



Pennant Walters

Mynydd y Glyn Wind Farm

Draft Environmental Statement

Appendix 8B: Bat Survey Report



This report was prepared by WSP Environment & Infrastructure Solutions UK Limited (formerly known as Wood Environment & Infrastructure Solutions UK Limited), company registration number 02190074, which is carrying out these services as a subcontractor and/or agent to Wood Group UK Limited

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Report for

Pennant Walters

Main contributors

Jenny Iles
Katie Watkins
Gary Lindsay

Issued by

PP

Chris Prydderch

.....
Jenny Iles

Approved by

Chris Hill

.....
Chris Hill

WSP Environment & Infrastructure Solutions UK Limited

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1. Introduction

1.1 Background

- 1.1.1 Pennant Walters is seeking consent for a wind farm of up to seven turbines on land at Mynydd y Glyn, Pontypridd ('the Site'). The Site lies within the Rhondda Cynon Taf County Borough Council administrative area and is located approximately 3km west of Pontypridd (National Grid Reference (NGR) ST 03605 89504). The Site comprises a plateau of grazing pasture with areas of conifer plantation woodland and blanket bog and measures approximately 182.27 hectares (ha), (see **Figure 1.1, Annex A**).
- 1.1.1 WSP E&IS UK Ltd (WSP) was commissioned by Pennant Walters to undertake a suite of bat surveys to assess the baseline condition for the Site to inform the assessment of potential effects arising from the Proposed Development and the identification of an appropriate mitigation strategy and calculation of the collision risk.

1.2 This report

- 1.1.2 This report provides the methods and results of bat baseline surveys carried out between April 2020 and July 2021 and is an update to the bat report submitted as part of EIA Scoping in 2021. Surveys have been ongoing in 2022; where surveys are completed, and results analysed these are also summarised in this report. Findings of all surveys have fed into the evolving project design and the development of appropriate mitigation and enhancement measures and have informed the Environmental Impact Assessment (EIA). Due to ongoing analysis of 2022 automated recorder data this report does not provide a complete assessment of the status of bat populations on the Site, which will be provided within the final Environmental Statement (ES). Notwithstanding the data presented is from two years of data collection across the Site and whilst turbine locations and therefore detector locations have moved the majority have stayed in the same general area of the Site and in contiguous habitats, therefore the data is robust enough to allow for a preliminary assessment to be made.
- 1.2.1 This report presents the methods and findings of the baseline bat surveys. The structure of the report is as follows:
- Section 2 – Methods;
 - Section 3 – Results;
 - Section 4 – Summary;
 - Section 5 – Collision Risk Assessment; and
 - Section 6 – Further Survey.

1.3 Survey area

- 1.1.3 The bat survey area incorporates the current Site Boundary, an additional 275m buffer (200m plus a maximum potential rotor radius of 75m) was also added to the area of the Site where the turbines were proposed as shown on **Figure 1.2, Annex A**. The access track and Grid Connection corridor did not require a 275m buffer in line with guidance as the extended search area is associated with assessing impacts to roosts from collision risk/barotrauma, which occurs from turbines only. The survey area has changed over the

duration of the survey period in response to altering scheme designs, therefore, some of the locations surveyed in 2020 may not fall within the current survey area but do, however remain relevant to the baseline, providing overall context.

1.4 Legislative and policy context

- 1.4.1 All British bat species are protected under UK and European legislation (see **Annex B** of this report), such that it is a criminal offence to disturb, injure or kill any bat, or damage or destroy a bat roost (even when no bats are present).
- 1.4.2 In addition, the following national and local planning policies require the consideration of biodiversity/nature conservation and provide guidance/considerations for developments affecting designated sites and habitats, along with protected priority habitats and species:
- Future Wales: The National Plan 2040;¹
 - Planning Policy Wales – Chapter 6 Distinctive and Natural Places (11th Ed.; 2021)²;
 - Technical Advice Note 5 (TAN5) Nature Conservation and Planning (2009);³
 - Rhondda Cynon Taf Local Development Plan (LDP) up to 2021 (adopted 2011⁴);
 - The Rhondda Cynon Taf Supplementary Planning Guidance (SPG) Nature Conservation 2011; and
 - Rhondda Cynon Taf Biodiversity Action Plan (Action for Nature) 2000 (updated 2008).
- 1.4.3 In order to ensure compliance with the relevant legislation and policy, it is necessary to understand how bats use features within the Site so that the effects of the proposed development on bat populations can be appropriately assessed and mitigated for.

¹ Welsh Government (2021) Future Wales: The National Plan 2040, February 2021. [online]. Available at: <https://gov.wales/future-wales-national-plan-2040>

² Welsh Government (2021) Planning Policy Wales, Edition 11, February 2021. [online]. Available at: https://gov.wales/sites/default/files/publications/2021-02/planning-policy-wales-edition-11_0.pdf. [Accessed 01 December 2021].

³ Welsh Government, (2009). Planning Policy Wales Technical Advice Note 5: Nature Conservation and Planning.

⁴ Rhondda Cynon Taf County Borough Council (2011) Local Development Plan up to 2021. [online]. Available at: <https://www.rctcbc.gov.uk/EN/Resident/PlanningandBuildingControl/LocalDevelopmentPlans/RelateddocumentsLDP20062021/AdoptedLocalDevelopmentPlan.pdf>. [Accessed 19 April 2022].

2. Methodology

2.1 Overview

1.1.4 A variety of methods have been used to assess the use of the Site by bats, in line with best practice guidelines. Bats and Onshore Wind Turbines (2019 edition updated 2021)⁵ and the Bat Conservation Trust (BCT) third edition of Good Practice Guidelines⁶ were the main source of guidance when designing the survey methodology and programme of survey work. The Bat Mitigation Guidelines⁷, Bat Workers' Manual⁸, Bat Tree Habitat Key⁹ and British Standard 8596:2015¹⁰ provide further guidance that has been taken into account. The available guidance has been interpreted using professional experience to develop a detailed survey design specific to the survey area and adapted as necessary to account for emerging survey data.

1.1.5 The remainder of this section describes the following survey methods that have been applied over the survey period (between 2020 and 2022).

- desk study;
- field survey: roost identification:
 - ▶ preliminary appraisal of potential bat roost features;
 - ▶ built structures (external inspection);
 - ▶ trees (ground level roost assessment, potential roost feature [PRF] inspection); and
 - ▶ emergence and re-entry survey.
- field survey: bat activity:
 - ▶ preliminary appraisal of habitats for bats;
 - ▶ manual transects; and
 - ▶ automated monitoring.

2.1.1 This section then goes on to describe:

- methods used to aid species identification;
- environmental conditions considered in survey design and recorded during field survey work;
- the presence of limitations which may affect field surveys; and
- personnel involved.

⁵ SNH, NE, NRW, Renewable UK, Scottish Power Renewables, Ecotricity Ltd, University of Exeter and BCT *et al.* *Bats and onshore wind turbines: survey, assessment and mitigation*. 2021

⁶ J. Collins (ed.). *Bat surveys for professional ecologists: Good practice guidelines*. 3rd Edition. London: Bat Conservation Trust, 2016.

⁷ A.J. Mitchell-Jones. *Bat Mitigation Guidelines*. Peterborough: Natural England, 2004.

⁸ A.J. Mitchell-Jones A.P. McLeish, A.P. *Bat Workers' Manual*. 3rd Edition. Peterborough: JNCC, 2004.

⁹ H. Andrews. *Bat roosts in trees: a guide to identification and assessment for tree-care and ecology professionals*. Exeter: Pelagic Publishing, 2018.

¹⁰ British Standards Institution. *BS 8596:2015: Surveying for bats in trees and woodland*. London: BSI. 2015.

2.2 Personnel

- 1.1.6 All survey work was led and organised by Chris Hill MCIEEM. Chris is registered under Natural England (NE) Class Licence 2 (registration no. 2015-15031-CLS-CLS) and has over 12 years' experience in ecological consultancy. Tree and building inspections were led and undertaken by Kelly Jones. Kelly is registered under Natural Resources Wales (NRW) (registration no. S088838/1) and has over 10 years' experience in ecological consultancy. The additional survey area for tree and building inspections were undertaken by Katie Watkins. Katie is registered under Natural Resources Wales (NRW) (registration no. S091198/1) and has over three years' experience in ecological consultancy. The survey leads were assisted by suitably qualified and experienced Wood ecologists; details of whom are provided in **Table C.6, (Annex C)**.

2.3 Desk study

- 2.3.1 A desk study was carried out in 2020 to feed into the design of field surveys. The following data sources were consulted as part of the desk study:
- South East Wales Biodiversity Records Centre (SEWBRc) – Records of bats within a 10km radius of the Site boundary.
- 2.3.2 The desk study will be updated prior to final ES and planning application.

2.4 Field survey: roost identification

Preliminary appraisal of potential bat roost features

- 2.4.1 A walkover survey of the bat survey area (**Figure 1.2, Annex A**) was undertaken on 29 April and 01 May 2020. During this survey all trees and built structures¹¹ were assessed for their potential to support roosting bats. This included an appraisal of the exterior of built structures to consider the presence, or likely presence, of potential roost features (PRFs) such as roof voids or weatherboarding.
- 2.4.2 The survey area has changed over the duration of the survey period in response to altering scheme designs, therefore, in 2022 additional surveys were undertaken to assess any trees or built structure within the new boundary for their potential to support roosting bats.
- 2.4.3 This was a high-level scoping exercise and did not involve assessing every individual tree, but where groups of trees occur together (e.g. woodland) a general assessment was made of the tree group and its potential to support bat roosts.

Built structures

Overview

- 2.4.4 **Table 2.1** lists the built structures assessed in 2020 and 2021 and indicates which methods have been applied at each structure and the date on which the surveys were carried out. The methods adopted at each building were selected based on those that were deemed most appropriate, considering initial survey results and the suitability and

¹¹ Built structures is used to refer to all natural and constructed features surveyed within the bat survey area such as buildings and rock excavations; but excludes trees.

type of PRFs present. Built structure locations are shown in **Figure 3.2, (Annex A)**. No new built structures were identified in 2022 in response to the evolving scheme design.

Table 2.1 Built structures external inspection dates

Building Structure ID	External Inspection	Internal Inspection	Summer 2021 Monitoring
B1	29.06.2020	N/A	N/A
B2	29.06.2020	10.08.2021	N/A
B3	30.07.2020	N/A	N/A
B4	30.07.2020	N/A	N/A
B5	30.07.2020	11.08.2021	Emergence / re-entry: 12.08.2021 24.08.2021 08.09.2021
B6	30.07.2020	11.08.2021	N/A

External inspection

- 1.1.7 To build upon the preliminary appraisal of built structures, a more detailed visual inspection of the exterior of built structures within the bat survey area, where accessible, was carried out in July 2020. This inspection assessed the level of potential suitability to support roosting bats, categorised as either negligible, low, moderate or high, as set out in **Table 2.2**.

Table 2.2 Criteria used for categorising the level of potential for built structures to support roosting bats

Potential Roost Suitability	Requirements
Negligible	Structures with negligible features likely to be used by roosting bats.
Low	A structure with one or more potential roost sites that could be used by individual bats opportunistically. However, these potential roost sites do not provide enough space, shelter, protection, appropriate conditions and/or suitable surrounding habitat to be used on a regular basis or by larger numbers of bats.
Moderate	A structure with one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions and surrounding habitat but unlikely to support a roost of high conservation status.
High	A structure with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions and surrounding habitat.

- 1.1.8 A general description of the structure was made, along with consideration of the following factors:

- the presence of PRFs such as roof voids and soffit boxes with access gaps and gaps under bargeboards, roof tiles, hanging tiles and weatherboarding;
- expected levels of artificial lighting around potential roost entrances;
- expected levels of disturbance to any potential roost;
- quality of adjoining or connecting habitat for roosting bats at the site of the structure, and the potential for bat foraging and commuting routes in the surrounding area; and
- which 'type' of bat roost the feature might be suitable for i.e. maternity, hibernation or solitary day roost, etc.

1.1.9 In addition, the exteriors of buildings near potential roost entrances (e.g. gaps under soffits and hanging tiles) were examined using binoculars and a powerful torch to look for signs of bats, such as staining or droppings.

1.1.10 Built structures were categorised by their highest potential to support any type of roost. For example, if a structure had high potential to support a maternity roost of bats in the summer, but only low potential to support hibernating bats in the winter, the structure was categorised as having high potential to support roosting bats overall.

Emergence and re-entry survey

1.1.11 Dusk emergence and dawn re-entry survey visits of built structures identified as having low, moderate or high potential suitability for roosting bats, were carried out between June and September 2021, specific dates are provided in **Table 2.1**.

1.1.12 Teams of ecologists visited built structures at dusk or dawn to monitor bat emergence or re-entry from PRFs or potential access/egress points. Surveyors were positioned appropriately around the built structure to provide suitable coverage of all PRFs, bat activity was then recorded using a combination of visual observation and full spectrum bat detectors (Elekon Batlogger M). Canon XA30 video cameras with infrared capabilities accompanied by separate powerful infrared light sources, were used to aid surveyors in low light levels. On occasion, specific PRFs were monitored using standalone cameras and light sources. Where this was the case, video recordings were later fully reviewed in real time by an ecologist to check for any bat emergence or re-entry that may have been recorded.

1.1.13 The survey effort that was applied for emergence and re-entry survey for each built structure was dependent on their roost categorisation from earlier survey work. **Table 2.3** shows the recommended survey effort from the BCT Good Practice Guidelines.

1.1.14 Dusk emergence survey visits began at least 15 minutes before sunset and ended 120 minutes after sunset, encompassing the typical emergence periods for UK bat species. Dawn re-entry survey visits began 120 minutes before sunrise and ended at least 15 minutes after sunrise, encompassing the typical re-entry periods of UK bats.

Table 2.3 Recommended survey effort to give confidence in a negative result for structures

Low Roost Potential	Moderate Roost Potential	High Roost Potential
One visit between May and August	Two separate visits between May and September, with at least one survey between May and August	Three separate visits between May and September, with at least two surveys between May and August
Either a dusk emergence OR a dawn re-entry	One dusk emergence and a separate dawn re-entry	One dusk emergence and a separate dawn re-entry. The third visit could be either dusk emergence or dawn re-entry

Trees

Overview

1.1.15 **Tables D.1 and D.2 (Annex D)** lists the trees assessed in 2020 and 2021 and indicates which methods have been applied at each tree and the date on which the surveys were carried out. One additional tree was identified in 2022 in response to the altering scheme designs and is listed in **Table D.2**. The survey methods adopted at each tree were selected based on those that were deemed most appropriate, considering initial survey results and the suitability and type of PRFs present. Tree locations are shown in **Figure 3.3, (Annex A)**.

Ground level roost assessment

- 1.1.16 To build upon the preliminary bat appraisal, a more detailed visual inspection of trees within the bat survey area was carried out to assess their level of potential suitability to support roosting bats. The trees were inspected from ground level between May and July 2020 with the additional survey area inspected in June 2022, using close focussing binoculars and a powerful light source, and assessed with consideration of the following.
- the presence of PRFs such as rot holes; knot holes; tear outs; flush cuts; hazard beams; wounds; cankers; and other cavities, splits or lifting bark (which are arboricultural terms for such features);
 - expected levels of artificial lighting around potential roost entrances;
 - expected levels of disturbance to any potential roost; and
 - quality of adjoining or connecting habitat for roosting bats at the site of the structure, and the potential for bat foraging and commuting routes in the surrounding area.
- 1.1.17 The assessed trees were categorised in accordance with their level of potential suitability to support roosting bats, as set out in **Table 2.4**.

Table 2.4 Criteria used for categorising the level of potential for trees to support roosting bats

Potential Roost Suitability	Requirements
Negligible	Trees with no visible features likely to be used by roosting bats
Low	A tree of sufficient size and age to contain PRFs but with none seen from the ground or features seen with only very limited roosting potential
Moderate	A tree with one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions and surrounding habitat but unlikely to support a roost of high conservation status
High	A tree with one or more PRFs that are suitable for use by large numbers of bats on a regular basis, and potentially for longer periods of time due to their size, shelter, protection, conditions and surrounding habitat
Confirmed roosts	Where it was possible to determine that the tree supports a PRF that is used or has been used by bats. Any tree confirmed to support roosting bats during subsequent survey works was also moved into this category

1.1.18 For all trees categorised as having high or moderate potential to support roosting bats, a unique reference number was assigned, a photograph was taken, and the following details were recorded:

- grid reference;
- tree species;
- tree diameter at breast height (DBH);
- tree height (measured using a clinometer);
- number and type of PRF(s);
- approximate height of PRF(s), and whether they were on the stem or a limb; and
- aspect that the PRF(s) were facing.

1.1.19 Full details of low and negligible potential trees were not recorded, and these trees were not considered for further assessment.

PRF inspection

1.1.20 PRFs occurring up to 2m from ground level were inspected either from ground level or using a ladder. PRFs above this height were accessed using rope and harness climbing techniques, where safe to do so. All PRF inspections were undertaken using an endoscope and torch, once during the winter period (January- February) in 2021 and once during the summer period (August) in 2021.

1.1.21 PRF inspections updated the ground level roost assessments and recorded additional characteristics of each feature, including approximate internal cavity dimensions and the type of bat roost the feature had potential to support. These were defined as:

- maternity roosts supported by larger cavities and utilised between May and August by female bats and their young;
- hibernation roosts supported by a range of cavity sizes but providing constant humidity and temperatures for bats between the months of October and March; and
- day roosts supported by a range of cavity sizes, but usually smaller, supporting individual or small groups of bats between the months of March and November.

1.1.22 Any bats, or evidence of bat occupation (including staining, smoothing of bark and droppings) was recorded, and a photograph of each PRF was taken for reference and to aid future identification of individual features if such were required.

1.1.23 While in the canopy it is often possible to identify features that are not visible from ground level. Therefore, any additional PRFs observed, that had not been identified from the ground level assessment were recorded and inspected and then included in further survey work, as appropriate. Trees were 'scoped out' from requiring further survey during this exercise, where close inspection revealed them to provide low or negligible potential to support roosting bats.

1.1.24 If found during PRF inspection work, droppings were collected and submitted for DNA analysis to confirm the identification of bat species. Samples were not sent for analysis if bats were present could be confidently identified to species level.

Winter PRF inspection

1.1.25 Trees categorised as providing a high level of bat roost potential during the ground level roost assessment were taken forward for winter inspection. The decision to take forward high potential trees only was based on the Bats and Onshore Wind Turbines guidance which outlines that key features that could support maternity roosts and significant hibernation or swarming sites (both of which may attract bats from numerous colonies from a large catchment) should be taken forward. It was considered that only the trees with high potential roost suitability met these criteria.

Summer PRF inspection

1.1.26 Summer PRF inspections were limited to those trees with moderate and high potential roost suitability located within direct land take or within 100m of proposed turbines and 50m of associated infrastructure. Due to an evolving scheme design, some of the trees included within the winter PRF inspection were scoped out of further survey.

2.5 Field survey: bat activity

Preliminary appraisal of habitats for bats

1.1.27 During the initial walkover of the bat survey area in April and May 2020, the habitats were assessed for their potential to support foraging and commuting bats. An overall category was assigned, taking into account the features summarised in **Table 2.5**.

Table 2.5 Factors considered when assessing the potential suitability of the bat survey area for bats

Potential Suitability	Requirements
Negligible	<ul style="list-style-type: none"> - Negligible habitat features on the Site that are likely to be used by foraging or commuting bats. - Habitat may be brightly lit by artificial lighting.
Low	<ul style="list-style-type: none"> - Habitat that could be used by small numbers of commuting bats such as a gappy hedgerow or unvegetated stream, but isolated and not well connected to the surrounding landscape by other habitat. - Suitable but isolated habitat that could be used by small numbers of foraging bats such as a lone tree or patch of scrub. - Site may be well-lit by artificial lighting in some areas.
Moderate	<ul style="list-style-type: none"> - Continuous habitat connected to the wider landscape that could be used by bats for commuting such as lines of trees and scrub. - Habitat that is connected to the wider landscape that could be used by bats for foraging, such as trees, scrub, grassland or water. - Habitat may be lit by artificial lighting, but this is low-level and/or only affects parts of the site.
High	<ul style="list-style-type: none"> - Continuous, high-quality habitat that is well connected to the wider landscape and likely to be regularly used by commuting bats. Such as river valleys, vegetated streams, intact hedgerows and woodland edge. - High quality habitat that is well connected to the wider landscape and likely to be rich in invertebrate prey. Such as broadleaved woodland, tree-lined watercourses, water bodies and grazed parkland. - Habitat is typically unlit by artificial lighting.

Manual transects

Overview

1.1.28 During the active bat survey period (April to October), two transect routes, approximately 4km in length, were designed to incorporate the areas of habitat categorised as moderate and high potential suitability for foraging and commuting bats. The transect routes are shown in **Figures 2.1**. **Table 2.6** presents the dates on which manual transect survey visits were carried out.

Table 2.6 Manual transect survey visits 2020 – dates, and start and end times in relation to sunset

Date	Start/End Time of Transect
20 th May 2020	21:07/23:44*
9 th June 2020	21:27/00:27
30 th July 2020	21:05/00:05
10 th September 2020	19:40/22:40

Date	Start/End Time of Transect
16 th September 2020	19:24/21:54*
12 th October 2020	18:36/21:36

*Survey cut short due to very strong winds

2020 manual transect survey

- 1.1.29 During the active bat survey period of 2020, transect routes (1 and 2), were designed to incorporate the areas of habitat categorised as moderate and high potential suitability for foraging and commuting bats.
- 1.1.30 During each survey visit the surveyor walked at least two circuits of the transect route from sunset, until approximately three hours after sunset; recording the number of 'bat passes' of each species, and the type of activity heard (e.g. foraging, social calls). For the purpose of this assessment, a "pass" is defined as the sequence of calls¹² a bat makes as it flies past, typically getting louder then quieter as the distance between bat and surveyor changes.
- 1.1.31 While walking the transect route, surveyors observed bat activity (light levels permitting) and recorded bat calls using Elekon BatLogger M handheld detectors. Calls were subsequently analysed using BatExplorer software to aid species identification (see **Section 2.6**).
- 1.1.32 Each transect route was surveyed simultaneously once per month between May to October inclusive. The starting point of the transect route was varied between visits to enable sampling of different parts of the route at differing periods of time after sunset.

Automated monitoring

- 1.1.33 To monitor bat activity throughout the night at proposed turbine locations, an Elekon Batlogger A+ was installed at, or as close as possible to each of the proposed locations. Detectors were deployed to record bat calls continuously from 30 minutes before sunset to 30 minutes after sunrise for a minimum of ten nights per season through the active bat survey season (spring, summer and autumn). The monitoring locations for 2020, 2021 and 2022 are shown with reference to the current proposed turbine positions in **Figure 2.2, Figure 2.3 and Figure 2.4 (Annex A)**. Best efforts were made to achieve ten consecutive nights of automated monitoring in optimal weather conditions within each seasonal window. Notwithstanding, some monitoring nights fell outside of the optimum weather conditions set out in **Section 2.7**.
- 1.1.34 Currently a scheme for up to seven turbines is being taken forward; the proposed turbine locations were amended over the course of the survey period with one additional device deployed from the summer 2021 monitoring period onwards to account for this. The other proposed turbine locations remained in similar habitat but have moved as the design evolved.
- 1.1.35 Posts were used to elevate the microphones to a height of 2m from the ground. In 2020 proposed turbine locations were monitored per season as per guidance in spring (May), summer (July) and autumn (September). Whilst a sufficient baseline level of survey had been achieved in 2020 to inform an impact assessment, the proposed turbine locations were monitored again in April, May, June and July 2021 to increase the baseline dataset and to gather activity data alongside a weather station which was erected on Site. Due to

¹² Bat "calls" are the individual clicks made by bats as they echolocate.

evolving scheme designs additional data was collected in 2022 in the summer (July) and autumn (September) period. **Table 2.7** provides specific dates of automated monitoring at the proposed turbine locations.

1.1.36

Exceptions to this were:

- location 7: evolution of scheme design added this proposed turbine location for the 2021 summer monitoring period; however, this was also in the area where automated detector 1 was located in 2020.

Table 2.7 Automated monitoring at proposed turbine locations survey dates

Automated Monitoring Location	British National Grid Reference 2020	Spring Monitoring (May 2020)	Summer Monitoring (July 2020)	Autumn Monitoring (September 2020)	British National Grid Reference 2021	Spring Monitoring (April 2021)	Spring Monitoring (May 2021)	Summer Monitoring (June 2021)	Summer Monitoring (July 2021)	British National Grid Reference 2022	Summer Monitoring (July 2022)	Autumn Monitoring (September 2022)
1	ST 03246 89768	14.05.2020 – 31.05.2020	01.07.2020 – 15.07.2020	07.09.2020 – 25.09.2020	ST 02987 89734	01.04.2021 – 21.04.2021	01.05.2021 – 30.05.2021	01.06.2021 – 30.06.2021	01.07.2021 – 19.07.2021	ST 02930 89735		01/09/2022 – 20/09/2022
2	ST 03327 89397	14.05.2020 – 31.05.2020	01.07.2020 – 15.07.2020	07.09.2020 – 25.09.2020	ST 03120 89391	01.04.2021 – 21.04.2021	01.05.2021 – 30.05.2021	01.06.2021 – 30.06.2021	01.07.2021 – 19.07.2021	ST 03185 89395		01/09/2022 – 20/09/2022
3	ST 03677 89263	14.05.2020 – 31.05.2020	01.07.2020 – 15.07.2020	07.09.2020 – 25.09.2020	ST 03673 89405	01.04.2021 – 21.04.2021	01.05.2021 – 30.05.2021	01.06.2021 – 30.06.2021	01.07.2021 – 19.07.2021	ST 03690 89455		01/09/2022 – 20/09/2022
4	ST 03553 88821	14.05.2020 – 31.05.2020	01.07.2020 – 15.07.2020	07.09.2020 – 25.09.2020	ST 03432 88958	01.04.2021 – 21.04.2021	01.05.2021 – 30.05.2021	01.06.2021 – 30.06.2021	01.07.2021 – 19.07.2021	ST 03525 88975		01/09/2022 – 20/09/2022
5	ST 03183 88942	14.05.2020 – 31.05.2020	01.07.2020 – 15.07.2020	07.09.2020 – 25.09.2020	ST 03018 89075	01.04.2021 – 21.04.2021	01.05.2021 – 30.05.2021	01.06.2021 – 30.06.2021	01.07.2021 – 19.07.2021	ST 03070 88985		01/09/2022 – 20/09/2022
6	ST 03744 89877	14.05.2020 – 31.05.2020	01.07.2020 – 15.07.2020	07.09.2020 – 25.09.2020	ST 04184 89354	01.04.2021 – 21.04.2021	01.05.2021 – 30.05.2021	01.06.2021 – 30.06.2021	01.07.2021 – 19.07.2021	ST 04185 89380		01/09/2022 – 20/09/2022
7					ST 03450 89817				01.07.2021 – 19.07.2021	ST 03395 90000	05/07/2022 – 22/07/2022	01/09/2022 – 20/09/2022

- 1.1.37 As far as possible, at least ten consecutive nights of data per month, from each recording location was analysed using BatExplorer software to identify bats to species level, or to genus or species group where the characteristics of the call were common to more than one species (**Section 2.6**). Each file was assigned to a species/species group, or multiple species and/or multiple individuals where such was observed. Each one was counted as a 'recording', which are typically the length of a single bat pass, or continue for a maximum of 20 seconds, where bat activity continues.
- 1.1.38 Prior to deployment and at intervals of every five days during recording periods, all automated bat detectors, cables and microphones were checked, and the microphones tested and calibrated to ensure operation at the same level of sensitivity.

Ecobat analysis

- 1.1.39 Analysis of the data collected during the automated monitoring included use of Ecobat¹³ to aid in quantifying bat activity levels in the context of bat activity levels recorded elsewhere in the region. Ecobat is an online tool that compares data collected by automated bat detectors at any given site with data collected by the same means at the same time of year within a defined search radius. The reference range data set were stratified to include:
- all available records (not limited by the time of year¹⁴);
 - records within a 100km radius of the survey location; and
 - records using any make or model of bat detector.
- 1.1.40 The Ecobat software runs the analysis at both the 'site scale' to allow an overall assessment of bat activity across the Proposed Development and at the 'local scale', allowing assessment of individual automated monitoring locations.
- 1.1.41 Through generating a percentile rank for each night of bat activity, the Ecobat tool can identify the number of nights in which species data collected by a static detector could be considered to represent 'high', 'moderate/ high', moderate, 'low/moderate', or 'low' levels of activity, as shown in **Table 2.8**.

Table 2.8 Ecobat percentile score and categorised level of bat activity

Percentile Score	Bat Activity Level
81 - 100	High
61 - 80	Moderate - High
41 - 60	Moderate
21 - 40	Low - Moderate
0 - 20	Low

Extracted from *Bats and onshore wind turbines* (2019)⁵.

¹³ Ecobat, <http://www.ecobat.org.uk/> accessed on November 2021

¹⁴ The interim report presented data against 30 days of the survey dates, following NRW consultation (7/09/21) it was agreed that this was a very narrow comparative window.

2.6 Species identification

1.1.42 Analysis of bat recordings was carried out with reference to published guidance to aid species identification^{15,16}. Where records from the bat detector surveys (manual transect survey and automated monitoring) were not identified to species level during the sound analysis process due to the overlapping call parameters of some species, records were identified to genus or species group, with the following groups used:

- CP/SP (common pipistrelle or soprano pipistrelle);
- NP/CP (Nathusius' pipistrelle or common pipistrelle);
- NSL or Nyctaloid (noctule, Leisler's bat or serotine);
- *Nyctalus* sp. (noctule or Leisler's bat);
- *Myotis* sp. (bat species in the genus *Myotis*);
- *Plecotus* sp. (brown or grey long-eared bat); and
- Bat sp. (calls that could not be ascribed to a species group).

