Records of note include registrations of barbastelle (5) and Daubenton's bat (3).

The results are summarised in **Table 37**, below. The sunset/sunrise times and weather for the dates of the records are displayed in **Table 95** in Appendix 1.

Table 37: *SM Mini R August 2021 static bat detector results*

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
Soprano pipistrelle	142	71	26.87	19.00	19:53	04:48
Common pipistrelle	103	51.5	57.28	40.50	20:57	04:01
Barbastelle	5	2.5	3.54	2.50	21:54	23:22
Daubenton's bat	3	1.5	0.71	0.50	21:24	21:24
Noctule	3	1.5	0.71	0.50	21:51	02:00

4.4.11 September 2021 River Wensum static bat detector results (SM Mini R)

SM Mini R was deployed on the west bank of the River Wensum at Attlebridge (**Figure 5**). It was deployed for five nights from the evening of 10th September to the morning of 15th September 2021, but it was only operational for the first two nights.

The detector recorded 782 bat registrations across the two-night period. The majority of registrations were of soprano pipistrelle (446) and common pipistrelle (306).

Records of note include one registration each of barbastelle and *Myotis* species.

The results are summarised in **Table 38**, below. The sunset/sunrise times and weather for the dates of the records are displayed in **Table 98** in Appendix 1.

Table 38: SM Mini R September 2021 static bat detector results

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
Soprano pipistrelle	446	223	193.91	111.95	19:45	06:03
Common pipistrelle	306	72	100.53	58.04	19:49	05:55
Noctule	23	9.5	7.09	4.10	19:29	06:08
Brown long-eared bat	6	1.5	1.73	1.00	21:32	05:19
Barbastelle	1	0.5	1.00	0.58	20:39	04:27
Myotis sp.	1	0.5	1.00	0.58	05:57	05:57

4.4.12 River Wensum transect survey results

The transect at The River Wensum were undertaken monthly from April to September (inclusive) 2021. The results are summarised in **Table 39**, below and shown in **Figure 17** - **Figure 22**.

Table 39: River Wensum 2021 transect results

Month	Weather	Species	Total No. Registrations	Earliest Registration
April (28/04/21) Sunset: 20:18	Start Temp: 7ºC End Temp: 6ºC Cloud cover: 35% Wind Speed (BS): 2-3 No precipitation	Soprano pipistrelle	16	20:45
		Common pipistrelle	10	21:22
		Myotis sp.	3	21:10
May (19/05/21) Sunset: 20:51	Start Temp: 12ºC End Temp: 10ºC Cloud cover: 20% Wind Speed (BS): 0 No precipitation	Soprano pipistrelle	31	21:16
		Common pipistrelle	28	21:16
		Myotis sp.	4	21:28
June (09/06/21)	Start Temp: 21ºC End Temp: 19ºC	Soprano pipistrelle	30	21:59
		Common pipistrelle	17	21:57

Month	Weather	Species	Total No. Registrations	Earliest Registration
Sunset: 21:17	Cloud cover: 0% Wind Speed (BS): 0 No precipitation	Barbastelle	4	22:19
		Brown long- eared bat	3	22:20
		Noctule	2	21:46
		Myotis sp.	1	22:27
July (08/07/21) Sunset: 21:18	Start Temp: 18ºC End Temp: 16ºC Cloud cover: 90% Wind Speed (BS): 0-1 No precipitation	Common pipistrelle	11	22:04
		Soprano pipistrelle	9	21:26
		Myotis sp.	6	22:11
		Brown long-eared bat	1	22:19
		Barbastelle	1	22:13
August (04/08/21) Sunset: 20:45	Start Temp: 16ºC End Temp: 13ºC Cloud cover: 5% Wind Speed (BS): 1 No precipitation	Common pipistrelle	14	21:25
		Soprano pipistrelle	9	21:25
		Barbastelle	1	21:43
September (10/09/21) Sunrise: 06:20	Start Temp: 17ºC End Temp: 17.5ºC Cloud cover: 10 % Wind Speed (BS): 0 No precipitation	Soprano pipistrelle	14	05:55*
		Common pipistrelle	5	04:56*

*Results from the dawn transect survey show the last bat registration recorded rather than the first.

4.5 Ringland Covert Results

Static bat detector surveys were undertaken across 2021, with detectors placed in a range of locations centrally within the Ringland Covert woodland. The most frequently recorded bat species was common pipistrelle, with high levels of soprano pipistrelle also recorded. Given the earliest and latest registration times for both species closely align with sunset/sunrise times, there are likely roosts located nearby. Of particular note are the significant number of barbastelle registrations, particularly in July 2021 when over 600 registrations were recorded. This site recorded the highest number of registrations for barbastelle across all sites surveyed for bats. Timings suggest there could be a maternity roost or roosts nearby. There were also a number of rarer species recorded including serotine, Nathusius's pipistrelle, Brandt's bat and Natterer's bat. Given the significant levels of barbastelle recorded and the range of other rare species recorded at Ringland Covert this site is considered to be of **National** scale conservation importance for bats.

As discussed for the River Wensum, unseen bat survey data collected by Wild Wings Ecology purports to show a meta-population of barbastelle bats, considered to be of international importance, located around the River Wensum corridor and nearby woodlands in the general area between Lenwade and the A47. The number of barbastelle registrations recorded by WFE during the 2020-21 bat surveys at Ringland Covert indicates that this woodland may support some part of this meta-population (for instance, in its capacity as a foraging site) and that the woodland is within the CSZ of barbastelle maternity roosts. The unseen data from Wild Wings Ecology therefore concludes that the site is of **European** conservation importance for bats. However, the

Wild Wings Ecology data on which the barbastelle super-colony conclusion is based has not been reviewed by WFE and it remains unpublished.

4.5.1 April 2021 Ringland Covert static bat detector results (SM2 C)

SM2 C was deployed centrally in Ringland Covert woodland near Ringland (**Figure 6**). The static bat detector was operational and deployed for five nights from the evening of 23rd April to the morning of 30th April 2021.

The detector recorded two registrations in total across the seven nights. Both registrations are common pipistrelle.

The results are summarised in **Table 40**, below. The sunset/sunrise times and weather for the dates of the records are displayed in **Table 86** in Appendix 1.

Table 40: SM2 C April 2021 Ringland Covert static bat detector results

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
Common pipistrelle	2	0.3	0.46	0.16	19:46	21:42

4.5.2 May 2021 Ringland Covert static bat detector results (SM2 J)

SM2 J was deployed centrally in Ringland Covert woodland (**Figure 6**). It was operational and deployed for five nights from the evening of 19th May to the morning of 24th May 2021.

The static bat detector recorded 2,663 registrations across the five-night period. The majority of records were common pipistrelle registrations (2,331).

Records of note include four registrations of barbastelle and nine registrations of Nathusius' pipistrelle. There were also 55 registrations of serotine.

There were records of several different *Myotis* species Bats including Daubenton's bat (19) and Natterer's bat (37).

The results are summarised in

Table 41, below. The sunset/sunrise times and weather for the dates of the records are displayed in **Table 88** in Appendix 1.

Table 41: SM2 J May 2021 Ringland Covert static bat detector results

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
Common pipistrelle	2,331	466.2	273.05	111.47	21:00	04:42
Soprano pipistrelle	208	41.6	39.43	16.10	21:05	04:24
Serotine	55	11	21.49	8.77	21:18	23:09
Natterer's	37	7.4	4.92	2.01	03:31	22:02

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
bat						
Daubenton's bat	19	3.8	3.71	1.51	21:39	02:45
Nathusius' pipistrelle	9	1.8	2.35	0.96	00:39	04:05
Barbastelle	4	0.8	1.03	0.42	21:37	22:58

4.5.3 June 2021 Ringland Covert static bat detector results (SM2 H)

SM2 H was deployed centrally in Ringland Covert woodland (**Figure 6**). A detector was deployed earlier in the month (10th to 15th June), but due to a technical fault the device did not record. It was redeployed and was operational for five nights from the evening of 16th June to the morning of 21st June.

The detector recorded 1,498 bat registrations from five species of bat. The majority of registrations were of pipistrelle bat species, with common pipistrelle accounting for 956 registrations and soprano pipistrelle accounting for 485 registrations. There were also 33 registrations of Nathusius' pipistrelle.

Records of note include 22 registrations of barbastelle.

The results are summarised in **Table 42,** below. The sunset/sunrise times and weather for the dates of the records are displayed in **Table 90** in Appendix 1.

Table 42: SM2 H June 2021 Ringland Covert static bat detector results

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
Common pipistrelle	956	191.2	92.35	37.70	21:11	04:11
Soprano pipistrelle	485	97	45.05	18.39	21:03	04:36
Nathusius' pipistrelle	33	6.6	5.13	2.09	21:32	03:40
Barbastelle	22	4.4	3.83	1.56	21:28	02:34
Natterer's bat	2	0.4	0.82	0.33	22:07	22:13

4.5.4 July 2021 Ringland Covert static bat detector results (SM Mini T)

SM Mini T was deployed centrally within Ringland Covert woodland (**Figure 6**). It was deployed and operational for five nights from the evening of 14th July to the morning of 19th July 2021.

The detector recorded 6,323 bat registrations relating to eight species of bat across the five-night period. The majority of registrations were of common pipistrelle (3,026) and soprano pipistrelle (2,362).

Records of note include registrations of barbastelle (607) and Nathusius' pipistrelles (128). There was also a number *Myotis* species recorded including Natterer's (93) and Daubenton's (36).

The results are summarised in **Table 43**, below. The sunset/sunrise times and weather for the dates of the records are displayed in **Table 93** in Appendix 1.

Table 43: SM Mini T July 2021 Ringland Covert static bat detector results

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
Common pipistrelle	3,026	605.2	131.82	49.82	20:49	04:52
Soprano pipistrelle	2,362	472.4	173.49	65.57	20:47	04:56
Barbastelle	607	121.4	29.27	11.06	21:16	04:44
Nathusius' pipistrelle	128	25.6	8.71	3.29	20:49	04:52
Natterer's bat	93	18.6	6.68	2.52	21:51	04:15
Noctule	60	12	6.11	2.31	21:18	04:43
Brown long-eared bat	30	6	3.55	1.34	22:45	04:49
Daubenton's bat	17	3.4	1.27	0.48	21:34	04:16

4.5.5 August 2021 Ringland Covert static bat detector results (SM2 H)

SM2 H was deployed centrally in the Ringland Covert woodland (**Figure 6**). It was deployed and operational for five nights from the evening of 4th August to the morning of 9th August 2021.

The detector recorded 226 bat registrations across the five-night period. The majority of registrations were of common pipistrelle (1,569).

Records of note include registrations of barbastelle (6) and Nathusius' pipistrelle (26). There were also a number *Myotis* species recorded including Natterer's bat (4) and Daubenton's bat (2).

The results are summarised in **Table 44**, below. The sunset/sunrise times and weather for the dates of the records are displayed in **Table 95** in Appendix 1.

Table 44: SM2 H August 2021 Ringland Covert static bat detector results

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
Common pipistrelle	1,569	313.8	468.64	191.32	20:45	05:12
Soprano pipistrelle	675	135	190.22	77.66	20:29	05:27

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
Nathusius' pipistrelle	26	5.2	7.17	2.93	20:50	05:10
Barbastelle	6	1.2	2.00	0.82	21:08	04:54
Natterer's bat	6	1.2	1.67	0.68	21:39	23:11
Daubenton's bat	5	1	1.60	0.65	21:43	00:28

4.6 River Tud Results

Static bat detector surveys were undertaken at the River Tud, with detectors mainly deployed along banks of the river either in grazing pasture or woodland. The highest number of registrations recorded during the surveys related to soprano pipistrelle, with common pipistrelle and noctule also frequently recorded. At the River Tud there were also high levels of both serotine and Daubenton's bat registrations. Given the earliest and latest times for all of these species, it is conceivable that there are roosts located in the vicinity. There were also other rarer species recorded including barbastelle, Nathusius's pipistrelle, Brandt's bat and Natterer's bat. Given the high frequency of registrations recorded for serotine and Daubenton's bats and the range of other species present at the River Tud, this site is considered to be of **District** scale conservation importance for bats.

4.6.1 May 2021 River Tud static bat detector results (SM Mini O)

SM Mini O was deployed on the south side of the River Tud near Honingham (**Figure 7**). The detector was operational and deployed for five nights from the evening of 19th May to the morning of 24th May 2021.

The detector recorded 1,809 registrations in total across the five nights. The majority of registrations were of pipistrelle species, with soprano pipistrelles accounting for 957 recordings and common pipistrelle accounting for 789 records.

Records of note include 10 registrations of Nathusius' pipistrelle. There are also records of several different *Myotis* species Bats including Daubenton's bat (1) and Natterer's bat (2).

The results are summarised in **Table 45**, below. The sunset/sunrise times and weather for the dates of the records are displayed in **Table 88** in Appendix 1.

Table 45: SM Mini O River Tud static bat detector results

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
Soprano pipistrelle	957	191.4	166.48	67.97	21:21	04:14
Common pipistrelle	789	157.8	177.92	72.64	21:21	03:25
Noctule	51	10.2	10.05	4.10	21:12	00:33

Nathusius' pipistrelle	10	2	3.14	1.28	21:44	22:15
Natterer's bat	2	0.4	0.52	0.21	22:43	03:24
Daubenton's bat	1	0.2	0.41	0.17	23:24	23:24

4.6.2 June 2021 River Tud static bat detector results (SM Mini O)

SM Mini O was deployed attached to a tree on the north side of the River Tud (**Figure 7**). It was deployed and operational for five nights from the evening of 10th June to the morning of 15th June 2021.

The static bat detector recorded 3,244 registrations across the five-night period from at least 10 species of bat. The majority of records were soprano pipistrelles (1,578).

Records of note include 18 registrations of Nathusius' pipistrelle and five registrations of serotines. There are also a notable number of noctule registrations (688).

There were records of several different *Myotis* species bats including Daubenton's bat (18), Natterer's bat (14) and Brandt's bat (5).

The results are summarised in **Table 46**, below. The sunset/sunrise times and weather for the dates of the records are displayed in **Table 89** in Appendix 1.

Table 46: SM Mini O June 2021 River Tud static bat detector results

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
Soprano pipistrelle	1,578	315.6	172.06	70.24	21:53	03:50
Common pipistrelle	898	179.6	100.35	40.97	03:50	22:14
Noctule	688	137.6	61.66	25.17	21:26	04:18
Brown long-eared bat	19	3.8	2.14	0.87	22:22	03:31
Daubenton's bat	19	3.8	2.71	1.11	03:31	22:49
Nathusius' pipistrelle	18	3.6	3.10	1.26	22:40	03:43
Natterer's bat	14	2.8	2.25	0.92	23:23	01:39
Serotine	5	1	0.98	0.40	23:24	02:44
Brandt's bat	5	1	0.98	0.40	01:14	03:11

4.6.3 July 2021 River Tud static bat detector results (SM Mini P)

SM Mini P was deployed on the north bank of the River Tud (**Figure 7**). It was deployed and operational for five nights from the evening of 14th July to the morning of 19th July 2021.

