Heronsbridge School

Bat Activity Report

Bridgend County Borough Council

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Quality information

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Executive Summary

AECOM were instructed by Bridgend County Council to complete an assessment of bat activity surveys to inform the proposed construction of Heronsbridge School, a new special educational needs facility (hereafter referred to as the Proposed Development) within an arable field in Bridgend (hereafter referred to as the Site). illustrated on Figure 1.

The Proposed Development includes the provision of a two-storey school complex containing shared facilities for students, Multi-Use Games Area (MUGA), 4G sports pitch, car park and an access road.

A Preliminary Ecological Appraisal carried out by AECOM in March 2023[1] assessed the Site as having Moderate habitat suitability for foraging and commuting bats, which was re-assessed and confirmed as Moderate by a walkover survey in 2025.

This report sets out the methods and results of the bat activity surveys, assesses potential impacts and constraint to development and provides recommendations for avoidance, mitigation and compensation where needed.

The activity surveys comprised seasonal Night-time Bat Walkovers (NBW) (Spring, Summer and Autumn 2025) and monthly automated static bat detector surveys for five consecutive nights once per month May-October 2025, inclusive. These paid due regard to best practice guidelines[2].

The activity surveys confirmed activity within the Site by at least ten bat species, including two protected by Annex II of the Conservation of Habitats and Species (Amendment)(EU Exit) Regulations 2019: common pipistrelle *Pipistrellus pipistrellus*; soprano pipistrelle *Pipistrellus pygmaeus*; Nathusius' pipistrelle *Pipistrellus nathusii*; noctule *Nyctalus noctula*; Leisler's bat *Nyctalus leisleri*; serotine *Cnephaeus serotinus*; Myotis species *Myotis* sp.; brown long-eared bat *Plecotus auritus*; lesser horseshoe bat (Annex II) *Rhinolophus hipposideros*; and, greater horseshoe bat (Annex II) *Rhinolopus ferrumequinum*.

Common and soprano pipistrelle species accounted for most passes on all NBW surveys (91.2%) and lesser horseshoe accounted for 7.4% % of passes. Activity was greatest associated with mature hedgerows and woodland edges which form the boundary of the Site.

Standardisation of data recorded by the automated static bat detectors identified the highest bat activity was at Static C on the west site boundary, on the edge of broadleaved woodland. Common and soprano pipistrelle accounted for 84.7% of passes. Lesser horseshoe bats were identified during every month, on every automated static bat detector, with Static C recording the highest activity. Lesser horseshoe made up 5.6% of bat passes. Greater horseshoe bats were detected at Statics A and C and made up 0.01% of passes.

The timing of the lesser horseshoe calls is indicative of lesser horseshoe bat roosting in proximity to the Site (these are likely the bats roosting at Island Farm Prisoner of War (PoW) Camp Site of Importance for Nature Conservation (SINC)). The Site is within the Core Sustenance Zone (CSZ) [3] for roosts of lesser horseshoe bat (2 km). Analysis of bat activity data indicates that common pipistrelle, soprano pipistrelle, noctule are likely roosting within the immediate landscape, due to the early time of their calls relative to sunset, the Site is potentially within their roost's CSZ.

The Site was assessed as supporting a bat species assemblage of Regional importance.

Without mitigation, the Proposed Development has potential to impact foraging and commuting bats through loss of habitat and severance of commuting routes and fragmentation of habitat. The Proposed Development has potential to cause loss of suitable foraging habitat within the CSZ of known roosts, including the lesser horseshoe bat roost at Island Farm PoW Camp SINC. Artificial nighttime illumination, as well as increased noise and human activity, within the Site has potential to fragment habitat and may isolate known roosts from associated foraging habitat or other satellites roosts and ultimately reduce their resilience.

Mitigation recommendations include: retention of boundary features, which should be buffered with a no development strip (aiming for a 15 m buffer of 'green' landscaping with limited lighting), to reduce impacts during construction and operation; to maintain connectivity across the Site and to foraging habitat the creation of a new green corridor (new hedgerow and treeline) and improvement of existing boundary habitat at the northern, western

[1] AECOM (2023) Heronsbridge School Preliminary Ecological Appraisal and BREEAM Report
[2] Collins, J. (ed.) (2023) Bat Surveys for Professional Ecologists: Good Practice Guidelines (4th edition). The Bat Conservation Trust, London.
[3] The CSZ is the area around a roost within which habitat availability and quality has a significant influence on the resilience and conservation status of the roosting colony.

and eastern boundaries; lighting must be sensitively designed and avoid light spill onto existing and proposed boundary features; and landscaping should prioritise plant species of high value to bats. The creation of gaps in hedgerows and lines of trees should be kept to a minimum and less than 5 m wide.

As per best practice guidelines[4], five years post construction monitoring is proposed in years 2, 3 and 5 following construction to enable identification and implementation of remedial bat mitigation measures, should they be required.

This executive summary is a synopsis of the report only. Refer to the full report for further detail

[4] Reason, P.F. and Wray, S. (2025). *UK Bat Mitigation Guidelines: a guide to impact assessment, mitigation and compensation for developments affecting bats. Version 1.2.* Chartered Institute of Ecology and Environmental Management, Ampfield.