1.1.43 The majority of recordings of bats in the genus *Myotis* were grouped together, as these species in particular have widely overlapping call parameters. Similarly, it is not possible to distinguish between the two British species of long-eared bats through flight observations and sound recordings alone, therefore recordings were grouped as '*Plecotus* sp.' rather than identified to species.

2.7 Environmental conditions

1.1.44 Manual transect survey and automated monitoring were undertaken as far as practically possible when there was little or no rain, maximum ground wind speed of 5 metres per second (m/s) and the temperature was 10°C and above as, in these weather conditions, bats are unlikely to be deterred from flying. Temperature, humidity, cloud cover and rainfall levels were recorded by the surveyors during each manual survey session. Any other environmental conditions that may affect bat activity, such as high noise or artificial light levels, were also noted.

1.1.45 During automated monitoring 2020, weather recordings were taken directly after each recording night from <https://www.wunderground.com>. During automated monitoring 2021 a weather station was deployed on Site near proposed Turbine Location 4. Full details of weather conditions experienced during automated detector survey work are provided in **Table C.1** (2020) and **C.2** (2021) (**Annex C**).

1.1.46 The weather station, a Davis Vantage Vue, was set up to take weather reading every five minutes. Prior to deployment and at intervals of every five days during automated recording periods, cables and monitoring kit were checked and tested.

¹⁵ J. Russ, J. British Bat Calls a Guide to Species Identification. Exeter: Pelagic Publishing, 2012

¹⁶ N. Middleton, A. Froud and K. French. Social calls of the bats of Britain and Ireland. Exeter: Pelagic Publishing, 2014.

2.8 Field survey limitations

Roost identification surveys

- 2.8.1 Access could not be gained for internal inspections in the built structures identified within the bat survey area in 2020 due to access restrictions predominately associated with the Covid-19 pandemic. Access was granted for the summer inspections in 2021.

Bat activity surveys

- 2.8.2 The Site is subject to high levels of public use, with vandalism being recorded on several occasions and two automated detectors being vandalised or stolen. The automated detectors were small and could be concealed to a degree, however, it was not considered that a suitable weather station/s could be safely deployed on the Site in 2020.
- 2.8.3 Best efforts were made to achieve ten consecutive nights of automated monitoring in optimal weather conditions within each seasonal window. Notwithstanding, some monitoring nights fell outside of the optimum weather conditions set out in **Section 2.7**. In most cases, the weather was only marginally outside of the optimal range (e.g., 0.5 – 3m/s over the optimum wind or 1°C below the correct temperature), which is to be expected for a Welsh upland site. Given the nature and location of the Site it is considered that the monitoring data was collected in the best available weather conditions for each season and accurately reflects bat activity at this geographic location.
- 1.1.47 Due to the evolution of scheme design some proposed turbine locations changed after the completion of the 2020 monitoring period additionally a seventh turbine location was added in 2021. Each automated monitoring location is associated with one final proposed turbine location as shown below in **Table 2.9** and presented in **Figure 2.2, Figure 2.3 and Figure 2.4 (Annex A)**. Automated monitoring location numbers and Turbine location numbers are different as automated monitoring location numbers were kept consistent but scheme designs and Turbine numbering changed.
- 1.1.48 Three years monitoring data has been collected from the Site and includes data at all turbine locations. For 2022 data was collected within the direct footprint of final turbine locations, for 2020 and 2021 data collected was at previous turbine locations which may have moved, however all this data was within continuous habitat of final locations and provides valuable Site information suitable to inform an accurate assessment for the Site. **Table 2.10** gives full details of the distances between the 2020, 2021 and 2022 automated monitoring locations and the proposed turbine locations (T). No further monitoring is proposed to inform the assessment.
- 2.8.4 The walked transect surveys were planned to be undertaken once each month from May to October inclusive. However, the August transect could not be completed due to health and safety restrictions with cattle being present across the Site. To ensure a good spread of data collection through the season, an additional transect was undertaken in September.

Table 2.9 Automated static monitoring sites and their associated final proposed turbine location

Automated Monitoring Locations	Associated Final Proposed Turbine Location
1	Turbine 1
2	Turbine 3
3	Turbine 4
4	Turbine 7
5	Turbine 6
6	Turbine 5
7	Turbine 2

Table 2.10 Distance of automated static monitoring sites from final proposed turbine locations

Automated Monitoring Locations	Static Location 2020	Static 2020 Distance from Proposed Turbine Location	Phase 1 Habitat Classification of Static Location	Linear Features Within 50m Detector	Static Location 2021	Static 2021 Distance from Proposed Turbine Location	Phase 1 Habitat Classification of Static Location	Linear Features Within 50m Detector	Static Location 2022	Static 2022 Distance from Proposed Turbine Location	Phase 1 Habitat Classification of Static Location	Linear Features Within 50m Detector
1	ST 03246 89768	317 metres east of T1	Acid grassland - semi-improved	No	ST 02987 89703	57 metres south of T1	Dry heath/acid grassland	No	ST 02930 89735	Within footprint of T1	Dry heath/acid grassland	No
2	ST 03325 89493	142 metres east of T3	Dry heath/acid grassland	Yes, fence line and crumbling stone wall	ST 03120 89391	65 meters east of T3	Dry heath/acid grassland	No	ST 03185 89395	Within footprint of T3	Dry heath/acid grassland	No
3	ST 03677 89263	192 metres south of T4	Acid grassland - semi-improved	Yes, fence line	ST 03673 89405	53 meters south of T4	Wet heath / acid grassland	No	ST 03690 89455	Within footprint of T4	Wet heath / acid grassland	No
4	ST 03557 88798	156 metres north of T7	Acid grassland - semi-improved	Yes, intact stone wall	ST 03432 88958	94 meters north of T7	Acid grassland - semi-improved	No	ST 03525 88975	Within footprint of T7	Acid grassland - semi-improved	No
5	ST 03183 88942	121 metres northwest of T6	Acid grassland - semi-improved	No	ST 03018 89075	104 meters north of T6	Acid grassland - semi-improved	No	ST 03070 88985	Within footprint of T6	Acid grassland - semi-improved	No
6	ST 03682 89865	664 metres northwest of T5	Bare ground	Yes, fence line with scattered young trees	ST 04184 89354	26 meters northwest of T5	Acid grassland - semi-improved	Yes, fence line	ST 04185 89380	Within footprint of T5	Acid grassland - semi-improved	No
7		ST 03450 89817	191 meters west of T2		Acid grassland - semi-improved	No		ST 03395 90000	Within footprint of T2	Acid grassland - semi-improved	No	

3. Results

3.1 Desk study

Designated sites

- 3.1.1 There are no internationally or nationally important sites that are designated for bat conservation within 10km of the Site.

SEWBRc records

- 3.1.2 SEWBRc holds records of at least 12 species of bat, recorded within the last 15 years within 10km of the Site. The bat roost records are summarised in **Table 3.1** and shown on **Figure 3.1, Annex A** while **Table 3.2** lists the activity records.

Table 3.1 Summary of bat roost records within 10km of the Site

Species	Number of Records	Types of Roost	Year of Most Recent Record	Distance (m) and Direction of Nearest Record from the Site
Common Pipistrelle	83	Maternity Day	2018	664 W
Soprano Pipistrelle	45	Maternity Day	2017	1,139 N
Pipistrellus Species	83	Maternity Day	2014	783 W
Noctule	1	-	2012	8,660 SW
Brown Long-eared Bat	41	Maternity Day Hibernation	2019	1,139 N
Brandt's Bat	1	Day	2012	9,865 N
Daubenton's Bat	7	Day Hibernation	2019	3,284 E
Natterer's bat	4	Day Hibernation	2012	2,836 W
Whiskered Bat	7	-	2011	4,637 NE
Myotis Bat Species	6	Maternity Day	2010	5,229 NE
Greater Horseshoe Bat	1	Hibernation	2013	9519 SE
Lesser Horseshoe Bat	8	Maternity Day Hibernation	2017	5,982 SW

Species	Number of Records	Types of Roost	Year of Most Recent Record	Distance (m) and Direction of Nearest Record from the Site
Unidentified Bat Species	154	-	2017	267 W

As set out in the BCT Best Practice Guidelines, roost types are categorised as – Day, Night, Feeding, Transitional, Maternity, Hibernation and Satellite.

Table 3.2 Summary of bat activity records within 10km of the Site

Species	Number of records	Date of most recent record	Distance (m) and direction of nearest record from the Site
Common Pipistrelle	599	2018	673 NW
Soprano Pipistrelle	495	2019	931 N
Nathusius Pipistrelle	11	2018	3,050 W
Pipistrellus Species	159	2019	2,767 W
Noctule	127	2018	783 E
Serotine	7	2017	4,470 SW
Nyctalus Bat Species	5	2017	5,413 W
Brown Long-eared Bat*	43	2018	3,369 S
Plecotus species	1	2013	673 N
Brandt's Bat	1	2013	8,740 SE
Daubenton's Bat	11	2014	3,050 E
Natterer's bat	14	2013	5,064 NW
Whiskered Bat	6	2015	2,927 W
Myotis Bat Species	118	2018	3,142 E
Greater Horseshoe Bat	6	2017	4,470 SW
Lesser Horseshoe Bat	8	2018	5,655 W
Unidentified Bat Species	133	2019	783 W

* Although it is not possible to distinguish brown and grey long-eared bats by call parameters alone, the known distribution of grey long-eared bats is limited to the south coast of England, therefore, it is assumed that these records are accurately identified as brown long-eared bats.

3.2 Field survey: roost identification

Preliminary appraisal of potential bat roost features

- 3.2.1 During the preliminary appraisal, six built structures were recorded within the bat survey area that were later subject to focussed survey work. The built structures comprise a mix of agricultural buildings, residential dwellings and a stone wall. Further survey results supersede the results of the preliminary appraisal and are presented in the relevant sections of this document.
- 3.2.2 The preliminary appraisal identified trees within the bat survey area that were later subject to focussed survey work assessing each tree individually. Further survey results supersede the preliminary appraisal results and are detailed in the relevant sections of this document.

Built structures

- 3.2.3 Results following the external inspections, internal inspections and the emergence and re-entry surveys are in **Table 3.3** and **Table 3.4**. The final potential roost suitability of built structures is presented in **Table 3.5**, with locations shown in **Figure 3.2 (Annex A)**.

External inspection

- 3.2.4 The results of external inspections to establish the level of potential suitability to support roosting bats in built structures are summarised in **Table 3.3**. The built structures comprise a mix of agricultural buildings, residential dwellings and a stone wall. Four of the six built structures within the bat survey area were considered suitable for roosting bats; two structures were classed as low potential suitability; one structure was categorised as moderate, and one offered high potential suitability. The location of each structure is shown in **Figure 3.2 (Annex A)** along with the current potential roost status category following the results of both external inspections and subsequent internal inspections and the emergence and re-entry surveys. The distance of built structures within the bat survey area from all the proposed turbine locations are provided in full detail in **Table C.5 (Annex C)**, with the nearest proposed turbine location to each built structure is shown in **Table 3.3**.

Table 3.3 Built structures external inspection results

Built Structure ID	General Description	PRFs and Potential Access Points Recorded	Distance and Direction to Nearest Turbine	Hibernation Potential	Potential Roost Suitability
B1	Small open cattle shed constructed of cinderblock with corrugated metal roofing. Structurally generally sound with wooden support beams. Does not appear to be in current use.	Low potential for roosting bats around roof beams where corrugated metal meets wall, however exposure to the elements means it is not suitable for more than occasional summer use by individual bats	~436m south of turbine location 6	No	Low

Built Structure ID	General Description	PRFs and Potential Access Points Recorded	Distance and Direction to Nearest Turbine	Hibernation Potential	Potential Roost Suitability
	Low habitat quality: structure is surrounded by short grazed agricultural grassland. Lack of feature nearby for commuting to connect to wider landscape.				
B2	<p>Crumbling stone wall running along dry riverbed.</p> <p>High habitat quality: structure lies within shaded dry river bed underneath tree cover. Good foraging and commuting opportunities directly outside roost.</p>	<p>Large cavity in wall extends into bank >30cm. Provides opportunities for crevice roosting bats.</p> <p>Easy access by rodents reduces suitability as only 1m above ground level.</p>	~190m south of turbine location 6	No	Moderate
B3	<p>House in current use. Looks like it has been recently built with roof tiles, soffit boxes, chimney and barge boards all in good condition.</p> <p>Moderate habitat quality: cattle sheds nearby which may attract invertebrates and provide foraging opportunities. Additional foraging opportunities in bracken and bog to the north and low levels of disturbance. Relatively exposed with no clear cover for commuting however low levels of lighting and disturbance means there are no significant barriers.</p>	No PRFs recorded or potential access points recorded	~485m southwest of turbine location 1	No	Negligible
B4	<p>Cattle shed. Constructed of timber beams with corrugated metal sheeting. Exposed to elements with lots of movement of</p>	Many access points however no suitable PRFs recorded.	~474m southwest of turbine location 1	No	Negligible

Built Structure ID	General Description	PRFs and Potential Access Points Recorded	Distance and Direction to Nearest Turbine	Hibernation Potential	Potential Roost Suitability
	<p>metal sheeting in the wind</p> <p>Moderate habitat quality: cattle shed may attract invertebrates and provide foraging opportunities. Additional foraging opportunities in bracken and bog to the north and low levels of disturbance. Relatively exposed with no clear cover for commuting however low levels of lighting and disturbance means there are no significant barriers.</p>				
B5	<p>Farmhouse currently in use. Brick construction walls with pitched tiled roof. Wooden bargeboard on eastern aspect, bargeboard missing on western aspect. Stone structure attached to side of house with pitched roof and wooden beams.</p> <p>Moderate habitat quality: cattle sheds nearby which may attract invertebrates and provide foraging opportunities. Additional foraging opportunities in bracken and bog to the north and low levels of disturbance. Relatively exposed with no clear cover for commuting however low levels of lighting and disturbance means there are no significant barriers.</p>	<p>Easy access to loft space on wester aspect due to missing barge board. Loft space is likely to provide many roosting and hibernating opportunities for crevice roosting and void dwelling bats.</p> <p>Easy access to stone structure adjacent to property which is sheltered and has wooden beams to provide roosting opportunities. Likely to also contain many opportunities for crevice roosting bats but was not inspected internally. Multiple opportunities for crevice roosting bats in stone wall at entrance to structure.</p>	<p>~450m southwest of turbine location 1</p>	<p>Yes</p>	<p>High</p>

Built Structure ID	General Description	PRFs and Potential Access Points Recorded	Distance and Direction to Nearest Turbine	Hibernation Potential	Potential Roost Suitability
B6	<p>Cattle shed with exposed wooden beams and corrugated metal roof. Plastic fascia runs along western and eastern aspect.</p> <p>Moderate habitat quality: cattle shed may attract invertebrates and provide foraging opportunities. Additional foraging opportunities in bracken and bog to the north and low levels of disturbance. Relatively exposed with no clear cover for commuting however low levels of lighting and disturbance means there are no significant barriers.</p>	Exposure to element within main structure and lack of roosting opportunities means it is unlikely to support roosting bats. May be limited opportunities behind fascia for individual crevice roosting bats.	~440m southwest of turbine location 1	No	Low

Hibernation monitoring

3.2.5 Following the external inspections, one built structures (B5) was assessed as having the potential to support hibernating bats and was highlighted for further survey. However, due to access restrictions no internal survey could be undertaken (see **Section 2.8**).

Emergence, re-entry survey

3.2.6 Emergence and re-entry surveys were undertaken for one built structure (B5), the results for which are summarised in **Table 3.4**. Weather conditions for each visit are reported in **Table C.3 (Annex C)**.

Table 3.4 Emergence and re-entry survey results

Built Structure ID	Potential Roost Suitability	Visit 1	Visit 2	Visit 3
B5	High	Survey type: Emergence	Survey type: Re-entry No bats recorded emerging or re-entering during the survey visit.	Survey type: Emergence No bats recorded emerging during the survey visit. Two

Built Structure ID	Potential Roost Suitability	Visit 1	Visit 2	Visit 3
		No bats recorded emerging or re-entering during the survey visit.		common pipistrelle bats were observed re-entering the north aspect of the building during a light rain shower.

Built structure summary

- 3.2.7 The total number of roosts identified as a result of the built structure survey work and the final potential roost suitability categories for each built structure are presented in **Table 3.5**, with locations shown in **Figure 3.2 (Annex A)**.
- 3.2.8 Following the external and internal inspections, and emergence and re-entry surveys, one confirmed bat roosts were identified in built structures:
- 3.2.9 B5: Common pipistrelle, day roost (single or low number of bats).
- 3.2.10 Of the six built structures surveyed, one structure was categorised as ‘confirmed’, one structure was categorised ‘moderate’, two structures were classed as ‘low’ roosting potential and two structures were classed as ‘negligible’ roosting potential.

Table 3.5 Potential roost suitability of built structures within a 275m radius of the Site

Potential Roost Suitability	Built Structure Reference	Total Number in Category
Confirmed	B5	1
Moderate	B2	1
Low	B1, B6	2
Negligible	B3, B4	2

Trees

Overview

- 3.2.11 Results following the ground level roost assessments and the subsequent winter PRF inspections are summarised in **Table 3.6**, with full results provided in **Table D.1 (Annex D)**. Results of the summer PRF inspections (which included a refined survey area as described in **Section 2.4**) summarised in **Table 3.7**, with full results provided in **Table D.2 (Annex D)**. The final potential roost suitability of each tree following all survey work to date is presented in **Table 3.7**, with locations shown in **Figure 3.3 (Annex A)**.

Ground level roost assessment

3.2.12 Most of the trees identified were found in the dry riverbed in the east of the Site and along the southern perimeter of the bat survey area. A total of 20 trees were initially recorded as having high or moderate suitability for roosting bats during the ground level roost assessment (19 in 2020 and 2021 and one in 2022).

Winter PRF inspection

3.2.13 Of the 19 trees identified in the 2020 and 2021 survey period which required a visual inspection of PRFs, all were able to be fully inspected using rope and harness or from ground level using the endoscope. Overall:

- only one tree (Tree Reference [TR] 9) remained as high suitability;
- one tree (TR8) was upgraded to high suitability;
- seven trees remained as moderate suitability;
- four trees were downgraded to moderate suitability;
- five trees were downgraded to low suitability; and
- one tree (TR17) was downgraded to negligible suitability.

3.2.14 No bats or signs of bats (such as droppings) were recorded.

Table 3.6 Potential roost suitability of trees following winter PRF inspection

Roost potential	Tree references	Total number in category
Confirmed	-	-
High	TR8, TR9	2
Moderate	TR1, TR2, TR3, TR4, TR6, TR7, TR13, TR14, TR15, TR16, TR18	11
Low	TR5, TR10, TR11, TR12, TR19	5
Negligible	TR17	1

Summer PRF inspection

3.2.15 Following the reduction of the survey area for summer inspections and amendments to the project design, 13 trees with moderate and high potential roost suitability remained within the survey scope in 2021.

3.2.16 The PRFs in the remaining trees were fully inspected.

- one tree remained high potential roost suitability;
- one tree was upgraded to high potential suitability;
- four trees were downgraded to moderate potential roost suitability; and
- seven trees remained moderate potential roost suitability.

2022 PRF inspection

- 3.2.17 Due to altering scheme designs an additional survey area was assessed in the Summer of 2022 to account for the access track and on-site grid connection corridor. One tree with moderate potential roost suitability was identified. The PRF was fully inspected on two occasions from ground level using an endoscope. **Table 3.7** summarises the final PRF inspection survey results.

Table 3.7 Final potential roost suitability of trees following summer PRF inspection in the applied buffer

Potential Roost Suitability	Tree Reference	Total Number in Category
Confirmed	-	-
High	TR8, TR9	2
Moderate	TR1, TR2, TR3, TR4, TR6, TR7, TR13, TR14, TR15, TR16, TR18, TR19	12
Low	-	-
Negligible	-	-

Tree survey summary

- 3.2.18 A total of 20 trees were identified within the bat survey area, following the ground level roost assessment, winter PRF and summer PRF inspections:
- two trees provided high potential roost suitability;
 - 12 trees provided moderate potential roost suitability;
 - five trees provided low potential roost suitability; and
 - one tree provided negligible potential roost suitability.

3.3 Field survey: bat activity

Preliminary appraisal of habitats for bats

Habitat features of low suitability

- 3.3.1 There are large swathes of continuous bracken across the Site and areas of short grazed improved grassland, both habitat types offering limited opportunities for foraging and commuting bats. The Site is located on a heavily grazed plateau and is generally open and exposed.

Habitat features of moderate suitability

- 3.3.2 The heavily grazed plateau is dominated by semi-improved acid grassland, poor semi-improved grassland and wet heath/acid grassland mosaics. Due to the generally close-cropped nature of the grasslands, the sward is short and lacks botanical diversity. This

reduces the abundance and diversity of associated invertebrate species which in turn reduces its foraging value for bat species.

- 3.3.3 There is a small block of dense/continuous scrub present in the south of the site and the sections of drystone walls across parts of the Site have the potential to provide a linear landscape feature for commuting bats.

Habitat features of high suitability

- 3.3.4 A small number of mature trees are present lining the dry riverbed in the southeast of the Site.
- 3.3.5 The blanket bog present centrally in the site is likely to support a good diversity of invertebrate species providing a foraging resource for bats. In addition, there is a pond and wet ditches present within the Site which provide good foraging and commuting opportunities for bats.

Summary

- 3.3.6 The preliminary appraisal of the habitats within the bat survey area identified large areas of low and moderate suitability habitat and smaller areas of high suitability habitat for foraging and commuting bats. As such, the overall suitability of the bat survey area has been assessed as being 'moderate'. There are very limited sources of artificial lighting on and around the Site.

Manual transects

- 3.3.7 At least four species were confirmed to be using the survey area during manual transect survey work:
- Common pipistrelle;
 - Soprano pipistrelle;
 - *Plecotus* sp; and
 - *Myotis* sp.

- 3.3.8 Additional species may have been recorded within the *Myotis* sp. group, and within the NP/CP (Nathusius' or common pipistrelle) group. In addition, the *Plecotus* sp. group includes both the grey and brown long-eared bat, which cannot be distinguished by acoustics alone. However, the known range of the grey long-eared bat is limited to the southern coast of England, and it is considered that all *Plecotus* sp. bats recorded during the survey work are that of the brown long-eared bat and will be recorded as such going forward.

Table 3.8 summarises the results of the 2020 manual transect survey work in terms of the number of bat passes, by each species, recorded on each transect route. In order to provide a means of comparison, an average number of passes per hour of each species has been calculated. It should be noted that these figures are intended to give an indication of relative levels of bat activity on each transect route and do not represent actual numbers of bats. A single bat may pass the surveyor several times, with each pass counted separately. Equally, the same bat may pass over more than one transect route in a single evening, therefore being recorded by more than one surveyor on the same date. **Figure 3.4 to Figure 3.8. (Annex A)** presents the relative distribution of species across the transect routes.

Table 3.8 Number (and average number per hour) of bat passes recorded during manual transect survey 2020

Survey month	Number of Passes	Transect Number	Species											Total	
			CP	SP	CP/SP	NP/CP	NSL	Nyctalus sp.	N	LE	Myotis sp.	Bat sp.	GH		LH
May	Per Species	1	13.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	15.00
	Average Per Hour Per Species		4.33	0.00	0.00	0.33	0.00	0.00	0.00	0.00	0.33	0.00	0.00	0.00	5.00
	Per Species	2	8.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	11.00
	Average Per Hour Per Species		2.67	0.00	0.33	0.33	0.00	0.00	0.00	0.00	0.33	0.00	0.00	0.00	3.67
June	Per Species	1	3.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.00
	Average Per Hour Per Species		1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00
	Per Species	2	7.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.00
	Average Per Hour Per Species		2.33	0.00	0.00	0.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.67

Survey month	Number of Passes	Transect Number	Species											Total	
			CP	SP	CP/SP	NP/CP	NSL	Nyctalus sp.	N	LE	Myotis sp.	Bat sp.	GH		LH
July	Per Species	1	8.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	8.00
	Average Per Hour Per Species		2.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.33	0.00	0.00	0.00	2.67
	Per Species	2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Average Per Hour Per Species		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
September 1 st Visit	Per Species	1	22.00	0.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	25.00
	Average Per Hour Per Species		7.33	0.00	0.00	0.33	0.33	0.00	0.00	0.33	0.00	0.00	0.00	0.00	8.33
	Per Species	2	46.00	2.00	0.00	3.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.00
	Average Per Hour Per Species		15.33	0.67	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.00
September 2 nd Visit	Per Species	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

Survey month	Number of Passes	Transect Number	Species											Total	
			CP	SP	CP/SP	NP/CP	NSL	Nyctalus sp.	N	LE	Myotis sp.	Bat sp.	GH		LH
	Average Per Hour Per Species		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Per Species	2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Average Per Hour Per Species		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
October	Per Species	1	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00
	Average Per Hour Per Species		0.00	0.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.33
	Per Species	2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Average Per Hour Per Species		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Result Type															

Survey month	Number of Passes	Transect Number	Species											Total	
			CP	SP	CP/SP	NP/CP	NSL	Nyctalus sp.	N	LE	Myotis sp.	Bat sp.	GH		LH
Total Number of Passes Per Species for All Months Combined			107	3	1	7	1	0	0	1	3	0	0	0	122
Average Passes Per Hour Per Species for All Months Combined			5.94	0.17	0.06	0.39	0.06	0.00	0.00	0.06	0.17	0.00	0.00	0.00	6.78

Table notes: CP = common pipistrelle; SP = soprano pipistrelle; CP/SP = common or soprano pipistrelle; NP/CP = Nathusius' pipistrelle or common pipistrelle; NSL = noctule/serotine/Leisler's bat; N = noctule; LE = *Plecotus* sp., GH = greater horseshoe; LH = lesser horseshoe.

- 3.3.9 In 2020, there was a relatively low level of bat activity recorded across both transect routes. The greatest levels of bat activity were recorded on the areas of transects that incorporated linear features or woodland edge habitat, such as the stone wall on the southeast of transect route 1, and around the area of blanket bog in the centre of the Site on transect route 2. Lower levels of activity were recorded in the more open and exposed habitats, in particular the northern sections of transect routes 2, which incorporated fields of grazed pasture and arable.
- 3.3.10 Activity levels across the bat survey area were highest on the first transect visit in September, followed by July with similar levels recorded in May and June. The lowest levels of activity were recorded in October and on the second transect visit in September. Overall, there was an average of 6.78 bat passes per hour recorded across the Site, for all species across all months. There is no strong temporal pattern reflected in the data.
- 3.3.11 Common pipistrelle was the most frequently recorded over the entire monitoring period, recorded on every transect route and in every month of survey.
- 3.3.12 To summarise:
- Common pipistrelle made up the greatest proportion of recordings, representing approximately 88 percent of all bat passes (5.94 passes per hour on average);
 - The next most frequently recorded group was the category of 'Nathusius' pipistrelle or common pipistrelle' which made up 5.7 percent of all bat passes across the Site (0.39 passes per hour on average);
 - When considering all potential noctule, Leisler's bat and serotine calls as a group, these make up 0.8 percent of recordings on the Site (0.06 passes per hour on average); and
 - When considering the quieter species that are typically underrepresented in acoustic surveys, it is notable that very little activity was recorded on the Site, with only two passes assigned to the Myotis genera throughout the entire survey period. One brown long-eared pass was recorded, but this was out-with the site boundary, within the bat survey area.
- 3.3.13 A summary of the geographical and temporal distribution of recordings by species as follows.

Common pipistrelle

- 3.3.14 Common pipistrelle recordings are distributed relatively evenly across the entire survey area, having been recorded at nearly every point along each of the transect routes. The recordings peaked on the first transect visit in September. Only one pass was recorded that could not be differentiated between common pipistrelle and soprano pipistrelle (on transect 1 in May). Highest activity was associated with linear features on Site (stone walls), with majority passes were recording foraging behaviour. Activity was generally recorded over the entire survey period, with an exception on the second transect visit in September. The peak activity was recorded on the first transect visit in September, which typically correlates with high foraging activity for bats who are building up their fat stores for hibernation.

Soprano pipistrelle

- 3.3.15 Soprano pipistrelle were only recorded twice in September and once October with activity limited to the southern part of the Site. Only one pass was recorded that could not be differentiated between common pipistrelle and soprano pipistrelle (on transect 1 in May).

Common or Nathusius' pipistrelle

- 3.3.16 Only seven passes were recorded of species which could not be differentiated between common pipistrelle or Nathusius' pipistrelle. Passes were recorded in May, June and September; three on transect 1 and four passes on transect 2, all in the south of the Site.

Myotis species

- 3.3.17 *Myotis* species were recorded twice on transect 1 (May and June) and once on transect 2 (May), all in the northern section of the Site. The level of activity is likely to be under-represented due to the quiet calls of these species.

Plecotus sp.

- 3.3.18 *Plecotus* sp. recordings were made on a single occasion on transect 1, in September. The recording was made within the 266m buffer area. The level of activity is likely to be under-represented due to the quiet calls of these species.

Noctule, serotine and Leisler's bats

- 3.3.19 Only one pass was recorded of species which could not be differentiated between Noctule/serotine/Leisler's bats in September in the south of the Site, adjacent to a drystone wall.