The detector recorded 2,629 bat registrations across the five-night period. The majority of registrations were of soprano pipistrelle (1,032).

Records of note include registrations of barbastelle (60), serotine (491), Nathusius' pipistrelles (20). There were also a number *Myotis* species recorded including Daubenton's (36), Natterer's (11) and Brandt's bat (9).

The results are summarised in **Table 47**, below. The sunset/sunrise times and weather for the dates of the records are displayed in **Table 94** in Appendix 1.

Table 47: SM Mini P July 2021 River Tud static bat detector results

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
Soprano pipistrelle	1,032	206.4	67.66	25.57	21:14	04:27
Common pipistrelle	831	166.2	47.55	17.97	21:14	04:15
Serotine	491	98.2	107.75	43.99	22:47	02:36
Noctule	112	22.4	9.87	3.73	21:15	04:37
Barbastelle	60	12	10.63	4.02	21:57	02:57
Daubenton's bat	36	7.2	2.79	1.06	21:32	03:43
Brown long-eared bat	27	5.4	4.10	1.55	22:26	02:19
Nathusius' pipistrelle	20	4	3.85	1.45	21:39	03:52
Natterer's bat	11	2.2	1.51	0.57	21:22	03:29
Brandt's bat	9	1.8	1.80	0.68	21:18	00:59

4.6.4 August 2021 River Tud static bat detector results (SM Mini O)

SM Mini O was deployed attached to on a tree to the north of the River Tud (**Figure 7**). It was deployed and operational for five nights from the evening of 11th August to the morning of 16th August 2021.

The detector recorded 3,225 bat registrations across the five-night period. The majority of registrations were of soprano pipistrelle (1,703) and common pipistrelle (1,306).

Records of note include registrations of barbastelle (20) and Nathusius' pipistrelle (9). There were also a number *Myotis* species recorded including Daubenton's bat (29) and Natterer's bat (13).

The results are summarised in **Table 48**, below. The sunset/sunrise times and weather for the dates of the records are displayed in **Table 96** in Appendix 1.

Table 48: SM Mini O August 2021 River Tud static bat detector results

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
Soprano pipistrelle	1,702	340.4	251.37	102.62	20:39	05:06
Common pipistrelle	1,306	261.2	182.99	74.71	20:44	04:52
Noctule	121	24.2	11.92	4.87	20:27	05:13
Daubenton's bat	29	5.8	3.43	1.40	21:31	03:54
Barbastelle	20	4	3.14	1.28	21:24	04:14
Natterer's bat	13	2.6	3.25	1.33	22:14	04:13
Serotine	17	3.4	2.40	0.98	21:26	04:03
Nathusius' pipistrelle	9	1.8	2.07	0.85	21:12	04:33
Brown long-eared bat	8	1.6	1.03	0.42	21:05	03:38

4.6.5 September 2021 River Tud static bat detector results (SM2 H)

SM Mini P was deployed attached to a tree on the north bank of the River Tud (**Figure 7**). It was deployed for five nights from the evening of 10th September to the morning of 15th September 2021, but was only operational for the first two nights.

The detector recorded 1,375 bat registrations across the five-night period. The majority of registrations were of common pipistrelle (1,067).

Records of note include registrations of Daubenton's bat (57) and Natterer's bat (10).

The results are summarised in **Table 49**, below. The sunset/sunrise times and weather for the dates of the records are displayed in **Table 98** in Appendix 1.

Table 49: SM Mini P September 2021 River Tud static bat detector results

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
Soprano pipistrelle	1,067	213.4	385.37	272.50	19:30	06:06
Noctule	119	23.8	20.51	14.50	19:31	06:12
Common pipistrelle	113	22.6	27.58	19.50	20:00	05:34
Daubenton's bat	57	11.4	12.02	8.50	20:01	05:22
Natterer's bat	10	2	2.83	2.00	20:33	04:28

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
Brown long-eared bat	9	1.8	4.95	3.50	19:58	03:58

4.7 River Yare Results

Both banks of the River Yare and surrounding woodland habitat were surveyed across 2020 and 2021. Common pipistrelle was the most frequently recorded species, with the earliest and latest registration suggesting that roosts may be located nearby. There were rarer species recorded, including a significant number of Nathusius's pipistrelle registrations. Other rarer species recorded include serotine, Daubenton's bat, Natterers bat and Brandt's bat. Given the number of Nathusius's pipistrelle registrations and range of other rarer species recorded, the River Yare is considered to be of **District** scale conservation importance for bats.

4.7.1 July-August 2020 River Yare static bat detector results (SM2 K)

SM2 K was deployed in a woodland just north of the River Yare, in an area which is surrounded by large plantation woodlands and open grasslands, south of the village of Colton (**Figure 8**). The static bat detector was deployed and operational for 11 nights from the evening of 30th July until the morning of 10th August 2020.

The detector recorded 1,313 registrations relating to at least four species of bats. The highest frequency of registrations relates to soprano pipistrelles, with 817 recordings. Common pipistrelles were the second most frequently recorded species, with 359 registrations.

There were 16 *Myotis* species registrations, which cannot be confidently classified to species level. However, given the location of the detector close to a river, there is a high likelihood that these records relate to Daubenton's bat.

The detector recorded 19 registrations of noctule.

There were also two unidentified registrations, which could not be confidently assigned to a bat species.

The results are summarised in **Table 50**, below. The sunset/sunrise times and weather for the dates of the records are displayed in **Table 81** in Appendix 1.

Table 50: SM2 K July-August 2020 River Yare static bat detector results

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
Soprano pipistrelle	817	74.27	49.87	14.40	20:40	05:06
Common pipistrelle	459	41.72	20.92	6.04	20:49	05:00
Noctule	19	1.72	2.39	0.69	20:59	02:30
Myotis sp.	16	1.45	0.78	0.22	21:04	04:37
Unidentified	2	0.18	0.39	0.11	21:31	00:49

4.7.2 May 2021 River Yare static bat detector results (SM2 N)

SM2 N was deployed on the south side of the River Yare near Colton (**Figure 8**). It was operational and deployed for five nights from evening of 19th May to the morning of 24th May 2021.

The static bat detector recorded 1,662 registrations across the five-night period. The majority of records were of pipistrelle bats, with soprano pipistrelle accounting for 1,101 registrations and common pipistrelle accounting for 514 registrations. There was also one registration attributable to Nathusius' pipistrelle.

Records of note include 46 registrations of Daubenton's bat.

The results are summarised in **Table 51**, below. The sunset/sunrise times and weather for the dates of the records are displayed in **Table 88** in Appendix 1.

Table 51: SM2 N May 2021 River Yare static bat detector results

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
Soprano pipistrelle	1,101	220.2	284.07	115.97	21:06	04:16
Common pipistrelle	514	102.8	123.47	50.41	21:10	03:57
Daubenton's bat	46	5.1	5.43	2.22	02:41	22:04
Nathusius' pipistrelle	1	0.2	0.41	0.17	22:11	22:11

4.7.3 June 2021 River Yare static bat detector results (SM2 N)

SM2 N was deployed on the north side of the River Yare on the edge of a pocket of woodland bordering the river (**Figure 8**). It was deployed and operational for five nights from the evening of 10th June to the morning of 15th June 2021.

The detector recorded 1,544 bat registrations from five species across the five-night period. The majority of registrations were of common pipistrelle (1,314).

Records of note include registrations of barbastelle (1) and Nathusius' pipistrelle (34). There were also several *Myotis* species registrations.

The results are summarised in **Table 52**, below. The sunset/sunrise times and weather for the dates of the records are displayed in **Table 89** in Appendix 1.

Table 52: SM2 N June 2021 River Yare static bat detector results

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
Common pipistrelle	1,314	262.8	162.72	66.43	21:51	03:46
Soprano	191	38.2	17.79	7.26	21:43	03:50

pipistrelle					
Nathusius' pipistrelle	34	6.8	12.91	5.27	00:57	03:11
Daubenton's bat	4	0.8	0.82	0.33	23:11	03:35
Barbastelle	1	0.2	0.41	0.17	00:50	00:50

4.7.4 July 2021 River Yare static bat detector results (SM Mini O)

SM Mini O was deployed on the north bank of the River Yare (**Figure 8**). It was deployed and operational for five nights from the evening of 7th July to the morning of 12th July 2021.

The detector recorded 2,987 bat registrations of nine species across the five-night period. The majority of registrations were from common pipistrelles (1,672).

Records of note include registrations of barbastelle (18) and Nathusius' pipistrelle (79). There were also several *Myotis* species registrations.

The results are summarised in **Table 53**, below. The sunset/sunrise times and weather for the dates of the records are displayed in **Table 92** in Appendix 1.

Table 53: SM Mini O July 2021 River Yare static bat detector results

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
Common pipistrelle	1,672	334.4	310.28	126.67	21:22	04:13
Noctule	894	178.8	77.63	31.69	21:16	04:29
Soprano pipistrelle	255	51	33.08	13.50	21:25	04:06
Nathusius' pipistrelle	79	15.8	26.10	10.65	21:35	03:07
Brown long-eared bat	43	8.6	5.13	2.29	22:01	03:31
Daubenton's bat	19	3.8	3.35	1.37	22:07	03:40
Barbastelle	18	3.6	2.93	1.19	21:50	03:25
Natterer's bat	6	1.2	1.26	0.52	22:13	03:42
Serotine	1	0.2	0.41	0.17	22:26	22:26

4.7.5 August 2021 River Yare static bat detector results (SM2 J)

SM2 J was deployed in a woodland on the north bank of the River Yare (**Figure 8**). It was deployed and operational for five nights from the evening of 4th August to the morning of 9th August 2021.

The detector recorded 1,668 bat registrations across the five-night period. The majority of registrations were of common pipistrelle (939).

Records of note include registrations of barbastelle (1), serotine (3) and Daubenton's bat (10).

The results are summarised in **Table 54**, below. The sunset/sunrise times and weather for the dates of the records are displayed in **Table 95** in Appendix 1.

Table 54: SM2 J August 2021 River Yare static bat detector results

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
Common pipistrelle	939	187.8	278.38	113.65	05:06	20:58
Soprano pipistrelle	711	142.2	230.22	93.99	20:58	04:52
Daubenton's bat	10	2	4.08	1.67	21:28	23:22
Noctule	4	0.8	1.03	0.42	21:22	21:31
Serotine	3	0.6	0.84	0.34	21:24	02:17
Barbastelle	1	0.2	0.41	0.17	03:27	03:27

4.7.6 September 2021 River Yare static bat detector results (SM Mini T)

SM Mini T was deployed on the north bank of the River Yare (**Figure 8**). It was deployed for five nights from the evening of 10th September to the morning of 15th September 2021.

The detector recorded 4,873 bat registrations across the five-night period. The majority of registrations were of soprano pipistrelle (2,487) and common pipistrelle (2,126).

Records of note include registrations of barbastelle (6) and Nathusius' pipistrelle (2). There were also a number *Myotis* species recorded including Daubenton's bat (82), Natterer's bat (33) and Brandt's bat (5).

The results are summarised in **Table 55**, below. The sunset/sunrise times and weather for the dates of the records are displayed in **Table 98** in Appendix 1.

Table 55: SM Mini T September River Yare static bat detector results

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
Common pipistrelle	2,481	496.2	446.92	223.46	19:32	05:41
Soprano pipistrelle	2,126	425.2	241.12	120.56	19:29	06:13
Daubenton's bat	82	16.4	6.95	3.48	19:47	05:42
Noctule	78	15.6	8.35	4.17	19:21	06:08
Brown Long-eared bat	52	10.4	7.53	3.76	20:09	05:30

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
Natterer's bat	33	6.6	3.69	1.84	20:32	05:17
Barbastelle	6	1.2	2.38	1.19	02:55	00:27
Brandt's bat	5	1	0.96	0.48	19:52	05:47
Serotine	5	1	1.50	0.75	20:01	20:35
Nathusius' pipistrelle	2	0.4	1.00	0.50	00:34	03:10

4.8 River Tiffey Results

The River Tiffey and surrounding floodplains were surveyed across 2020 and 2021. The surveys recorded registrations from a range of species, with common pipistrelle the most frequently recorded species. Earliest and latest registration times suggests that there could be roosts located nearby. Some rarer species were recorded using the site including Daubenton's bat, barbastelle, serotine and *Myotis* species. However, there were relatively low numbers of registrations, indicating that the site is not frequently used by these species. Given that common species of bat appear to use this site frequently but rarer bats only use the site occasionally, the River Tiffey is considered to be of **Local** scale conservation importance for bats.

4.8.1 June-July 2020 River Tiffey static bat detector results (SM2 K)

SM2 K was deployed just south of the River Tiffey (**Figure 9**). It recorded a total of 5,099 registrations. It was deployed and operational for 16 nights, between the evening of 24th June and the morning of 10th July. The majority of the registrations were of soprano pipistrelle*s*, which had a total registration count of 3,147. Common pipistrelle had the second highest number with 1,449 registrations recorded in total across the June/July survey.

Where *Pipistrellus* species could not be determined between common and soprano (i.e. where registrations had a peak frequency of 50kHz, rather than 45kHz which indicates common pipistrelle or 55kHz which indicates soprano pipistrelle), these were noted in a category labelled as 50kHz *pipistrellus*; these registrations would relate to either of the aforementioned pipistrelle species, echolocating atypically. A total of 92 50kHz *Pipistrellus* registrations were recorded in total across the June/July survey period.

The detector recorded a total of 361 registrations of noctule. There was one *Nyctalus* species registration that could either have been from a noctule or a Leisler's bat; the call was not of sufficient clarity to allow confident assignment to either species.

There were also 33 registrations of *Myotis* species.

There were 16 registrations which were in the category of unidentified. These could not be specifically attributed to a species due to the quality of the recording (e.g. faint, distant, partial recordings), but are likely to relate to brown long-eared bat*, Myotis* species bats or possibly barbastelle.

The results from the SM2 K are summarised in **Table 56**, below. The weather and sunset times for the location of this bat detector are summarised in **Table 80** in Appendix 1.

Table 56: SM2 K June-July 2020 River Tiffey static bat detector results

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
Soprano pipistrelle	3,147	196.69	150.35	36.46	21:27	04:26
Common pipistrelle	1,449	90.56	88.74	21.52	21:21	04:24
Noctule	361	22.56	19.67	4.77	21:16	04:36
50 kHz *Pipistrellus sp.*	92	5.75	14.29	3.47	22:17	03:53
Myotis sp.	33	2.06	2.68	0.65	22:22	03:12
Unidentified	16	1.00	1.20	0.29	22:40	04:04

4.8.2 September-October 2020 River Tiffey static bat detector results (SM2 K)

SM2 K was deployed adjacent to the River Tiffey (**Figure 9**). The static bat detector was operational and deployed for 11 nights from the evening of 24th September to the morning of 5th October 2020.