1. Introduction

AECOM were instructed by Bridgend County Council to complete an assessment of roosting bat to inform the proposed construction of Heronsbridge School, a new special educational needs facility (hereafter referred to as the Proposed Development). This will be located within an arable field in Bridgend (hereafter referred to as the Site), illustrated on Figure 1.

Ecological input was previously provided to this project in 2023, in the form of a Preliminary Ecological Appraisal (PEA; hereafter referred to as the 2023 PEA)[5] and surveys for hazel dormouse *Muscardinus avellanarius*[6]. Due to the time elapsed since the 2023 PEA, a repeat PEA was completed in 2025which validated the 2023 PEA results. This was documented in a PEA, Dormouse Survey Validation and Ground Level Tree Assessment file note[7]. This File Note detailed recommendations for further survey for roosting bats within the Site. This File Note detailed recommendations for further survey for bat activity within the Site.

1.1 The Site

The Site is located in Bridgend, south Wales and it is approximately 4 ha. The illustrated boundary (on Figure 1) is indicative as a definitive red line boundary has not been provided. The central grid reference for the Site is SS 90179 78239. Site photographs are provided in Appendix C (Photographs 1 – 4).

The majority of the Site is occupied by an arable field, though small areas of scrub and bare ground are present. The boundary of the Site is formed by broadleaved trees, scrub and hedgerows. To the west, the trees on the Site boundary connect to an area of broadleaved woodland which forms past of Island Farm Prisoner of War (PoW) Camp Site of Importance for Nature Conservation (SINC). Residential properties are adjacent to the Site in the north, and in the east there is an empty office block and a derelict nursing home in a visible state of disrepair.

1.2 The Proposed Development

The Proposed Development is a new-build project to replace the existing Heronsbridge Special School which is located approximately 800 m northeast of the Site, within Bridgend. The Proposed Development includes the provision of a two-storey school complex containing shared facilities for students including a Multi-Use Games Area (MUGA) and a 4G sports pitch, storm water retention basin, car park and access road. Nighttime illumination is anticipated in association with the Proposed Development and may include lighting of sports facilities, car park, footways and access road.

Design is yet to be finalised, a provisional ‘Landscape GA Plan’ (HSEN-HLM-ZZ-ZZ-D-L-0001) dated 31 October 2025 has been provided to assist with the ecology assessment.

It is understood that the Proposed Development will lead to the loss of agricultural cropland and scrub habitat within the Site boundary, as well as an area of improved grassland and ruderal vegetation. A new road access will be cut through the eastern boundary.

The Proposed Development forms part of a wider masterplan that incorporates multiple developments within the adjacent wider landscape.

1.3 Objectives

The purpose of this report and associated surveys is to:

- identify the bat species assemblage within the Site;
- identify important features within the Site for bat activity;
- establish the value of the Site for foraging and commuting bats;
- identify adverse impacts on bats that may occur as a result of the Proposed Development;
- provide recommendations for avoidance, mitigation and compensation of potential impacts on bat activity, and provide recommendations on enhancements; and,
- provide recommendations on any requirement for further survey.

[5] AECOM (2023) Heronsbridge School Preliminary Ecological Appraisal and BREEAM Report
[6] AECOM (2023) Heronsbridge School Hazel Dormouse *Muscardinus avellanarius* Survey Report
[7] AECOM (2025) Heronsbridge School: File Note – Preliminary Ecological Appraisal, Dormouse Survey Validation and Ground Level Tree Assessment

This report is restricted to bat activity and does not consider the significance of the Site for roosting bats or any associated recommendations for required mitigation measures. Measures specific to roosting bats are reported in the Heronsbridge School Roosting Bats Report[8].

1.4 Quality Assurance

This survey and subsequent report were undertaken in line with AECOM's Integrated Management System (IMS). The IMS places great emphasis on professionalism, technical excellence, quality, environmental and Health and Safety management. All staff members are committed to establishing and maintaining this certification to the international standards BS EN ISO 9001:2015 and 14001:2015 and BS ISO 45001 2018.

All AECOM Ecologists who worked on this project follow the Chartered Institute of Ecology and Environmental Management (CIEEM) code of professional conduct[9] when undertaking ecological work.

[8] AECOM (2025) Heronsbridge School Roosting Bat Report
[9] CIEEM (2025) Code of Professional Conduct. Chartered Institute of Ecology and Environmental Management

2. Summary of Legislation and Policy

2.1 Legislation

All UK native bat species and their roosts (whether bats are present or not) are protected under the *Conservation of Habitats and Species Regulations 2017* (as amended) and under the *Wildlife and Countryside Act 1981* (as amended). Under this legislation it is an offence to:

- deliberately, intentionally or recklessly capture, injure or kill a bat;
- damage/destroy a breeding site or resting place of a bat (this is an offence whether the act is deliberate or not);
- deliberately, intentionally or recklessly disturb a bat; or,
- intentionally or recklessly obstruct access to any structure which a bat uses for shelter or protection.