3.4 Automated monitoring

- 3.4.1 At least seven species of bat were confirmed to be using the bat survey area during the automated detector work:
- Common pipistrelle;
 - Soprano pipistrelle;
 - Noctule;
 - *Plecotus* sp;
 - *Myotis* sp;
 - Greater horseshoe bat; and
 - Lesser horseshoe bat.
- 3.4.2 Additional species may also have been recorded, where some ambiguous calls were allocated to groupings such as *Myotis* sp, common/ Nathusius' pipistrelle or noctule/serotine/Leisler's bat rather than species level.
- 3.4.3 **Table 3.9** and **Table 3.10** summarise the results of the automated monitoring in terms of the total number of recordings at each location, allocated to each species. To provide a means of comparison, an average number of recordings per night of each species has been calculated. It should be noted that these figures are intended to give an indication of relative levels of bat activity and do not represent actual numbers of bats. **Table D.3** and **D.4 (Annex D)** presents the results of the automated monitoring by location and season (spring, summer and autumn).

- 3.4.4 **Graph 3.1 to 3.5** shows the results of automated monitoring and weather conditions in 2021 (**Section 3.5**). **Graphs E.1 to E.4 (Annex E)** show the total number of recordings for each night for the automated monitoring in 2020. These graphs were designed to display the number of recordings within each 5 minute interval over a night, with totals calculated for the entire ten night monitoring period, providing an overview of at which times of night bat activity was recorded.
- 3.4.5 Due to ongoing analysis of 2022 automated recorder data this report does not provide the results of the 2022 data or the assessment of the status of bat populations on the Site, which will be provided within the final Environmental Statement (ES).

Automated monitoring 2020

- 3.4.6 Results for the entire monitoring period at each of the six monitoring locations and for each species recorded in 2020 are provided in **Table 3.9**.

Table 3.9 Total number of recordings (average number per night) recorded during automated monitoring at each location over the monitoring period in 2020

Total Bat Recordings (average recordings per night below)														
Automated Monitoring Location	Number of Nights Recording	CP	SP	CP/SP	NP/CP	NSL	Nyct sp.	N	LE	M	Bat sp.	GH	LH	Total
1	30	412 13.73	21 0.70	48 1.60	30 1.00	4 0.13	4 0.13	38 1.27	9 0.30	9 0.30	15 0.50	0	0	590 19.67
2	30	454 15.13	42 1.40	62 2.07	53 1.77	10 0.33	4 0.13	11 0.37	4 0.13	6 0.20	22 0.73	1 0.03	0	669 22.3
3	30	962 32.07	64 2.13	165 5.50	94 3.13	4 0.13	3 0.10	16 0.53	18 0.60	67 2.23	18 0.60	0	2 0.07	1413 47.1
4	30	1145 38.17	83 2.77	83 2.77	75 2.5	0	12 0.4	19 0.63	26 0.87	71 2.37	41 1.37	1 0.03	7 0.23	1563 52.1
5	30	91 3.03	8 0.27	21 0.7	10 0.33	6 0.20	14 0.47	34 1.13	8 0.27	3 0.10	4 0.13	10 0.33	0	209 6.97
6	30	315 10.5	24 0.8	75 2.5	37 1.23	4 0.13	6 0.20	29 0.97	14 0.47	19 0.63	8 0.27	0	34 1.13	565 18.83
Total	180	3379	242	454	299	28	43	147	79	175	108	12	43	5009
	Average	18.77	1.34	2.52	1.66	0.16	0.24	0.82	0.44	0.97	0.60	0.07	0.24	27.83

Species codes: **CP** = common pipistrelle; **SP** = soprano pipistrelle; **CP/SP** = common/soprano pipistrelle (*Pipistrellus* species); **CP/NP** = common/ Nathusius' pipistrelle (*Pipistrellus* species); **NSL** = Noctule/Serotine/Leiser bat (Nyctaloid species); **Nyct sp.** = Noctule/leiser bat (Nyctalus species); **N** = Noctule; **LE** = *Plecotus* sp; **M** = *Myotis* bat species; **Bat sp.** = Bat call unable to clearly identify down to species level; **GH** = greater horseshoe and **LH** = lesser horseshoe

- 3.4.7 In 2020, there was an average of 27.8 recordings per night for all species, across all locations over the monitoring period. Activity levels were notably different between the monitoring locations, with by far the highest levels of activity recorded at monitoring location 4 in the south of the bat survey area, averaging 52.1 recordings per night, followed by monitoring location 3 in the centre of Site with an average of 47.1 recordings per night. Monitoring locations 2, 1 and 6 each had an average of between 15 and 25 recordings per night. The lowest average (7 recordings per night) was recorded at monitoring locations 5, in the west of the bat survey area.
- 3.4.8 Common pipistrelle was the most frequently recorded species, making up 67.5 percent of all recordings across all monitoring locations and the entire monitoring period (an average of 18.8 recordings per night). With an additional 9.1 percent which were assigned to the species group common or soprano pipistrelle and 6 percent assigned to the Nathusius' or common pipistrelle species group. Soprano pipistrelle accounted for 4.8 percent of all recordings (an average of 1.3 recordings per night). Common or soprano pipistrelle group, Nathusius' or common pipistrelle species group and Soprano pipistrelle were recorded across all monitoring locations and the entire monitoring period.
- 3.4.9 All other species or species groups recorded each accounted for less than 1 percent of the total recordings with average number of recordings per night of less than 1 for *Myotis* sp. group, greater horseshoe bat, lesser horseshoe bat, *Plecotus* sp., noctule, the noctule or Leisler's bat genus and the noctule, serotine or Leisler's bat species group.
- 3.4.10 *Plecotus* sp., noctule, the noctule or Leisler's bat genus were recorded across all monitoring locations and the entire monitoring period. The noctule, serotine or Leisler's bat species group was recorded at each monitoring location apart from locations 4. Greater horseshoe bat was only recorded at locations 2, 4 and 5. Lesser horseshoe bat were record at locations 3, 4 and 6 with a peak of 34 recordings at location 6.
- 3.4.11 2.2 percent of the total recordings (0.6 average number of recordings per night) account for bat recordings that were not identified to species or genus level. These records were recorded across all monitoring locations and over the entire monitoring period.

Automated monitoring 2021

- 3.4.12 Results for the entire monitoring period at each of the seven monitoring locations and for each species recorded in 2021 are provided in **Table 3.10**.

Table 3.10 Total number of recordings (average number per night) recorded during automated monitoring at each location over the monitoring period in 2021

Total Bat Recordings (average recordings per night below)														
Automated Monitoring Location	Number of Nights Recording	CP	SP	CP/SP	NP/CP	NSL	Nyct sp.	N	LE	M	Bat sp.	GH	LH	Total
1	40	228	4	17	30	1	2	116	2	50	1	0	0	451
		5.70	0.10	0.43	0.75	0.03	0.05	2.90	0.05	1.25	0.03			11.28
2	40	1491	84	72	77	1	2	120	1	4	22	0	0	1874
		37.28	2.10	1.80	1.93	0.03	0.05	3.00	0.03	0.10	0.55			46.85
3	37	1155	47	234	57	0	1	11	2	113	2	0	0	1622
		31.22	1.27	6.32	1.54		0.03	0.30	0.05	3.05	0.05			43.84
4	39	37	6	6	2	0	0	9	0	5	0	0	0	65
		0.95	0.15	0.15	0.05			0.23		0.13				1.67
5	40	69	6	19	9	0	0	39	0	3	4	0	0	149
		1.73	0.15	0.48	0.23			0.98		0.08	0.10			3.73
6	40	525	3	9	1	2	0	4	0	2	3	0	0	549
		13.13	0.08	0.23	0.03	0.05		0.10		0.05	0.08			13.73
7	10	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	246	3505	150	357	176	4	5	299	5	177	32	0	0	4710

Total Bat Recordings (average recordings per night below)

Average	14.25	0.61	1.45	0.72	0.02	0.02	1.22	0.02	0.72	0.13	19.15
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Species codes: **CP** = common pipistrelle; **SP** = soprano pipistrelle; **CP/SP** = common/soprano pipistrelle (*Pipistrellus* species); **CP/NP** = common/ Nathusius' pipistrelle (*Pipistrellus* species); **NSL** = Noctule/Serotine/Leiser bat (Nyctaloid species); **Nyct sp.** = Noctule/leiser bat (Nyctalus species); **N** = Noctule; **LE** = *Plecotus* sp; **M** = *Myotis* bat species; **Bat sp.** = Bat call unable to clearly identify down to species level; **GH** = greater horseshoe and **LH** = lesser horseshoe

- 3.4.13 In 2021 overall, there was an average of 19.2 recordings per night for all species, across all locations over the monitoring period. Activity levels were notably different between the monitoring locations, with by far the highest levels of activity recorded at monitoring location 2 in the centre of the bat survey area, averaging 46.9 recordings per night, followed by monitoring location 3 in the centre of Site with an average of 43.8 recordings per night. Monitoring locations 1 and 6 each had an average of between 11 and 14 recordings per night. The lowest average (1.67 recordings per night) was recorded at monitoring locations 4, in the south of the bat survey area. Monitoring location 7 recorded no bat activity in the ten days of deployment in July¹⁷.
- 3.4.14 Common pipistrelle was the most frequently recorded species, making up 74.4 percent of all recordings across all monitoring locations with an exception at monitoring location 7 and the entire monitoring period (an average of 14.25 recordings per night). With an additional 7.6 percent which were assigned to the species group common or soprano pipistrelle and 3.7 percent assigned to the Nathusius' or common pipistrelle species group. Soprano pipistrelle accounted for 3.2 percent of all recordings (an average of 0.61 recordings per night). Common or soprano pipistrelle group, Nathusius' or common pipistrelle species group and Soprano pipistrelle were recorded across all monitoring locations with an exception at monitoring location 7 and the entire monitoring period.
- 3.4.15 Noctule was the third most frequently recorded species, making up 6.3 percent of all recordings across all monitoring locations with an exception at monitoring location 7 (an average of 1.22 recordings per night). The *Myotis* species group accounted for 3.8 percent of all recordings (an average of 0.72 recordings per night).
- 3.4.16 All other species or species groups recorded each accounted for less than 1 percent of the total recordings with average number of recordings per night of less than 1 for *Plecotus* sp., the noctule or Leisler's bat genus and the noctule, serotine or Leisler's bat species group.
- 3.4.17 *Plecotus* sp., the noctule or Leisler's bat genus were recorded across monitoring locations 1, 2 and 3. The noctule, serotine or Leisler's bat species group was recorded at monitoring locations 1, 2 and 6. Greater horseshoe bat and Lesser horseshoe bat were not recorded at any monitoring location in 2021.
- 3.4.18 0.7 percent of the total recordings (0.13 average number of recordings per night) account for bat recordings that were not identified to species or genus level. These records were recorded across all monitoring locations and over the entire monitoring period.

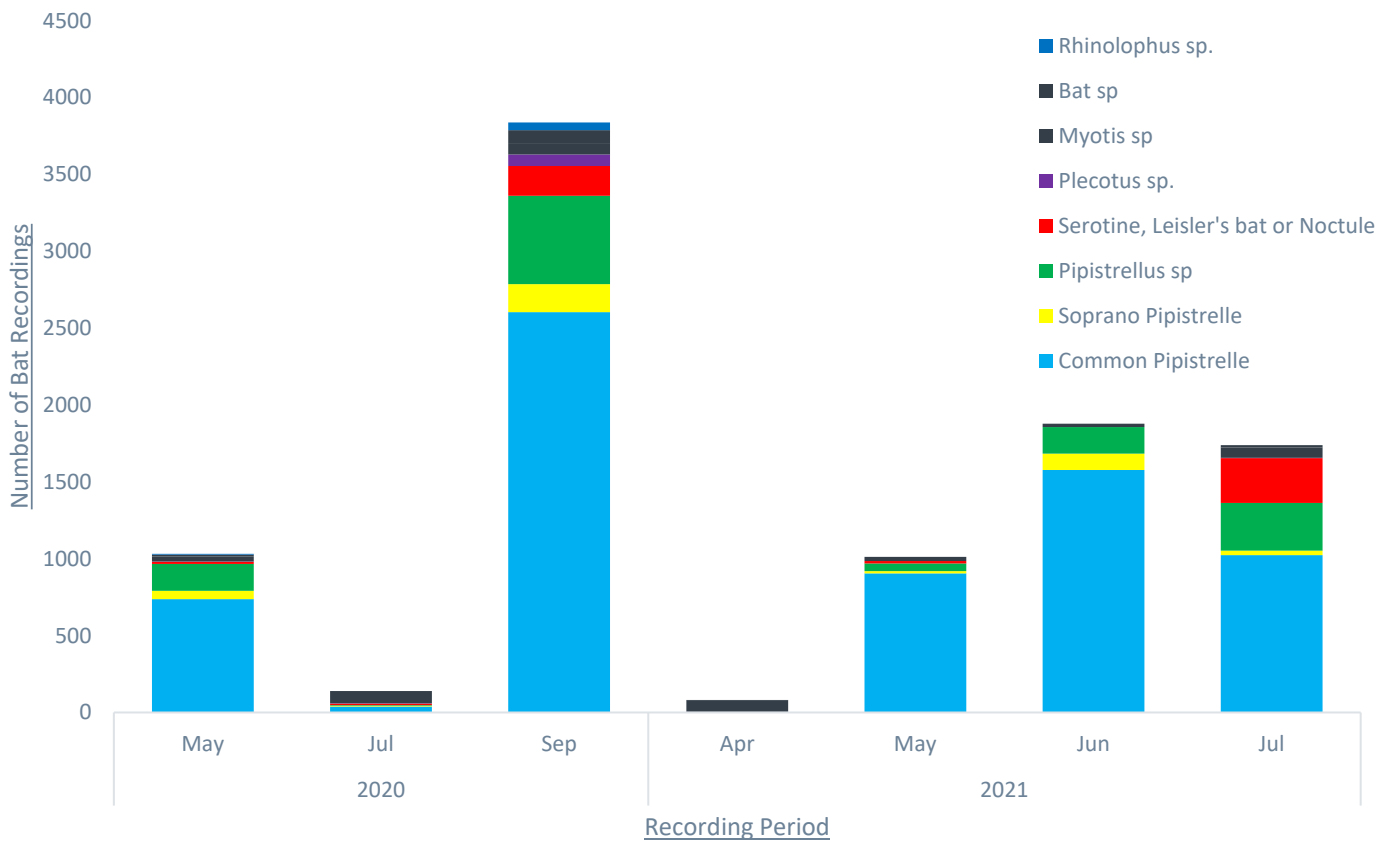
Automated monitoring seasonal assessment (2020 / 2021)

- 3.4.19 The total number recordings for each recording month and for all automated monitoring locations in 2020 and 2021 are shown in **Graph 3.6**. Due to the low numbers of recordings for certain species or groups, some have been grouped together into larger categories. For example, all *Pipistrellus* sp. which were not allocated to a species, the common pipistrelle and soprano pipistrelle group and the common pipistrelle and Nathusius' pipistrelle group; all *Nyctalus* and *Eptesicus* species and species groups; and the *Rhinolophid* sp. (greater and lesser horseshoe bats).
- 3.4.20 The graph shows that most bat activity was recorded in the Autumn monitoring period (September) in 2020, with an total of 3,837 recordings over the monitoring period. The summer period (June) and (July) in 2021 had less than 2,000 recordings, by comparison,

¹⁷ The microphone and detector was checked before, during and after monitoring and was functioning properly.

and the spring monitoring periods in 2020 and 2021 (May) had just over 1,000 recordings over the monitoring periods. To summarise by species:

- Common pipistrelle showed an increase in activity with the total number of recordings per night in May 2021 (905) to that recorded the previous year in May (737). A large increase of activity was recorded in July 2021 with a total of 1,023 recordings in comparison to the previous year only 39 recordings were made in July 2020;
- Soprano pipistrelle showed a decrease in activity with overall number of recordings decreasing from 242 in 2020 to 150 recordings in 2021. This was observed particularly in the May recording periods with 54 recordings in the 2020 and only 14 recordings in 2021;
- Pipistrellus sp recording showed an overall decrease in the number of recordings in May 2021 to that recorded in the previous year in May 2020;
- Noctule, the noctule or Leisler's bat genus and the noctule, serotine or Leisler's bat species group also showed an increase in the overall number of recordings in July 2021 to that recorded the previous year in July;
- *Plecotus* sp. showed a similar number of recordings in July 2021 to that recorded in the previous year in July 2020. The highest period of activity was recorded in September 2020;
- *Myotis* sp. group showed a similar number of recordings in July 2021 to that recorded in the previous year in July 2020.;
- Bat sp. group showed a decrease in activity with overall number of recordings decreasing from 108 in 2020 to 32 recordings in 2021; and
- Greater horseshoe bat and Lesser horseshoe bat were only recorded on Site in 2020 with a total of 55 recordings. The highest period of activity was recorded in September 2020 (50 recordings).



Graph 3.6 Total number of recordings per night for all automated monitoring locations for each monitoring period in 2020 and 2021

Automated monitoring summary

- 3.4.21 A summary of the level of species or species group activity for 2020 and 2021 follows below. The relative activity level across automated monitoring locations broadly showed a peak in recordings in September 2020.
- 3.4.22 Due to ongoing analysis of 2022 automated recorder data this report does not provide the results of the 2022 data or the assessment of the status of bat populations on the Site, which will be provided within the final ES.

Common pipistrelle

- 3.4.23 Common pipistrelle was widely distributed across the entire bat survey area at widely different levels of activity. The highest level of relative activity was recorded at automated monitoring locations 2 and 3. Lowest levels of relative activity was recorded at automated monitoring location 5. No common pipistrelle were recorded at automated monitoring location 7.
- 3.4.24 Activity was recorded in all months with a peak in recordings in September 2020 during the autumn monitoring period. Very low levels of bat activity were recorded in April 2021 and June 2020 with the following months showing an increase in bat activity.

Soprano pipistrelle

- 3.4.25 Soprano pipistrelle was widely distributed across the entire bat survey area, at broadly similar levels of relative activity across automated monitoring locations 1, and 4-6. Automated monitoring locations 2 and 3 in 2020 showed a high level of relative activity when compared to monitoring locations 1, and 4-6. In 2021, soprano pipistrelle was recorded at broadly similar levels of relative activity across automated monitoring locations 1-6 with less than 100 recordings at each location. Automated monitoring location 7 recorded no records of soprano pipistrelle.
- 3.4.26 Soprano pipistrelle was recorded in low levels of activity in all months, except September in 2020. The peak in activity for this species was recorded in September during the autumn monitoring period, when a total of 183 passes were recorded across the Site. In 2021, soprano pipistrelle was recorded in slightly lower numbers in June with 106 passes with less than 30 passes recorded in April and May 2021.

Common or Soprano pipistrelle

- 3.4.27 Common or soprano pipistrelle group was widely distributed across the entire bat survey area, at broadly similar levels of relative activity in 2020 across automated monitoring locations 1, 2 and 4-6. Automated monitoring locations 3 in 2020 showed a slightly high level of relative activity when compared to the other automated monitoring locations. In 2021, common or soprano pipistrelle group was recorded at broadly similar levels of relative activity across automated monitoring locations 1, 2 and 4 – 6 (<75 total recordings in 2021 at each location) with a higher level of relative activity recorded at monitoring location 3 (234 total recordings in 2021). Automated monitoring location 7 recorded no passes of the Common or Soprano pipistrelle group.
- 3.4.28 In 2020, species which could not be differentiated between common pipistrelle or soprano pipistrelle were recorded across Site in low levels of activity with a peak in September 2020. In 2021, no calls were recorded that could not be differentiated between common pipistrelle or soprano pipistrelle in April. Low levels of activity were recorded with a peak in activity recorded in July 2021.

Common or Nathusius' pipistrelle

- 3.4.29 Common or Nathusius' pipistrelle group was widely distributed across the entire bat survey area, at broadly similar levels of relative activity in 2020 across automated monitoring locations 1, 2 and 4-6. Automated monitoring locations 3 in 2020 showed a slightly high level of relative activity when compared to the other automated monitoring locations. In 2021, common or soprano pipistrelle group was recorded at broadly similar levels of relative activity across automated monitoring locations 1 and 4 – 6 (<30 total recordings in 2021 at each location) with a higher level of relative activity recorded at monitoring locations 2 (77 total recordings in 2021) and 3 (57 total recordings in 2021). Automated monitoring location 7 recorded no passes of the Common or Nathusius' pipistrelle group.
- 3.4.30 In 2020, species which could not be differentiated between common pipistrelle or soprano pipistrelle were recorded across Site in low levels of activity with a peak in September 2020. In 2021, no calls were recorded that could not be differentiated between common pipistrelle or soprano pipistrelle in April. Low levels of activity were recorded with a peak in activity recorded in July 2021.

Noctule, Serotine and Leisler's bat

- 3.4.31 Noctule, Serotine and Leisler's bat in 2020 were recorded at broadly similar levels of relative activity across automated monitoring locations 1-3, 5 and 6. No recordings were made at monitoring location 4. In 2021, only monitoring locations 1, 2 and 6 recorded Noctule, Serotine and Leisler's bat, no recording were made at monitoring locations 3 – 5 and 7.
- 3.4.32 Species which could not be differentiated between Noctule, Serotine and Leisler's bat was recorded in very low levels of activity in July and September month. The peak in activity for this species was recorded in September 2020, when a total of 26 passes were recorded across the Site. No calls were recorded for this group in May and June 2020 and April, May and June 2021.

Nyctalus sp.

- 3.4.33 Species which could not be differentiated between Noctule and Leisler's bat are grouped in *Nyctalus sp.* In 2020 were recorded at broadly similar levels of relative activity across all automated monitoring locations. In 2021, monitoring locations 1 - 3 recorded *Nyctalus sp.* at broadly similar levels (> 3 passes per month), no recordings were made at monitoring locations 4 - 7.
- 3.4.34 *Nyctalus sp.* were recorded in very low levels of activity (>39 calls per month). The peak in activity for this species was recorded in September 2020, when a total of 39 passes were recorded across the Site. No calls were recorded for this group in April and June 2021.

Noctule

- 3.4.35 In 2020, noctule were recorded at broadly similar levels of relative activity across all automated monitoring locations with a peak of activity at monitoring locations 1 and 5. In 2021, noctule were recorded at all automated monitoring locations with an exception at monitoring location 7. Highest level of relative activity was recorded at monitoring locations 1 and 2.
- 3.4.36 Noctule was recorded in low levels of activity in all months (>283 calls per month) with an exception in June 2021. The peak in activity for this species was recorded in July 2021, when a total of 283 passes were recorded across the Site. No calls were recorded for this species in June 2021.

Plecotus species

- 3.4.37 *Plecotus sp.* were recorded at broadly similar levels of relative activity across all automated monitoring locations with a peak of activity at monitoring location 4 (26 total recordings in 2020). In 2021, *Plecotus sp.* were recorded at monitoring locations 1 – 3. No passes were recorded at monitoring locations 4 – 7.
- 3.4.38 *Plecotus sp.* were recorded in low levels of activity, the peak in activity for this species was recorded in September 2020, when a total of 75 passes were recorded across the Site. No calls were recorded for this group in May and June 2021.

Myotis species

- 3.4.39 *Myotis sp.* were widely distributed across the entire survey area, at broadly similar levels of relative activity across automated monitoring locations 1, 2, 5 and 6. Automated

monitoring locations 3 and 4 in 2020 showed a higher level of relative activity when compared to monitoring locations 1, 2, 5 and 6. In 2021, *Myotis* sp. group was recorded at broadly similar levels of relative activity across automated monitoring locations 2, 4 – 6 (less than 5 total recordings in 2021 at each location) with a higher level of relative activity recorded at monitoring location 1 (50 total recordings in 2021) and 3 (113 total recordings in 2021).

- 3.4.40 Activity was recorded in all months at broadly similar levels apart from in May and June 2021 where lower levels of bat activity were recorded.

Greater Horseshoe bat

- 3.4.41 Greater Horseshoe bat were recorded at monitoring locations 2, 4 and 5 in 2020 and at no monitoring locations in 2021 (<10 recordings at each location).
- 3.4.42 Greater Horseshoe bat were recorded in low levels of activity only in September 2020.

Lesser Horseshoe bat

- 3.4.43 Lesser Horseshoe bat were recorded at monitoring locations 3, 4 and 6 in 2020 and at no monitoring locations in 2021.
- 3.4.44 Lesser Horseshoe bat were recorded in low levels of activity only in May and at higher levels of activity in September 2020.

Bat sp.

- 3.4.45 Bat sp. were widely distributed across the entire survey area, at broadly similar levels of relative activity across all automated monitoring locations in 2020. In 2021, Bats sp. were recorded at broadly similar levels of relative activity across automated monitoring locations 1, 3, 5 and 6. A peak of 22 passes was recorded at automated monitoring location 2. No passes were recorded at automated monitoring locations 4 and 7.
- 3.4.46 Activity was recorded in all months with a peak in recordings in September 2020. Very low levels of bat activity were recorded in April and May 2021 with an increase in bat activity in June 2021.

Ecobat analysis (2020 / 2021)

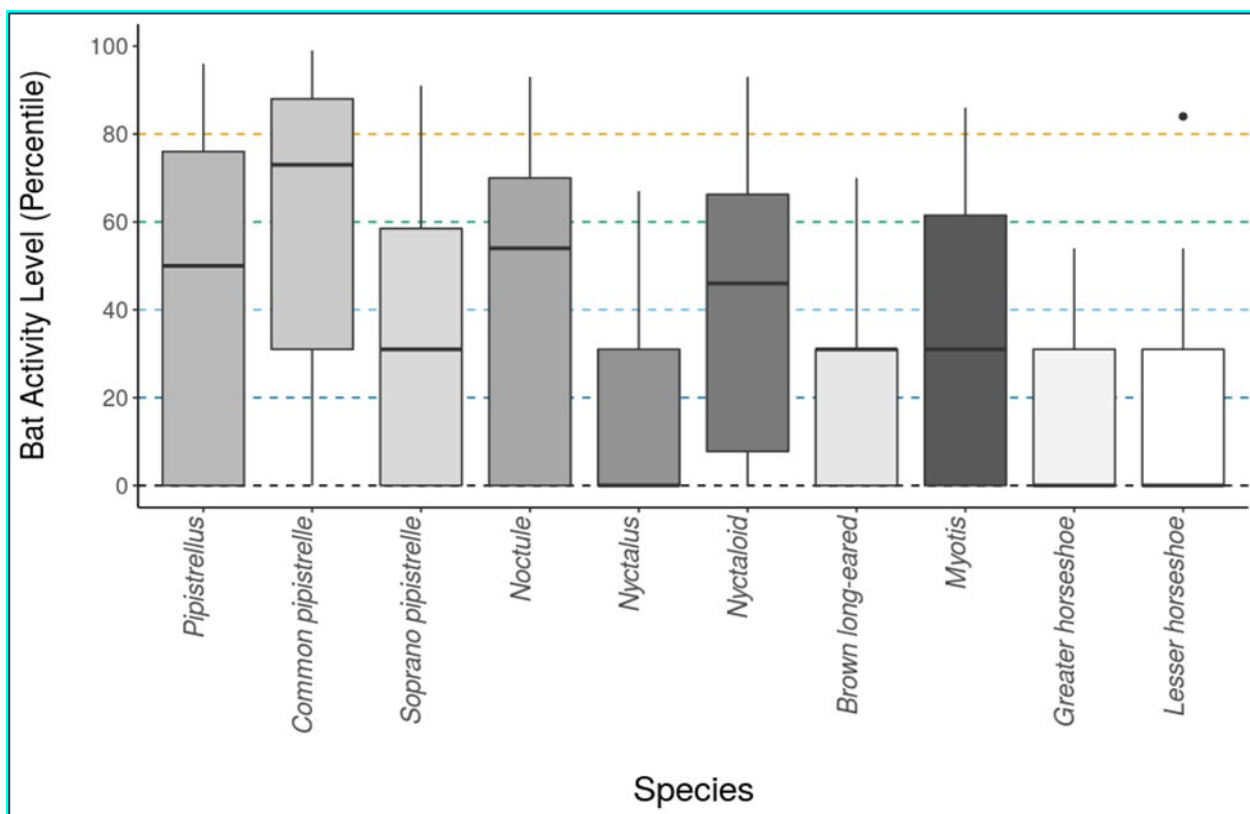
Site scale

- 3.4.47 A summary of the Ecobat outputs relating to 'site level' activity recorded within the bat survey area is provided in **Table 3.11** and shown in **Graph 3.7**. The centre line of each of the boxes on **Graph 3.7** indicates the median percentile, whereas each box represents the interquartile range for each species. This prevents the skewing of data by removing anomalous nights and including only the 25 percent of nights either side of the median. For detailed Ecobat outputs relating to 'site-wide' activity levels, refer to **Annex F**.

Table 3.11 Key metrics for each species/species group for all automated monitoring locations in 2020/2021

Species/Species Group	Median Percentile	Median Ecobat Activity Category	95% Confidence Intervals	Max Percentile	Nights Recorded
M	31	Low - Moderate	50 - 62	86	86
Nyctaloid	46	Moderate	69.5 - 69.5	93	18
Nyctalus	0	Low	31 - 31	67	12
N	54	Moderate	53 - 89	93	53
Pipistrellus	50	Moderate	61 - 76	96	128
CP	73	Moderate - High	77 - 89	99	196
SP	31	Low - Moderate	45.5 - 72	91	90
LE	31	Low - Moderate	38.5 - 38.5	70	40
GH	0	Low	31 - 31	54	7
LH	0	Low	31 - 57.5	84	13

Species codes: CP = common pipistrelle; SP = soprano pipistrelle; Pipistrellus = common/soprano/Nathusius' pipistrelle; N = noctule; Nyctalus = noctule/Leisler's bat; Nyctaloid = noctule/serotine/Leisler's bat; LE = long-eared bat; M = *Myotis* sp.; GH = greater horseshoe bat; and LH = lesser horseshoe bat.