The detectors recorded 259 registrations relating to five bat species. The highest frequency of registrations relates to soprano pipistrelles, with 189 registrations. Common pipistrelles were the second most frequently recorded species, with 41 registrations.

There were nine *Myotis* species registrations.

The detector recorded five registrations of noctule. There were also three further registrations which may have been noctule, serotine or Leisler's bat, but the registrations do not allow confident species classification.

There was one registration of barbastelle and 11 records which were unidentifiable.

The results are summarised in **Table 57**, below. The sunset/sunrise times and weather for the dates of the records are displayed in **Table 84** in Appendix 1.

Table 57: SM2 K September-October 2020 River Tiffey static bat detector results

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
Soprano pipistrelle	189	17.18	14.09	4.70	18:29	06:54
Common pipistrelle	41	3.73	5.48	1.83	18:55	06:47
Unidentified	11	1	1.09	0.36	20:14	03:06
Myotis sp.	9	0.82	1.12	0.37	20:46	04:23
Noctule	5	0.45	0.73	0.24	19:13	05:48

Nyctalus sp.	3	0.27	1.00	0.33	22:13	22:13
Barbastelle	1	0.09	0.33	0.11	19:22	19:22

4.8.3 April-May 2021 River Tiffey static bat detector results (SM Mini O)

SM Mini O was deployed on the north bank of the River Tiffey at Barford (**Figure 9**). The static bat detector was operational and deployed for nine nights from the evening of 27th April to the morning of 6th May 2021. A detector was originally deployed in this location between 21st April and 26th April, but as the detector malfunctioned, it was redeployed later in April.

The detector recorded 8,364 registrations in total across the nine nights. The majority of registrations were of pipistrelle species, with soprano pipistrelles accounting for 4,622 recordings and common pipistrelle attributing to 3,564 registrations.

Records of note include two registrations of barbastelle and 12 registrations of Nathusius' pipistrelle. There are also records of several different *Myotis* bats including Daubenton's bat (109), Natterer's bat (67) and Brandt's bat *Myotis brandti* (33).

The results are summarised in **Table 58,** below. The sunset/sunrise times and weather for the dates of the records are displayed in **Table 87** in Appendix 1.

Table 58: SM Mini O April-May 2021 River Tiffey static bat detector results

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
Soprano pipistrelle	4,622	513.56	711.56	225.02	20:19	05:10
Common pipistrelle	3,564	396	495.41	156.66	20:06	05:09
Daubenton's bat	109	12.11	10.27	3.25	20:41	03:31
Natterer's bat	67	7.44	7.79	2.46	20:35	04:17
Noctule	56	6.22	10.44	3.48	20:37	05:54
Brandt's bat	33	3.67	2.54	0.80	20:45	03:22
Brown long-eared bat	22	2.44	4.26	1.61	20:42	03:37
Nathusius' pipistrelle	12	1.33	3.12	0.99	20:27	21:23
Barbastelle	2	0.22	0.42	0.13	20:57	01:53

4.8.4 May 2021 River Tiffey static bat detector results (SM2 H)

SM2 H was deployed on the north side of the River Tiffey (**Figure 9**). The static bat detector was deployed for five nights from the evening of 19th May to the morning of 24th May 2021, but was only operational for the first three nights.

The static bat detector recorded 4,110 registrations across the five-night period. The majority of records were of pipistrelle bats, with soprano pipistrelle accounting for

2,789 registrations and common pipistrelle accounting for 1,254 registrations. There were also 20 registrations attributable to Nathusius' pipistrelle.

There were records of several different *Myotis* species Bats including Daubenton's bat (31), whiskered bat (11) and Natterer's bat (1).

The results are summarised in **Table 59**, below. The sunset/sunrise times and weather for the dates of the records are displayed in **Table 88** in Appendix 1.

Table 59: SM2 H May 2021 River Tiffey static bat detector results

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
Soprano pipistrelle	2,789	557.8	551.67	318.51	21:02	04:39
Common pipistrelle	1,254	250.8	289.26	167.01	21:09	04:35
Daubenton's bat	31	6.2	6.11	3.53	21:54	02:13
Nathusius' pipistrelle	20	4	10.69	6.17	21:29	02:21
Whiskered bat	11	2.2	1.53	0.88	21:26	04:14
Noctule	4	0.8	2.31	1.33	21:12	21:12
Natterer's bat	1	0.2	0.58	0.33	02:54	02:54

4.8.5 June 2021 River Tiffey static bat detector results (SM2 H)

SM2 H was deployed on the north side of the River Tiffey (**Figure 9**). It was deployed and operational for five nights from the evening of 10ᵗʰ June to the morning of 15ᵗʰ 2021.

The detector recorded 2,520 bat registrations from six species of bats across the five-night period. The majority of registrations are soprano pipistrelle (1,811).

Records of note include registrations of barbastelle (1), Nathusius' pipistrelle (2) and serotine (18). There were also several *Myotis* species registrations.

The results are summarised in **Table 60**, below. The sunset/sunrise times and weather for the dates of the records are displayed in **Table 89** in Appendix 1.

Table 60: SM2 H June 2021 River Tiffey static bat detector results

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
Soprano pipistrelle	1,811	362.2	259.65	106.00	21:37	04:04
Common pipistrelle	667	133.4	48.15	19.66	21:33	04:02

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
Daubenton's bat	18	3.6	2.45	1.00	22:01	03:57
Serotine	18	3.6	1.90	0.77	22:13	03:13
Brown long-eared bat	3	0.6	0.84	0.34	22:28	01:56
Nathusius' pipistrelle	2	0.4	0.82	0.33	03:24	03:24

4.8.6 July 2021 River Tiffey static bat detector results (SM2 N)

SM2 N was deployed on the north bank of the River Tiffey (**Figure 9**). It was deployed and operational for five nights from the evening of 7th July to the morning of 12th July 2021.

The detector recorded 1,147 bat registrations from five species of bat across the five-night period. The majority of registrations were of soprano pipistrelle (777).

Records of note include registrations of Nathusius' pipistrelle (3) and Daubenton's bat (36).

The results are summarised in **Table 61**, below. The sunset/sunrise times and weather for the dates of the records are displayed in **Table 92** in Appendix 1.

Table 61: SM2 N July 2021 River Tiffey static bat detector results

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
Soprano pipistrelle	777	155.4	58.23	23.77	04:26	21:08
Common pipistrelle	365	73	21.14	8.63	21:10	04:35
Daubenton's bat	36	7.2	8.39	3.43	22:00	00:51
Nathusius' pipistrelle	3	0.6	0.84	0.34	23:00	23:57
Noctule	2	0.4	0.82	0.33	21:57	22:22

4.8.7 August 2021 River Tiffey static bat detector results (SM2 K)

SM2 K was deployed in a grazing pasture to the north of the River Tiffey (**Figure 9**). It was deployed and operational for five nights from the evening of 6th August to the morning of 11th August 2021.

The detector recorded 359 bat registrations across the five-night period. The majority of registrations were of soprano pipistrelle (277).

Records of note include registrations of Daubenton's bat (2).

The results are summarised in **Table 62**, below. The sunset/sunrise times and weather for the dates of the records are displayed in **Table 97** in Appendix 1.

Table 62: SM2 K August 2021 River Tiffey static bat detector results

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
Soprano pipistrelle	277	55.4	0.41	0.17	20:37	05:11
Common pipistrelle	79	15.8	5.91	2.41	20:36	05:16
Daubenton's bat	2	0.4	0.52	0.21	21:17	22:13
Brown long-eared bat	1	0.2	14.69	6.00	04:24	04:24

4.8.8 September 2021 River Tiffey static bat detector results (SM Mini R)

SM Mini R was deployed in grazing pasture on the north bank of the River Tiffey (**Figure 9**). Originally, a detector was deployed earlier in the month (from 10th to 15th September), but due to fault it was re-deployed later in the month. It was deployed for five nights from the evening of 22nd September to the morning of 27th September 2021, but due to a high levels of noise files created (from crickets) it was only operational for the first two nights.

The detector recorded 126 bat registrations relating to six species of bats across the two-night period. The majority of registrations were of soprano pipistrelle (57).

Records of note include records of *Myotis* species including Daubenton's bat (27) and Natterer's bat (6).

The results are summarised in **Table 63**, below. The sunset/sunrise times and weather for the dates of the records are displayed in **Table 99** in Appendix 1.

Table 63: SM Mini R September 2021 River Tiffey static bat detector results

Species	Total registrations	Average registrations per night	Standard deviation	Standard deviation	Earliest registration	Latest registration
Soprano pipistrelle	57	11.4	36.06	25.50	19:06	01:42
Common pipistrelle	27	5.4	17.68	12.50	19:13	23:24
Daubenton's bat	27	5.5	9.19	6.50	20:18	02:34
Brown long-eared bat	9	1.8	3.54	2.50	18:53	00:16
Natterer's bat	6	1.2	2.83	2.00	21:40	00:14

4.9 Furze Meadow Results

Furze Meadow was surveyed across 2021. The static bat detectors were deployed to the south of Furze Meadow, along a small stream within the woodland. The most frequently recorded bat species was common pipistrelle, with soprano pipistrelle also regularly recorded. There were low numbers of registrations relating to noctule, brown long-eared bat, serotine, barbastelle and Daubenton's bat. Given the site is mainly used by common species of bat, Furze Meadow is considered to be of **Local** scale conservation importance for bats.

4.9.1 April 2021 Furze Meadow static bat detector results (SM Mini P)

SM Mini P was deployed at Furze Meadow in an area of woodland near Ketteringham (**Figure 10**). The static bat detector was operational and deployed for five nights from the evening of 21st April to the morning of 26th April 2021.

The detector recorded three registrations each relating to one of three bat species. The species recorded were common pipistrelle, soprano pipistrelle and noctule.

The results are summarised in **Table 64,** below. The sunset/sunrise times and weather for the dates of the records are displayed in **Table 85** in Appendix 1.

Table 64: SM Mini P April 2021 Furze Meadow static bat detector results

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
Noctule	1	0.2	0.45	0.2	05:38	05:38
Common pipistrelle	1	0.2	0.45	0.2	21:48	21:48
Soprano pipistrelle	1	0.2	0.45	0.2	21:07	21:07

4.9.2 June 2021 Furze Meadow static bat detector results (SM2 F)

SM2 F was deployed on the edge of a woodland to the south of Furze Meadow near Ketteringham (**Figure 10**). A detector was deployed earlier in the month (10th to 15th June), but due to a technical fault the device did not record. It was redeployed and was operational for five nights from the evening of 16th June to the morning of 21st June 2021.

There were only five registrations of bats, all of which relate to noctule.

The results are summarised in **Table 65**, below. The sunset/sunrise times and weather for the dates of the records are displayed in **Table 91** in Appendix 1.

Table 65: SM2 N June 2021 static bat detector results

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
Noctule	5	1	0.98	0.40	21:54	03:21

4.9.3 July 2021 Furze Meadow static bat detector results (SM2 K)

SM2 K was deployed in the south of Furze Meadow on the edge of a woodland (**Figure 10**). It was deployed and operational for five nights from the evening of 7th July to the morning of 12th July 2021.

The detector recorded 278 bat registrations across the five-night period. All the registrations were of pipistrelle species.

The results are summarised in **Table 66**, below. The sunset/sunrise times and weather for the dates of the records are displayed in **Table 92** in Appendix 1.

Table 66: SM2 I July 2021 Furze Meadow static bat detector results

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
Common pipistrelle	190	38	32.82	13.40	21:44	04:41
Soprano pipistrelle	88	17.6	14.72	6.01	21:20	04:28

4.9.4 August 2021 Furze Meadow static bat detector results (SM2 I)

SM2 H was deployed along the edge of a woodland at Furze Meadow (**Figure 10**). It was deployed and operational for five nights from the evening of 4th August to the morning of 9th August 2021.

The detector recorded 3,287 bat registrations across the five-night period. The majority of registrations were of common pipistrelle (2,202).

Records of note include registrations of barbastelle (9) and serotine (52).

The results are summarised in **Table 67**, below. The sunset/sunrise times and weather for the dates of the records are displayed in **Table 95** in Appendix 1.

Table 67: SM2 I August 2021 Furze Meadow static bat detector results

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
Common pipistrelle	2,202	440.4	307.62	125.58	21:10	05:02
Soprano pipistrelle	1,016	203.2	226.36	92.41	05:11	20:45
Serotine	52	10.4	6.02	2.46	21:28	04:37
Barbastelle	9	1.8	2.35	0.96	21:47	04:25
Brown long-eared bat	5	1	0.98	0.40	02:22	04:06
Noctule	3	0.6	0.84	0.34	21:38	22:12

4.9.5 September 2021 Furze Meadow static bat detector results (SM Mini O)

SM Mini O was deployed north of a woodland at Furze Meadow (**Figure 10**). Originally, a detector was deployed earlier in the month (from 10th to 15th September), but due to fault it was re-deployed later in the month. It was deployed for five nights from the evening of 22nd September to the morning of 27th September 2021, but due to a high levels of noise files created (from crickets) it was only operational for the first two nights.

The detector recorded 338 bat registrations relating to six species of bats across the two-night period. The majority of registrations were of common pipistrelle (212).

Records of note include barbastelle (7) and Daubenton's bat (2).

The results are summarised in **Table 68**, below. The sunset/sunrise times and weather for the dates of the records are displayed in **Table 100** in Appendix 1.

Table 68: SM Mini O September 2021 Furze Meadow static bat detector results

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
Common pipistrelle	212	42.4	5.66	4.00	19:25	05:44
Soprano pipistrelle	102	20.4	5.66	4.00	19:11	06:27
Brown long-eared bat	13	2.6	0.71	0.50	20:06	05:17
Barbastelle	7	1.4	0.71	0.50	21:51	04:36
Daubenton's bat	2	0.4	1.41	1.00	19:36	22:22
Noctule	2	0.4	0.00	0.00	19:01	02:19

4.10 Substation Results

The substation site was surveyed across 2021, with both static bat detector surveys and transect surveys undertaken. The surveys mainly recorded common pipistrelle as the most frequently registered bat species during the surveys. The surveys did record some rarer species including barbastelle, serotine and *Myotis* species but these were in low numbers. As such, the substation site is considered to be of **Local** scale conservation importance for bats.

4.10.1 April 2021 Substation static bat detector results (SM2 K)

SM2 K was deployed to the south of the onshore substation site, alongside a hedgerow (**Figure 11**). The static bat detector was operational and deployed for five nights from the evening of 21st April to the morning of 26th April 2021.

The detector recorded four registrations, two which related to common pipistrelles and two soprano pipistrelles.

The results are summarised in **Table 69,** below. The sunset/sunrise times and weather for the dates of the records are displayed in **Table 85** in Appendix 1.