A bat roost is defined as "*any structure or place, which is used for shelter or protection*" or a "*breeding site or resting place*". Bats commonly use the same roosts at particular times of the year after periods of absence; therefore, the roost is protected whether or not bats are resident.

Disturbance is defined as that which is likely to:

- impair their ability to:
  - survive, to breed or reproduce, or to rear or nurture their young; or,
  - hibernate or migrate, in the case of animals of a hibernating or migratory species.
- or affect significantly the local distribution or abundance of the species to which they belong.

Given the above legislation, the potential presence of bats at a site represents a material consideration in the planning process.

Four bat species in the UK are listed on Annex II of the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019: greater horseshoe bat *Rhinolophus ferrumequinum*, lesser horseshoe bat *Rhinolophus hipposideros*, Bechstein's bat *Myotis bechsteinii* and barbastelle *Barbastellus barbastella*. These species are described as those of "*community interest*" whose conservation requires the designation of Special Areas of Conservation (SACs).

Eight of the UK bat species are listed as species of principal importance within Section 7 of the Environment (Wales) Act (2016): barbastelle, Bechstein's bat, noctule *Nyctalus noctula*, common pipistrelle *Pipistrellus pipistrellus* soprano pipistrelle *Pipistrellus pygmaeus*, brown long-eared bat *Plecotus auritus*, greater horseshoe bat and lesser horseshoe bat.

A summary of relevant national and local planning policy is provided within the PEA report[1] prepared for the Site.

2.2 European Protected Species Mitigation Licence

Although the law provides strict protection to bats, it also allows this protection to be set aside (derogated) under Regulation 52 of the *Conservation of Habitats and Species Regulations 2017* (as amended) through the issuing of European Protected Species Mitigation Licences (EPSML) for the purpose of preserving public health; public safety; other imperative reasons of overriding public interest, including those of a social or economic nature and beneficial consequences of primary importance for the environment. However, in accordance with the requirements a licence can only be issued where the following requirements are satisfied:

a. there is no satisfactory alternative; and,

b. the action authorised will not be detrimental to the maintenance of the population of the species concerned at a favourable conservation status in their natural range.

In Wales, EPSML applications are determined by Natural Resources Wales (NRW) who will only accept applications for schemes where planning consent has been granted, and all ecology relevant conditions have been discharged.

2.3 Good Practice

Current guidance[10] stresses the need for developers to maintain protected species within their current range at a favourable status. To achieve this, developers are often required to include mitigation strategies with their applications that describe how a Proposed Development will identify and remediate potential adverse effects. The hierarchy of mitigation in descending order of preference is to avoid, mitigate and compensate[10].

[10] CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine version 1.3. Chartered Institute of Ecology and Environmental Management, Winchester.

3. Method

All surveys undertaken to inform this assessment paid due regard to the Bat Conservation Trust (BCT) Good Practice Guidelines[11]. Where the surveys have deviated from the guidelines, this is outlined in the Limitations section (Section 3.3.6).

Bat roost surveys, including Potential Roost Feature (PRF) aerial inspections and emergence surveys, were completed by AECOM in 2025 to assess the potential for the Site to support roosting bats. The methods and results of these surveys are provided in the Heronsbridge School Roosting Bat Report[8].

3.1 Desk Study

The 2023 PEA included a desk study undertaken in March 2023 to review existing ecological baseline data and protected species records between 2013 and 2023 within a defined radius of the Site. In relation to bats, the following data sources were consulted as part of the desk study:

- the online Multi Agency Geographic Information for the Countryside (MAGIC) database was reviewed for Sites of Special Scientific Interest (SSSIs) and Special Areas of Conservation (SACs) designated for bats within 10 km of the Site boundary;
- the South East Wales Biodiversity Records Centre (SEWBReC) was contacted to search for bat roost and field records and locally designated sites within 2 km of the Site boundary; and,
- aerial imagery to identify habitats with suitability for roosting, foraging and commuting bats within the Site and surrounding wider landscape.

The 2023 PEA also assessed previous reports associated with adjacent developments within the wider masterplan for the area. These reports are:

- Ecological Assessment- Island Farm Tennis Court. October 2020 V2 (Ethos, 2020)[12];
- Bat Survey Report (Addendum to Ecological Assessment) Island Farm Tennis Court. September 2021 (Ethos, 2021a) [13];
- Protected Species Report (Addendum to Ecological Assessment) Island Farm Tennis Court. November 2021 (Ethos, 2021b) [14];
- Protected Species Report (Addendum to Ecological Assessment) Island Farm Tennis Court. July 2022 (Ethos, 2022) [15]; and,
- Bat Survey Report: Hut 9, Island Farm, Bridgend. May 2023 (MPS Ecology, 2023)[16],

[11] Collins, J. (ed.) (2023) Bat Surveys for Professional Ecologists: Good Practice Guidelines (4th edition). The Bat Conservation Trust, London.
[12] Ethos (2020) Ecological Assessment Island Farm tennis Court. October 2020 V2.
[13] Ethos (2021) Bat Survey Report (Addendum to Ecological Assessment) Island Farm Tennis Court. September 2021.
[14] Ethos (2021) Protected Species Report (Addendum to Ecological Assessment) Island Farm Tennis Court. November 2021.
[15] Ethos (2022) Protected Species Report (Addendum to Ecological Assessment) Island Farm Tennis Court. July 2022.
[16] MPS Ecology (2023) Bat Survey Report: Hut 9, Island Farm, Bridgend. May 2023.