Graph 3.7 Ecobat output showing the median activity level (percentile) of bats recorded on each night of automated monitoring at all locations across the bat survey area, in 2020 and 2021

Table 3.12 Ecobat output of the number of nights (of 426) in which automated monitoring results fell within each activity band for each species or species group in 2020 and 2021

Species/Species Group	Nights of High Activity	Nights of Moderate/ High Activity	Nights of Moderate Activity	Nights of Low/ Moderate Activity	Nights of Low Activity
M	3	19	18	13	33
Nyctaloid	2	4	4	3	5
Nyctalus	0	1	0	3	8
N	8	9	16	6	14
Pipistrellus	24	21	30	14	39
CP	75	43	27	28	23
SP	4	14	16	19	37
LE	0	2	7	12	19
GH	0	0	1	2	4

Species/Species Group	Nights of High Activity	Nights of Moderate/ High Activity	Nights of Moderate Activity	Nights of Low/ Moderate Activity	Nights of Low Activity
LH	1	0	2	2	8

Species codes: CP = common pipistrelle; SP = soprano pipistrelle; Pipistrellus = common/soprano/Nathusius' pipistrelle; N = noctule; Nyctalus = noctule/Leisler's bat; Nyctaloid = noctule/serotine/Leisler's bat; LE = Plecotus sp.; M = *Myotis* sp.; GH = greater horseshoe bat; and LH = lesser horseshoe bat.

3.4.48 Based on the Ecobat outputs, the following observations can be made¹⁸.

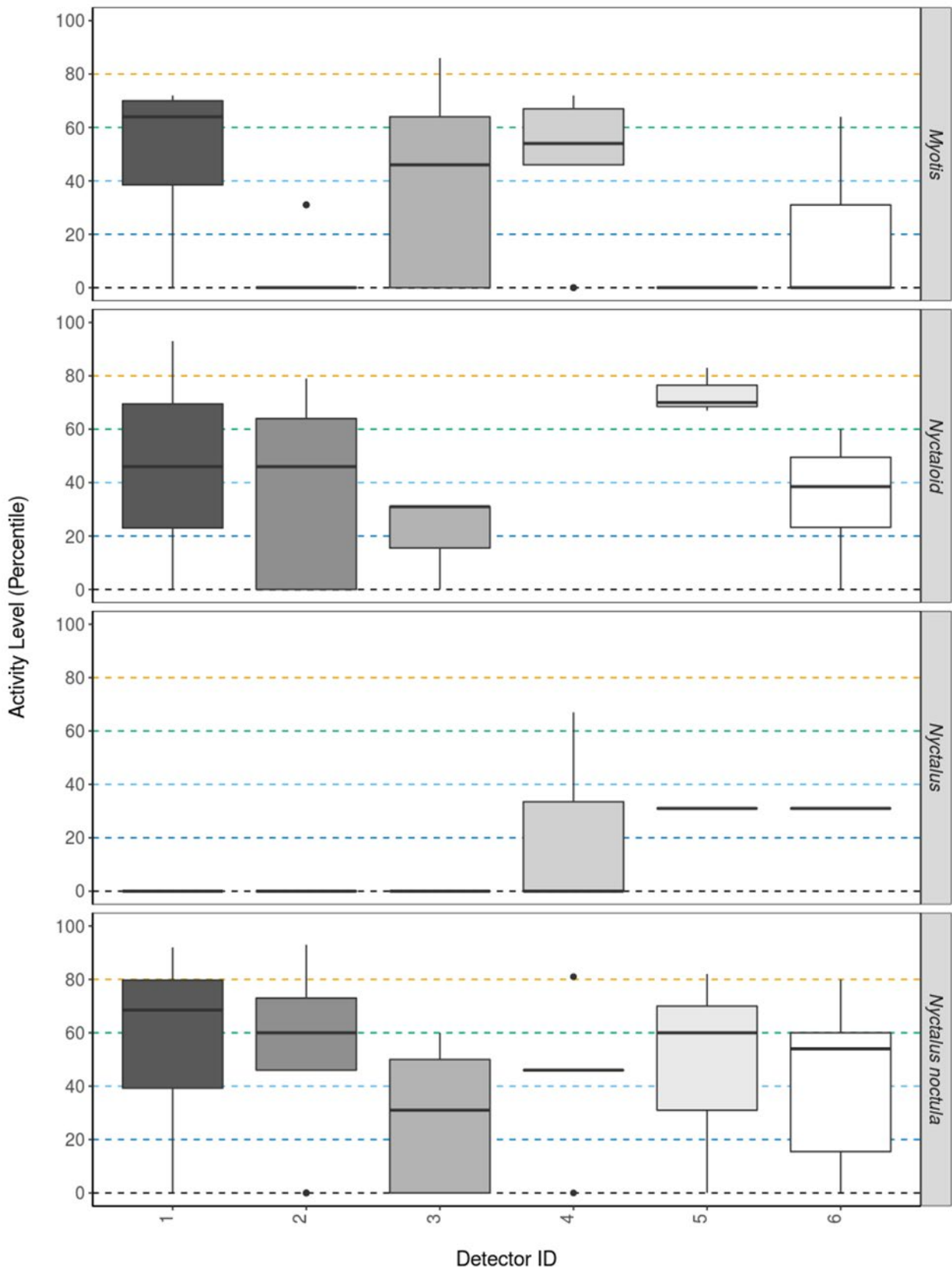
- Common pipistrelle: data suggests an overall Moderate - High level of activity across the bat survey area (median percentile of 73), based on 6,919 recordings uploaded to the Ecobat database. This means that activity levels of common pipistrelle within the bat survey area are higher than those recorded in the wider landscape on the same night. Although the majority of nights were classed as High activity, other nights within the monitoring period fell within the ranges for all other activity level classes, from Low to Moderate – High;
- Soprano pipistrelle: data indicates an overall Low-Moderate level of activity across the bat survey area (median percentile of 31), based on 397 recordings uploaded to the Ecobat database. This means that activity levels of soprano pipistrelle within the bat survey area are slightly lower to those recorded in the wider landscape on the same night. Although the majority of nights were classed as low activity, other nights within the monitoring period fell within the ranges for all other activity level classes, from Low-Moderate – High;
- Noctule: data indicates an overall Moderate level of activity across the Site (median percentile of 54), based on 447 uploaded to the Ecobat database. This means that activity levels of noctule within the bat survey area are similar on average to those recorded in the wider landscape on the same night. Although the majority of nights were classed as Moderate or Low activity, other nights within the monitoring period fell within the ranges for all other activity level classes, from Low -Moderate to High;
- Nyctalus sp.: This group comprises bats which could not be separated between noctule/Leisler's bat due to overlapping call parameters. Data indicates an overall Low level of activity across the Site (median percentile of 0), based on 21 recordings uploaded to the Ecobat database. Nights where this group were recorded were also categorised in Low and Low to Moderate categories with a single night categorised as Moderate – High;
- Nyctaloid: This group comprises bats that could not be separated between noctule/serotine/Leisler's bat due to overlapping call parameters. Data indicates an overall Moderate level of activity across the Site (median percentile of 46), based on 32 recordings uploaded to the Ecobat database. Nights where this group were recorded were also categorised in all other activity levels classes from High to Low;

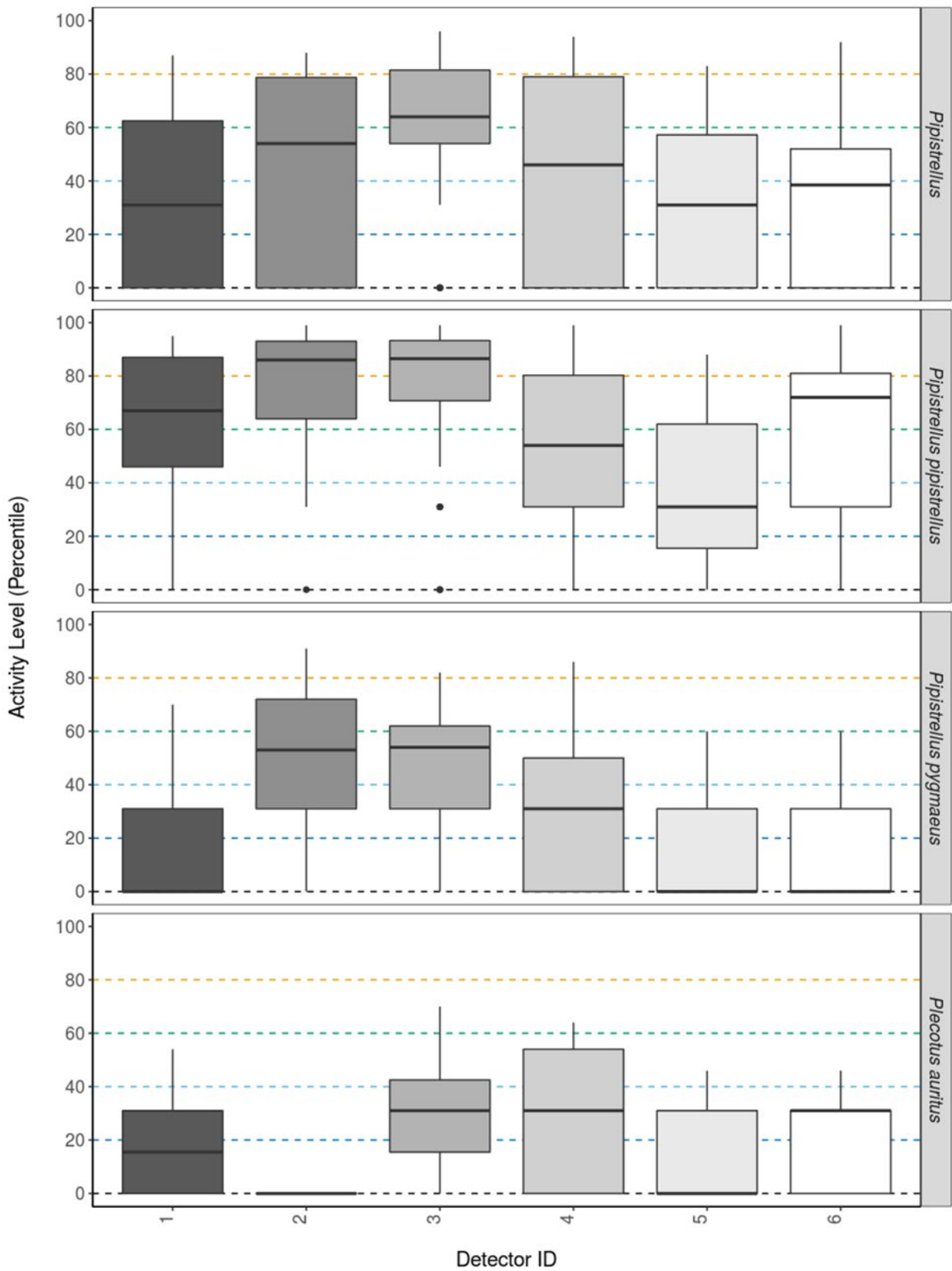
¹⁸ At the time of analysing data, Ecobat had a built-in programming error for *Pipistrellus* species group record counts. As such, results may be misleading, and this group is not discussed in this section. It is considered that the recordings identified to species level, for common and soprano pipistrelle, provide suitable data to inform the assessment without the addition of the Pipistrellus group.

- Plecotus sp.: data indicates an overall Low - Moderate level of activity across the Site (median percentile of 31), based on 84 recordings uploaded to the Ecobat database. Nights where this group were recorded were also categorised in all other activity level classes with the exception of the High category;
- Myotis sp.: data indicates an overall Low-Moderate level of activity across the Site (median percentile of 31), this is based on 356 Myotis recordings uploaded to the Ecobat database. Nights where this group were recorded were also categorised in all other activity levels classes from High to Low;
- Greater horseshoe bat: data indicates an overall Low level of activity across the Site (median percentile of 0), based on 12 recordings uploaded to the Ecobat database. Nights where this group were recorded were also categorised Low to Moderate categories; and
- Lesser horseshoe bat: data indicates an overall Low level of activity across the Site (median percentile of 0), with a moderate degree of confidence in this category based on 43 recordings uploaded to the Ecobat database. Nights where this group were recorded were also categorised in all other activity level classes with the exception of the Moderate - High category.

Local scale

- 3.4.49 Ecobat outputs showing the results of activity levels for each species of bat recorded at each automated monitoring location within the bat survey area are present in **Table 3.13**. For detailed Ecobat outputs, refer to **Annex F**.





Graph 3.8 Ecobat output showing median activity levels by Dectector ID (automated monitoring locations) in 2020/2021

Table 3.13 Ecobat output showing median activity levels at automated monitoring locations in 2020/2021

Species/ Species Group	1	2	3	4	5	6	7
CP	M-H	H	H	M	L-M	M-H	-
SP	L	M	M	L-M	L	L	-
N	M-H	M	L-M	M	M	M	-
Nyctalus	L	L	L	L	L-M	L-M	-
Nyctaloid	M	M	L-M	-	M-H	L-M	-
LE	L	L	L-M	L-M	L	L-M	-
M	M-H	L	M	M	L	L	-
GH	-	L	-	L	L-M	-	-
LH	-	-	L	L	-	L-M	-

Activity level classes: H = High, M-H = Moderate – High, M = Moderate, L-M = Low – Moderate and L = Low. Species codes: CP = common pipistrelle; SP = soprano pipistrelle; Pipistrellus = common/soprano/Nathusius' pipistrelle; N = noctule; Nyctalus = noctule/Leisler's bat; Nyctaloid = noctule/serotine/Leisler's bat; LE = *Plecotus* sp.; M = *Myotis* sp.; GH = greater horseshoe bat; and LH = lesser horseshoe bat.

3.4.50 The Ecobat outputs for 'local scale' show that common pipistrelle was recorded at Low-Moderate to High activity levels at all automated monitoring locations except for location 7 where no activity was recorded. Soprano pipistrelle was recorded at Low to moderate levels at all automated monitoring locations except for location 7 where no activity was recorded. All species and species groups incorporating noctule, serotine and Leisler's bat were recorded at Low to Moderate-High at all locations where it was recorded. *Plecotus* sp. were recorded at Low to Low-Moderate at all locations where it was recorded as was greater horseshoe bat and lesser horseshoe bat. The *Myotis* species group was recorded at Low to Moderate-High activity levels at automated monitoring locations where it was recorded.

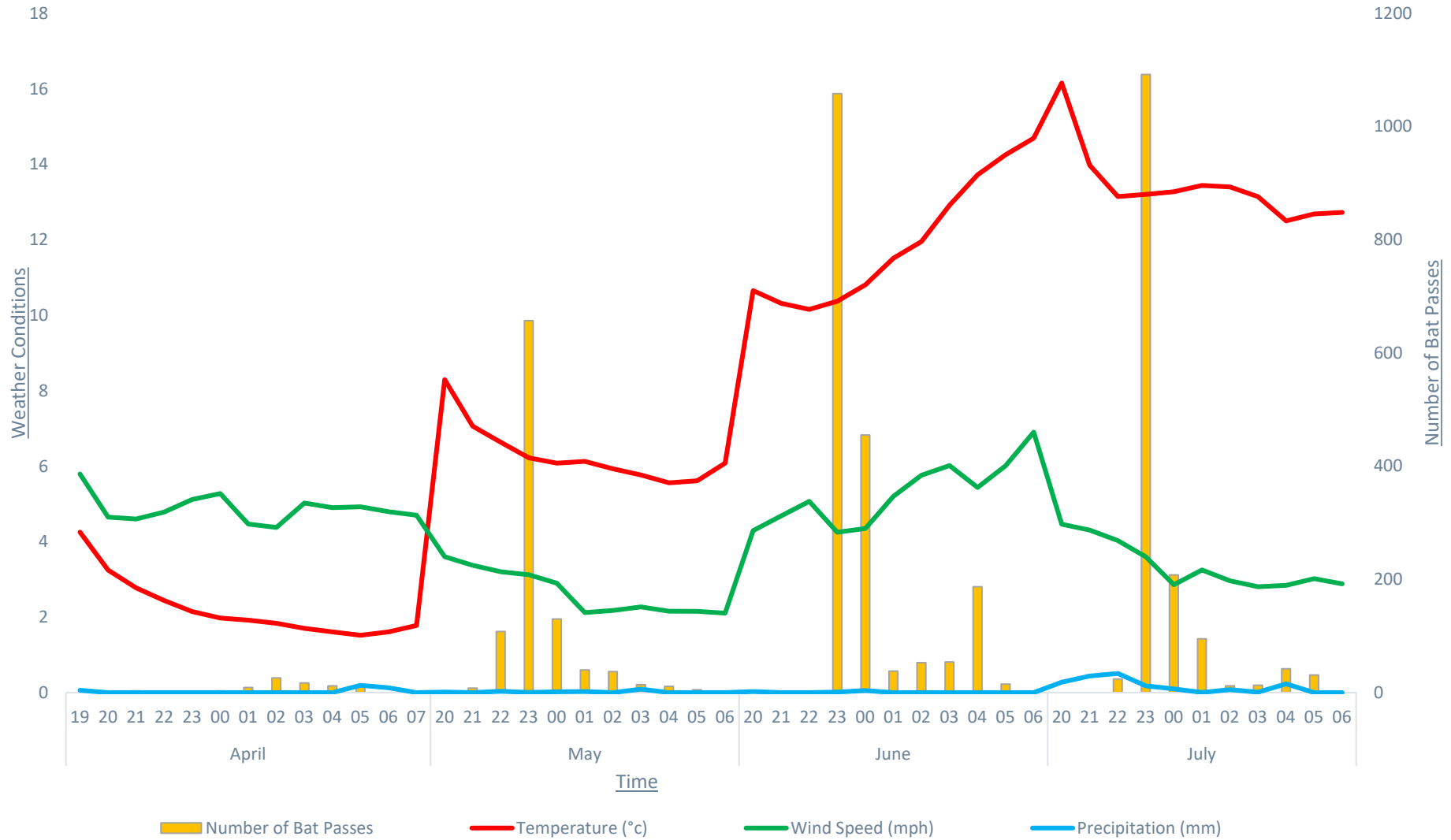
1.2 Environmental conditions

3.4.51 Full weather observations recorded on each active survey (emergence, re-entry and manual transect) in 2020 and 2021 are presented in **Table C.3** and **Table C.4 (Annex C)**, while the environmental conditions recorded during the automated monitoring periods are presented in Table C.1 and Table C.2 (Annex C).

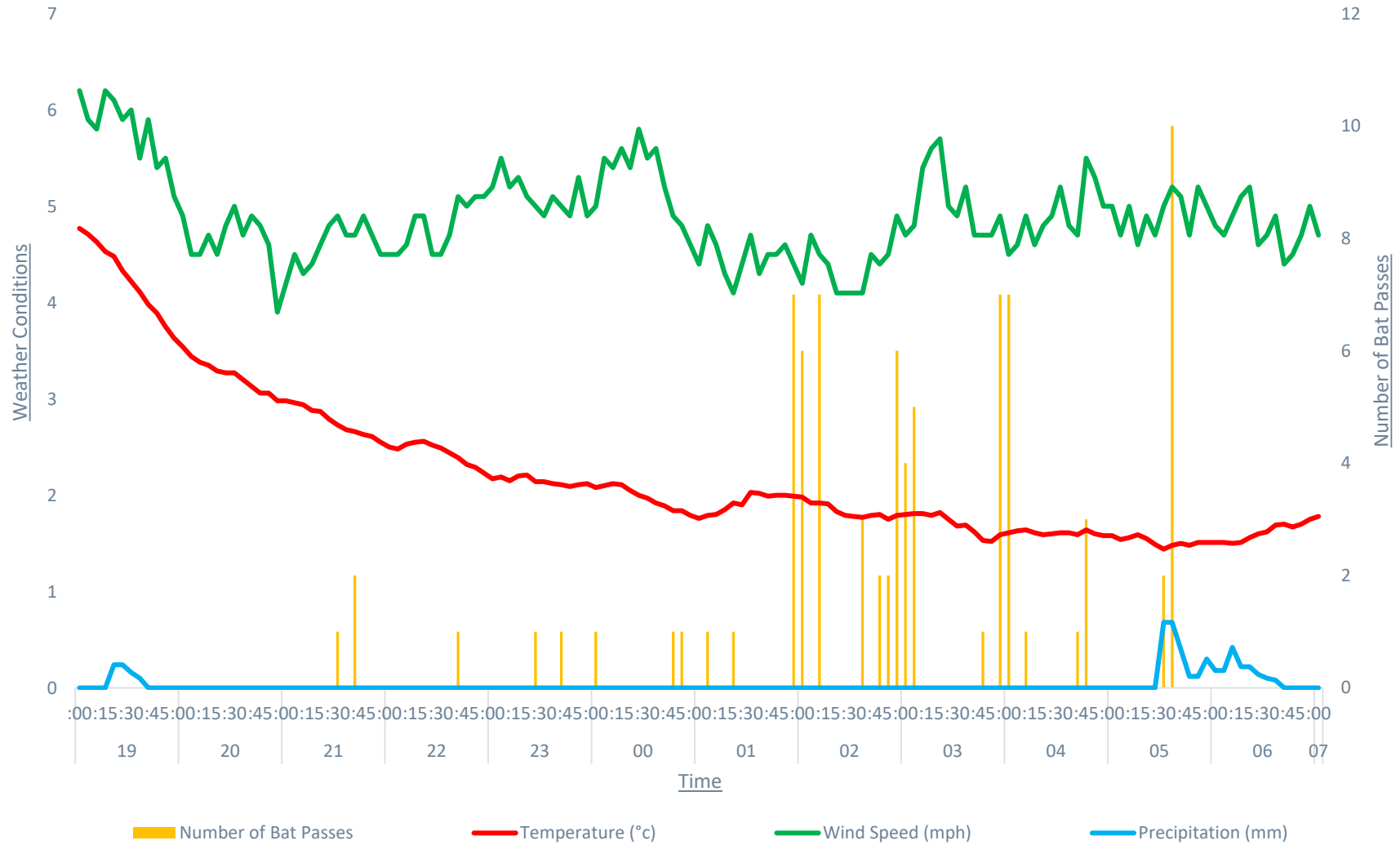
3.4.52 Graph 3.1 shows the total number of bat recordings of every night, during each month of monitoring, over 15-minute intervals, compared to the mean temperature, wind speed and rainfall for that same 15-minute interval. Local weather conditions were collected, over 5-minute intervals by the weather station installed during the 2021 automated monitoring period. **Graph 3.2** to **3.4** show the results of each month in greater detail.

- 3.4.53 A peak in activity levels is evident within the typical emergence period following sunset in each of the monitoring months, 20:00 in April, 21:00 in May and 22-23:00 in June). In June, a second peak is evident at 04:00, approximately 1 hour before sunset when a second foraging wave is often seen prior to commuting from foraging grounds to roost locations.

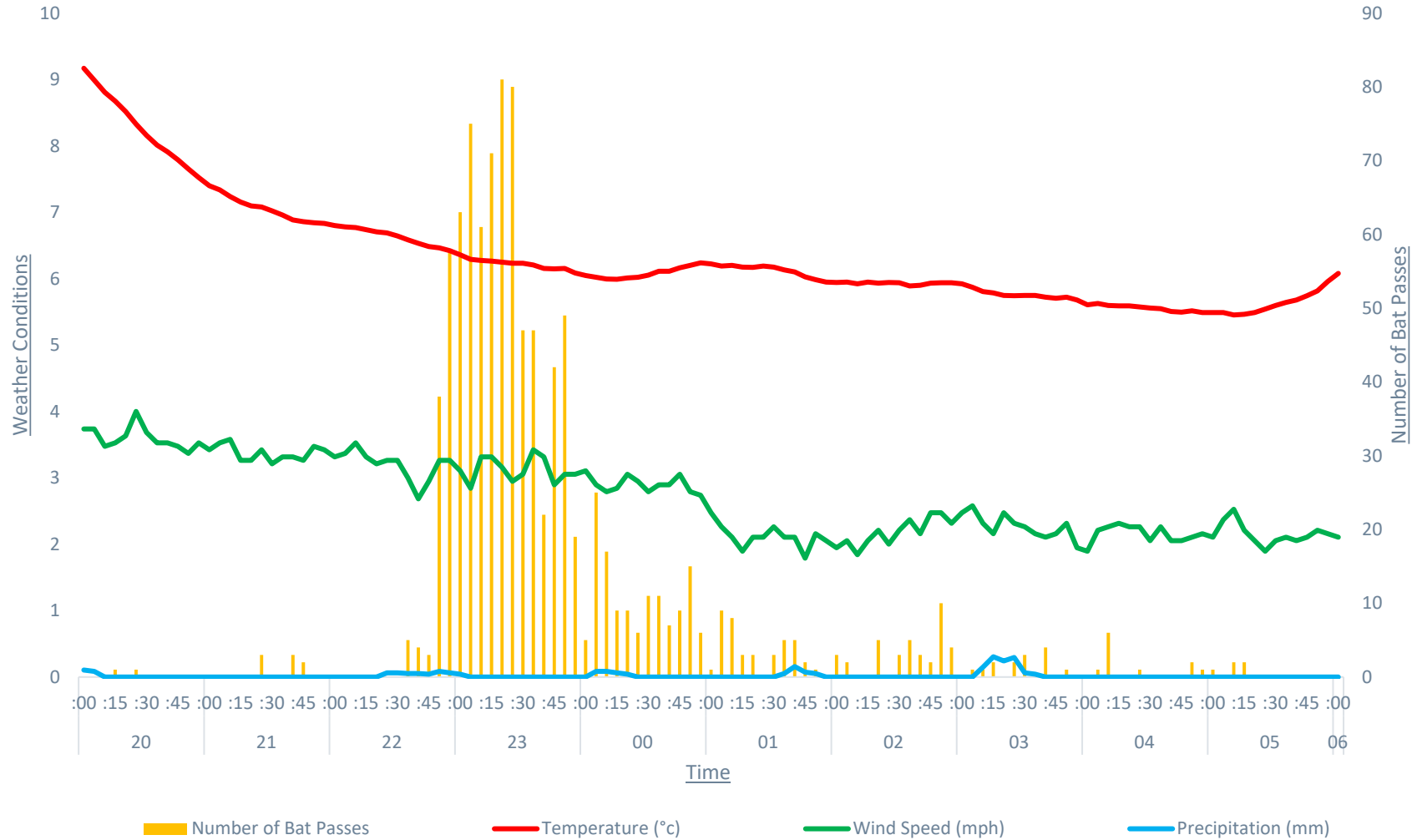
Graph 3.1. Bat activity and weather conditions recorded during automated monitoring in 2021



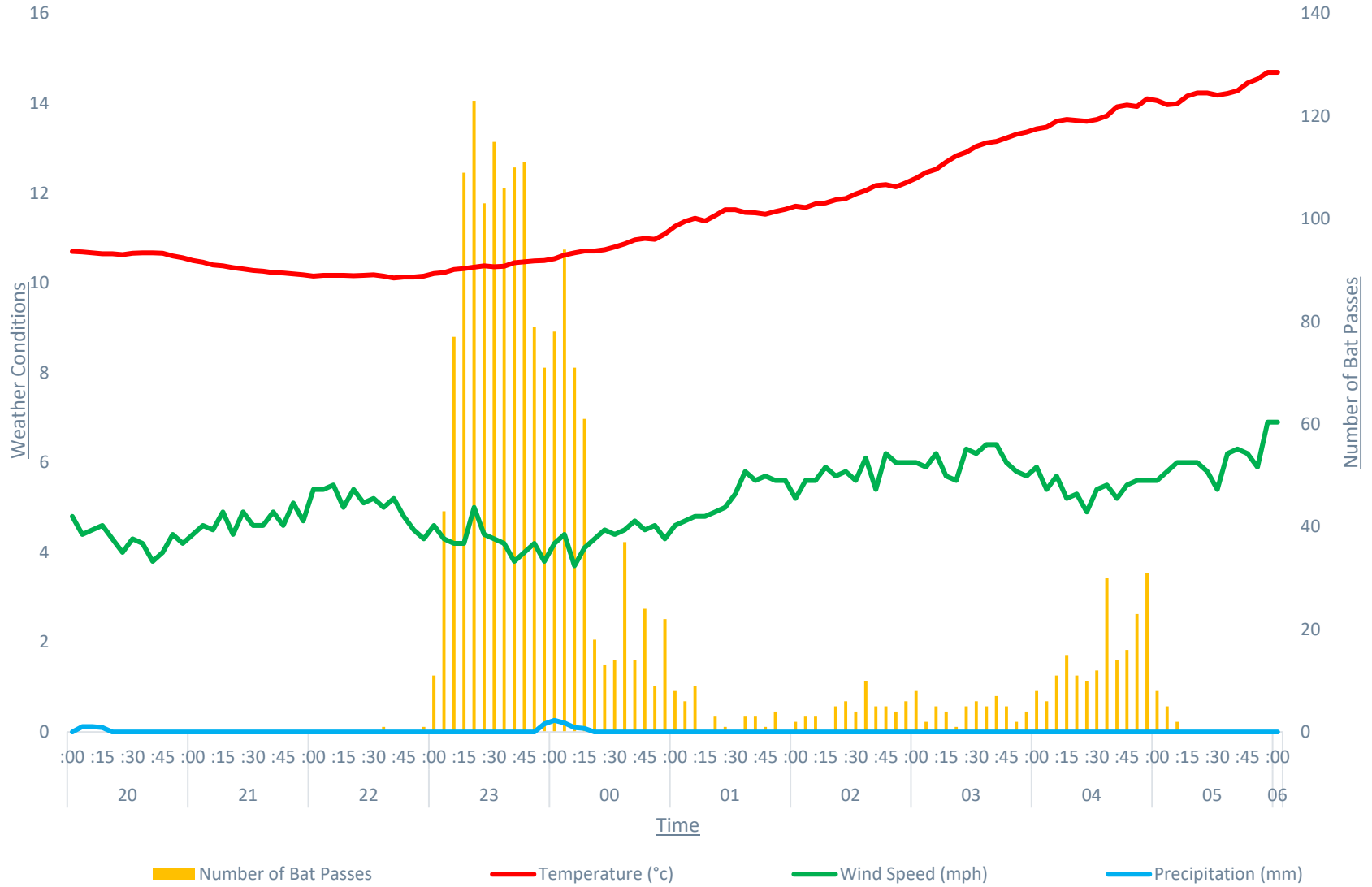
Graph 3.2. Bat activity and weather conditions recorded during automated monitoring in April 2021