Table 69: SM2 K April 2021 Substation static bat detector results

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
Common pipistrelle	2	0.2	0.89	0.4	02:39	02:52
Soprano pipistrelle	2	0.2	0.89	0.4	20:35	20:35

4.10.2 May 2021 Substation static bat detector results (SM2 I)

SM2 I was deployed alongside a hedgerow near the onshore substation site (**Figure 11**). It was operational and deployed for five nights from the evening of 19th May to the morning of 24th May 2021.

The static bat detector recorded 11 registrations across the five-night period. The majority of records were from common pipistrelles (8), with brown long-eared bat and Daubenton's bat both having low numbers of registrations.

The results are summarised in **Table 70**, below. The sunset/sunrise times and weather for the dates of the records are displayed in **Table 88** in Appendix 1.

Table 70: SM2 I May 2021 Substation static bat detector results

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
Common pipistrelle	8	1.6	3.06	1.53	23:06	02:09
Daubenton's bat	2	0.4	1.00	0.45	03:26	03:26
Brown long-eared bat	1	0.2	0.50	0.22	00:33	00:33

4.10.3 June 2021 Substation static bat detector results (SM2 J)

SM2 J was deployed attached to a tree centrally located at the onshore substation site (**Figure 11**). It was deployed and operational for five nights from the evening of 10th June to the morning of 15th June 2021.

The detector recorded 8,391 bat registrations across the five-night period. The majority of registrations were of common pipistrelle (7,856).

Records of note include registrations of barbastelle (5), Nathusius' pipistrelle (15) and serotine (2). There were also several *Myotis* species registrations.

The results are summarised in **Table 71**, below. The sunset/sunrise times and weather for the dates of the records are displayed in **Table 89** in Appendix 1.

Table 71: SM2 J June 2021 Substation static bat detector results

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
Common pipistrelle	7,856	1571.2	791.63	323.18	21:46	03:42
Soprano pipistrelle	389	77.8	65.03	26.55	22:05	04:02
Brandt's bat	72	14.4	11.66	4.76	22:18	03:35
Whiskered bat	23	4.6	3.76	1.54	22:55	03:09
Noctule	18	3.6	1.90	0.77	21:51	04:05
Nathusius' pipistrelle	15	3	1.87	0.76	21:52	03:30
Brown long-eared bat	11	2.2	2.14	0.87	22:22	03:38
Barbastelle	5	1.25	1.60	0.65	23:31	02:24
Serotine	2	0.4	0.82	0.33	23:52	02:40

4.10.4 July 2021 Substation static bat detector results (SM2 I)

SM2 I was deployed attached to a tree along a hedgerow at the onshore substation site (**Figure 11**). It was deployed and operational for five nights from the evening of 7th July to the morning of 12th July 2021.

The detector recorded 1,199 bat registrations from six species of bats across the five-night period. The majority of registrations were of common pipistrelle (1,123).

Records of note include registrations of serotine (2) and Natterer's bat (1).

The results are summarised in **Table 72**, below. The sunset/sunrise times and weather for the dates of the records are displayed in **Table 92** in Appendix 1.

Table 72: SM2 I July 2021 Substation static bat detector results

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
Common pipistrelle	1,123	224.6	147.56	60.24	21:43	03:55
Soprano pipistrelle	66	13.2	9.80	4.00	21:53	03:45
Noctule	6	1.2	1.10	0.45	21:44	23:01
Serotine	2	0.4	0.52	0.21	23:57	00:22
Natterer's bat	1	0.2	0.41	0.17	03:12	03:12
Brown long-eared bat	1	0.2	0.41	0.17	22:03	22:03

4.10.5 August 2021 Substation static bat detector results (SM2 N)

SM2 N was deployed attached to a tree centrally within the onshore substation site (**Figure 11**). It was deployed and operational for five nights from the evening of 4th August to the morning of 9th August 2021.

The detector recorded 534 bat registrations across the five-night period. The majority of registrations were of common pipistrelle (398).

Records of note include one registration of barbastelle (9).

The results are summarised in **Table 73**, below. The sunset/sunrise times and weather for the dates of the records are displayed in **Table 95** in Appendix 1.

Table 73: SM2 N August 2021 Substation static bat detector results

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
Common pipistrelle	398	79.6	83.17	33.95	21:16	04:35
Soprano pipistrelle	134	26.8	37.38	15.26	21:12	04:31
Barbastelle	1	0.2	0.41	0.17	04:19	04:19
Brown long-eared bat	1	0.2	0.41	0.17	00:36	00:36

4.10.6 September 2021 Substation static bat detector results (SM2 N)

SM2 N was deployed attached to a tree in a hedgerow bordering an arable field to the south of onshore substation site (**Figure 11**). It was deployed for five nights from the evening of 10th September to the morning of 15th September 2021.

The detector recorded 16 bat registrations relating to two species of bats across the five-night period. All of the registrations are of pipistrelle species; common pipistrelle and soprano pipistrelle, both with eight registrations.

The results are summarised in **Table 74**, below. The sunset/sunrise times and weather for the dates of the records are displayed in **Table 98** in Appendix 1.

Table 74: SM2 N September 2021 Substation static bat detector results

Species	Total registrations	Average registrations per night	Standard deviation	Standard error	Earliest registration	Latest registration
Common pipistrelle	8	1.6	2.16	1.08	20:14	00:26
Soprano pipistrelle	8	1.6	0.82	0.41	19:51	00:41

4.10.7 Substation transect survey results

The transects at the onshore substation site and surrounding land were undertaken monthly from April to September (inclusive) 2021. The results are summarised in **Table 75**, below and shown in **Figure 23** - **Figure 28**.

Table 75: Substation 2021 transect results

Month	Weather	Species	Total No. Registrations	Earliest Registration
April (28/04/21) Sunset: 20:16	Start Temp: 9°C End Temp: 6°C Cloud cover: 75% Wind Speed (BS): 2-3 No precipitation	Common pipistrelle	1	20:39
		Unidentified bat	1	20:41
May (19/05/21) Sunset: 20:51	Start Temp: 14.6°C End Temp: 12.4°C Cloud cover: 50% Wind Speed (BS): 0-1 No precipitation	Common pipistrelle	17	21:24
		Soprano pipistrelle	9	21:16
		Noctule	2	20:57
June (09/06/21) Sunset: 21:15	Start Temp: 21°C End Temp: 20°C Cloud cover: 0% Wind Speed (BS): 0-1 No precipitation	Soprano pipistrelle	19	22:03
		Common pipistrelle	14	21:59
		Noctule	1	22:00
		Serotine	1	22:54
		Myotis sp.	1	22:32
July (08/07/21) Sunset: 21:18	Start Temp: 16°C End Temp: 14°C Cloud cover: 80% Wind Speed (BS): 1 No precipitation	Common pipistrelle	51	21:54
		Soprano pipistrelle	5	21:54
		Noctule	1	22:00
August (04/08/21) Sunset: 20:42	Start Temp: 17°C End Temp: 13°C Cloud cover: 5% Wind Speed (BS): 1 No precipitation	Soprano pipistrelle	25	21:11
		Common pipistrelle	18	21:27
		Unidentified bat	3	21:42
September (10/09/21) Sunrise: 06:21	Start Temp: 16°C End Temp: 18°C Cloud cover: 0 % Wind Speed (BS): 0 No precipitation	Common pipistrelle	11	04:51*
		Soprano pipistrelle	2	05:29*
		Unidentified bat	1	04:45*

*Results from the dawn transect survey show the latest bat registration recorded rather than the earliest.

4.11 Summary of Static Bat Detector Survey Results

4.11.1 Summary of static bat detector surveys undertaken in 2020

Table 76*: Summary of results for static bat detector surveys undertaken in 2020*

Survey Location	Average number of bat registrations per night for bat detector deployments in:				Average for each species across all months
	Jun-Jul	**Jul-Aug**	**Aug-Sep**	**Sep-Oct**	
Weybourne Wood/ Hundred Acre Wood/Bodham Wood	0.19 common pipistrelle 0.06 noctule	4.6 common pipistrelle 1.2 soprano pipistrelle **0.08 *Myotis* sp.**	57 common pipistrelle 30 soprano pipistrelle 2 noctule **1.7 *Myotis* sp.** **0.46 barbastelle**	35 soprano pipistrelle 2.4 common pipistrelle	Common pipistrelle: 16 Soprano pipistrelle: 16.5 Barbastelle: 0.115 Myotis species: 0.445 Noctule: 0.515
River Bure	(no deployment at this location)	(no deployment at this location)	5.3 common pipistrelle 1.3 soprano pipistrelle 2.67 noctule **0.8 *Myotis* sp.** **0.2 barbastelle** 0.07 brown long-eared bat	22 common pipistrelle 7.8 soprano pipistrelle 7.8 noctule **2.5 barbastelle** **1.9 *Myotis* sp.** 0.45 brown long-eared bat	Common pipistrelle: 13.65 Soprano pipistrelle: 64.55 Barbastelle: 1.35 Brown long-eared bat: 0.26 Myotis species: 1.35 Noctule: 5.23

Survey Location	Average number of bat registrations per night for bat detector deployments in:				Average for each species across all months
	Jun-Jul	**Jul-Aug**	**Aug-Sep**	**Sep-Oct**	
Swannington (tributaries of the River Wensum)	(no deployment at this location)	72 common pipistrelle 20 soprano pipistrelle 5.1 noctule **0.3 *Myotis* sp.**	102 common pipistrelle 25 soprano pipistrelle 5.5 noctule **1.07 barbastelle** **0.27 *Myotis* sp.** 0.07 brown long-eared bat	(no deployment at this location)	Common pipistrelle: 87 Soprano pipistrelle: 22.5 Barbastelle: 0.535 Brown long-eared bat: 0.03 Myotis species: 0.28 Noctule: 5.23
River Wensum (including surrounding floodplain*)	708 soprano pipistrelle 133 common pipistrelle 42 noctule **38 *Myotis* sp.** 1.6 brown long-eared bat **1.3 barbastelle** **0.13 serotine**	180 soprano pipistrelle 23 common pipistrelle 14 noctule **4.3 *Myotis* sp.** **2 barbastelle** 0.33 brown long-eared bat	294 soprano pipistrelle 80 common pipistrelle **0.8 *Myotis* sp.** **0.8 Nathusius' pipistrelle** 0.2 noctule	**70 *Myotis* sp.** 9.4 noctule 4.4 common pipistrelle 3.4 soprano pipistrelle **0.18 barbastelle**	Common pipistrelle: 60.1 Soprano pipistrelle: 296.35 Barbastelle: 0.87 Brown long-eared bat: 0.48 Myotis species: 28.27 Noctule: 16.4 Nathusius's pipistrelle: 0.2 Serotine: 0.03
River Yare	(no deployment at this location)	74 soprano pipistrelle 42 common pipistrelle 1.7 noctule **1.5 *Myotis* sp.**	(no deployment at this location)	(no deployment at this location)	Common pipistrelle: 42 Soprano pipistrelle: 74 Myotis species: 1.5 Noctule: 1.7

Survey Location	Average number of bat registrations per night for bat detector deployments in:				Average for each species across all months
	Jun-Jul	Jul-Aug	Aug-Sep	Sep-Oct	
River Tiffey	197 soprano pipistrelle 91 common pipistrelle 23 noctule **2.1 *Myotis* sp.**	(no deployment at this location)	(no deployment at this location)	17 soprano pipistrelle 3.7 common pipistrelle **0.81 *Myotis* sp.** 0.45 noctule **0.09 barbastelle**	Common pipistrelle: 47.35 Soprano pipistrelle: 107 Barbastelle: 0.045 Myotis species: 1.46 Noctule: 11.73

Records of rarer species of bat (*Myotis* sp., barbastelle, Nathusius' pipistrelle and serotine) are emboldened to highlight these records.