3.2 Field Survey

3.3 Preliminary Assessment - Daytime Bat Walkover

The 2023 PEA included a Daytime Bat Walkover (DBW) of habitats within and directly adjacent to the Site to assess their suitability for foraging and commuting bats. This assessment was validated in the 2025 File Note. Habitats were classified into categories, as summarised in Table 3-1.

Table 3-1 Habitat Suitability Descriptions

Potential Habitat Suitability	Habitat Description
None	No habitat features on site likely to be used by any commuting or foraging bats at any time of year.
Negligible	No obvious habitat features on site likely to be used as flightpaths or by foraging bats. Where habitats are classified as providing Negligible habitat, these are considered to be "*so small or unimportant as to be not worth considering, insignificant*'. These areas are that which could be used by a bat to forage due to the presence of a single attribute, though it is unlikely that they would do so due to the presence of another.
Low	Habitat may be used by small numbers of bats, but it is likely to be isolated. This includes habitats which are suitable but may only be used by a small number of bats, such as an individual tree in an urban setting.
Moderate	Continuous habitat which is connected to the wider landscape and may be used by bats for flight paths or foraging. This includes habitats such as trees, scrub and grassland.
High	Continuous, high-quality habitat that is well-connected to the wider landscape and likely to be used regularly by bats. This includes habitats such as broadleaved woodland and tree-lined watercourses. Areas in this category are likely to be well-connected to known bat roosts.

Source: Adapted from Table 4.1 of the BCT Guidelines[11]

3.3.1 Automated Bat Detector Surveys

The DBW concluded that the Site was of Moderate suitability for foraging and commuting bats[5].

As such, automated bat detectors (Titley Anabat Swift) were deployed for a minimum of five consecutive nights per month April-October 2025, inclusive, in suitable weather conditions for bats as recommended by Table 8.3 of the BCT Guidelines[11]. Four automated bat detectors (hereafter referred to as Statics A to D) were deployed to sample a variety of habitats and locations across the Site. The locations of the automated bat detectors are described in Table 3-2 and are shown on Figure 1; the same locations were utilised throughout the survey period to enable comparison of collected data where appropriate.

All automated bat detector microphones were positioned at least 1 m above the ground in a position clear of vegetation to maximise detection of passing bats and the quality of call recording. All detectors were set to automatically record bats from half an hour before sunset to half an hour after sunrise in .wav format.

Automated bat detectors were left in place for a minimum of five nights per monitoring period during suitable weather conditions, including temperature, wind speed and precipitation. Favourable conditions are considered to be temperatures above 10°C, wind speeds lower than 10 m/s, and no precipitation[11]. Where suboptimal conditions were encountered, automated bat detectors were redeployed on subsequent nights in the same month in an attempt to obtain bat data during suitable weather conditions. The final dates and weather conditions during each of the automated bat detector deployments are outlined in Table 3-3. Weather data has been considered in the analysis as outlined in the Limitations section.

Table 3-2 Automated Bat Detector Location Information

Automated Bat Detector	OS Grid Reference	Surrounding Habitat Description
A	SS 90278 78335	Eastern boundary - Deployed on a fence post in the northeast of the Site within a boundary hedgerow (Photograph 5, Appendix C)
B	SS 90160 78319	Deployed on butterfly-bush *Buddleia davidii* scrub in the north of the Site (Photograph 6, Appendix C)
C	SU 06594 85277	West boundary - Deployed on a tree within the woodland bordering the Site (Photograph 7, Appendix C)

Automated Bat Detector	OS Grid Reference	Surrounding Habitat Description
D	SU 07043 85472	Southeast boundary - Deployed on a fence post in the southeastern corner of the Site, within scrub (Photograph 8, Appendix C)

Table 3-3 Weather Conditions During Automated Bat Detector Deployment

Date	Sunset Time	Sunrise Time	Minimum Nightly Temperature Range (°C)*	Maximum Nightly Windspeed (mph)*	Precipitation*
25-30 April	20:33-20:42	06:00-05:50	7-12	11	Light rain through the night 25 April. Light rain 02:20-02:50 27 April
1-6 May	20:44-20:50	05:48-05:40	4-12	12	None
18-23 June	21:43-21:42	04:57-04:58	13-20	12	Light rain 22 June 21:20-22:50. Otherwise dry.
7-12 July	21:31-21:28	05:07-05:12	10-18	13	None.
12-16 August	20:48-20:40	05:59-06:06	13-17	15	None.
15-19 September	19:33-19:23	06:55-07:01	13-17	23	Scattered light rain 15 September. Light rain 17 September 00:20-02:20, increasing to heavy rain 04:20-05:20, light rain 19:20-21:50.
9-14 October	18:35-18:28	07:45-07:32	9-13	12	Light rain 05:20-06:50 13 October. Otherwise, dry.