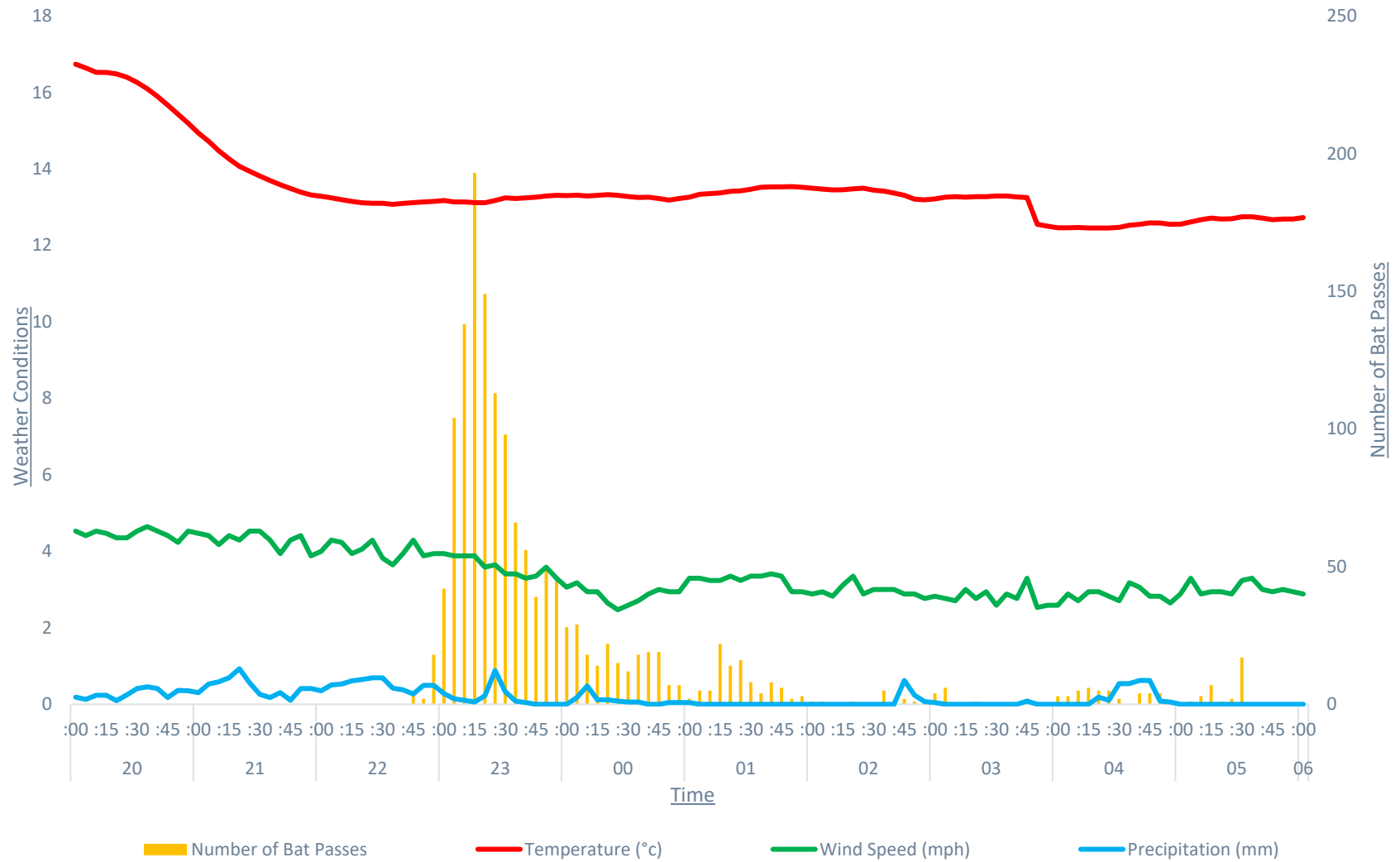
● Graph 3.3. Bat activity and weather conditions recorded during automated monitoring in May 2021



Graph 3.4. Bat activity and weather conditions recorded during automated monitoring in June 2021



● Graph 3.5. Bat activity and weather conditions recorded during automated monitoring in July 2021



4. Summary

4.1 Overview

4.1.1 A desk study was carried out in 2020, which provided the following information:

- no international or nationally designated sites for bat conservation are within 10km of the Site;
- bat roost records from at least 12 species were recorded within 10km; and
- bat activity records from at least 13 species were recorded within 10km.

4.1.2 In total, at least seven species of bat were confirmed to be using the Site during the current survey period. Table 4.1 provides a summary of the bat species recorded within, or potentially occurring within, the Site, and a summary of the data that supports this assessment.

4.1.3 It is possible that Leisler's bat, serotine and/or Nathusius' pipistrelle were also recorded on the Site, with these species known to occur in south Wales. No definitive recordings of these species have been made in the survey area, however, noctule and common pipistrelle have been widely recorded across the Site as such it is considered likely the activity in the noctule/serotine/Leisler's bat group were from ambiguous noctule calls with the activity from the common pipistrelle/ Nathusius' pipistrelle group likely from ambiguous common pipistrelle calls.

4.1.4 Myotis recordings could be from whiskered bat, Brandt's bat, Daubenton's bat or Natterer's bat which were all recorded in the desk study. Bechstein's, whiskered and Brandt's bat are predominantly woodland bats, with Bechstein's an extremely rare bat species which is not considered likely to be present. While some woodland is close to the Site, it is considered unlikely these bats account for the Myotis passes recorded at the turbine locations, being located in open habitats. The Myotis activity is therefore most likely associated with Daubenton's bat and Natterer's bat, although Brandt's and whiskered may be present in the nearby woodland blocks.

4.1.5 While long-eared bat recordings cannot typically be assigned to species level based on acoustic files alone, the known distribution of the grey long eared bat is very restricted in the UK with no confirmed records of this species occurring in this region of Wales. It is, therefore, unlikely that this very rare species occurs in the bat survey area, and it is assumed all long-eared bat records collected during the survey work relate to brown long-eared bats.

Roost identification

4.1.6 A day roost for one or a small number of common pipistrelle bats was recorded within Building B5, a farmhouse to the west of the Site, contains, no other roosts where recorded. 14 trees with moderate or high potential to support roosting bats, were recorded in the bat survey area.

Bat activity

- 4.1.7 The Site as a whole provides moderate suitability for foraging and commuting bats. Common pipistrelle was widely recorded across the Site and make up 70.8% of all automated detector recordings across all locations and all months. Contacts which could not be assigned to species-level between common or soprano pipistrelle accounted for 8.3%, while those which could not be assigned to species-level between common or Nathusius' pipistrelle accounted for 4.9%. Noctule was the fourth most frequently recorded species which make up 4.6% of all recordings. Soprano pipistrelle was the fifth most frequently recorded species which make up 4% of all. The species group Myotis sp. made up 3.6% of all recordings while the Bat sp. group made up 1.4% of all recordings. All other recorded species or groups of species each accounted for less than 1% of the total.
- 4.1.8 The greatest levels of bat activity were recorded on the areas of the Site that were closest to linear features, such as dry stone walls in the south western of the Site, where automated detectors 3 and 4 were located, and along the southern extent of both transects.
- 4.1.9 Due to ongoing analysis of 2022 automated recorder data this report does not provide the results data or the final assessment of the status of bat populations on the Site, which will be provided within the final ES.

Table 4.1 Bat species recorded within/potentially occurring within the bat survey area

Species	Desk study Information	Roosting Status	Activity Recorded on the Site
Common pipistrelle	The most frequently recorded species (559) within 10 km of the Site, with maternity and day roosts also recorded.	Day roost was identified in built structure B5.	High levels of foraging and commuting recorded across the bat survey area throughout the survey season. Activity most heavily focussed along linear features on Site. Activity levels confirmed as Moderate-High in the context of a 10km radius through Ecobat.
Soprano pipistrelle	The second highest recorded species (495) within 10km of the Site, with records of maternity and day roosts also recorded.	No roosts identified.	Low levels of foraging and commuting recorded across all areas of the bat survey area throughout the survey season. Activity most heavily focussed along linear features on Site. Activity levels confirmed as Low-Moderate in the context of a 10km radius through Ecobat.
Nathusius' pipistrelle	11 activity record recorded within 10 km of the Site. No records of roosts within 10km.	No roosts identified.	There was no confirmed evidence of this species recorded during the activity survey work, albeit any recordings would likely have been categorised as 'Common or Nathusius' pipistrelle'. Common or Nathusius' pipistrelle were recorded at low levels within the Site, particularly focussed along linear features on

Species	Desk study Information	Roosting Status	Activity Recorded on the Site
			Site and most frequently in the summer survey visits.
Noctule	127 activity records of this species within 10 km of the Site, with one uncategorised roost recorded within 10km.	No roosts identified.	Low levels of foraging and commuting recorded across all areas of the bat survey area throughout the survey season. Activity levels confirmed as Moderate in the context of a 10km radius through Ecobat.
Serotine	Seven activity records, no records of roosts within 10km.	No roosts identified.	<p>There was no confirmed evidence of this species recorded during the activity survey work, albeit any recordings would likely have been categorised as 'Noctule, Serotine and Leisler's bat'.</p> <p>Noctule, Serotine and Leisler's bat were recorded at low levels within the Site, most frequently in the summer survey visits. Activity levels confirmed as Moderate in the context of a 10km radius through Ecobat.</p>
Brown long-eared bat*	43 activity records returned alongside hibernation, maternity and day roosts recorded within 10 km of the Site.	No roosts identified.	<p>Low levels of foraging and commuting recorded across all areas of the bat survey area throughout the survey season. Activity levels confirmed as Low - Moderate in the context of a 10km radius through Ecobat.</p> <p>The level of activity is likely to be under-represented due to the quiet calls of these species.</p>
Leisler's bat	No data for this species was returned by the desk study.	No roosts identified.	<p>There was no confirmed evidence of this species recorded during the activity survey work, albeit any recordings would likely have been categorised as 'Nyctalus sp'.</p> <p>Nyctalus sp. were recorded at low levels within the Site, most frequently in the summer survey visits. Activity levels confirmed as Low in the context of a 10km radius through Ecobat.</p>
Brandt's bat	1 activity records returned alongside day roosts recorded within 10 km of the Site.	No roosts identified.	<p>There was no confirmed evidence of this species recorded during the activity survey work, albeit any recordings would likely have been categorised as 'Myotis sp.'.</p> <p>Myotis sp. were recorded at low levels within the Site. The level of activity is likely to be under-represented due to the quiet calls of these species.</p>

Species	Desk study Information	Roosting Status	Activity Recorded on the Site
Daubenton's bat	11 activity records returned alongside hibernation and day roosts recorded within 10 km of the Site.	No roosts identified.	<p>There was no confirmed evidence of this species recorded during the activity survey work, albeit any recordings would likely have been categorised as '<i>Myotis</i> sp.'</p> <p><i>Myotis</i> sp. were recorded at low levels within the Site. The level of activity is likely to be under-represented due to the quiet calls of these species.</p>
Natterer's bat	14 activity records returned alongside hibernation and day roosts recorded within 10 km of the Site.	No roosts identified.	<p>There was no confirmed evidence of this species recorded during the activity survey work, albeit any recordings would likely have been categorised as '<i>Myotis</i> sp.'</p> <p><i>Myotis</i> sp. were recorded at low levels within the Site. The level of activity is likely to be under-represented due to the quiet calls of these species.</p>
Whiskered bat	Six activity records returned alongside seven uncategorised roost records within 10 km of the Site.	No roosts identified.	<p>There was no confirmed evidence of this species recorded during the activity survey work, albeit any recordings would likely have been categorised as '<i>Myotis</i> sp.'</p> <p><i>Myotis</i> sp. were recorded at low levels within the Site. The level of activity is likely to be under-represented due to the quiet calls of these species.</p>
Greater horseshoe bat	Six activity record was returned alongside a hibernation roost recorded within 10 km of the Site.	No roosts identified.	<p>Very low levels of foraging and commuting recorded across all areas of the bat survey area throughout the survey season. Activity most heavily focussed along linear features. Activity levels confirmed as low in the context of a 10km radius through Ecobat.</p> <p>The level of activity is likely to be under-represented due to the quiet and highly directional echolocation calls of these species.</p>
Lesser horseshoe bat	Eight activity records returned alongside eight roost records (hibernation, maternity and day) recorded within 10 km of the Site.	No roosts identified.	<p>Very low levels of foraging and commuting recorded across all areas of the bat survey area throughout the survey season. Activity most heavily focussed along linear features. Activity levels confirmed as low in the context of a 10km radius through Ecobat.</p> <p>The level of activity is likely to be under-represented due to the quiet and highly directional echolocation calls of these species.</p>

* Although it is not possible to distinguish brown and grey long-eared bats by call parameters alone, the known distribution of grey long eared bats is limited to the south coast of England, therefore, it is assumed that these records are accurately identified as brown long-eared bats.

5. Collision risk assessment

5.1 Methodology

5.1.1 A collision risk assessment for bats has been carried out within this report using the data from the 2020 and 2021 recording period following the steps outlined in the Bats and Onshore Wind Turbines guidance. Estimating the vulnerability of bat populations to windfarms is based on the following factors:

- relative abundance and collision risk of bat species;
- the project size and habitat suitability within the Site; and
- bat activity levels recorded at the Site.

5.1.2 **Table 5.1** outlines the relative abundance and level of potential vulnerability from wind farms of populations of Welsh bat species which has been used to inform the assessment.

Table 5.1 Level of potential vulnerability of Welsh bat populations to wind farms.

Wales	Collision Risk		
	Low collision risk	Medium collision risk	High collision risk
Relative abundance	Common species		Common pipistrelle Soprano pipistrelle
	Rarer species	Brown long eared bat Daubenton's bat Natterer's bat Lesser horseshoe	
	Rarest species	Alcathoe bat Bechstein's bat Brandt's bat Greater horseshoe Grey long eared bat Whiskered bat	Barbastelle Serotine

Extracted from *Bats and onshore wind turbines* (2019)⁷. Yellow = low population vulnerability, Orange = medium population vulnerability, Red = high population vulnerability.

5.1.3 The level of potential vulnerability identified in **Table 5.1** has then been considered alongside scheme details and bat activity recorded at the Site. This requires a two-stage process, **Table 5.2** provides an indication of the potential site risk based on evaluation of habitat and the size of the development (Stage 1) and an overall assessment of risk can then be made by considering the results of the initial site risk assessment in relation to bat activity output from Ecobat (Stage 2), which considers the relative vulnerability of each species of bat present, at the population level (**Table 5.3**). Full details on how the habitat risk and project size was determined are presented in **Table F1, Annex G**.

Table 5.2 Stage 1 - Initial site risk assessment

Site risk level (1-5)	Project size			
		Small	Medium	Large
Habitat risk	Low	1	2	3
	Moderate	2	3	4
	High	3	4	5

Extracted from *Bats and onshore wind turbines (2019)*⁷

Green (1 – 2) – lowest/ low site risk; Yellow (3) – medium site risk; Red (4 – 5) – highest/ high site risk

Table 5.3 Stage 2 - Overall risk assessment

Site risk level (from Table 5.2)	Ecobat activity category (or equivalent justified categorisation)					
	Nil (0)	Low (1)	Low – moderate (2)	Moderate (3)	Moderate – high (4)	High (5)
Lowest (1)	0	1	2	3	4	5
Low (2)	0	2	4	6	8	10
Medium (3)	0	3	6	9	12	15
High (4)	0	4	8	12	16	18
Highest (5)	0	5	10	15	20	25

Overall assessment: Low (green) – 0-4; Medium (yellow) 5 -12; High (red) – 15 - 25

5.1.4 The scores in the table are a product of multiplying Site risk level and the Ecobat activity category. The activity categories equate to those given in **Table 5.1** for high collision risk species.

5.2 Results

5.2.1 As detailed in **Table 5.1**, the following high collision risk species were recorded on Site during all survey work:

- Common pipistrelle;
- Soprano pipistrelle; and
- Noctule.

5.2.2 As discussed in **Section 4.1**, it is possible that Leisler's bat and Nathusius' pipistrelle (high collision risk) or serotine (medium collision risk) were also recorded on the Site. No definitive recordings of these species have been made in the bat survey area during all survey work and these species are classed within the rarest category in Wales (**Table**

5.1). As such, they are not considered common and widespread; noctule and common pipistrelle however were widely recorded across the Site during survey work. It is considered likely that activity recorded as the *Nyctalus* and Nyctaloid species groupings were noctule calls which fell within the overlapping range. The activity recorded as the Nathusius' or common pipistrelle group are likely to be attributable to common pipistrelle with calls in the lower parameters of its range. While it is possible that some of recordings within these species groups may have been Leisler's bat, serotine or Nathusius' pipistrelle, it is considered unlikely based on the lack of other records within the bat survey area. Nathusius' pipistrelle, serotine and Leisler's bat are therefore not being taken forward for further consideration within the collision risk assessment.

Stage 1 - Initial site risk assessment

- 5.2.3 Based on the results of the habitat suitability assessment detailed in **Section 3.3** and following the criteria set out in **Table G1, Annex G** the Site is considered to provide Moderate potential habitat risk. The Site is located on a heavily grazed plateau and is generally open and exposed. The heavily grazed plateau is dominated by semi-improved acid grassland, poor semi-improved grassland and wet heath/acid grassland. Due to the close-cropped nature of the grasslands, the sward is short and lacks botanical diversity. There are large swathes of continuous bracken across the Site and an area of improved grassland. Continuous scrub is present in the south of the site and a small number of mature trees are present lining the dry riverbed in the southeast of the Site. There are sections of drystone walls across parts of the Site along with an area of blanket bog located centrally in the Site and a pond and wet ditches present within the Site which provide good foraging and commuting opportunities for bats.
- 5.2.4 Following the criteria set out in Table G.1, Annex G the project size is considered to be Medium. There will be less than 10 turbines, which falls within the Small project size category, however the turbines are proposed to be over 100m in height which falls within the Large project size category. The Large category is allocated for the largest developments (>40 turbines), due to the low number of turbines 19 it is considered that the Medium project size best reflects scheme proposals.
- 5.2.5 Based on evaluation of habitats and the size of the development (Stage 1 of the assessment) the Site is considered to have a **site risk level of 3 (medium site risk)**.

Stage 2 - Overall risk assessment

- 5.2.6 The overall assessment of collision risk has been undertaken for each high-risk species. In order to understand collision risk at average levels of bat activity and at unusually high levels of bat activity both the highest Ecobat activity category and the most frequent activity category (median) is shown in **Table 5.4**. All calculations reference the method in **Table 5.3**.

¹⁹ At time of writing a seven-turbine scheme is being taken forward

Table 5.4 Stage 2 - Overall collision risk assessment

Species	Maximum Ecobat Category (number of nights activity recorded at that category)	Maximum Risk Category	Median Ecobat Category	Median Risk Category
Common pipistrelle	High (75)	15	High	15
Soprano pipistrelle	High (4)	15	Moderate	9
Noctule	High (8)	15	Moderate	9

Overall assessment: Low (green) – 0-4; Medium (yellow) 5 -12; High (red) – 15 – 25

5.2.7 The maximum Ecobat activity category was the same as the median for common pipistrelle. This category was only recorded on four nights for soprano pipistrelle and eight nights for noctule, as such it is considered that the assessment at the median Ecobat activity category best reflects the levels of bat activity recorded on the Site. The overall collision risk category for the Proposed Development is High for common pipistrelle, Moderate for soprano pipistrelle and Moderate for noctule.

5.2.8 An overall collision risk assessment has also been undertaken for each automated detector location as presented in Table 5.5.

Table 5.5 Stage 2 - Overall collision risk assessment

Automated Monitoring Location	Associated Final Proposed Turbine Location	Common pipistrelle		Soprano pipistrelle		Noctule	
		Ecobat Median Category	Overall Collision Risk Category	Ecobat Median Category	Overall Collision Risk Category	Ecobat Median Category	Overall Collision Risk Category
1	Turbine 1	Moderate-High	12	Low	3	Moderate - High	12
2	Turbine 3	High	15	Moderate	9	Moderate	9
3	Turbine 4	High	15	Moderate	9	Low – Moderate	6
4	Turbine 7	Moderate	9	Low – Moderate	6	Moderate	9
5	Turbine 6	Low-Moderate	6	Low	3	Moderate	9
6	Turbine 5	Moderate	9	Low	3	Moderate	9
7	Turbine 2	-		-		-	

Overall assessment: Low (green) – 0-4; Medium (yellow) 5 -12; High (red) – 15 - 25

- 5.2.9 Collision risk for common pipistrelle is classed as:
- high - at automated monitoring locations 2 and 3; and
 - medium - at automated monitoring locations 1, 4, 5 and 6.
- 5.2.10 No common pipistrelle activity was recorded at automated monitoring location 7.
- 5.2.11 Collision risk for soprano pipistrelle is classed as:
- medium - at automated monitoring locations 2, 3 and 4; and
 - low - at automated monitoring locations 1, 5 and 6.
- 5.2.12 No soprano pipistrelle activity was recorded at automated monitoring location 7.
- 5.2.13 Collision risk for noctule is classed as:
- medium – at automated monitoring locations 1, 2, 3, 4, 5 and 6.
- 5.2.14 No noctule activity was recorded at automated monitoring location 7.

5.3 Conclusion

- 5.3.1 A collision risk assessment has been undertaken for the data collected in 2020 and 2021 for each high risk species recorded on the Site (common pipistrelle, soprano pipistrelle, and noctule). Due to ongoing analysis of 2022 automated recorder data this report does not provide the results data or the final assessment of the status of bat populations on the Site, which will be provided within the final ES.
- 5.3.2 The overall collision risk category by turbine location for high risk species based on the 2020 and 2021 results is:
- high collision risk at turbine locations 3 and 4; and
 - medium collision risk for turbine locations 1, 3, 4, 5, 6 and 7.
- 5.3.3 No bat activity was recorded at turbine location 2 (automated detector location 7) in 2021 and an overall collision risk category cannot be given for this location.

Annex A

Figures

Figure 1.1 Site boundary.

Figure 1.2 Survey areas.

Figure 2.1 Manual transect routes.

Figure 2.2 Automated monitoring locations 2020.

Figure 2.3 Automated monitoring locations 2021.

Figure 2.4 Automated monitoring locations 2022.

Figure 3.1 Records of roosting bats from desk study data within 10km of the Site.

Figure 3.2 Level of roosting potential assigned to built structures.

Figure 3.3 Level of roosting potential assigned to trees

Figure 3.4 Indicative distribution of species records during the manual transect survey.

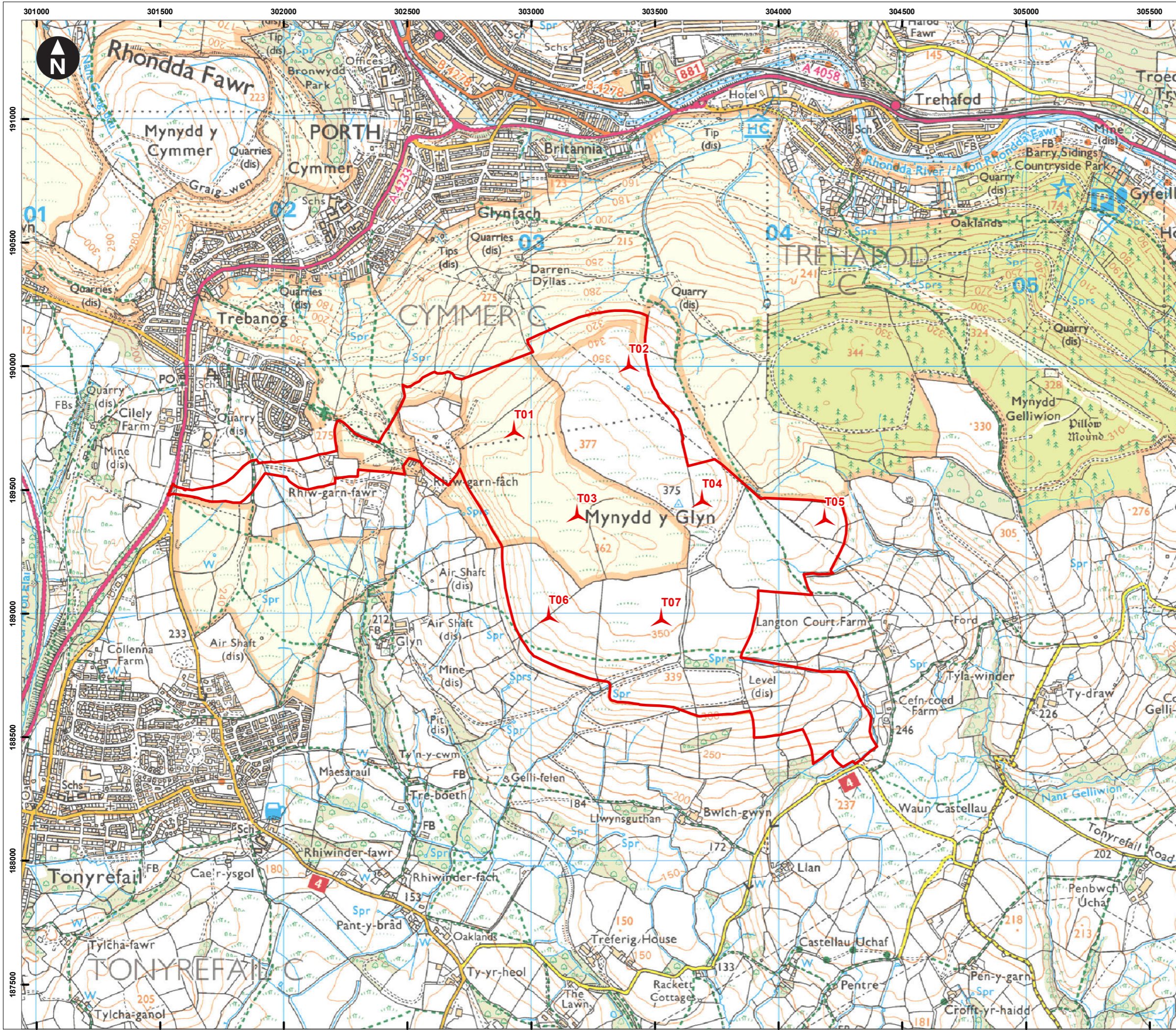
Figure 3.5 Manual bat transect activity for Common Pipistrelle.

Figure 3.6 Manual bat transect activity for Soprano Pipistrelle.

Figure 3.7 Manual bat transect activity for Pipistrellus sp.

Figure 3.8 Manual bat transect activity for Noctule, Long-eared and Myotis sp.