Figure 29: Graph displaying average registrations per night for common and soprano pipstrelle at each location surveyed in 2020
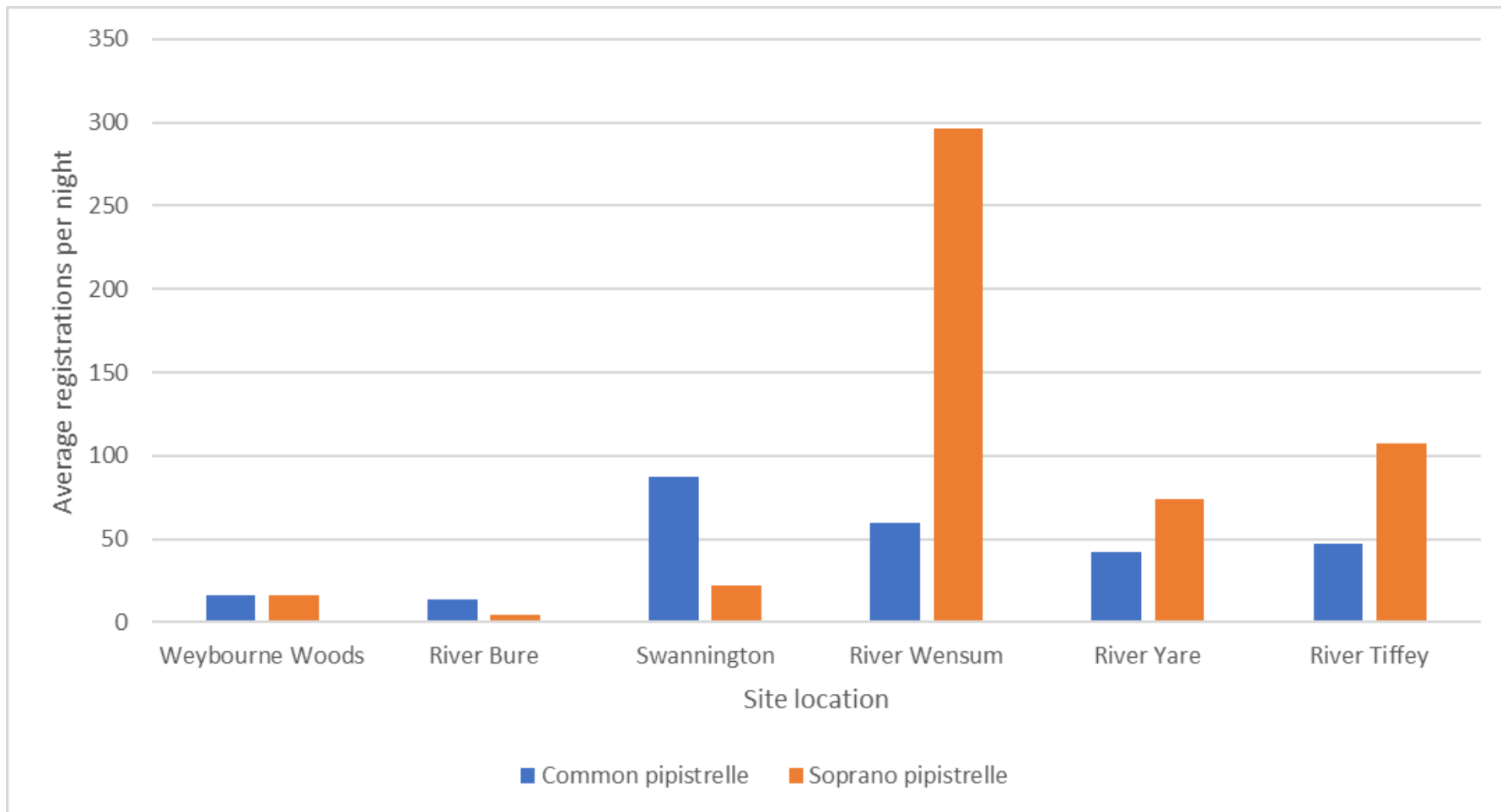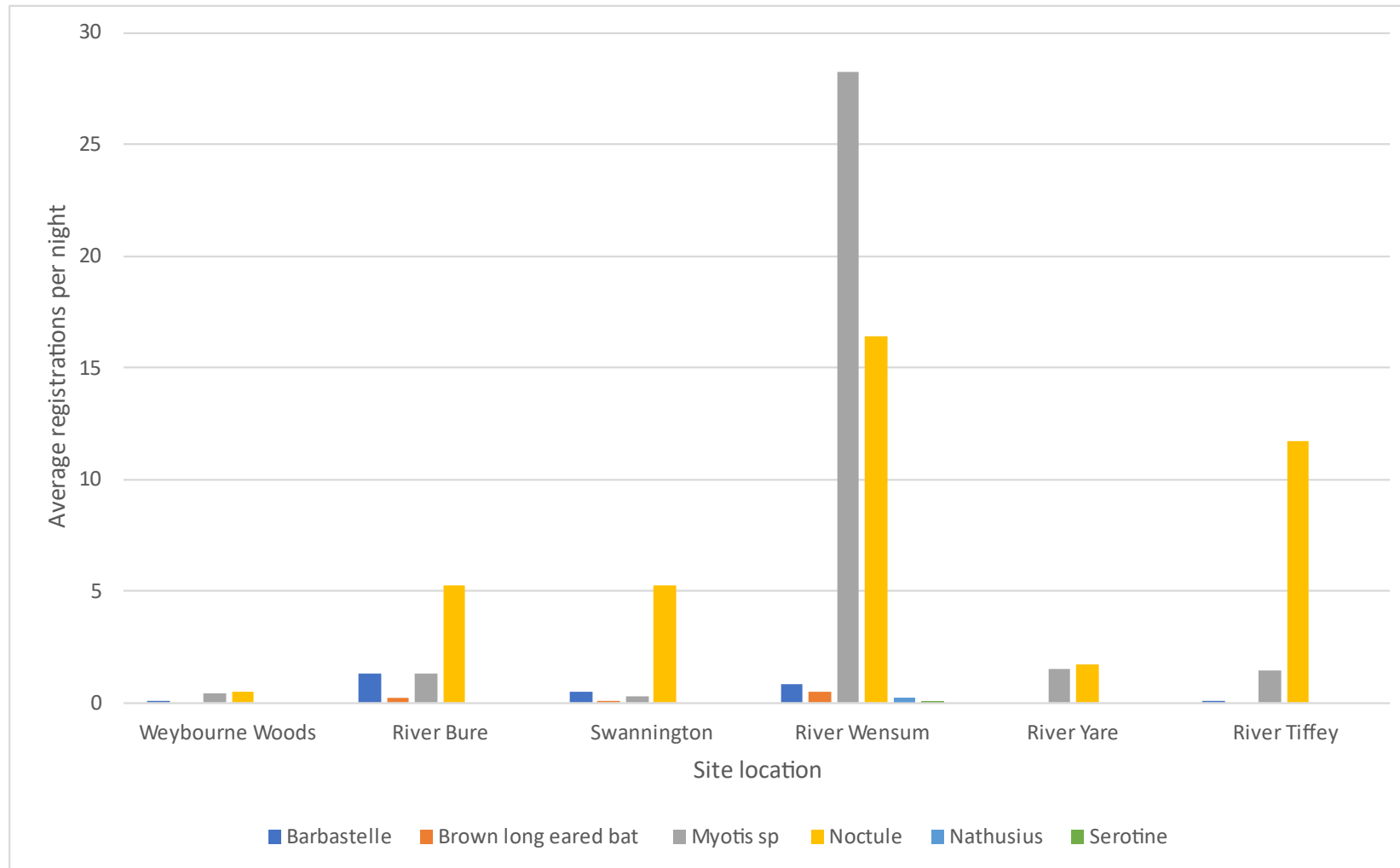
Figure 30: Graph displaying average registrations per night at each location surveyed in 2020 (all species recorded are inlcuded except for common and soprano pipstrelle)

4.11.2 Summary of static bat detector surveys undertaken in 2021

Table 77: Summary of results for static bat detector surveys undertaken in 2021

Survey Location	Average number of bat registrations per night for bat detector deployments in:						Average for each species across all months
	April	May	June	July	August	September	
Weybourne Wood/ Hundred Acre Wood/ Bodham Wood	(No deployment at this location)	0.2 Noctule	17.4 Soprano pipistrelle 14 Common pipistrelle **2.4 *Myotis* sp.** 1 50 kHz Pipistrellus **0.2 Barbastelle** **0.2 Daubenton's bat**	(Detector malfunction)	72 Common pipistrelle **4.2 Natterer's bat** 3.8 Noctule 1 Soprano pipistrelle **0.6 Barbastelle** 0.4 Brown long-eared bat **0.4 Nathusius' pipistrelle** **0.2 Serotine**	90 Common pipistrelle 11.6 Noctule 6.8 Soprano pipistrelle **3.8 Natterer's bat** 1.6 Brown Long-eared bat **0.6 Barbastelle** **0.2 Nathusius' pipistrelle**	Common pipistrelle: 44 Soprano pipistrelle: 6.3 Barbastelle: 0.35 Brown long-eared bat: 0.5 Myotis species: 0.6 Daubenton's bat: 0.05 Natterers: 0.95 Noctule: 3.9 Nathusius's pipistrelle: 0.15 Serotine: 0.05
River Bure	2.2 Common pipistrelle 1.8 Soprano pipistrelle 0.4 Brown long-eared bat **0.2 *Myotis* sp.**	(Detector malfunction)	152.6 Common pipistrelle 28.6 Soprano pipistrelle **9.8 Serotine** **3.2 Barbastelle** **1.2 Daubenton's bat** 1.2 Noctule **1 Brandt's bat** 0.2 Brown long-eared bat **0.2 Natterer's bat**	158 Common pipistrelle 11.4 Soprano pipistrelle **0.8 Barbastelle** 0.8 Noctule **0.6 Serotine** **0.2 Brown Long-eared bat**	211 Common pipistrelle 45 Soprano pipistrelle **14 Barbastelle** 11.6 Noctule **4 Daubenton's bat** 2.2 Brown long-eared bat **1.4 Natterer's bat**	1.8 Common pipistrelle 1.4 Soprano pipistrelle **0.4 *Myotis* sp.** 0.4 Noctule **0.2 Barbastelle**	Common pipistrelle: 105.2 Soprano pipistrelle: 17.6 Barbastelle: 4.55 Brown long-eared bat: 0.6 Myotis species: 0.08 Daubenton's bat: 1.04 Natterer's bat: 0.32 Brandt's bat: 0.2 Noctule: 2.8

							Serotine: 2.08
Swannington (tributaries of the River Wensum)	0.4 Noctule 0.4 Common pipistrelle **0.2 *Myotis* sp.** 0.2 Soprano pipistrelle	93.6 Common pipistrelle 0.8 Soprano pipistrelle	141 Noctule 16.4 Common pipistrelle **4.6 Natterer's bat** 4.4 Soprano pipistrelle 2 Brown long-eared bat **2 Daubenton's bat** **1 Barbastelle** **0.8 Serotine**	33.4 Noctule 10 Common pipistrelle 1.4 Soprano pipistrelle **1.6 Natterer's bat** 0.8 Brown long-eared bat	20 Common pipistrelle 18.8 Noctule 3.8 Soprano pipistrelle 0.8 Brown long-eared bat **0.8 Natterer's bat** **0.4 Daubenton's bat** **0.4 Serotine** **0.2 Barbastelle**	214.2 Common pipistrelle 34.8 Soprano pipistrelle 1 Brown long-eared bat	Common pipistrelle: 59.1 Soprano pipistrelle: 7.6 Barbastelle: 0.2 Brown long-eared bat: 0.76 Myotis species: 0.03 Daubenton's bat: 0.4 Natterer's bat: 1.16 Noctule: 32.2 Serotine: 0.2
River Wensum (including surrounding floodplain)	**4 Daubenton's bat** 3 Soprano pipistrelle 1.2 Common pipistrelle **1.2 Natterer's bat** **0.6 *Myotis* sp.**	191.2 Common pipistrelle 65.2 Soprano pipistrelle **11.2 Daubenton's bat** 3.6 Noctule **1 Whiskered bat** **0.8 Barbastelle** 0.8 Brown long-eared bat **0.2 Brandt's bat**	484.4 Soprano pipistrelle 69 Common pipistrelle **6.6 Daubenton's bat** **1.6 Brandt's bat** 1 Brown long-eared bat **0.6 Barbastelle** 0.4 Noctule **0.2 Nathusius' Pipistrelle**	(Detector malfunction)	71 Soprano pipistrelle 51.5 Common pipistrelle **2.5 Barbastelle** **1.5 Daubenton's bat** 1.5 Noctule	223 Soprano pipistrelle 72 Common pipistrelle 9.5 Noctule 1.5 Brown long-eared bat **0.5 Barbastelle** **0.5 *Myotis* sp.**	Common pipistrelle: 76.98 Soprano pipistrelle: 17.6 Barbastelle: 0.78 Brown long-eared bat: 0.66 Myotis species: 0.22 Daubenton's bat: 4.66 Natterer's bat: 0.24 Brandt's bat: 1.8 Whiskered: 0.2 Noctule: 2.28
Ringland Covert	0.3 Common pipistrelle	466.2 Common pipistrelle 41.6 Soprano pipistrelle **11 Serotine**	191.2 Common pipistrelle 97 Soprano pipistrelle **6.6 Nathusius'**	605.2 Common pipistrelle 472.4 Soprano pipistrelle **121.4 Barbastelle**	313.8 Common pipistrelle 135 Soprano pipistrelle **5.2 Nathusius'**	(No deployment at this location)	Common pipistrelle: 315.34 Soprano pipistrelle: 149.2 Barbastelle: 25.32

		7.4 Natterer's bat 3.8 Daubenton's bat 1.8 Nathusius' Pipistrelle 0.8 Barbastelle	Pipistrelle 4.4 Barbastelle 0.4 Natterer's bat	25.6 Nathusius' pipistrelle 18.6 Natterer's bat 12 Noctule 6 Brown long-eared bat 3.4 Daubenton's bat	pipistrelle 1.2 Barbastelle 1.2 Natterer's bat 1 Daubenton's bat		Brown long-eared bat: 1.2 Daubenton's bat: 2.32 Natterer's bat: 5.52 Noctule: 2.4 Nathusius's pipistrelle: 7.84 Serotine: 0.36
River Tud	(No deployment at this location)	191.4 Soprano pipistrelle 157.8 Common pipistrelle 10.2 Noctule 2 Nathusius' pipistrelle 0.4 Natterer's bat 0.2 Daubenton's bat	315.6 Soprano pipistrelle 179.6 Common pipistrelle 137.6 Noctule 3.8 Brown long-eared bat 3.8 Daubenton's bat 3.6 Nathusius' pipistrelle 2.8 Natterer's bat 1 Serotine 1 Brandt's bat	206.4 Soprano pipistrelle 166.2 Common pipistrelle 98.2 Serotine 22.4 Noctule 12 Barbastelle 7.2 Daubenton's bat 5.4 Brown long-eared bat 4 Nathusius' pipistrelle 2.2 Natterer's bat 1.8 Brandt's bat	340.4 Soprano pipistrelle 261.2 Common pipistrelle 24.2 Noctule 5.8 Daubenton's bat 4 Barbastelle 3.4 Serotine 2.6 Natterer's bat 1.8 Nathusius' pipistrelle 1.6 Brown long-eared bat	213.4 Soprano pipistrelle 23.8 Noctule 22.6 Common pipistrelle 11.4 Daubenton's bat 2 Natterer's bat 1.8 Brown long-eared bat	Common pipistrelle: 157.48 Soprano pipistrelle: 253.44 Barbastelle: 3.2 Brown long-eared bat: 2.52 Daubenton's bat: 28.4 Natterer's bat: 2 Brandt's bat: 0.56 Noctule: 43.4 Nathusius's pipistrelle: 2.32 Serotine: 20.52
River Yare	(No deployment at this location)	220.2 Soprano pipistrelle 102.8 Common pipistrelle 5.1 Daubenton's bat 0.2 Nathusius' pipistrelle	262.8 Common pipistrelle 38.2 Soprano pipistrelle 6.8 Nathusius' pipistrelle 0.8 Daubenton's bat 0.2 Barbastelle	334.4 Common pipistrelle 178.8 Noctule 51 Soprano pipistrelle 15.8 Nathusius' pipistrelle 8.6 Brown long-eared bat 3.8 Daubenton's	187.8 Common pipistrelle 142.2 Soprano pipistrelle 2 Daubenton's bat 0.8 Noctule 0.6 Serotine 0.2 Barbastelle	496.2 Common pipistrelle 425.2 Soprano pipistrelle 16.4 Daubenton's bat 15.6 Noctule 10.4 Brown long-eared bat 6.6 Natterer's bat	Common pipistrelle: 276.8 Soprano pipistrelle: 175.36 Barbastelle: 1.04 Brown long-eared bat: 3.8 Daubenton's bat: 5.62 Natterer's bat: 1.56

			bat **3.6 Barbastelle** **1.2 Natterer's bat** **0.2 Serotine**			**1.2 Barbastelle** **1 Brandt's bat** **1 Serotine** **0.4 Nathusius' pipistrelle**	Brandt's bat: 0.2 Noctule: 39.04 Nathusius's pipistrelle: 4.64 Serotine: 0.36
River Tiffey	513 Soprano pipistrelle 396 Common pipistrelle **12.1 Daubenton's bat** **7.4 Natterer's bat** 6.2 Noctule **3.6 Brandt's bat** 2.4 Brown long-eared bat **1.3 Nathusius' pipistrelle** **0.2 Barbastelle**	(No deployment at this location)	362.2 Soprano pipistrelle 133.4 Common pipistrelle **3.6 Daubenton's bat** **3.6 Serotine** 0.6 Brown long-eared bat **0.4 Nathusius' pipistrelle**	155.4 Soprano pipistrelle 73 Common pipistrelle **7.2 Daubenton's bat** **0.6 Nathusius' pipistrelle** 0.4 Noctule	55.4 Soprano pipistrelle 15.8 Common pipistrelle **0.4 Daubenton's bat** 0.2 Brown long-eared bat	11.4 Soprano pipistrelle 5.4 Common pipistrelle **5.4 Daubenton's bat** 1.8 Brown long-eared bat **1.2 Natterer's bat**	Common pipistrelle: 124.72 Soprano pipistrelle: 219.48 Barbastelle: 0.04 Brown long-eared bat: 1 Daubenton's bat: 5.74 Natterer's bat: 1.72 Brandt's bat: 0.72 Noctule: 1.32 Nathusius's pipistrelle: 0.46 Serotine: 0.16
Furze Meadow	0.2 Noctule 0.2 Common pipistrelle 0.2 Soprano pipistrelle	(No bat registrations on bat detector)	1 Noctule	38 Common pipistrelle 17.6 Soprano pipistrelle	440.4 Common pipistrelle 203.2 Soprano pipistrelle **10.4 Serotine** **1.8 Barbastelle** 1 Brown long-eared bat 0.6 Noctule	42.4 Common pipistrelle 20.4 Soprano pipistrelle 2.6 Brown long-eared bat **1.4 Barbastelle** **0.4 Daubenton's bat** 0.4 Noctule	Common pipistrelle: 86 Soprano pipistrelle: 40 Barbastelle: 0.64 Brown long-eared bat: 0.72 Daubenton's bat: 0.08 Noctule: 0.44 Serotine: 2.08
Substation	0.2 Common pipistrelle	1.6 Common pipistrelle	1571.2 Common pipistrelle	224.6 Common pipistrelle	79.6 Common pipistrelle	1.6 Common pipistrelle	Common pipistrelle: 312.96