*Data provided by timeanddate.com (Available at https://www.timeanddate.com/weather/@3333239/historic)

3.3.2 Night-Time Bat Walkover

In accordance with BCT Guidelines[11] for a site of Moderate suitability, Night-Time Bat Walkover (NBW) surveys were completed by a suitably experienced ecologist and assistant once per season (Spring: April-May, Summer: June-August, Autumn: September-October). Each survey commenced at sunset and lasted for at least three hours due to the presence of a known lesser horseshoe bat roost in the wider landscape.

A NBW route was defined in advance of the NBW surveys, to ensure that representative habitats within the Site were surveyed, this was adjusted during the survey if flightlines or important habitats were identified. Surveyors began the survey at a position close to potential roosting locations, such as broadleaved woodlands and remained in position for at least 30 minutes. The identified route was then walked at a steady pace, with notes made regarding any adjustment of the route during the survey. The route walked during each NBW survey is illustrated on the corresponding figure (Figures 2 - 4). The starting point of the NBW was varied during each visit to sample different areas of the Site and the direction was varied to ensure that bat activity at a particular location was not overlooked.

A handheld bat detector (Elekon Batlogger M) used to detect and record bat calls during the NBW surveys. Bats, their activity, flight direction and height were recorded with a time stamp and GPS location where possible.

NBW surveys were undertaken in suitable weather conditions, as detailed in Table 3-4.

Table 3-4 Dates and Environmental Conditions During NBW Surveys

Date	Sunset Time	Start-Finish Time	Start-Finish Temperature (°C)	Start-Finish Wind Speed (Beaufort*)	Start-Finish Cloud Cover (% Scale**)	Start-Finish Precipitation***	Overall Weather Description
28 April 2025	20:39	20:39-23:39	19-12	1-1	30-0	0-0	Dry and warm all day and throughout survey.
7 July 2025	21:38	21:38-00:38	16-14	1-1	30-0	0-0	Dry, warm and still throughout.
24 September 2025	19:11	19:11-22:11	14-11	1-1	40-20	0-0	Dry and warm all day and

Date	Sunset Time	Start-Finish Time	Start-Finish Temperature (°C)	Start-Finish Wind Speed (Beaufort*)	Start-Finish Cloud Cover (% Scale**)	Start-Finish Precipitation***	Overall Weather Description
							throughout survey.

*Beaufort Scale: 0 no wind, 1 = light air, 2 = light breeze, 3 = gentle breeze, 4 = moderate breeze, 5 = fresh breeze, 6 = strong breeze, 7 = near gale

**Cloud cover % scale: 1 = 0-20%, 2 = 21-40%, 3 = 41-60%, 4 = 61-80%, 5 = 81-100%

***Precipitation scale: 0 = none, 1 = drizzle, 2 = shower, 3 = rain, 4 = downpour, 5 = flood

3.3.3 Bat Sonogram Analysis

Bat call recordings made by automated bat detectors and handheld bat detectors during the field surveys were analysed using Kaleidoscope Pro software. Automatic species identification software was utilised, and 10% of pipistrelle bat calls and noise was subsequently checked by a suitably experienced ecologist with reference to guidance material[17]. All calls of other species, and calls assigned “no ID”, were checked by the ecologist. Following this, 10% of all species checked were subject to a second check by an appropriately experienced ecologist for quality assurance purposes.

This analysis provides information on the species present at each location, as well as the number and timing of bat passes. A bat pass is defined as a single automated detector file made up of bat pulses of a single species; there may be one bat in a file or many bats in a file. The number of passes recorded on an automated bat detector gives an indication of the level of bat activity at a given location, but this cannot be reliably correlated to actual bat abundance because there is no observational context.

Where bat calls were identified during the NBW surveys, the location where the species was recorded is illustrated on the relevant figure (Figures 2 – 4). Where calls of the same species were identified multiple times within one minute, this is identified only once on the figure.

Following the identification of species, the time difference between each call and sunset/sunrise on that day was calculated. This is compared with information provided in Section 3.5 of the BCT Guidelines[11] to provide an indication on the proximity of bat roosts.

Where data in addition to the specified five nights for each automatic bat detector deployment is available, these have been processed using the automatic species identification function of Kaleidoscope Pro to check if additional species (specifically, greater horseshoe bat) are present and for the timing of calls identifying lesser horseshoe bat. Passes identified as other bat species, noise or “no ID” were not subject to identification by an ecologist. The passes identified in data outside of the specified five consecutive nights are not included in the analysis of data or species counts within this report.

3.3.4 Bat Activity Data Standardisation and Interpretation

As described in Chapter 10 of the BCT Guidelines[11], bat data requires standardisation to allow both geographic and temporal comparison. The number of bat passes was therefore divided by the night length (hours) and the number of nights to obtain the passes per hour for each species at each location. This data is provided in Appendix A.