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- Key
- Site boundary
 - ▲ Proposed turbine location

0 250 500 750 m
 Scale at A3: 1:15,000
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 0100031673

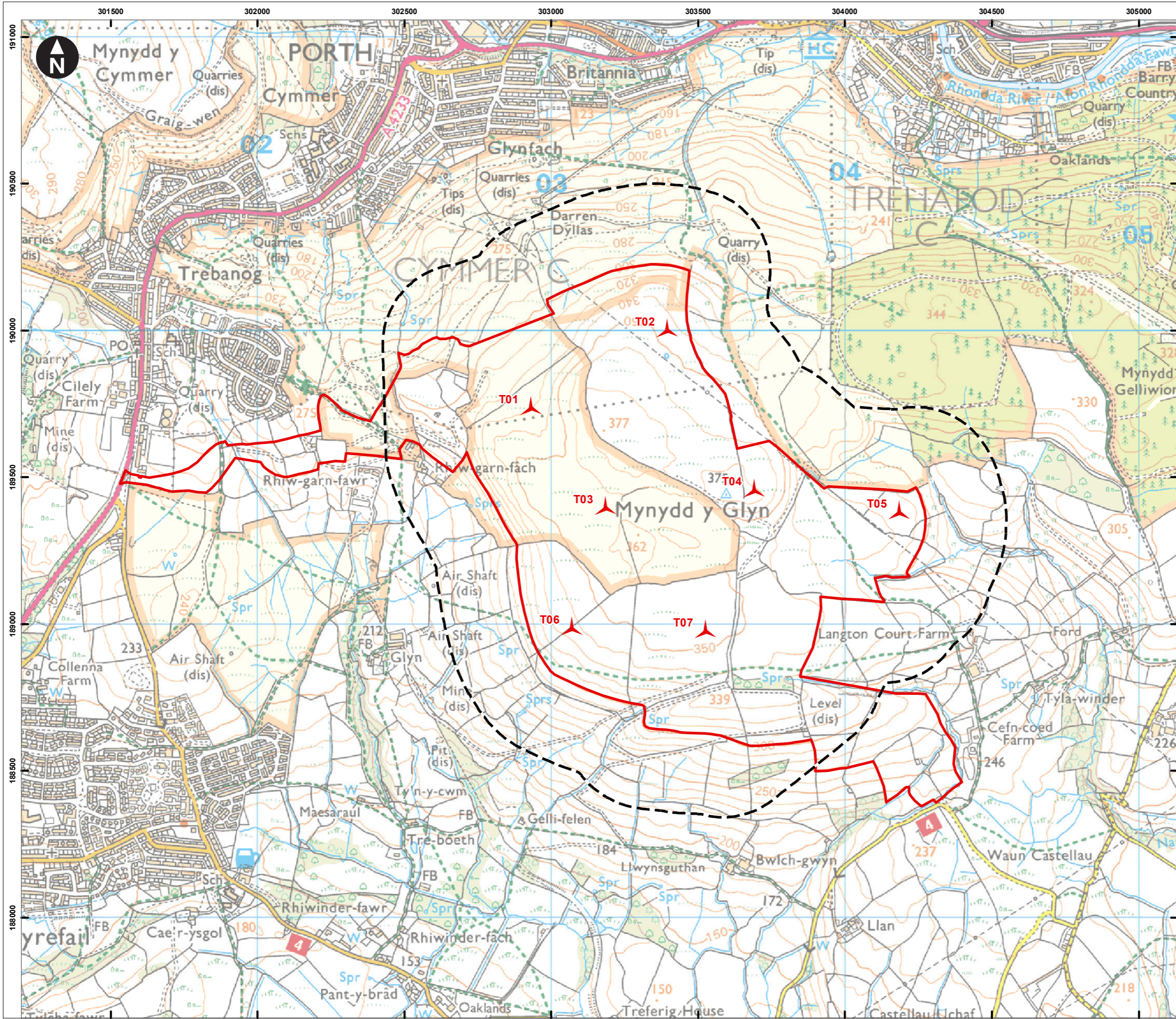
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Figure 1.1
Site boundary

October 2022



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- Key
- Site boundary
 - ▲ Proposed turbine location
 - Bat survey area (275m buffer)

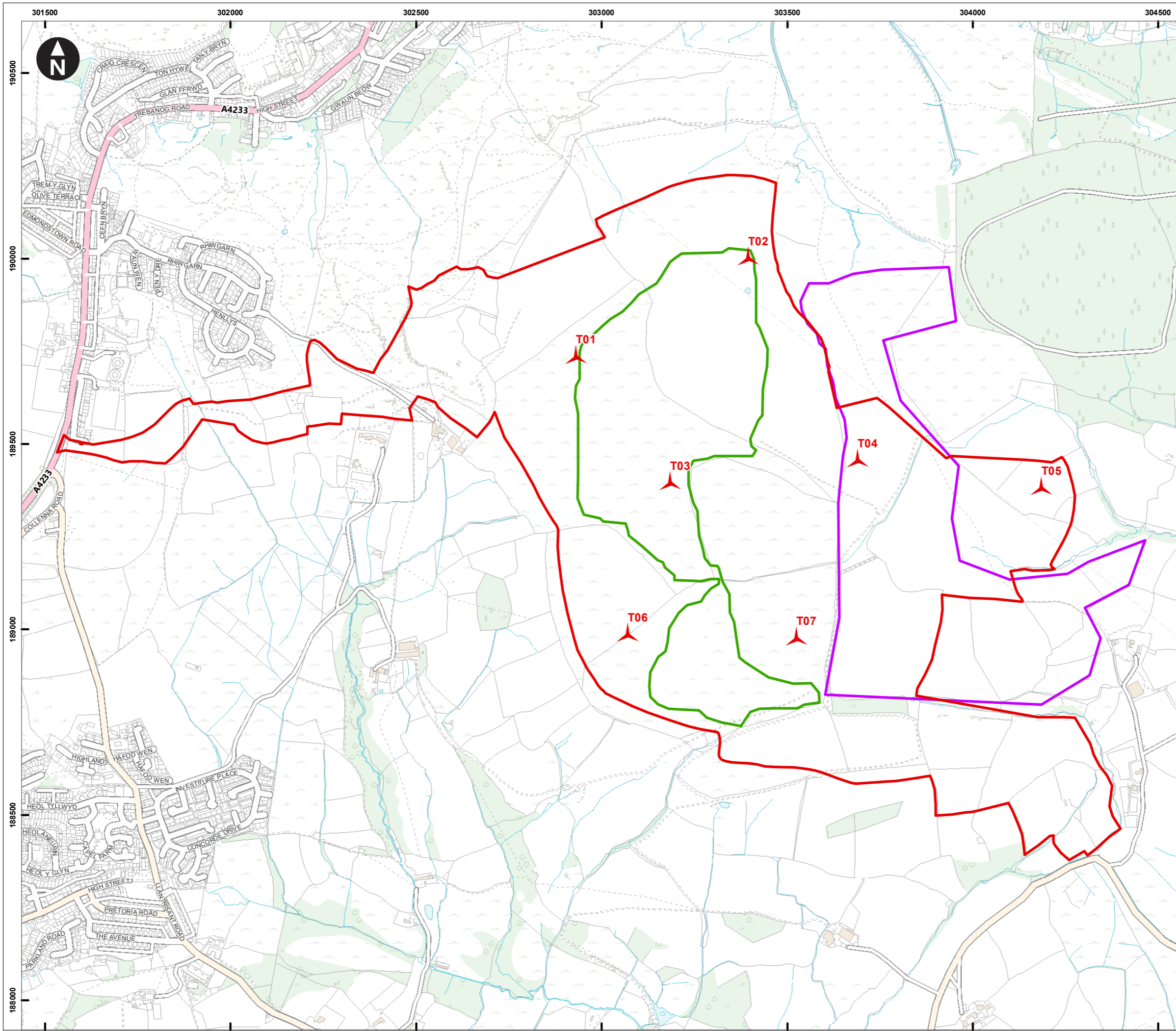
0 250 500 750 m
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 0100031673

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Figure 1.2
 Survey area

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Key

- Site boundary
- ▲ Proposed turbine location

Manual bat activity transect routes

- Transect 1
- Transect 2

0 100 200 300 400 500 600 m
 Scale at A3: 1:10,000
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Figure 2.1
Manual transect surveys

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Key

- Site boundary
- ▲ Proposed turbine location

Automated bat activity monitoring locations 2020

- 01
- 02
- 03
- 04
- 05
- 06

0 100 200 300 400 500 600 m
 Scale at A3: 1:10,000
 Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

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Figure 2.2
Automated monitoring locations 2020

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Key

- Site boundary
- ▲ Proposed turbine location

Automated Monitoring Locations 2021

- 1
- 2
- 3
- 4
- 5
- 6
- 7

0 100 200 300 400 500 600 m
 Scale at A3: 1:10,000
 Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

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Figure 2.3
Automated monitoring locations 2021

October 2022



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Key

- Site boundary
- ▲ Proposed turbine location

Automated Monitoring Locations 2022

- 1
- 2
- 3
- 4
- 5
- 6
- 7

0 100 200 300 400 500 600 m
 Scale at A3: 1:10,000
 Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

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Figure 2.4
Automated monitoring locations 2022

October 2022





Key

- Site boundary
- 10km buffer

Bat roost

- Brandt's bat
- Brown long-eared bat
- Common pipistrelle
- Daubenton's bat
- Greater horseshoe bat
- Lesser horseshoe bat
- Long-eared bat species
- Myotis bat species
- Natterer's bat
- Noctule bat
- Pipistrelle agg.
- Pipistrellus bat species
- Soprano pipistrelle
- Whiskered bat
- Unknown bat

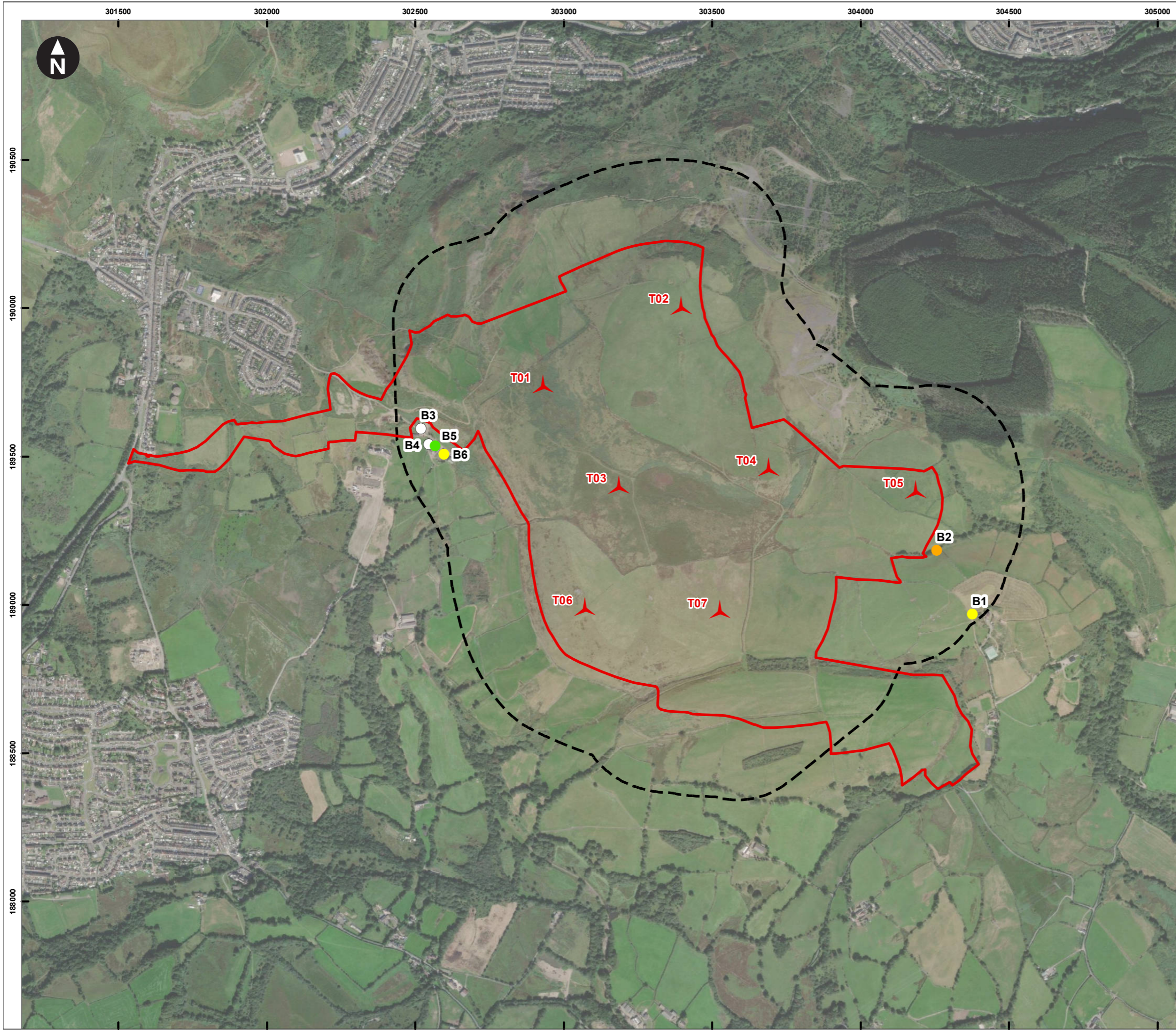
0 1,000 2,000 3,000 4,000 5,000 m

Scale at A3: 1:90,000

Contains OS data © Crown Copyright and database right 2020

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Figure 3.1
Records of roosting bats from desk study
data within 10km of the Site



Key

- Site boundary
- ▲ Proposed turbine location
- Bat survey area (275m buffer)

Bat surveys

- Confirmed
- High
- Moderate
- Low
- Negligible

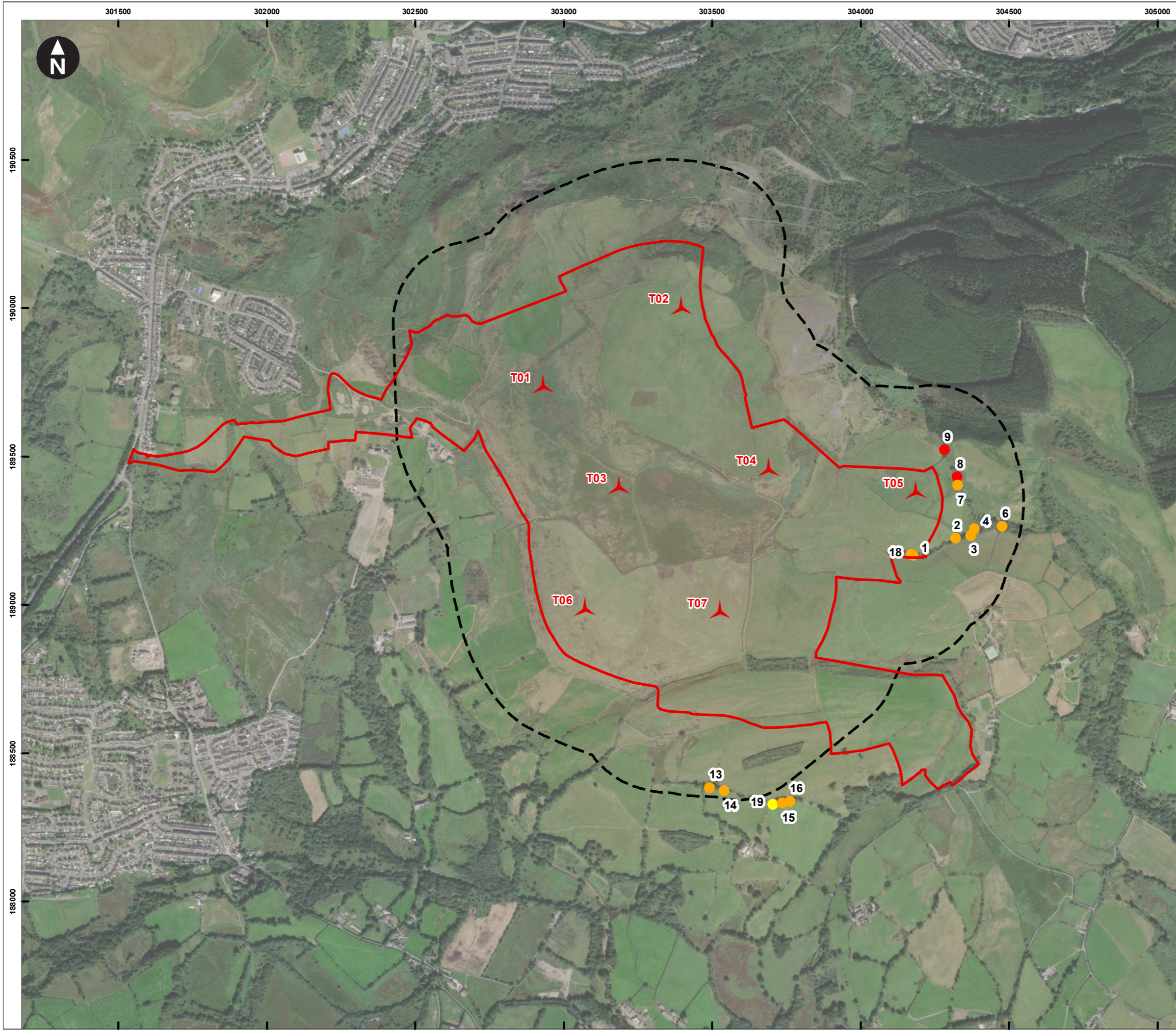


Scale at A3: 1:12,500

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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Figure 3.2
Level of roosting potential assigned to
built structures



Key

- Site boundary
- ▲ Proposed turbine location
- Bat survey area (275m buffer)

Bat surveys

- High
- Moderate
- Low
- Negligible



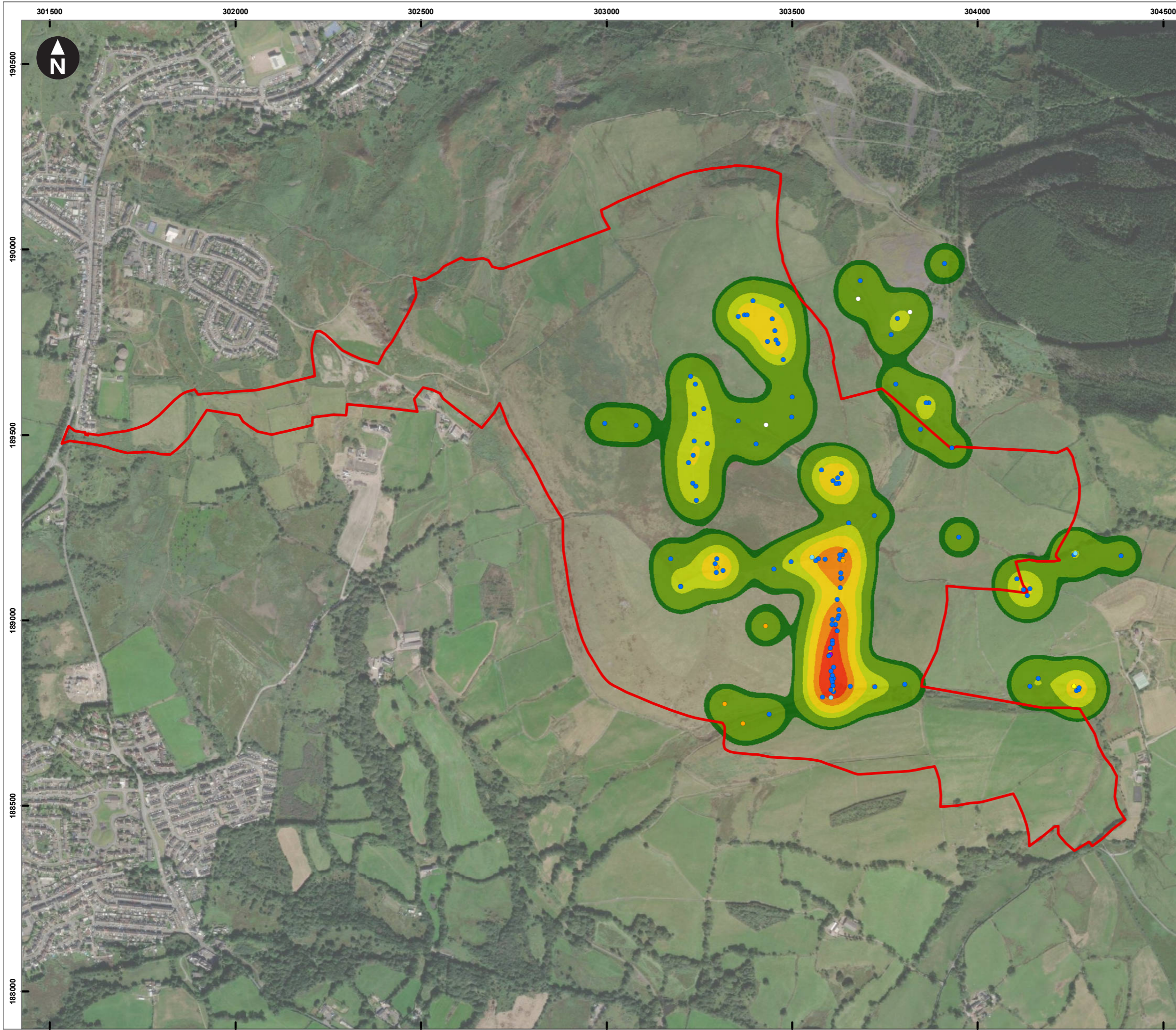
Scale at A3: 1:12,500

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

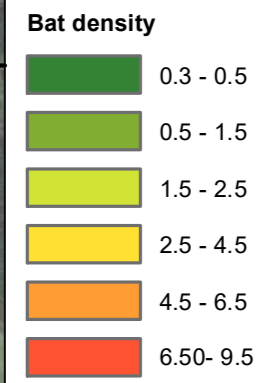
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Figure 3.3
Level of roosting potential assigned to trees

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- Key
- Site boundary
 - Common pipistrelle
 - Soprano pipistrelle
 - Pipistrellus sp
 - Myotis sp
 - NSL
 - Plecotus auritus

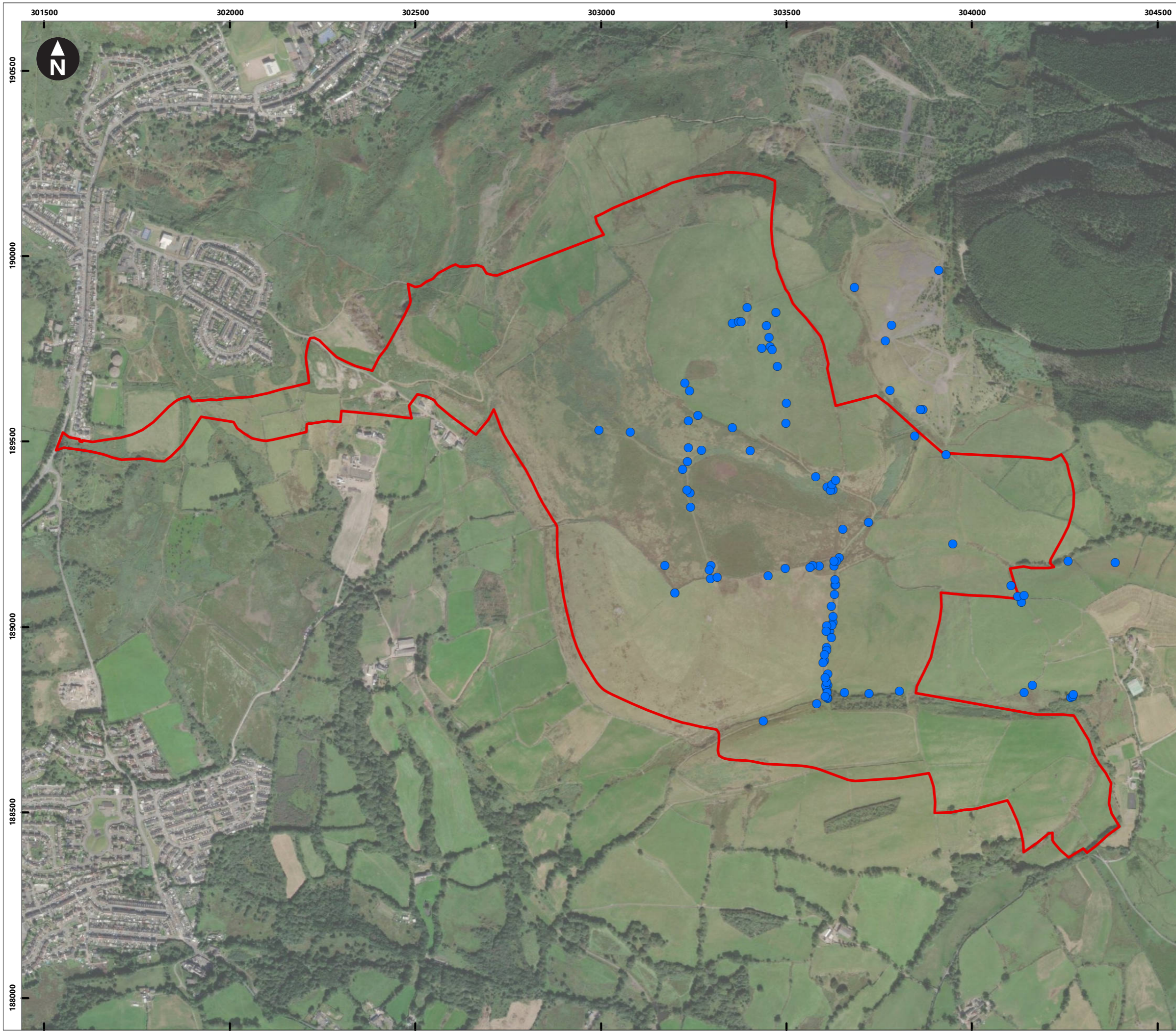


Scale at A3: 1:10,000
 Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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Figure 3.4
 Indicative distribution of species records during the manual transect survey

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- Key
- Site boundary
 - Common pipistrelle

0 100 200 300 400 500 600 m

Scale at A3: 1:10,000

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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Figure 3.5
Manual bat transect activity for Common
Pipistrelle

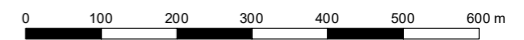
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Key

- Site boundary
- Soprano pipistrelle



Scale at A3: 1:10,000
 Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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Figure 3.6
Manual bat transect activity for Soprano Pipistrelle

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- Key
- Site boundary
 - Pipistrellus sp

0 100 200 300 400 500 600 m

Scale at A3: 1:10,000

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

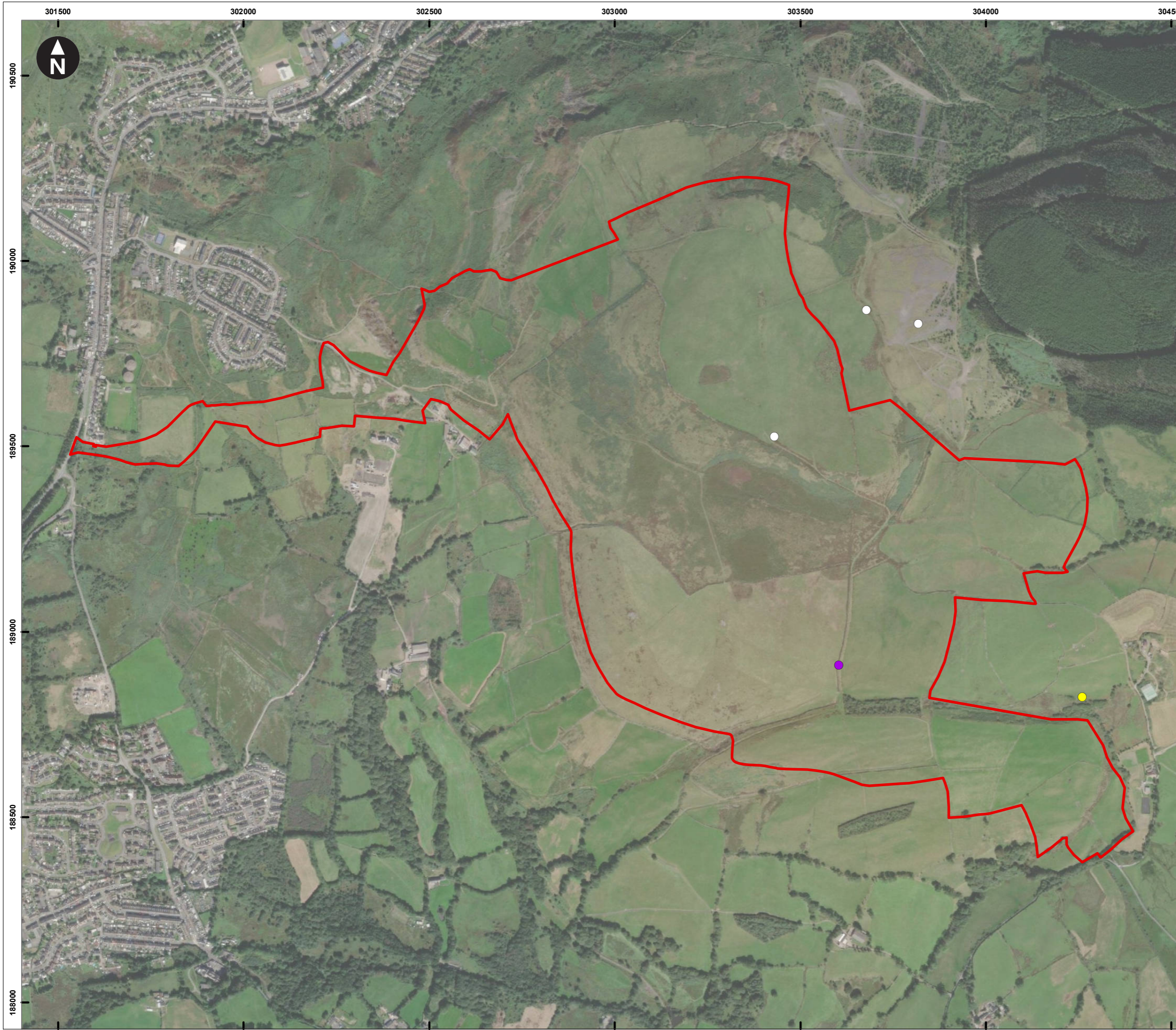
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Figure 3.7
Manual bat transect activity for *Pipistrellus* sp.



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42864-WOOD-XX-XX-FG-OE-0059_S2_P01.3



- Key
- Site boundary
 - Myotis* sp
 - NSL
 - Plecotus auritus*

0 100 200 300 400 500 600 m

Scale at A3: 1:10,000

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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Figure 3.8
Manual bat transect Recorded bat activity
for *Nyctaloid* sp., Long-eared. and *Myotis*
sp.