	0.2 Soprano pipistrelle	**0.4 Daubenton's bat** 0.2 Brown long-eared bat	77.8 Soprano pipistrelle **14.4 Brandt's bat** **4.6 Whiskered bat** 3.6 Noctule **3 Nathusius' pipistrelle** 2.2 Brown long-eared bat **1.3 Barbastelle** **0.4 Serotine**	13.2 Soprano pipistrelle 1.2 Noctule **0.4 Serotine** **0.2 Natterer's bat** 0.2 Brown long-eared bat	26.8 Soprano pipistrelle **0.2 Barbastelle** 0.2 Brown long-eared bat	1.6 Soprano pipistrelle	Soprano pipistrelle: 19.9 Barbastelle: 0.3 Brown long-eared bat: 0.56 Daubenton's bat: 0.08 Natterer's bat: 0.04 Brandt's bat: 2.88 Whiskered bat: 0.92 Noctule: 0.96 Nathusius's pipistrelle: 0.6 Serotine: 0.16

Figure 31: Graph showing average registrations per night for common and soprano pipistrelle bats across the 2021 static detector surveys
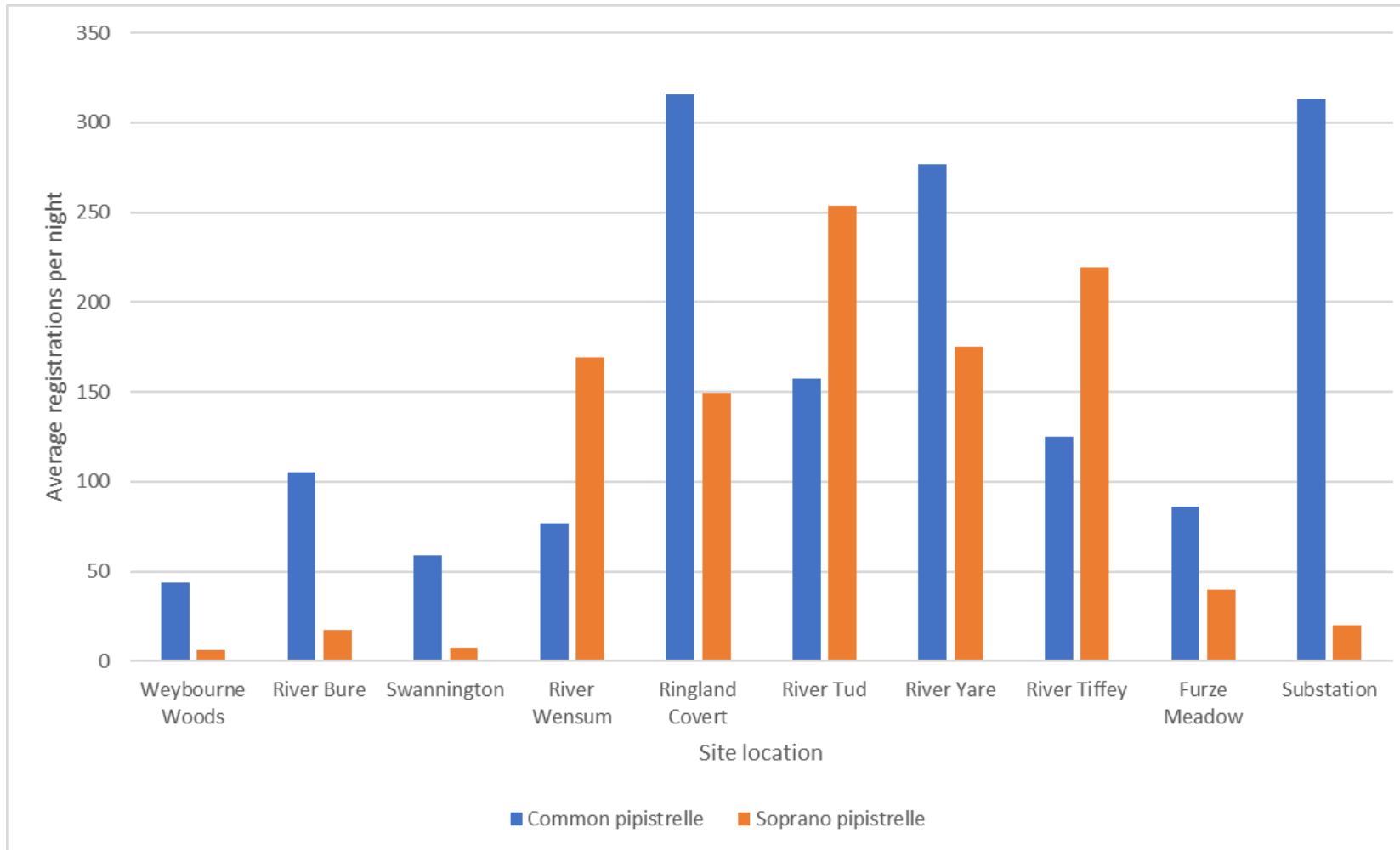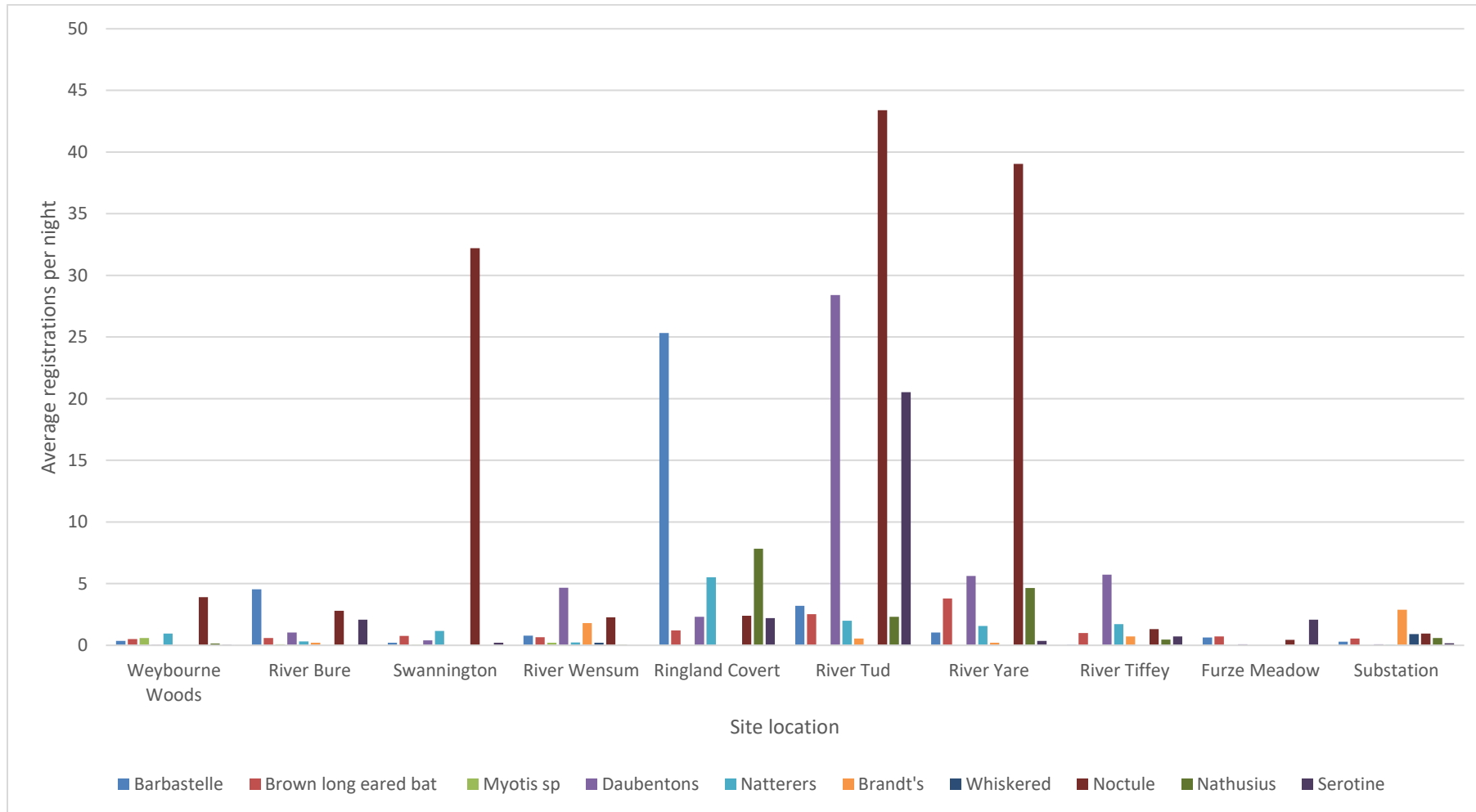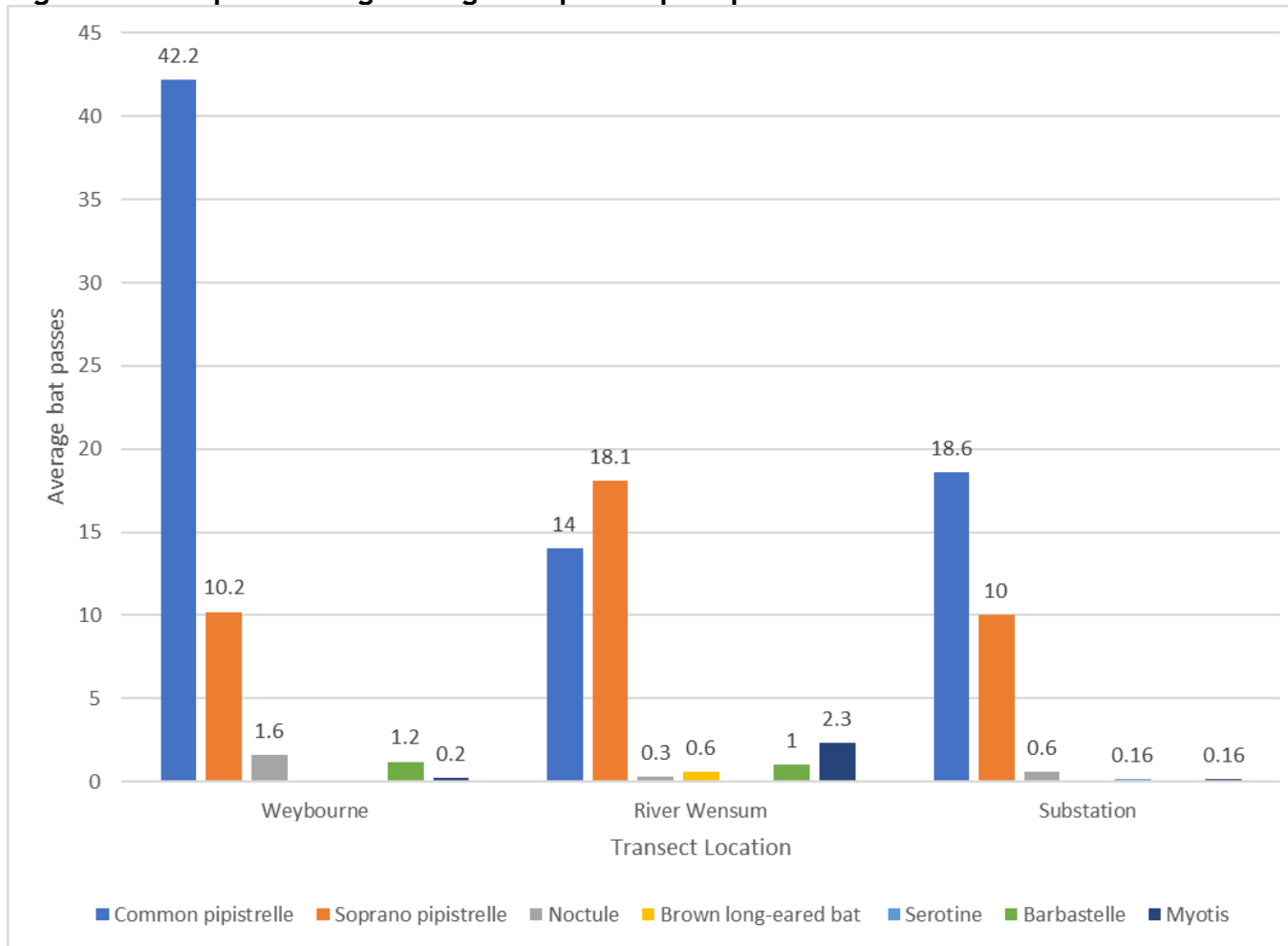
Figure 32: Graph showing average registrations per night for bats across the 2021 static detector surveys (excluding common and soprano pipistrelle

4.11.3 Summary of bat transect surveys undertaken in 2021

Figure 33: Graph showing average bat passes per species at the three transect locations

4.12 Data Search Results

The data provided by Wild Wings Ecology in relation to barbastelles shows the routes used by commuting barbastelles as well as important woodlands used for foraging and CSZ around known maternity roosts. The data is confidential so cannot be provided in full in this report. However, where commuting routes overlap with areas of the DCO boundary this has been displayed in **Figure 5**: Map showing static bat detector deployment locations and areas outlined as important commuting routes for barabstelles at the River Wensum The data also provides further evidence of a super colony for barbastelles located between Lenwade and A47. This corroborates with results of the Ringland Covert surveys, where high numbers of barbastelle registrations were recorded.