Passes recorded within one hour of sunset and sunrise were counted for each species. The first and last pass of each species was noted and compared with the species-specific average emergence times outlined in Table 3.3 within the BCT Guidelines[11]. Given the potential for lesser horseshoe bats to forage within their roost woodland, or a nearby woodland, until it is dark[18], the timing associated with their first and last pass is also provided as context for their use of habitats in the Site. This data is provided in Appendix A, though the assessment for the potential presence of roosting bats in proximity to the Site is provided in the Roosting Bat Report[8].

3.3.5 Assessing the Importance of the Bat Assemblage

As the conservation status of bat species varies between different counties of the UK, a hierarchical geographical approach was used to assign biodiversity importance (sensitivity) of the bat assemblage associated with the Site

[17] Russ, J. (2012) Bat Calls of Great Britain and Europe: A Guide to Species Identification. Pelagic Publishing,
[18] Buglife, Plantlife and Bat Conservation Trust (no date) Barbastelle *Barbastella barbastellus* back from the brink species information guide. Available online at https://naturebftb.co.uk/wp-content/uploads/2021/11/Barbastelle-bat-species-info-guide.pdf [Accessed 30/10/2024].

based upon the Bat Mitigation Guidelines[19]. This approach has been developed to reflect geographic variations in species distributions and takes into account current understanding of abundance and distribution. Species in the southwest are assigned a 'rarity' category as outlined in Table 3.5 which underpins the subsequent assessment of importance of the overall assemblage of bats present on a site.

Table 3-5 Rarity Category of Bats in South Wales

Rarity Category	Species
Widespread (score 1)	Common pipistrelle Soprano pipistrelle Brown long-eared bat
Widespread but not abundant (score 2)	Whiskered bat *Myotis mystacinus* Brandt's bat *Myotis brandtii* Daubenton's bat *Myotis daubentonii* Natterer's bat *Myotis nattereri* Noctule
Rarer or restricted distribution (score 3)	Lesser horseshoe bat Serotine *Cnephaeus serotinus* Leisler's bat *Nyctalus leisleri* Nathusius' pipistrelle *Pipistrellus nathusii*
Rarer Annex II species and very rare (score 4)	Greater horseshoe bat Bechstein's bat Barbastelle Grey long-eared bat *Plecotus austriacus*

Source: Adapted from Table 3.1 of the Bat Mitigation Guidelines[19]

Each species identified within a site is assigned a score based on its rarity category outlined in Table 3.5. Where a species cannot be absolutely determined through the survey methods utilised within this assessment (for example, Myotis sp. as described in Section 3.3.6.2.3), species are included in the assemblage assessment if there are records of them within 2 km of the Site and suitable habitat is present within the Site. The total score for a site is calculated and compared to the maximum total available in a region (41 in South Wales). A percentage scale is then utilised to assign an importance level according to the following categories:

- County importance: score >45% (18 in south Wales);
- Regional importance: score >55% (23 in south Wales); and,
- National importance: score >70% (29 in south Wales).

Professional judgement is utilised at this stage to ensure that the category accurately reflects the conditions encountered during the surveys and the results of all investigations. For example, the overall importance of a site may be underestimated due to limitations in the survey data or overestimated due to the presence of a single call of a rare species. Reference to the local biodiversity action plan, identified designated sites and currently known distribution of species is made where appropriate.

An assessment of the importance of individual habitats, including flightlines, is not included in this report as there is no standard matrix method. Professional judgement is utilised to identify valuable habitats where appropriate, though no numerical value is assigned to habitats.

3.3.6 Limitations

Bats are highly mobile animals. Therefore, these surveys only provide a snapshot of current foraging and commuting behaviour. Such survey data is typically considered valid for up to two years, after which point update surveys will be required (October 2027).

Designs are not yet finalised and therefore assessments have been made based on broad assumptions regarding aspects such as night-time illumination. A provisional 'Landscape GA Plan' dated 31 October 2025' has been provided with has been used to form the basis of any assumptions.

A definitive red line boundary has not been provided for the Proposed Development, and an indicative boundary has been used to inform this report. This is not considered a significant limitation as the Proposed Development is

[19] Reason, P.F., & Wray, S. (2023) UK Bat Mitigation Guidelines: a guide to impact assessment, mitigation and compensation for developments affecting bats. Chartered Institute of Ecology and Environmental Management, Ampfield.

anticipated to be restricted to the area within the indicative boundary as illustrated on Figure 1. If the final boundary is significantly altered from the indicative boundary, further assessment may be required.

3.3.6.1 Desk Study

The aim of a desk study is to help characterise the baseline context of a site and provide valuable background information that would not be captured during a single site survey alone. Information obtained during the course of a desk study is dependent upon people and organisations having made and submitted records for the area of interest. As such, a lack of records for a particular species does not necessarily mean that the species do not occur in the study area. Likewise, the presence of records for particular species does not automatically mean that these still occur within the area of interest or are relevant in the context of the Proposed Development.