October 2022

Annex B

Legislation

All British bat species are listed in Schedule 5 of the *Wildlife and Countryside Act 1981* (as amended) and Schedule 2 of the *The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019*. They are afforded full protection under Section 9(4) of the Act and Regulation 43 of the Regulations. These make it an offence, *inter alia*, to:

- Deliberately capture, injure or kill a bat;
- Deliberately disturb a bat (this applies anywhere, not just at its roost), in particular in such a way as to be likely to:
 - ▶ Impair their ability to survive, breed or reproduce, or rear or nurture their young; and
 - ▶ Impair their ability to hibernate or migrate.
- Affect significantly the local distribution or abundance of that bat species;
- Damage or destroy a breeding Site or resting place of any bat;
- Intentionally or recklessly disturb a bat while it is occupying a structure or place that it uses for shelter or protection; and
- Intentionally or recklessly obstruct access to any place that a bat uses for shelter or protection (this is taken to mean all bat roosts whether bats are present or not).

Annex C

Tables relating to survey methods

Table C1 Automated monitoring weather conditions 2020

Season	Date	Sunrise	Sunset	Temperature (Min°C)	Temperature (Max°C)	Temperature (Average°C)	Average Wind Speed (m/s)	Rainfall	Average Humidity (%)
Spring	20/05/2020	05:14:00	21:06:00	11	19	14	3.3	Some light rain showers	82
	21/05/2020	05:12:00	21:08:00	13	18	15	5.5	Some light rain showers	76
	22/05/2020	05:11:00	21:09:00	12	13	12	8.8	None	77
	23/05/2020	05:10:00	21:11:00	12	13	12	8.1	None	86
	24/05/2020	05:09:00	21:12:00	7	12	9	2.7	None	96
	25/05/2020	05:08:00	21:13:00	9	15	11	2.5	None	86
	26/05/2020	05:07:00	21:14:00	12	17	13	3.1	None	91
	27/05/2020	05:06:00	21:16:00	14	21	17	4.4	None	63
	28/05/2020	05:05:00	21:17:00	12	21	15	4.7	None	53

Season	Date	Sunrise	Sunset	Temperature (Min°C)	Temperature (Max°C)	Temperature (Average°C)	Average Wind Speed (m/s)	Rainfall	Average Humidity (%)
	29/05/2020	05:04:00	21:18:00	12	21	15	3.6	None	55
Summer	03/07/2020	05:02:00	21:33:00	15	16	16	5.8	Some light rain showers	98
	04/07/2020	05:03:00	21:32:00	14	17	15	8.6	Some light rain showers	94
	05/07/2020	05:03:00	21:32:00	12	14	13	8.8	None	77
	06/07/2020	05:04:00	21:31:00	13	15	14	4.1	None	86
	07/07/2020	05:05:00	21:30:00	14	15	15	7.2	Heavy rain showers	99
	08/07/2020	05:06:00	21:30:00	15	16	15	5.3	Some light rain showers	97
	09/07/2020	05:07:00	21:29:00	11	17	13	4.1	None	80
	10/07/2020	05:08:00	21:28:00	9	15	11	3.3	None	80
	11/07/2020	05:09:00	21:27:00	10	16	12	3.1	None	80
	12/07/2020	05:10:00	21:26:00	14	18	15	3.1	None	82
Autumn	08/09/2020	06:37:00	19:43:00	15	16	15	5.5	Some light rain showers	96

Season	Date	Sunrise	Sunset	Temperature (Min°C)	Temperature (Max°C)	Temperature (Average°C)	Average Wind Speed (m/s)	Rainfall	Average Humidity (%)
	09/09/2020	06:39:00	19:40:00	9	13	11	2.5	None	84
	10/09/2020	06:40:00	19:38:00	11	14	13	3.1	None	80
	11/09/2020	06:42:00	19:36:00	14	16	15	5.5	None	86
	12/09/2020	06:44:00	19:33:00	14	16	15	4.1	None	86
	13/09/2020	06:45:00	19:31:00	12	16	14	2.7	None	96
	14/09/2020	06:47:00	19:29:00	17	22	19	2.7	None	67
	15/09/2020	06:48:00	19:27:00	15	16	16	3.8	None	100
	16/09/2020	06:50:00	19:24:00	13	19	16	7.5	None	84
	17/09/2020	06:52:00	19:22:00	11	17	13	6.6	None	77

*Weather data obtained from <https://www.wunderground.com/> at time of data collection

Table C.2 Automated monitoring weather conditions 2021 taken from Davis Vantage Vue weather station

Season	Date	Sunrise	Sunset	Temperature (Min°C)	Temperature (Max°C)	Temperature (Average°C)	Average Wind Speed (mph)	Average Wind Speed (m/s)	Rainfall	Average Humidity (%)
Spring	01/04/2021	06:49	19:46	1.4	7.1	3.7	12.0	5.4	0.00	87
	02/04/2021	06:47	19:47	1.6	7.9	3.7	9.8	4.4	0.00	78
	03/04/2021	06:45	19:49	1.9	7.1	3.2	1.8	0.8	0.00	79
	04/04/2021	06:42	19:51	3.7	8.0	5.5	13.4	6.0	0.00	85
	05/04/2021	06:40	19:52	-2.0	2.4	-0.8	9.8	4.4	0.00	73
	06/04/2021	06:38	19:54	-1.7	1.9	-0.4	5.9	2.7	0.00	77
	07/04/2021	06:36	19:56	1.2	4.3	2.6	4.9	2.2	0.00	78
	08/04/2021	06:33	19:57	3.5	5.5	4.3	8.8	3.9	0.00	89
	09/04/2021	06:31	19:59	-0.8	6.1	2.0	6.1	2.7	0.00	78
	10/04/2021	06:29	20:01	-1.2	2.9	0.4	5.1	2.3	0.00	85
	11/04/2021	06:27	20:02	0.0	3.4	1.5	6.9	3.1	0.00	78
	12/04/2021	06:25	20:04	1.4	5.7	2.8	1.5	0.7	0.00	76
	13/04/2021	06:22	20:06	2.8	5.1	3.7	2.3	1.0	0.20	86
	14/04/2021	06:20	20:07	0.0	7.2	3.1	4.4	2.0	0.00	74
	15/04/2021	06:18	20:09	0.5	7.9	2.6	3.0	1.3	0.00	73



Season	Date	Sunrise	Sunset	Temperature (Min°C)	Temperature (Max°C)	Temperature (Average°C)	Average Wind Speed (mph)	Average Wind Speed (m/s)	Rainfall	Average Humidity (%)
	16/04/2021	06:16	20:11							
	17/04/2021	06:14	20:12							
	18/04/2021	06:12	20:14							
	19/04/2021	06:10	20:16							
	20/04/2021	06:08	20:17							
	21/04/2021	06:05	20:19	4.5	4.6	4.6	10.0	4.5	0.00	76
	22/04/2021	06:03	20:21	5.8	5.9	5.8	8.3	3.7	0.00	55
	23/04/2021	06:01	20:22	7.3	7.4	7.3	10.5	4.7	0.00	59
	24/04/2021	05:59	20:24	6.7	6.9	6.8	12.2	5.5	0.00	71
	25/04/2021	05:57	20:26	4.1	4.2	4.1	12.4	5.5	0.00	79
	26/04/2021	05:55	20:27	6.8	6.9	6.8	1.7	0.8	0.00	66
	27/04/2021	05:53	20:29	5.7	5.8	5.7	0.4	0.2	0.40	83
	28/04/2021	05:51	20:31	3.0	3.1	3.0	0.0	0.0	0.00	81
	29/04/2021	05:50	20:32	2.7	2.9	2.8	0.1	0.0	0.00	83
	30/04/2021	05:48	20:34	3.0	3.1	3.0	2.8	1.3	0.00	83
	01/05/2021	05:46	20:36	3.7	3.8	3.7	1.8	0.8	0.00	78



Season	Date	Sunrise	Sunset	Temperature (Min°C)	Temperature (Max°C)	Temperature (Average°C)	Average Wind Speed (mph)	Average Wind Speed (m/s)	Rainfall	Average Humidity (%)
	02/05/2021	05:44	20:37	5.3	5.3	5.3	6.3	2.8	2.60	88
	03/05/2021	05:42	20:39	6.0	6.1	6.0	26.3	11.8	1.20	89
	04/05/2021	05:40	20:40	2.6	2.7	2.6	8.9	4.0	0.20	84
	05/05/2021	05:38	20:42	2.0	2.1	2.1	2.2	1.0	0.20	87
	06/05/2021	05:37	20:44	2.9	3.1	3.0	5.9	2.6	0.00	77
	07/05/2021	05:35	20:45	5.1	5.2	5.2	0.0	0.0	0.00	84
	08/05/2021	05:33	20:47	10.0	10.1	10.0	0.0	0.0	0.00	94
	09/05/2021	05:32	20:48	7.9	8.0	7.9	0.0	0.0	0.00	93
	10/05/2021	05:30	20:50	6.2	6.3	6.2	6.8	3.0	0.00	91
	11/05/2021	05:28	20:51	5.3	5.4	5.3	1.6	0.7	0.00	91
	12/05/2021	05:27	20:53	6.1	6.2	6.1	0.0	0.0	0.00	93
	13/05/2021	05:25	20:55	7.2	7.2	7.2	0.0	0.0	0.00	94
	14/05/2021	05:24	20:56	7.0	7.0	7.0	0.0	0.0	0.00	94
	15/05/2021	05:22	20:58	7.6	7.7	7.6	0.0	0.0	0.00	94
	16/05/2021	05:21	20:59	6.1	6.2	6.1	0.0	0.0	0.00	94
	17/05/2021	05:19	21:01	6.4	6.5	6.5	0.1	0.0	0.00	91



Season	Date	Sunrise	Sunset	Temperature (Min°C)	Temperature (Max°C)	Temperature (Average°C)	Average Wind Speed (mph)	Average Wind Speed (m/s)	Rainfall	Average Humidity (%)
	18/05/2021	05:18	21:02	6.1	6.2	6.2	0.0	0.0	0.00	94
	19/05/2021	05:16	21:03	7.2	7.3	7.2	0.0	0.0	0.00	93
	20/05/2021	05:15	21:05	7.5	7.6	7.5	0.0	0.0	0.00	94
	21/05/2021	05:14	21:06	6.8	6.8	6.8	0.0	0.0	0.00	95
	22/05/2021	05:13	21:08	5.0	5.1	5.1	0.0	0.0	0.00	87
	23/05/2021	05:11	21:09	5.5	5.6	5.5	0.0	0.0	0.00	95
	24/05/2021	05:10	21:10	5.9	6.0	5.9	0.0	0.0	0.00	89
	25/05/2021	05:09	21:12	4.3	4.4	4.4	0.0	0.0	0.00	92
	26/05/2021	05:08	21:13	4.6	4.8	4.7	0.0	0.0	0.00	89
	27/05/2021	05:07	21:14	8.6	8.7	8.6	0.0	0.0	0.00	89
	28/05/2021	05:06	21:15	11.3	11.4	11.3	0.0	0.0	0.00	92
	29/05/2021	05:05	21:16	10.3	10.5	10.4	0.0	0.0	0.00	82
	30/05/2021	05:04	21:18	8.0	8.2	8.1	0.0	0.0	0.00	85
	31/05/2021	05:03	21:19	10.4	10.6	10.5	0.0	0.0	0.00	83
Summer	01/06/2021	05:03	21:20	12.2	12.1	12.1	0.0	0.0	0.00	79
	02/06/2021	05:02	21:21	13.8	13.7	13.7	0.0	0.0	0.00	93



Season	Date	Sunrise	Sunset	Temperature (Min°C)	Temperature (Max°C)	Temperature (Average°C)	Average Wind Speed (mph)	Average Wind Speed (m/s)	Rainfall	Average Humidity (%)
	03/06/2021	05:01	21:22	6.0	5.9	6.0	0.0	0.0	0.00	90
	04/06/2021	05:00	21:23	8.8	8.5	8.7	0.0	0.0	0.00	86
	05/06/2021	05:00	21:24	14.5	14.3	14.4	0.0	0.0	0.00	94
	06/06/2021	04:59	21:25	11.3	11.1	11.2	1.7	0.8	0.00	89
	07/06/2021	04:59	21:26	11.4	11.2	11.3	3.3	1.5	0.00	84
	08/06/2021	04:58	21:26	12.7	12.6	12.7	4.5	2.0	0.00	89
	09/06/2021	04:58	21:27	13.6	13.6	13.6	6.0	2.7	0.00	95
	10/06/2021	04:57	21:28	12.8	12.8	12.8	13.2	5.9	0.00	95
	11/06/2021	04:57	21:29	12.3	12.1	12.2	4.5	2.0	0.00	92
	12/06/2021	04:57	21:29	16.2	16.0	16.1	4.8	2.1	0.00	73
	13/06/2021	04:57	21:30	16.8	16.6	16.7	6.0	2.7	0.00	76
	14/06/2021	04:57	21:30	12.7	12.5	12.6	3.9	1.8	0.00	75
	15/06/2021	04:56	21:31	14.0	13.9	14.0	4.2	1.9	0.00	79
	16/06/2021	04:56	21:31	13.6	13.5	13.6	2.1	0.9	0.00	80
	17/06/2021	04:56	21:32	13.0	12.9	12.9	6.0	2.7	0.00	71
	18/06/2021	04:56	21:32	10.6	10.5	10.6	4.0	1.8	0.00	89

Season	Date	Sunrise	Sunset	Temperature (Min°C)	Temperature (Max°C)	Temperature (Average°C)	Average Wind Speed (mph)	Average Wind Speed (m/s)	Rainfall	Average Humidity (%)
	19/06/2021	04:56	21:32	11.5	11.5	11.5	6.8	3.0	0.00	93
	20/06/2021	04:57	21:33	10.6	10.5	10.5	8.0	3.6	0.00	83
	21/06/2021	04:57	21:33	10.6	10.3	10.5	5.9	2.7	0.00	75
	22/06/2021	04:57	21:33	12.4	12.2	12.3	3.6	1.6	0.00	71
	23/06/2021	04:57	21:33	13.2	13.0	13.1	1.0	0.5	8.20	87
	24/06/2021	04:58	21:33	11.7	11.6	11.7	6.9	3.1	0.00	85
	25/06/2021	04:58	21:33	11.6	11.5	11.6	5.9	2.6	3.40	90
	26/06/2021	04:59	21:33	13.0	12.9	13.0	5.9	2.7	0.00	88
	27/06/2021	04:59	21:33	12.3	12.2	12.3	3.2	1.4	0.00	92
	28/06/2021	05:00	21:33	13.5	13.4	13.5	2.4	1.1	0.00	86
	29/06/2021	05:00	21:33	15.9	15.7	15.9	1.5	0.7	0.00	83
	30/06/2021	05:01	21:32	15.2	15.0	15.1	2.7	1.2	0.00	84
	01/07/2021	04:59	21:32	13.7	13.5	13.6	2.5	1.1	0.00	87
	02/07/2021	05:00	21:32	13.4	13.4	13.4	5.8	2.6	54.20	94
	03/07/2021	05:01	21:31	14.2	14.0	14.1	4.7	2.1	8.00	92
	04/07/2021	05:02	21:31	9.1	9.0	9.1	6.9	3.1	1.40	69



Season	Date	Sunrise	Sunset	Temperature (Min°C)	Temperature (Max°C)	Temperature (Average°C)	Average Wind Speed (mph)	Average Wind Speed (m/s)	Rainfall	Average Humidity (%)
	05/07/2021	05:02	21:30	10.3	10.3	10.3	4.6	2.1	224.80	93
	06/07/2021	05:03	21:30	12.8	12.7	12.7	13.8	6.2	81.40	95
	07/07/2021	05:04	21:29	12.7	12.6	12.7	3.3	1.5	0.00	94
	08/07/2021	05:05	21:29	12.2	12.1	12.1	2.8	1.2	0.00	92
	09/07/2021	05:06	21:28							
	10/07/2021	05:07	21:27	12.0	11.9	11.9	0.0	0.0	0.00	92
	11/07/2021	05:08	21:26	12.0	11.9	11.9	5.0	2.2	2.40	95
	12/07/2021	05:09	21:25	13.6	13.5	13.6	2.0	0.9	0.00	92
	13/07/2021	05:11	21:24	13.8	13.7	13.7	3.4	1.5	0.00	86
	14/07/2021	05:12	21:24	14.0	13.9	13.9	2.8	1.3	0.00	85
	15/07/2021	05:13	21:23	15.5	15.4	15.4	0.4	0.2	0.00	85
	16/07/2021	05:14	21:21	16.8	16.6	16.7	0.0	0.0	0.00	84
	17/07/2021	05:15	21:20	17.8	17.7	17.7	0.0	0.0	0.00	84
	18/07/2021	05:17	21:19	16.5	16.3	16.3	0.0	0.0	0.00	88

Table C.3 2021 Weather conditions for emergence, re-entry survey visits on built structure B5.

Built Structures / Tree ID number	Weather Conditions		
	Visit 1 – 12.08.2021	Visit 2 – 24.08.2021	Visit 3 – 08.09.2021
B5	Temperature: 17:14 °C, Wind: Light, Rain: None, Cloud Cover: 70%	Temperature: 13-14 °C, Wind: Light, Rain: None, Cloud Cover:50%	Temperature: 20-18°C, Wind: Calm, Rain: Light, Cloud Cover:90%

Table C.4 Weather conditions for transect survey visits

Date	Start/End Time of Transect	Time of Sunset or Sunrise	Weather Conditions
20th May 2020	21:07/11:44*	00:07	Temperature: 12-10°C, Average Wind: 0.9-2.7m/s, Rain: None, Cloud Cover: 65%
9th June 2020	21:27/00:27	21:27	Temperature: 8.9-8.5°C, Average Wind: 5 - 3.6m/s, Rain: None, Cloud Cover: 50%
30th July 2020	21:05/00:05	21:05	Temperature: 17-15°C, Average Wind: 4-2.7m/s, Rain: None, Cloud Cover: 30%
10th September 2020	19:40/22:40	19:40	Temperature: 13-10°C, Average Wind: 2.7-0m/s, Rain: None, Cloud Cover: 60%
16th September 2020	19:24/21:54*	19:24	Temperature: 14-9°C, Average Wind: 3-8m/s, Rain: None, Cloud Cover: 0%
12th October 2020	18:36/21:36	18:36	Temperature: 9°C, Average Wind: 3.7-2.2m/s, Rain: None, Cloud Cover: 20%

Table C.5 Distance between built structures and proposed turbine locations

Built Structure	Proposed Turbine Location	Distance and direction from proposed turbine location (m)
B1	T1	~1,631 southeast
	T2	~1,422 southeast
	T3	~1,260 southeast
	T4	~839 southeast
	T5	~455 south

Built Structure	Proposed Turbine Location	Distance and direction from proposed turbine location (m)
	T6	~1,299 east
	T7	~845 east
B2	T1	~1,431 southeast
	T2	~1,185 southeast
	T3	~1,086 southeast
	T4	~625 southeast
	T5	~211 south
	T6	~1,195 east
	T7	~754 east
B3	T1	~430 southwest
	T2	~960 southwest
	T3	~690 west
	T4	~1,173 west
	T5	~1,672 west
	T6	~818 northwest
	T7	~1,176 northwest
B4	T1	~425 southwest
	T2	~958 southwest
	T3	~656 west
	T4	~1,145 west
	T5	~1,643 west
	T6	~770 northwest
	T7	~1,133 northwest
B5	T1	~411 southwest

Built Structure	Proposed Turbine Location	Distance and direction from proposed turbine location (m)
	T2	~945 southwest
	T3	~631 west
	T4	~1,121 west
	T5	~1,619 west
	T6	~745 northwest
	T7	~1,107 northwest
	B6	T1
T2		~939 southwest
T3		~603 west
T4		~1,097 west
T5		~1,594 west
T6		~709 northwest
T7		~1,073 northwest

Table C.6 Personnel involved with bat survey work

Surveyor name	Position	Qualifications and experience
Chris Hill	Associate Director	BSc (hons), MRes. MCIEEM. Over 12 years' experience working in ecological consultancy. Natural England bat survey licence holder Class 2 licence registration no. 2015-15031-CLS-CLS.
Kelly Jones	Principal Consultant	BSc (hons), MSc. MCIEEM. 10 years working in ecological consultancy. Natural Resources Wales bat survey licence holder for 4 years. Class 4 licence registration no. S088838/1 and Natural England licence number 2017-30482-CLS-CLS. Certified in tree climbing and aerial rescue.
Sara Rodriguez-Pecino	Senior Consultant	BSc (hons), MSc. GradCIEEM. 8 years working in ecological consultancy. Natural England bat survey licence holder Class 2 licence registration no. 2019-41070-CLS-CLS. Certified in tree climbing and aerial rescue.
Sam Barnes	Senior Consultant	BSc (hons), MSc. 9 years working in ecological consultancy. Natural England bat survey licence holder Class 1 licence registration no. 2016-23778.

Surveyor name	Position	Qualifications and experience
Claire Neale	Senior Consultant	BSc (hons), MSc. 8 years working in ecological consultancy involved with numerous projects within the power sector, specialising in supporting the delivery of environmental support.
Hannah Rowding	Senior Consultant	BSc (hons), MSc. 6 years working in ecological consultancy involved with numerous projects within the renewable development sector. Certified in tree climbing and aerial rescue.
Gary Lindsay	Consultant	BSc (hons), MSc. 5 years working in ecological consultancy providing ecological support on a range of projects including large infrastructure developments, installation and refurbishment of power lines and residential developments.
Jonathan D'Arcy	Consultant	BSc (hons), 8 years working in ecological consultancy. Natural England and Natural Resources Wales class licence holder for 7 years. Natural Resources Wales licence number S085065/1 and Natural England Class 2 licence registration no. 2018-37285-CLS-CLS. Certified in tree climbing and aerial rescue.
Hannah Corrigan	Consultant	BSc (hons), 3.5 years working in ecological consultancy involved with numerous projects currently holds a Class 1 bat survey licence.
Katie Watkins	Consultant	BSc (hons), MSc. 3 years working in ecological consultancy providing ecological support on a range of projects including large infrastructure developments, installation and refurbishment of power lines and residential developments.
Oliver Gaskin	Assistant Consultant	BSc (hons), MSc. 2 years working in ecological consultancy providing ecological support on a range of projects including high profile large infrastructure developments.
George Trill	Assistant Consultant	BSc (hons), MSc. 1 year working in ecological consultancy providing ecological support on a range of projects including high profile large infrastructure developments.

Annex D

Tables relating to survey results

Table D1 Winter inspection tree survey dates, method and results for the 108 high potential trees taken forward for further survey

Tree ID	Tree species	PRA survey date	Initial suitability	PRF inspection date	Access method	Final suitability
1	Cherry	29/06/2020	Moderate	16/02/2021	Ground level	Moderate
2	Oak	29/06/2020	Moderate	16/02/2021	Ladder	Moderate
3	Oak	29/06/2020	High	16/02/2021	Ladder	Moderate
4	Oak	29/06/2020	Moderate	16/02/2021	Rope/harness	Moderate
5	Oak	29/06/2020	High	16/02/2021	Rope/harness	Low
6	Oak	29/06/2020	High	16/02/2021	Ground level	Moderate
7	Oak	29/06/2020	High	16/02/2021	Ground level	Moderate
8	Oak	29/06/2020	Moderate	16/02/2021	Rope/harness	High
9	Oak	29/06/2020	High	16/02/2021	Rope/harness	High
10	Oak	29/06/2020	Moderate	16/02/2021	Ground level	Low
11	Willow	29/06/2020	Moderate	17/02/2021	Ground level	Low
12	Oak	29/06/2020	Moderate	17/02/2021	Rope/harness	Low
13	Ash	29/06/2020	Moderate	17/02/2021	Ladder	Moderate
14	Cherry	29/06/2020	Moderate	17/02/2021	Ground level	Moderate
15	Ash	29/06/2020	High	17/02/2021	Ground level	Moderate
16	Birch	29/06/2020	Moderate	17/02/2021	Ground level	Moderate
17	Birch	29/06/2020	Moderate	17/02/2021	Ground level	Negligible
18	Cherry	n/a	Moderate	16/02/2021	Ground level	Moderate
19	Ash	n/a	High	17/02/2021	Ground level	Low

Table D2 Summer inspection of the 14 trees taken forward; method and results

Tree ID	Tree species	PRA survey date	Initial suitability	PRF inspection date	Access method	Final suitability
1	Cherry	29/06/2020	Moderate	11.08.2021	Ground level	Moderate
2	Oak	29/06/2020	Moderate	11.08.2021	Ladder	Moderate
3	Oak	29/06/2020	High	11.08.2021	Ladder	Moderate
4	Oak	29/06/2020	Moderate	11.08.2021	Rope/harness	Moderate
6	Oak	29/06/2020	High	11.08.2021	Ground level	Moderate
7	Oak	29/06/2020	High	11.08.2021	Ground level	Moderate
8	Oak	29/06/2020	Moderate	11.08.2021	Rope/harness	High
9	Oak	29/06/2020	High	11.08.2021	Rope/harness	High
13	Ash	29/06/2020	Moderate	11.08.2021	Ladder	Moderate
14	Cherry	29/06/2020	Moderate	11.08.2021	Ground level	Moderate
15	Ash	29/06/2020	High	11.08.2021	Ground level	Moderate
16	Birch	29/06/2020	Moderate	11.08.2021	Ground level	Moderate
18	Cherry	n/a	Moderate	11.08.2021	Ground level	Moderate
19	Willow	26/06/2022	Moderate	03.08.2022 / 01.09.2022	Ground level	Moderate

Table D3 2020 summary of automated detector monitoring results by season

Season	Automated detector	Number of nights recording	Total Passes (average passes per night)												Total
			CP	SP	CP/SP	NP/CP	NSL	Nyct sp.	N	LE	M	Bat sp.	GH	LH	
Spring	1	10	54	3	6	8	0	0	0	0	2	2	0	0	75
			5.4	0.3	0.6	0.8	0	0	0	0	0.2	0.2	0	0	7.5
	2	10	211	10	8	34	0	0	0	0	1	7	0	0	271
			21.1	1	0.8	3.4	0	0	0	0	0.1	0.7	0	0	27.1
	3	10	336	26	34	38	0	1	6	0	2	3	0	1	447
			33.6	2.6	3.4	3.8	0	0.1	0.6	0	0.2	0.3	0	0.1	44.7
	4	10	56	8	8	7	0	0	1	2	23	0	0	2	107
			5.6	0.8	0.8	0.7	0	0	0.1	0.2	2.3	0	0	0.2	10.7
	5	10	21	2	2	2	0	0	0	0	1	0	0	0	28
			2.1	0.2	0.2	0.2	0	0	0	0	0.1	0	0	0	2.8
	6	10	59	5	19	9	0	0	6	0	4	0	0	2	104
			5.9	0.5	1.9	0.9	0	0	0.6	0	0.4	0	0	0.2	10.4

Total Passes (average passes per night)															Total	
Summer	1	10	2	0	2	0	0	0	0	1	0	0	0	0	5	
			0.2	0	0.2	0	0	0	0.1	0	0	0	0	0	0.5	
	2	10	4	1	1	0	0	0	0	1	0	2	1	0	0	10
			0.4	0.1	0.1	0	0	0	0.1	0	0.2	0.1	0	0	0	1
	3	10	14	0	0	0	1	0	0	1	1	59	2	0	0	78
			1.4	0	0	0	0.1	0	0.1	0.1	5.9	0.2	0	0	0	7.8
	4	10	7	3	0	0	0	0	0	0	1	10	1	0	0	22
			0.7	0.3	0	0	0	0	0	0.1	1	0.1	0	0	0	2.2
	5	10	4	0	0	0	0	0	0	0	0	0	2	0	0	6
			0.4	0	0	0	0	0	0	0	0	0.2	0	0	0	0.6
	6	10	8	1	1	0	1	3	2	0	3	0	0	0	0	19
			0.8	0.1	0.1	0	0.1	0.3	0.2	0	0.3	0	0	0	0	1.9
Autumn	1	10	356	18	40	22	4	4	37	9	7	13	0	0	510	
			35.6	1.8	4	2.2	0.4	0.4	3.7	0.9	0.7	1.3	0	0	51	
	2	10	239	31	53	19	10	4	10	4	3	14	1	0	388	
			23.9	3.1	5.3	1.9	1	0.4	1	0.4	0.3	1.4	0.1	0	38.8	

Total Passes (average passes per night)														Total
3	10	612	38	131	56	3	2	9	17	6	13	0	1	888
		61.2	3.8	13.1	5.6	0.3	0.2	0.9	1.7	0.6	1.3	0	0.1	88.8
4	10	1082	72	75	68	0	12	18	23	38	40	1	5	1434
		108.2	7.2	7.5	6.8	0	1.2	1.8	2.3	3.8	4	0.1	0.5	143.4
5	10	66	6	19	8	6	14	34	8	2	2	10	0	175
		6.6	0.6	1.9	0.8	0.6	1.4	3.4	0.8	0.2	0.2	1	0	17.5
6	10	248	18	55	28	3	3	21	14	12	8	0	32	442
		24.8	1.8	5.5	2.8	0.3	0.3	2.1	1.4	1.2	0.8	0	3.2	44.2
Total	180	3379	242	454	299	28	43	147	79	175	108	12	43	5009
Proportion		67.46%	4.83%	9.06%	5.97%	0.56%	0.86%	2.93%	1.58%	3.49%	2.16%	0.24%	0.86%	

Species codes: **CP** = common pipistrelle; **SP** = soprano pipistrelle; **CP/SP** = common/soprano pipistrelle (*Pipistrellus* species); **CP/NP** = common/ Nathusius' pipistrelle (*Pipistrellus* species); **NSL** = Noctule/Serotine/Leiser bat (Nyctaloid species); **Nyct sp.** = Noctule/leiser bat (Nyctalus species); **N** = Noctule; **LE** = *Plecotus* sp; **M** = *Myotis* bat species; **Bat sp.** = Bat call unable to clearly identify down to species level; **GH** = greater horseshoe and **LH** = lesser horseshoe.