A data search for biological records was completed with the Norfolk Biodiversity Information Service (NBIS) in January 2021. The data search with NBIS returned 3,532 records of 12 confirmed species of bat within a 2km buffer of the DCO boundary. To further refine the data, it was manipulated to show only records within the DCO boundary and those of significance which lie outside of the DCO boundary. Records of significance were determined by the conservation status of the species[14][15]. Species considered rare include noctules, Nathusius's Pipistrelle, whiskered bat *Myotis mystacinus*, western barbastelle, Leisler's bat and serotine. They were only included in the results where the location of the record was within approximately 50m of the DCO boundary or well connected to the boundary via good quality habitat such as woodland and rivers.

There are 26 records of bats which lie within the DCO boundary and an additional 127 records of significance outside of the DCO boundary. The data search records for each species are summarised in **Table 78** and **Table 79**, below.

The records which lie within the DCO boundary are mostly concentrated around Ketteringham. There are occasional records both within and adjacent to other key areas such as Weybourne Woods, the River Wensum and the substation. There were no records for the other survey areas.

Table 78: Summary of data search records returned within the DCO boundary

Species	Number of records
Soprano pipistrelle	8
Pipistrelle sp.	8
Daubenton's bat	3
Natterer's	2
Brown long-eared bat	2
Noctule	1
Western Barbastelle	1
Unidentified	1

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[14] Battersby J. (2005) UK Mammals: Species Status and Population Trends. Online at:

[15] Mathews F, and Harrower C. (2020). IUCN – compliant Red List for Britain's Terrestrial Mammals. Assessment by the Mammal Society under contract to Natural England, Natural Resources Wales and Scottish Natural Heritage. Natural England, Peterborough ISBN 978-1-78354-485-1

Table 79: Summary of significant records returned outside of the DCO boundary

Species	Number of records
Noctule	66
Western Barbastelle	34
Serotine	22
Nathusius's Pipistrelle	2
Whiskered bat	2
Leisler's bat	1

4.13 Constraints and Limitations of Survey

The season of peak foraging/commuting bat activity is typically between April and October, inclusive. As static bat detector surveys in 2020 began in June (due to project constraints and limited landowner access), not all of the 2020 survey season has been covered. The 2021 survey season was also curtailed, with surveys not taking place in October due to conflicts with project timeframes. However, considering the surveys spanned five of the seven months in 2020 and six of the seven months in 2021 (and noting that central months of June, July and August were covered in both years), the data is considered sufficient to allow robust conclusions to be drawn.

Throughout the course of 2021 and early 2022, the DCO boundary was subject to ongoing refinement as part of the site selection process to refine the DCO boundary. Also, the static bat detector surveys in 2020 were based on the much wider PEIR boundary. As such, static detectors were deployed in a range of locations to reflect the survey area relevant at that given time. As a result, some static detectors are now located outside of the final DCO boundary. However, given that the majority of static detectors are still within the boundary, adjacent to the boundary or linked via habitat, this is not expected to be a significant constraint.

Where analysis has revealed bat activity close to sunset/sunrise times, this can be indicative of nearby roost locations. However, a different survey approach (i.e. emergence/re-entry surveys of potential roost features) would be required to confirm the location of any roosts. Roost surveys have been completed on selected trees within the DCO boundary, and a separate appendix is provided outlining the results (see Appendix 22.10).

On a number of the static bat detector deployments, the detectors ceased recording prematurely, resulting in comparatively shorter monitoring periods. The types of technological malfunctions experienced by the static bat detectors typically related to issues such as loss of battery power after a number of nights recording, the detectors' memory cards reaching capacity before the end of the deployment or in at least three cases the detectors were directly affected by cattle such that they ceased recording early. These are inherent technological issues with the models of detectors used, even though these are modern, widely used and relatively reliable detectors. In some cases, where these issues were noted, detectors were redeployed to obtain a full data set. Given the large amount of data collected for each site, this does not affect the validity of the results.

Loss of battery power and/or reaching memory card capacity can be a particular issue in areas of high bat activity (or high insect activity) where the detector is regularly drawing power and quickly accumulating data. To address this constraint, the data has

been analysed to provide an 'average number of registrations per night'. However, it is acknowledged that longer monitoring periods provide comparatively stronger data. Nevertheless, the data obtained and provided in this report is considered sufficiently robust to allow well-informed conclusions to be drawn.

Landowner access was sought and obtained for each completed bat survey. However, in some cases, access was not permitted. This is why some areas were not surveyed in some months, why some surveys took place on different dates to others, and why some detectors could not be redeployed after first deployments suffered a malfunction.

Bat data sent to the BTO was full spectrum recording so for some species groups e.g. Myotis bat species, more data was available to confidently assign bats to species level. Data analysed in house by WFE was largely zero cross files and therefore it was not always possible to split to species level.

4.14 Further Survey Requirements and Expiry Dates

The surveys undertaken comprising the static bat detector deployments and bat transect surveys will all be valid for one year (possibly up to 18 months if the habitat is unchanged). Where habitats at the key sites are expected to be unaffected by the proposed works, foraging bats using the sites are likely to remain at similar levels. If impacts on areas supporting key bat activity can be avoided (such as by adopting trenchless installation techniques at important sites), then the resulting low potential for impacts/effects on foraging bats would be considered to remove the requirement for additional/updated surveys. Minor residual risks to foraging bats (in a trenchless installation scenario) are expected to be able to be sufficiently addressed by adopting best-practice measures during construction.

In the event that sites supporting bats are due to be directly impacted (i.e. if trenchless installation of these sites cannot be accommodated), foraging bats would be at increased risk of negative impacts. This could include mortality or injury of individual bats (which could constitute a legal offence), destruction of a bat roost and/or destruction of key foraging habitat (which in turn can lead to the loss of a bat roost or roosts). In this scenario, a European Protected Species mitigation licence may be required (if roosting bats are to be affected) and a detailed mitigation plan would need to be produced to address the risks to foraging bats. Details of appropriate mitigation are provided within an Outline Landscape Management Plan and an Outline Ecological Management Plan, and include measures such as controlled artificial lighting, avoidance of night works at key times in key areas and avoidance/minimisation of impacts to habitats of importance to bats.

Post-construction habitat re-instatement will likely be required to ensure there are no long-term net losses in terms of quantity, quality and connectivity of important foraging bat habitat within and around the DCO boundary.

5. Conclusions

5.1 Site summaries

Weybourne Woods was surveyed across 2020 and 2021, with a number of static bat detector survey and transect surveys. The surveys found that common pipistrelle and soprano pipistrelle were the most commonly recorded species, with the average earliest and latest registration times suggesting that there could be roosts located in the vicinity. A number of rarer species were also recorded at Weybourne Woods, including *Myotis* species, barbastelle, serotine and Nathusius's pipistrelle. The data search also showed a number of barbastelle and noctule records within the woodland. The rarer species were not consistently recorded throughout the surveys, but given their presence and overall use of the woodland by bats, the site is considered to be of **Local** scale conservation importance for bats.

At the River Bure, a suite of static bat detector surveys was undertaken across 2020 and 2021. The surveys focussed on the north side of the river where there are small pockets of woodland and meadows which provide suitable foraging habitat for bats. Common pipistrelle was the most frequently recorded bat species, with average earliest and latest registration times close to sunset/sunrise times, indicating there could be roosts located nearby. Of particular note are the levels of barbastelle and serotine records at this location. The River Bure has the second highest average registrations per night recorded for barbastelles across the 10 target sites. In addition, there were low levels of other rarer species including Brandt's bat and Natterer's bat. Given the high levels of barbastelle recorded and the presence of other rarer species, the River Bure is considered to be of **District** scale conservation importance for bats.

For the static bat detector surveys undertaken at Swannington in 2020 and 2021, the surveys focussed on two key areas: a pocket of woodland located within grazing pasture and a meadow with varied structure which included a small stream and was adjacent to a plantation woodland. Across 2020, common pipistrelle was the most frequently recorded bat species compared to 2021 where noctule was the most frequently recorded. For both species, the average earliest and latest registration was close in time to the sunset/sunrise time, suggesting roosts could be located nearby. There were low levels of rarer species recorded including barbastelle, serotine and *Myotis* species. Given the site is frequently used by noctules and includes low levels of rarer species of bats, this site is considered to be of **District** scale conservation importance for bats.

Both static bat detector surveys and transect surveys were undertaken across 2020 and 2021. Surveys focussed on collecting data for bats using the River Wensum for commuting and for the surrounding floodplains. The static detectors recorded a high frequency of calls by soprano pipistrelle, with a peak of over 11,000 registrations in the first static deployment of 2020. Across all surveys soprano pipistrelle was the most frequently recorded species. The earliest/latest registration times are similar to sunset/sunrise times, suggesting there could be a roost located nearby. A range of rarer species were recorded at this site including barbastelle, serotine, Nathusius's pipistrelle and *Myotis* species. Given the high number of registrations of soprano pipistrelles and the range of rarer bats recorded at the site, the site is considered to be of **District** scale conservation importance for bats. Data searches and unseen data from Wild Wings Ecology purports to show a meta-population of barbastelle bats, considered to be of international importance, located around the River Wensum corridor and nearby woodlands in the general area between Lenwade and the A47. Given the summary maps from Wild Wing Ecology highlights the use of the river and surrounding woodlands as important for foraging and commuting bats and within core substance

zones of barbastelle maternity roosts, the River Wensum could be considered to be of **European** scale conservation importance for bats.

Static bat detector surveys were undertaken across 2021, with detectors placed in a range of locations centrally within the Ringland Covert woodland. The most frequently recorded bat species was common pipistrelle, with high levels of soprano pipistrelle also recorded. Given the earliest and latest registration times for both species closely align with sunset/sunrise times, there are likely roosts located nearby. Of particular note are the significant number of barbastelle registrations, particularly in July 2021 when over 600 registrations were recorded. This site recorded the highest number of registrations for barbastelle across all sites surveyed for bats. Timings suggest there could be a maternity roost or roosts nearby. There were also a number of rarer species recorded including serotine, Nathusius's pipistrelle, Brandt's bat and Natterer's bat. Given the significant levels of barbastelle recorded and the range of other rare species recorded at Ringland Covert this site is considered to be of **National** scale conservation importance for bats. As discussed for the River Wensum, unseen bat survey data collected by Wild Wings Ecology purports to show a meta-population of barbastelle bats, considered to be of international importance, located around the River Wensum corridor and nearby woodlands in the general area between Lenwade and the A47. The number of barbastelle registrations recorded by WFE during the 2020-21 bat surveys at Ringland Covert indicates that this woodland may support some part of this meta-population (for instance, in its capacity as a foraging site) and that the woodland is within CSZ of barbastelle maternity roosts. The unseen data from Wild Wings Ecology therefore concludes that the site is considered to be of European importance. However, this data is not published and has not been seen by WFE.

Static bat detector surveys were undertaken at the River Tud, with detectors mainly deployed along banks of the river either in grazing pasture or woodland. The highest number of registrations recorded during the surveys related to soprano pipistrelle, with common pipistrelle and noctule also frequently recorded. At the River Tud there were also high levels of both serotine and Daubenton's bat registrations. Given the earliest and latest times for all of these species, it is conceivable that there are roosts located in the vicinity. There were also other rarer species recorded including barbastelle, Nathusius's pipistrelle, Brandt's bat and Natterer's bat. Given the high frequency of registrations recorded for serotine and Daubenton's bats and the range of other species present at the River Tud, this site is considered to be of **District** scale conservation importance for bats.

Both banks of the River Yare and surrounding woodland habitat were surveyed across 2020 and 2021. Common pipistrelle was the most frequently recorded species, with the earliest and latest registration suggesting that roosts may be located nearby. There were rarer species recorded, including a significant number of Nathusius's pipistrelle registrations. Other rarer species recorded include serotine, Daubenton's bat, Natterers bat and Brandt's bat. Given the number of Nathusius's pipistrelle registrations and range of other rarer species recorded, the River Yare is considered to be of **District** scale conservation importance for bats.

The River Tiffey and surrounding floodplains were surveyed across 2020 and 2021. The surveys recorded registrations from a range of species, with common pipistrelle the most frequently recorded species. Earliest and latest registration times suggests that there could be roosts located nearby. Some rarer species were recorded using the site including Daubenton's bat, barbastelle, serotine and *Myotis* species. However, there were relatively low numbers of registrations, indicating that the site is not frequently used by these species. Given that common species of bat appear to use this site

frequently but rarer bats only use the site occasionally, the River Tiffey is considered to be of **Local** scale conservation importance for bats.

Furze Meadow was surveyed across 2021. The static bat detectors were deployed to the south of Furze Meadow, along a small stream within the woodland. The most frequently recorded bat species was common pipistrelle, with soprano pipistrelle also regularly recorded. There were low numbers of registrations relating to noctule, brown long-eared bat, serotine, barbastelle and Daubenton's bat. Given the site is mainly used by common species of bat, Furze Meadow is considered to be of **Local** scale conservation importance for bats.

The substation site was surveyed across 2021, with both static bat detector surveys and transect surveys undertaken. The surveys mainly recorded common pipistrelle as the most frequently registered bat species during the surveys. The surveys did record some rarer species including barbastelle, serotine and *Myotis* species but these were in low numbers. As such, the substation site is considered to be of **Local** scale conservation importance for bats.

5.2 Overall conclusions

The bat surveys have confirmed that bats are present/active across all of the targeted sites. Some sites such as Ringland Covert and the rivers are particularly important for foraging bats, including some rarer species. The survey data has been used to inform the ongoing site selection process. It also informs the bat impact assessment, and determines the requirements for mitigation.

Further bat surveys may be required pre-construction if construction impacts in areas which are important for foraging bats cannot be avoided. They may also be required where sensitive areas (such as Ringland Covert) supporting rarer species of bats such as barbastelle are to be affected. Mitigation may be necessary if construction impacts at important foraging sites cannot be avoided. Post-construction habitat reinstatement/management will also be required to ensure there are no long-term negative impacts to areas of suitable foraging and commuting habitat within and around the DCO boundary.