3.3.6.2 Automated Bat Detector Surveys

3.3.6.2.1 Weather Conditions

Suboptimal weather conditions were encountered during several deployments of the static bat detectors. Though these were short in duration and largely representative of weather conditions in this area of the UK, it is important to note that bat activity may reduce in temperatures below 10°C, windspeeds above 10mph and heavy precipitation. Barbastelle in particular are known to remain inactive for days at temperatures below 7°C as insect flight activity declines dramatically at temperatures below 10°C[20]. Suboptimal condition, and periods of light rain, are summarised in Table 3-6. These conditions were largely short in duration or a small deviation from the optimal conditions and therefore do not pose a significant limitation to the conclusions of this assessment. Light rain is not considered sub-optimal, or a limitation but is noted observationally. As the majority of the deployments were in suitable conditions and largely representative of conditions in the UK during these months, this is not considered to pose a significant limitation to the conclusions of this report.

A summary of limitations, and the total nights analysed during each automated bat detector deployment, is provided in Table 3-6.

Table 3-6 Summary of Sub-Optimal Weather and Light Rain for Automated Bat Detector Deployments

Date	Detector	Static Detector Limitations	Weather Limitations	Total nights analysed
25-30 April	A, B, C, D	None	• Light rain through the night 25 April. • Light rain 27 April 02:20-02:50. • Low temperature (9°C) 25 April, (7°C) 26 April, (8°C) 27 April.	5
1-6 May	A, B, C, D	None	• Low temperature (9°C) 4 May, (4°C) 5 May, (4°C) 6 May.	5
18-23 June	A, B, C, D	None	• Light rain 22 June 21:20-22:50.	5
7-12 July	A, B, C, D	None	None	5
12-16 August	A, B, C, D	None	None	5
15-19 September	A, B, C, D	None	• Strong wind (23 mph) 15 September overnight. • Scattered light rain 15 September and 16 September. • Light rain 17 September 00:20-02:20, increasing to heavy rain 04:20-05:20, light rain 19:20-21:50.	5
9-14 October	A, B, C, D	None	• Low temperature (9°C) 11 October overnight. • Light rain 05:20-06:50 13 October.	5

[20] Zeale, M. and Natural England (2024) Definition of Favourable Conservation Status for Barbastelle Bat. RP2974. Natural England.

3.3.6.2.2 Bat Sonogram Analysis

Different bat species vary in their likelihood of detection using bat detectors. Long-eared bat species *Plecotus* sp. have very quiet echolocation calls that may only be recorded up to 10 m away and are often not recorded on bat detectors. Similarly, horseshoe bats *Rhinolophus* sp. have directional calls that can easily be missed if they are flying on the opposite side of a feature. Noctule on the other hand can be recorded up to 50 m away. As a result, some species are often under-represented during call analysis and it is, therefore, not viable to compare numbers of bat passes from different species. To counter this, the data has been analysed to look for bat passes from all species across the Site. This is also taken into consideration when interpreting the abundance of different species.

It is accepted that Myotis bat species *Myotis* sp. are difficult to identify from echolocation alone, therefore these species are aggregated as "Myotis sp.". This aggregation, where undertaken, is widely accepted and does not affect the evaluation of the results of activity surveys. Likewise, the term "NLS" is used where echolocation calls of noctule, Leisler's bat and serotine were unable to be confidently distinguished from one another. Similarly, long-eared bats *Plecotus* sp. cannot be identified to species level by their echolocation calls alone. However, due to the location of the Site being outside of the known or potentially suitable range of the grey long-eared bat, all long-eared bat calls recorded are considered to be brown long-eared bat.

3.3.6.2.3 Assessing the Importance of the Bat Assemblage

The assessment of the importance of the bat species assemblage requires identification of Myotis sp. and long-eared bats to species level. Where identification to species level is not possible, species known to be present within 2 km of the Site due to the data returned from SEWBReC for the 2023 PEA have been included in the assemblage. The following species are assumed absent from the Site:

- Bechstein's bat: no records for Bechstein's bat were identified during the 2023 PEA[1] desk study The Site does not support significant areas of broadleaved woodland, though it is present directly adjacent to the boundary.
- Grey long-eared bat: no records for grey long-eared bat were identified during the 2023 PEA[1] desk study and the Site is not located within the known distribution of this species.
- Barbastelle bat: no records for barbastelle bat were identified in the 2023 PEA[1] desk study and Site is not located within the known distribution of this species[21].

[21] JNCC (2019). UK conservation status assessment for S1308 - Barbastelle (Barbastella barbastellus). Joint Nature Conservation Committee, Peterborough. Available at: https://jncc.gov.uk/jncc-assets/Art17/S1308-UK-Habitats-Directive-Art17-2019.pdf

4. Results

4.1 Desk Study

As reported within the 2023 PEA, SEWBReC returned one record of a pipistrelle *Pipistrellus* sp. maternity roost within a semi-rural house approximately 1.4 km southeast of the Site and connected to it via arable fields. SEWBReC returned foraging records for common pipistrelle, lesser horseshoe, soprano pipistrelle, whiskered bat, Myotis species and noctule within 2 km of the Site.

The 2023 PEA identified Island Farm PoW Camp SINC, a locally designated non-statutory site, adjacent to the west of the Site. This SINC is designated, in part, for roosting lesser horseshoe bat.