Table D.4 2021 summary of automated detector monitoring results by survey month

Total Passes (average passes per night)															Total
Season	Automated Detector	Number of Nights Recordings	CP	SP	CP/SP	NP/CP	NSL	Nyctalus sp.	N	LE	Myotis sp.	Bat sp.	GH	LH	
Spring	1	20	1	0	0	1	0	0	2	0	1	0	0	0	5
			0.05	0	0	0.05			0.1		0.05				0.25
	2	20	283	7	12	0	0	0	0	1	1	0	0	0	304
			14.15	0.35	0.6	0		0	0	0.05	0.05				15.2
	3	20	190	5	12	19	0	1	4	2	93	2	0	0	328
			9.5	0.25	0.6	0.95		0.05	0.2	0.1	4.65	0.1			16.4
	4	20	0	0	0	0	0	0	6	0	0	0	0	0	6
									0.3						0.3
	5	20	17	2	2	0	0	0	4	0	1	3	0	0	29
			0.85	0.1	0.1				0.2		0.05	0.15			1.45
	6	20	414	0	4	0	0	0	0	0	0	3	0	0	421
			20.7		0.2							0.15			21.05
Summer	1	20	227	4	17	29	1	2	114	2	49	1	0	0	446

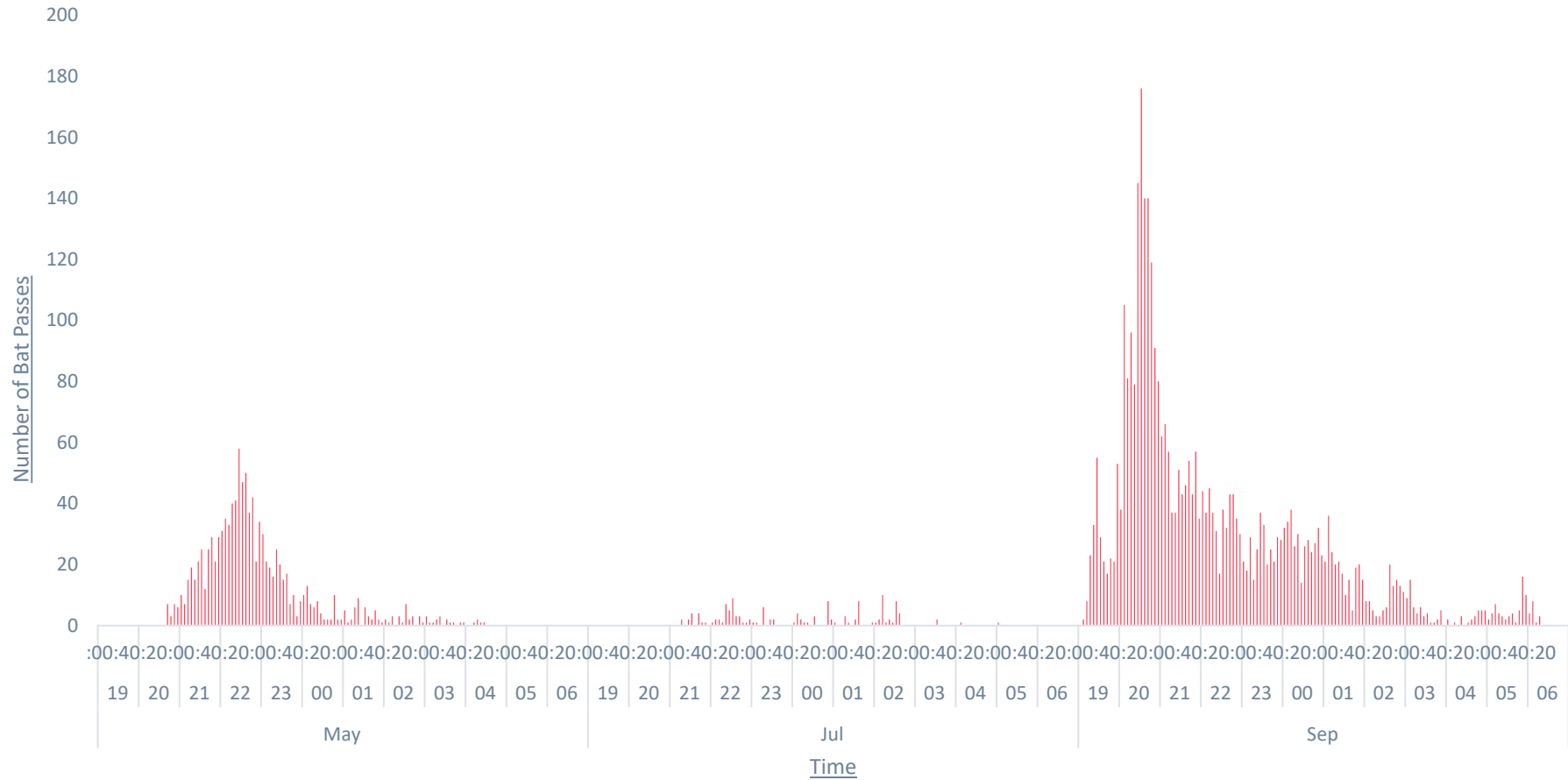
Total Passes (average passes per night)														Total
			11.35	0.2	0.85	1.45	0.05	0.1	5.7	0.1	2.45	0.05		22.3
2	20	1208	77	60	77	1	2	120	0	3	22	0	0	1570
			60.4	3.85	3	3.85	0.05	0.1	6		0.15	1.1		78.5
3	20	965	42	222	38	0	0	7	0	20	0	0	0	1294
			48.25	2.1	11.1	1.9			0.35		1	0		64.7
4	20	37	6	6	2	0	0	3	0	5	0	0	0	59
			1.85	0.3	0.3	0.1			0.15		0.25	0		2.95
5	20	52	4	17	9	0	0	35	0	2	1	0	0	120
			2.6	0.2	0.85	0.45			1.75		0.1	0.05		6
6	20	111	3	5	1	2	0	4	0	2	0	0	0	128
			5.55	0.15	0.25	0.05	0.1		0.2		0.1			6.4
7	10	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	230	3505	150	357	176	4	5	299	5	177	32	0	0	4710

Total Passes (average passes per night)													Total
Proportion	74.4 2	3.18	7.58	3.74	0.0 8	0.11	6.3 5	0.1 1	3.76	0.68	0.00	0.0 0	

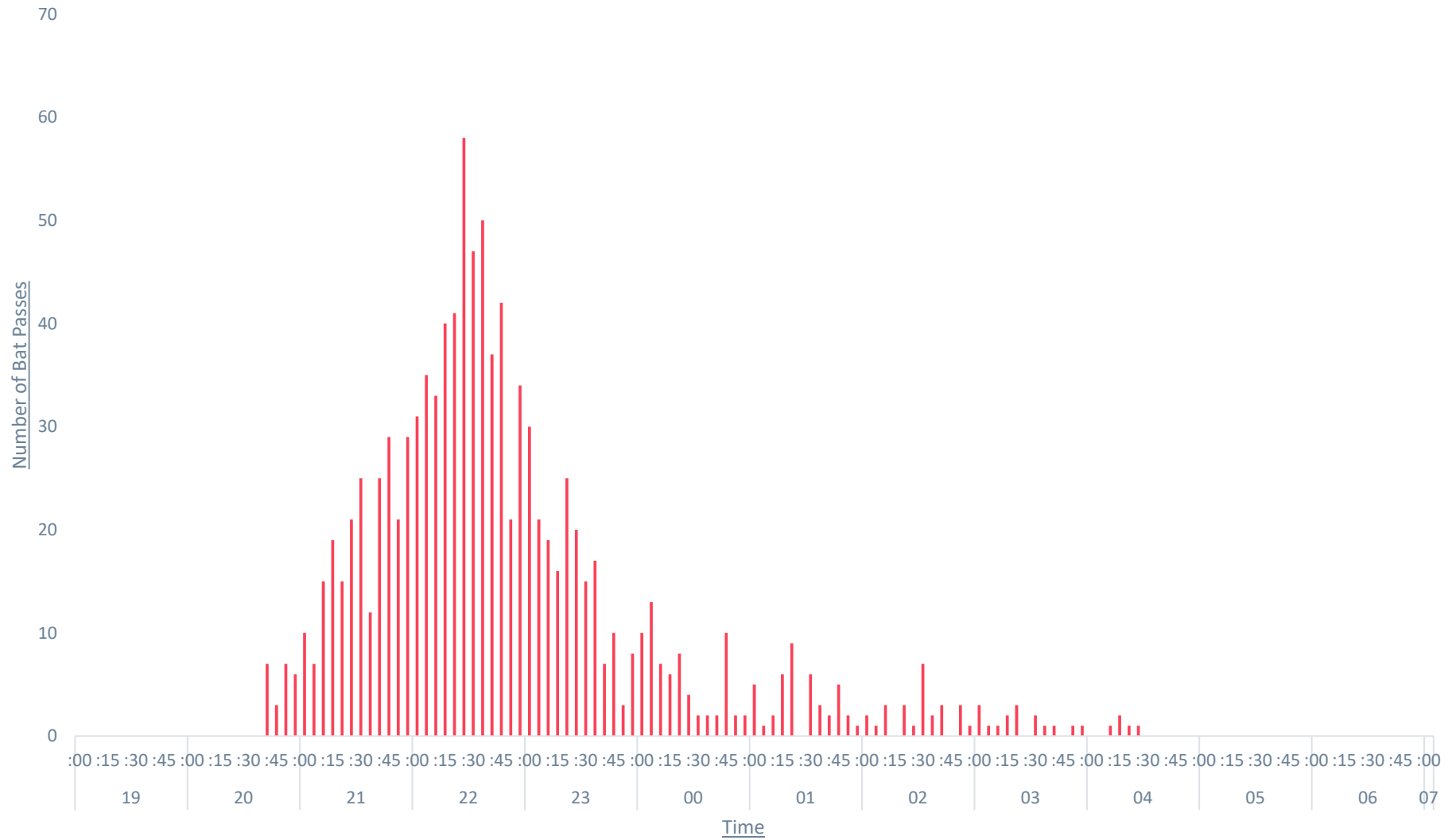
Species codes: **CP** = common pipistrelle; **SP** = soprano pipistrelle; **CP/SP** = common/soprano pipistrelle (*Pipistrellus* species); **CP/NP** = common/ Nathusius' pipistrelle (*Pipistrellus* species); **NSL** = Noctule/Serotine/Leiser bat (Nyctaloid species); **Nyct sp.** = Noctule/leiser bat (Nyctalus species); **N** = Noctule; **LE** = *Plecotus* sp; **M** = *Myotis* bat species; **Bat sp.** = Bat call unable to clearly identify down to species level; **GH** = greater horseshoe and **LH** = lesser horseshoe.

Annex E Graphs

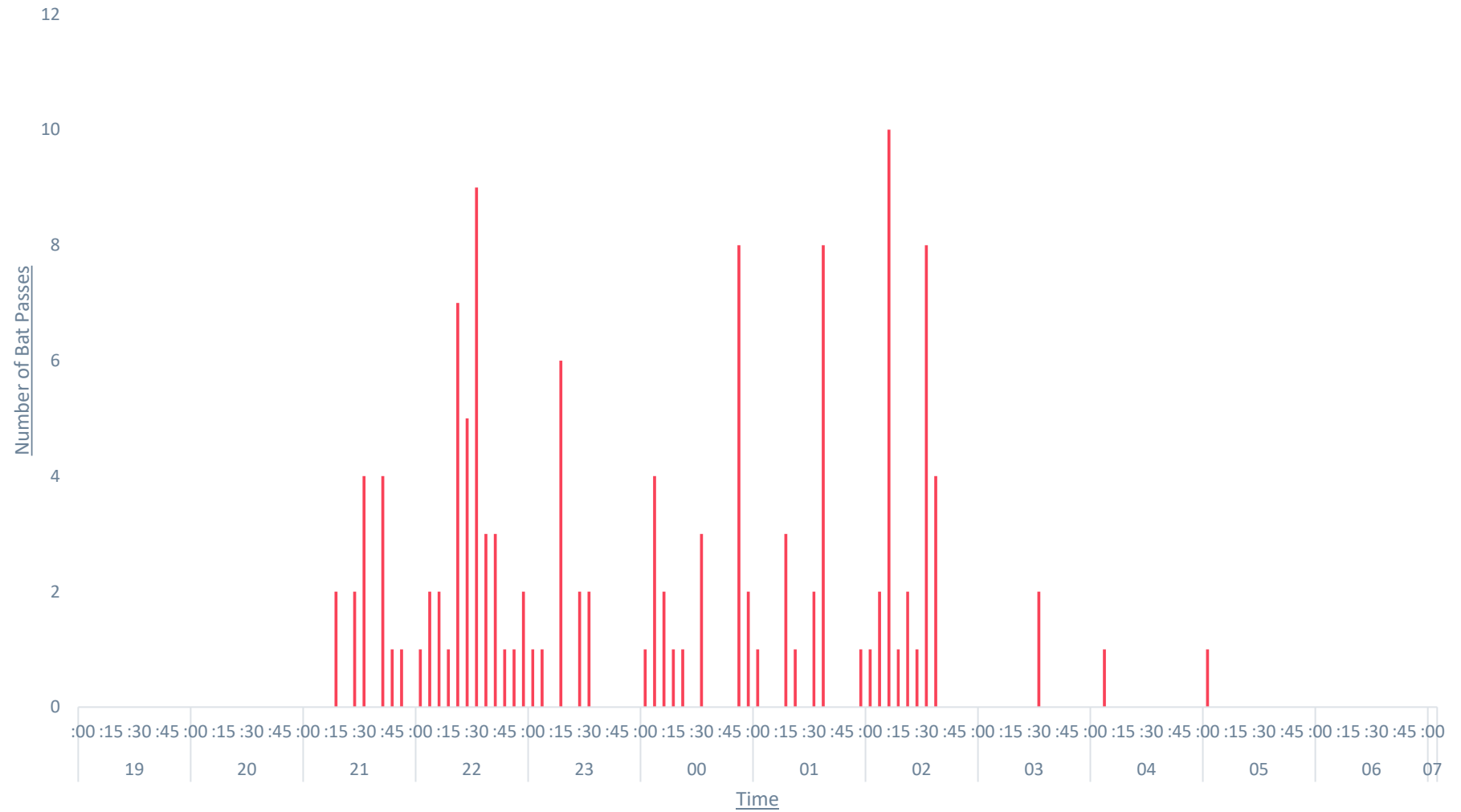
Graph E.1. Overall bat passes through time for 2020 automated bat static monitoring



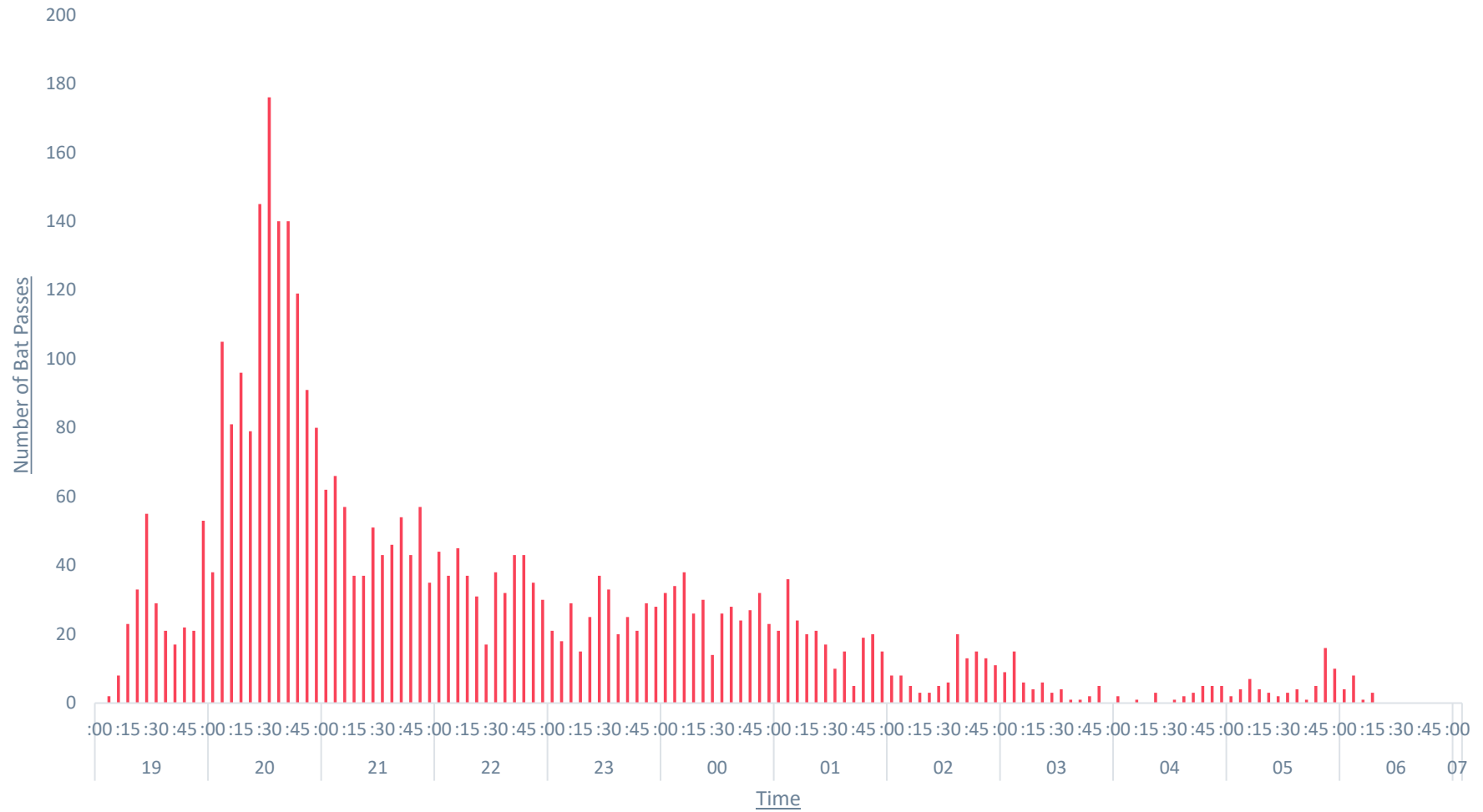
Graph E.2. Bat passes through time for May 2020 automated bat static monitoring



Graph E.3. Bat passes through time for July 2020 automated bat static monitoring



Graph E.4. Bat passes through time for September 2020 automated bat static monitoring



Annex F

Ecobat analysis

Table F1 Ecobat summary table showing the number of nights recorded bat activity fell into each activity band for each species.

Detector ID	Species/Species Group	Nights of High Activity	Nights of Moderate/ High Activity	Nights of Moderate Activity	Nights of Low/ Moderate Activity	Nights of Low Activity
1	<i>Myotis</i>	0	6	2	2	1
1	<i>Nyctaloid</i>	1	0	1	0	1
1	<i>Nyctalus</i>	0	0	0	0	2
1	<i>Nyctalus noctula</i>	3	4	0	1	2
1	<i>Pipistrellus</i>	3	2	4	2	9
1	<i>Pipistrellus pipistrellus</i>	9	7	6	4	3
1	<i>Pipistrellus pygmaeus</i>	0	2	0	3	7
1	<i>Plecotus auritus</i>	0	0	1	2	3
2	<i>Myotis</i>	0	0	0	2	7
2	<i>Nyctaloid</i>	0	2	1	0	2
2	<i>Nyctalus</i>	0	0	0	0	2
2	<i>Nyctalus noctula</i>	2	2	3	0	2
2	<i>Pipistrellus</i>	6	7	5	3	9
2	<i>Pipistrellus pipistrellus</i>	21	8	4	3	1
2	<i>Pipistrellus pygmaeus</i>	1	6	2	4	3

Detector ID	Species/Species Group	Nights of High Activity	Nights of Moderate/ High Activity	Nights of Moderate Activity	Nights of Low/ Moderate Activity	Nights of Low Activity
2	<i>Plecotus auritus</i>	0	0	0	0	5
2	<i>Rhinolophus ferrumequinum</i>	0	0	0	0	1
3	<i>Myotis</i>	3	7	6	5	10
3	<i>Nyctaloid</i>	0	0	0	2	1
3	<i>Nyctalus</i>	0	0	0	0	2
3	<i>Nyctalus noctula</i>	0	0	5	1	5
3	<i>Pipistrellus</i>	10	6	10	2	3
3	<i>Pipistrellus pipistrellus</i>	25	8	3	2	2
3	<i>Pipistrellus pygmaeus</i>	1	5	7	5	5
3	<i>Plecotus auritus</i>	0	1	1	3	2
3	<i>Rhinolophus hipposideros</i>	0	0	0	0	2
4	<i>Myotis</i>	0	5	10	0	2
4	<i>Nyctalus</i>	0	1	0	0	2
4	<i>Nyctalus noctula</i>	1	0	3	0	1
4	<i>Pipistrellus</i>	3	2	2	2	4
4	<i>Pipistrellus pipistrellus</i>	7	5	5	3	6
4	<i>Pipistrellus pygmaeus</i>	2	1	3	3	6
4	<i>Plecotus auritus</i>	0	1	3	2	3
4	<i>Rhinolophus ferrumequinum</i>	0	0	0	0	1
4	<i>Rhinolophus hipposideros</i>	0	0	1	0	4

Detector ID	Species/Species Group	Nights of High Activity	Nights of Moderate/ High Activity	Nights of Moderate Activity	Nights of Low/ Moderate Activity	Nights of Low Activity
5	<i>Myotis</i>	0	0	0	0	6
5	<i>Nyctaloid</i>	1	2	0	0	0
5	<i>Nyctalus</i>	0	0	0	2	0
5	<i>Nyctalus noctula</i>	2	2	2	3	2
5	<i>Pipistrellus</i>	1	2	1	4	4
5	<i>Pipistrellus pipistrellus</i>	3	4	5	8	7
5	<i>Pipistrellus pygmaeus</i>	0	0	1	2	5
5	<i>Plecotus auritus</i>	0	0	1	1	3
5	<i>Rhinolophus ferrumequinum</i>	0	0	1	2	2
6	<i>Myotis</i>	0	1	0	4	7
6	<i>Nyctaloid</i>	0	0	2	1	1
6	<i>Nyctalus</i>	0	0	0	1	0
6	<i>Nyctalus noctula</i>	0	1	3	1	2
6	<i>Pipistrellus</i>	1	2	8	1	10
6	<i>Pipistrellus pipistrellus</i>	10	11	4	8	4
6	<i>Pipistrellus pygmaeus</i>	0	0	3	2	11
6	<i>Plecotus auritus</i>	0	0	1	4	3
6	<i>Rhinolophus hipposideros</i>	1	0	1	2	2

Table F2 Ecobat summary table showing key metrics for each species recorded. The reference range is the number of nights for each species that your data were compared to. Reference Range of 200+ required to be confident in the relative activity level.

Detector ID	Species/Species Group	Median Percentile	95% CIs	Max Percentile	Nights Recorded	Reference Range
1	<i>Myotis</i>	64	46 - 70	72	11	2444
1	<i>Nyctaloid</i>	46	69.5 - 69.5	93	3	2193
1	<i>Nyctalus</i>	0	0 - 0	0	2	2062
1	<i>Nyctalus noctula</i>	69	50.5 - 87	92	10	2056
1	<i>Pipistrellus</i>	31	45.5 - 77.5	87	20	4653
1	<i>Pipistrellus pipistrellus</i>	67	59 - 79	95	29	4243
1	<i>Pipistrellus pygmaeus</i>	0	31 - 50.5	70	12	2763
1	<i>Plecotus auritus</i>	16	31 - 31	54	6	1108
2	<i>Myotis</i>	0	0 - 0	31	9	2444
2	<i>Nyctaloid</i>	46	46 - 79	79	5	2193
2	<i>Nyctalus</i>	0	0 - 0	0	2	2062
2	<i>Nyctalus noctula</i>	60	53 - 89	93	9	2056

Detector ID	Species/Species Group	Median Percentile	95% CIs	Max Percentile	Nights Recorded	Reference Range
2	<i>Pipistrellus</i>	54	56 - 78	88	30	4653
2	<i>Pipistrellus pipistrellus</i>	86	73 - 88	99	37	4243
2	<i>Pipistrellus pygmaeus</i>	53	45.5 - 72	91	16	2763
2	<i>Plecotus auritus</i>	0	0 - 0	0	5	1108
2	<i>Rhinolophus ferrumequinum</i>	0	0	0	1	526
3	<i>Myotis</i>	46	47.5 - 68	86	31	2444
3	<i>Nyctaloid</i>	31	31 - 31	31	3	2193
3	<i>Nyctalus</i>	0	0 - 0	0	2	2062
3	<i>Nyctalus noctula</i>	31	38.5 - 60	60	11	2056
3	<i>Pipistrellus</i>	64	61 - 76	96	31	4653
3	<i>Pipistrellus pipistrellus</i>	87	77 - 89	99	40	4243
3	<i>Pipistrellus pygmaeus</i>	54	45.5 - 64.5	82	23	2763
3	<i>Plecotus auritus</i>	31	31 - 50.5	70	7	1108

Detector ID	Species/Species Group	Median Percentile	95% CIs	Max Percentile	Nights Recorded	Reference Range
3	<i>Rhinolophus hipposideros</i>	0	0 - 0	0	2	442
4	<i>Myotis</i>	54	50 - 62	72	17	2444
4	<i>Nyctalus</i>	0	0 - 0	67	3	2062
4	<i>Nyctalus noctula</i>	46	46 - 46	81	5	2056
4	<i>Pipistrellus</i>	46	38.5 - 83.5	94	13	4653
4	<i>Pipistrellus pipistrellus</i>	54	55 - 77	99	26	4243
4	<i>Pipistrellus pygmaeus</i>	31	31 - 72	86	15	2763
4	<i>Plecotus auritus</i>	31	31 - 60	64	9	1108
4	<i>Rhinolophus ferrumequinum</i>	0	0	0	1	526
4	<i>Rhinolophus hipposideros</i>	0	0 - 0	46	5	442
5	<i>Myotis</i>	0	0 - 0	0	6	2444
5	<i>Nyctaloid</i>	70	67 - 83	83	3	2193
5	<i>Nyctalus</i>	31	31 - 31	31	2	2062

Detector ID	Species/Species Group	Median Percentile	95% CIs	Max Percentile	Nights Recorded	Reference Range
5	<i>Nyctalus noctula</i>	60	31 - 76	82	11	2056
5	<i>Pipistrellus</i>	31	31 - 60.5	83	12	4653
5	<i>Pipistrellus pipistrellus</i>	31	42.5 - 61	88	27	4243
5	<i>Pipistrellus pygmaeus</i>	0	31 - 31	60	8	2763
5	<i>Plecotus auritus</i>	0	38.5 - 38.5	46	5	1108
5	<i>Rhinolophus ferrumequinum</i>	31	31 - 31	54	5	526
6	<i>Myotis</i>	0	31 - 31	64	12	2444
6	<i>Nyctaloid</i>	39	31 - 60	60	4	2193
6	<i>Nyctalus</i>	31	0	31	1	2062
6	<i>Nyctalus noctula</i>	54	31 - 80	80	7	2056
6	<i>Pipistrellus</i>	39	46 - 69	92	22	4653
6	<i>Pipistrellus pipistrellus</i>	72	56 - 76.5	99	37	4243
6	<i>Pipistrellus pygmaeus</i>	0	31 - 54	60	16	2763

Detector ID	Species/Species Group	Median Percentile	95% CIs	Max Percentile	Nights Recorded	Reference Range
6	<i>Plecotus auritus</i>	31	31 - 31	46	8	1108
6	<i>Rhinolophus hipposideros</i>	31	31 - 57.5	84	6	442

Annex G

Collision risk assessment method

Table G1 Full details relating to Stage 1 – Initial site risk assessment

Site risk level (1-5)	Project size			
	Small	Medium	Large	
Habitat risk	Low	1	2	3
	Moderate	2	3	4
	High	3	4	5
Habitat risk	Description			
Low	<ul style="list-style-type: none"> • Small number of potential roost features, of low quality. • Low quality foraging habitat that could be used by small numbers of foraging bats. • Isolated site not connected to the wider landscape by prominent linear features. 			
Moderate	<ul style="list-style-type: none"> • Buildings, trees or other structures with moderate – high potential as roost sites on or near the site. • Habitat could be used extensively for foraging bats. • Site is connected to the wider landscape by linear features such as scrub, tree lines and streams. 			
High	<ul style="list-style-type: none"> • Numerous suitable buildings, trees (particularly mature ancient woodland) or other structures with moderate-high potential as roost sites on or near the site, and/ or confirmed roosts present close to or on the site. • Extensive and diverse habitat mosaic of high quality foraging for bats. • Site is connected to the wider landscape by a network of strong linear features such as rivers, blocks of woodland and mature hedgerows. • At/ near edge of range and/ or an important flyway. • Close to key roost and/ or swarming site. 			
Project size	Description			
Small	<ul style="list-style-type: none"> • Small scale development (≤ 10 turbines). No other wind energy developments within 10km. • Comprising turbines <50m in height. 			

Site risk level (1-5)	Project size
Medium	<ul style="list-style-type: none">• Larger developments (between 10 and 40 turbines). May have some other wind developments within 5km.• Comprising turbines 50 – 100m in height.
Large	<ul style="list-style-type: none">• Largest developments (>40 turbines) with other wind energy developments within 5km.• Comprising turbines >100m in height.