6. References

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Appendix 1: Weather conditions for static bat detector surveys

Weather conditions for the first static bat detector deployment (24th June – 8th/9th/10th July 2020)

Table 80: Summary of average weather and sunset/rise times for first 2020 deployment

Date	Sunrise time	Sunset time	Maximum Air Temperature	Minimum Air Temperature
24/06/2020	(Pre-deployment)	21:24	25ºC	15ºC
25/06/2020	04:32	21:24	23ºC	17ºC
26/06/2020	04:33	21:24	29ºC	17ºC
27/06/2020	04:33	21:23	23ºC	15ºC
28/06/2020	04:34	21:23	20ºC	11ºC
29/06/2020	04:35	21:23	17ºC	12ºC
30/06/2020	04:35	21:23	21ºC	13ºC
01/07/2020	04:36	21:22	20ºC	15ºC
02/07/2020	04:37	21:22	18ºC	13ºC
03/07/2020	04:38	21:22	19ºC	12ºC
04/07/2020	04:38	21:21	21ºC	15ºC
05/07/2020	04:39	21:20	21ºC	14ºC
06/07/2020	04:40	21:20	18ºC	12ºC
07/07/2020	04:41	21:19	17ºC	11ºC
08/07/2020	04:42	21:18	16ºC	12ºC
09/07/2020	04:43	21:18	18ºC	14ºC
10/07/2020	04:44	(Post-deployment)	17ºC	13ºC

Weather conditions for the second static bat detector deployment (30th July – 2nd/9th/10th/11th August 2020 and 19th August - 25th August 2020)

Table 81: Summary of average weather and sunset/rise times for the second 2020 deployment

Date	Sunrise time	Sunset time	Maximum Air Temperature	Minimum Air Temperature
30/07/2020	(Pre-deployment)	20:51	28ºC	13ºC
31/07/2020	05:13	20:49	31ºC	15ºC
01/08/2020	05:15	20:47	26ºC	17ºC
02/08/2020	05:16	20:46	22ºC	12ºC
03/08/2020	05:18	20:44	19ºC	10ºC
04/08/2020	05:20	20:42	22ºC	9ºC
05/08/2020	05:21	20:40	28ºC	16ºC
06/08/2020	05:23	20:38	27ºC	18ºC

Date	Sunrise time	Sunset time	Maximum Air Temperature	Minimum Air Temperature
07/08/2020	05:24	20:36	34ºC	15ºC
08/08/2020	05:26	20:35	24ºC	17ºC
09/08/2020	05:28	20:33	24ºC	17ºC
10/08/2020	05:30	(Post-deployment)	30ºC	17ºC

Weather and sunrise/sunset times for the later deployment period in August (19th-25th) are summarised in **Table 82**, below.

Table 82: Summary of weather and sunset/ sunrise times for SM2 1 (River Wensum)

Date	Sunrise time	Sunset time	Maximum Air Temperature	Minimum Air Temperature
19/08/2020	(Pre-deployment)	20:21	21ºC	15 ºC
20/08/2020	05:46	20:10	26ºC	17ºC
21/08/2020	05:48	20:08	23ºC	17ºC
22/08/2020	05:50	20:05	23ºC	15ºC
23/08/2020	05:51	20:03	22ºC	14ºC
24/08/2020	05:53	20:01	21ºC	11ºC
25/08/2020	05:15	(Post-deployment)	23ºC	14ºC

Weather conditions for the third static bat detector deployment (26th August – 9th/10th September 2020)

Table 83: Summary of average weather and sunset/rise times for the third 2020 deployment.

Date	Sunrise time	Sunset time	Maximum Air Temperature	Minimum Air Temperature
26/08/2020	(Pre-deployment)	19:57	19ºC	12ºC
27/08/2020	05:58	19:54	19ºC	12ºC
28/08/2020	06:00	19:52	17ºC	12ºC
29/08/2020	06:01	19:50	15ºC	14ºC
30/08/2020	06:03	19:47	16ºC	11ºC
31/08/2020	06:05	19:45	16ºC	8ºC
01/09/2020	06:06	19:43	17ºC	6ºC
02/09/2020	06:08	19:40	21ºC	6ºC
03/09/2020	06:10	19:38	22ºC	13ºC
04/09/2020	06:11	19:36	18ºC	12ºC
05/09/2020	06:13	19:33	18ºC	9ºC
06/09/2020	06:15	19:31	18ºC	9ºC
07/09/2020	06:17	19:29	19ºC	10ºC
08/09/2020	06:18	19:26	24ºC	15ºC
09/09/2020	06:20	19:24	23ºC	11ºC

| 10/09/2020 | 06:22 | (Post-deployment) | 17ºC | 10ºC |

Weather conditions for the forth static bat detector deployment (24th September – 2nd/5th October 2020)

Table 84: Summary of average weather and sunset/rise times for the fourth 2020 deployment.

Date	Sunrise time	Sunset time	Maximum Air Temperature	Minimum Air Temperature
24/09/2020	(Pre-deployment)	18:48	17ºC	8ºC
25/09/2020	06:47	18:46	11ºC	8ºC
26/09/2020	06:49	18:43	13ºC	8ºC
27/09/2020	06:50	18:41	13ºC	11ºC
28/09/2020	06:52	18:39	16ºC	9ºC
29/09/2020	06:54	18:36	15ºC	9ºC
30/09/2020	06:56	18:34	18ºC	9ºC
01/10/2020	06:57	18:32	17ºC	14ºC
02/10/2020	06:59	18:29	15ºC	8ºC
03/10/2020	07:01	18:27	15ºC	11ºC
04/10/2020	07:02	18:25	11ºC	9ºC
05/10/2020	07:04	(Post-deployment)	12ºC	5ºC

Weather conditions for April 2021 static bat detector deployment

Table 85: Summary of average weather and sunset/ sunrise times for the main April deployment (21st April -26th April 2021)

Date	Sunrise time	Sunset time	Maximum Air Temperature	Minimum Air Temperature
21/04/2021	(Pre-deployment)	20:06	10ºC	2ºC
22/04/2021	05:42	20:07	12ºC	-1ºC
23/04/2021	05:39	20:09	14ºC	0ºC
24/04/2021	05:37	20:11	13ºC	1ºC
25/04/2021	05:35	20:13	10ºC	4ºC
26/04/2021	05:33	(Post-deployment)	9ºC	3ºC

Table 86: Summary of weather and sunset/ sunrise times for the SM2 C (Ringland Covert)

Date	Sunrise time	Sunset time	Maximum Air Temperature	Minimum Air Temperature
23/04/2021	(Pre-deployment)	20:09	14ºC	0ºC
24/04/2021	05:37	20:11	13ºC	1ºC
25/04/2021	05:35	20:13	10ºC	4ºC
26/04/2021	05:33	20:14	9ºC	3ºC
27/04/2021	05:31	20:16	13ºC	1ºC

Date	Sunrise time	Sunset time	Maximum Air Temperature	Minimum Air Temperature
28/04/2021	05:29	20:17	12°C	7°C
30/04/2021	05:25	(Post-deployment)	10°C	3°C

Table 87: Summary of weather and sunset/ sunrise times for the SM Mini O (River Tiffey)

Date	Sunrise time	Sunset time	Maximum Air Temperature	Minimum Air Temperature
27/04/2021	(Pre-deployment)	20:16	13°C	1°C
28/04/2021	05:29	20:17	12°C	7°C
29/04/2021	05:27	20:19	10°C	6°C
30/04/2021	05:25	20:21	10°C	3°C
01/05/2021	05:23	20:23	9°C	1°C
02/05/2021	05:21	20:24	13°C	0°C
03/05/2021	05:19	20:26	12°C	6°C
04/05/2021	05:18	20:28	10°C	5°C
05/05/2021	05:16	20:29	11°C	2°C
06/05/2021	05:14	(Post-deployment)	10°C	0°C

Weather conditions for May 2021 static bat detector deployment

Table 88: Summary of average weather and sunset/ sunrise times for the main May deployment (19th May – 24th May 2021)

Date	Sunrise time	Sunset time	Maximum Air Temperature	Minimum Air Temperature
19/05/2021	(Pre-deployment)	20:52	17°C	7°C
20/05/2021	04:51	20:53	14°C	5°C
21/05/2021	04:50	20:55	13°C	10°C
22/05/2021	04:49	20:56	11°C	7°C
23/05/2021	04:47	20:58	14°C	4°C
24/05/2021	04:46	(Post-deployment)	15°C	7°C

Weather conditions for June 2021 static bat detector deployment

Table 89: Summary of average weather and sunset/ sunrise times for the main June deployment (10th June – 15th June 2021)

Date	Sunrise time	Sunset time	Maximum Air Temperature	Minimum Air Temperature
10/06/2021	(Pre-deployment)	21:19	23°C	15°C
11/06/2021	04:32	21:19	24°C	16°C
12/06/2021	04:31	21:20	19°C	11°C
13/06/2021	04:31	21:21	26°C	10°C
14/06/2021	04:31	20:21	25°C	15°C

15/06/2021	04:31	(Post-deployment)	20°C	12°C

Table 90: Summary of weather and sunset/ sunrise times for the SM2 H (Ringland Covert)

Date	Sunrise time	Sunset time	Maximum Air Temperature	Minimum Air Temperature
16/06/2021	(Pre-deployment)	21:21	28°C	12°C
17/06/2021	04:31	21:22	20°C	14°C
18/06/2021	04:31	21:22	15°C	12°C
19/06/2021	04:31	21:22	15°C	12°C
20/06/2021	04:31	21:23	14°C	10°C
21/06/2021	04:32	(Post-deployment)	15°C	10°C

Table 91: Summary of weather and sunset/ sunrise times for the SM2 F (Furze Meadow)

Date	Sunrise time	Sunset time	Maximum Air Temperature	Minimum Air Temperature
16/06/2021	(Pre-deployment)	21:21	28°C	12°C
17/06/2021	04:31	21:22	20°C	14°C
18/06/2021	04:31	21:22	15°C	12°C
19/06/2021	04:31	21:22	15°C	12°C
20/06/2021	04:31	21:23	14°C	10°C
21/06/2021	04:32	(Post-deployment)	15°C	10°C

Weather conditions for July 2021 static bat detector deployment

Table 92: Summary of average weather and sunset/ sunrise times for the main July deployment (7th July – 12th July 2021)

Date	Sunrise time	Sunset time	Maximum Air Temperature	Minimum Air Temperature
07/07/2021	(Pre-deployment)	21:21	22°C	12°C
08/07/2021	04:42	21:20	21°C	13°C
09/07/2021	04:43	21:20	22°C	12°C
10/07/2021	04:45	21:19	20°C	14°C
11/07/2021	04:46	21:18	21°C	14°C
12/07/2021	04:47	(Post-deployment)	20°C	15°C

Table 93: Summary of weather and sunset/ sunrise times for SM Mini T (Ringland Covert

Date	Sunrise time	Sunset time	Maximum Air Temperature	Minimum Air Temperature
14/07/2021	(Pre-	21:13	20°C	14°C

	deployment)			
15/07/2021	04:50	21:12	19°C	12°C
16/07/2021	04:51	21:11	22°C	12°C
17/07/2021	04:52	21:10	26°C	13°C
18/07/2021	04:54	21:09	28°C	16°C
19/07/2021	04:55	(Post-deployment)	24°C	14°C

Table 94: Summary of weather and sunset/ sunrise times for SM Mini P (River Tud)

Date	Sunrise time	Sunset time	Maximum Air Temperature	Minimum Air Temperature
14/07/2021	(Pre-deployment)	21:13	20°C	14°C
15/07/2021	04:50	21:12	19°C	12°C
16/07/2021	04:51	21:11	22°C	12°C
17/07/2021	04:52	21:10	26°C	13°C
18/07/2021	04:54	21:09	28°C	16°C
19/07/2021	04:55	(Post-deployment)	24°C	14°C

Weather conditions for August 2021 static bat detector deployment

Table 95: Summary of average weather and sunset/ sunrise times for the main August deployment (4th August – 9th August 2021)

Date	Sunrise time	Sunset time	Maximum Air Temperature	Minimum Air Temperature
04/08/2021	(Pre-deployment)	20:43	21°C	9°C
05/08/2021	05:21	20:41	22°C	9°C
06/08/2021	05:23	20:39	22°C	14°C
07/08/2021	05:24	20:37	20°C	13°C
08/08/2021	05:26	20:35	19°C	14°C
09/08/2021	05:28	(Post-deployment)	21°C	12°C

Table 96: Summary of weather and sunset/ sunrise times for SM Mini O (River Tud)

Date	Sunrise time	Sunset time	Maximum Air Temperature	Minimum Air Temperature
11/08/2021	(Pre-deployment)	20:31	25°C	14°C
12/08/2021	05:33	20:29	24°C	15°C
13/08/2021	05:35	20:27	23°C	14°C
14/08/2021	05:37	20:25	23°C	15°C
15/08/2021	05:38	20:23	23°C	14°C
16/08/2021	05:40	(Post-deployment)	18°C	12°C

Table 97: *Summary of weather and sunset/ sunrise times for SM2 K (River Tiffey)*

Date	Sunrise time	Sunset time	Maximum Air Temperature	Minimum Air Temperature
06/08/2021	(Pre-deployment)	20:39	22ºC	14ºC
07/08/2021	05:24	20:37	20ºC	13ºC
08/08/2021	05:26	20:35	19ºC	14ºC
09/08/2021	05:28	20:33	21ºC	12ºC
10/08/2021	05:29	20:31	23ºC	12ºC
11/08/2021	05:31	(Post-deployment)	25ºC	14ºC

Weather conditions for September 2021 static bat detector deployment

Table 98: *Summary of average weather and sunset/ sunrise times for the main September deployment (10th September -15th September 2021)*

Date	Sunrise time	Sunset time	Maximum Air Temperature	Minimum Air Temperature
10/09/2021	(Pre-deployment)	19:24	23ºC	16ºC
11/09/2021	06:24	19:21	23ºC	15ºC
12/09/2021	06:26	19:19	20ºC	13ºC
13/09/2021	06:27	19:16	19ºC	12ºC
14/09/2021	06:29	19:14	18ºC	13ºC
15/09/2021	06:31	(Post-deployment)	19ºC	11ºC

Table 99: *Summary of weather and sunset/ sunrise times for SM Mini R (River Tiffey)*

Date	Sunrise time	Sunset time	Maximum Air Temperature	Minimum Air Temperature
22/09/2021	(Pre-deployment)	18:55	21ºC	9ºC
23/09/2021	06:44	18:52	22ºC	12ºC
24/09/2021	06:46	18:50	23ºC	12ºC
25/09/2021	06:48	18:48	24ºC	15ºC
26/09/2021	06:49	18:45	22ºC	15ºC
27/09/2021	06:51	(Post-deployment)	18ºC	11ºC

Table 100: *Summary of weather and sunset/ sunrise times for SM Mini O*

Date	Sunrise time	Sunset time	Maximum Air Temperature	Minimum Air Temperature
22/09/2021	(Pre-deployment)	18:55	21ºC	9ºC
23/09/2021	06:44	18:52	22ºC	12ºC
24/09/2021	06:46	18:50	23ºC	12ºC
25/09/2021	06:48	18:48	24ºC	15ºC
26/09/2021	06:49	18:45	22ºC	15ºC
27/09/2021	06:51	(Post-deployment)	18ºC	11ºC