Crag y Parcau Local Nature Reserve (LNR) and SINC are 950m north of the Site and are cited as providing habitat for roosting Daubenton's bat, as well as other bat species.

The 2023 PEA summarised results of activity surveys conducted by Ethos between May 2020 and September 2021[12, 13, 14, 15], including the deployment of two automated bat detectors and NBWs over this period. During activity transects in 2020, Ethos recorded low numbers of common and soprano pipistrelle, and a single noctule and lesser horseshoe bat. The passive bat detectors recorded a total of 1,826 bat passes of nine species of bat; common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle, noctule bat, Leisler's bat, serotine, whiskered/Brandt's bat, Natterer's bat and lesser horseshoe. Most calls were common and soprano pipistrelles. Further NBW surveys in 2021 identified low numbers of common pipistrelle, and a single noctule and lesser horseshoe bat. Automated bat detectors deployed during this period recorded a total of 5,932 bat passes of ten species of bats, including those recorded previously and additional brown long-eared bat.

The 2023 PEA summarised results of a desk study and bat monitoring survey by MPS Ecology[16] at "Hut 9" within the Island Farm PoW Camp SINC (Hut 9 National Grid Reference: SS 90028 78480, approximately 0.18 km northwest of the Site). The report desk study identified that Hut 9 was utilised as a summer roost for brown-long eared bats between 2009 and 2012. Lesser horseshoe bats were recorded as having utilised Hut 9 as a maternity roost between 2010 and 2012, a hibernation roost between 2016 and 2018, and as a summer roost between 2017 and 2019. Vale of Glamorgan and Bridgend Bat Group conducted two emergence surveys at Hut 9 in June 2022, recording 130 lesser horseshoe bat emergences on 6 June and 117 lesser horseshoe bat emergences on the 19 June. MPS Ecology's 2022-2023 monitoring involved monthly internal inspections between March 2022 and March 2023. Lesser horseshoe bats were observed utilising the roost during every visit with a peak count of 149 in August 2022, and a single brown long-eared bat was recorded roosting within Hut 9 in April 2022. MPS Ecology concluded that the '*the site is an important summer and hibernation roost for lesser horseshoe bats'*, which are assumed to be breeding at numbers '*significant at the county scale and possibly regionally*'.

At least eight bat species were identified through the presence of field records within 2 km of the Site, these are summarised in Table 4-1 and the Core Sustenance Zone (CSZ) [22] for each species is given.

Table 4-1 Bat Foraging and Roosting Records within 2 km of the Site

Species	Foraging/Commuting Records and Location*	Roosting Records and Location*	Species CSZ[23]
Brown long-eared bat	Three records, closest approximately 0.3 km northwest of the Site and connected via woodland and grassland.	None	3 km
Common pipistrelle	13 records, closest approximately 0.5 km north of the Site and connected via woodland and hedgerows.	None	2 km
Daubenton's bat	Two records, closest approximately 0.7 km southwest of the Site and connected via woodland and grassland.	None.	2 km
Lesser horseshoe bat	Four records, closest approximately 0.3 km northwest of the Site and connected via woodland and grassland.	One record, 0.18 km northwest of the Site, within Island Farm PoW Camp SINC.	2 km

[22] The CSZ is the area around a roost within which habitat availability and quality has a significant influence on the resilience and conservation status of the roosting colony.
[23] Bat Conservation Trust (2020) Core Sustenance Zones and Habitats of Importance for Designing Biodiversity Net Gain for Bats. Available online at https://cdn.bats.org.uk/uploads/images/Bat-Species-Core-Sustenance-Zones-and-Habitats-for-Biodiversity-Net-Gain.pdf

Species	Foraging/Commuting Records and Location*	Roosting Records and Location*	Species CSZ[23]
Nathusius' pipistrelle	One record, closest approximately 2.2 km east of the Site and separated by the A48.	None.	3 km
Noctule	Seven records, closest approximately 1.4 km northwest of the Site and connected via woodland and grassland.	None.	4 km
Soprano pipistrelle	Six records, closest approximately 0.9 km south of the Site and connected via hedgerows and grassland.	None.	3 km
Whiskered bat	Four records, closest approximately 0.9 km south of the Site and connected via hedgerows and grassland.	None.	1 km
Pipistrelle sp.	N/A	One record within a semi-rural house approximately 1.4 km southeast of the Site and connected to it via arable fields.	2-3 km

*Where records are situated outside of the Site, the distance and direction are given at the closest point of the feature from the Site

4.2 Field Survey

4.2.1 Preliminary Assessment

The 2023 PEA[5] assessed the Site as having Moderate suitability habitat for foraging and commuting bats due to the presence of habitats known to support foraging bats such as grasslands, scrub and hedgerows, as well as the proximity to well-connected woodland. The vegetated boundaries of the Site (including woodland edge, treelines, scrub, and hedgerows) were considered suitable flightlines for commuting bats.

4.2.2 Automated Bat Detector Surveys

4.2.2.1 Species Composition

Automated bat detector surveys identified at least ten species within the Site, including two Annex II species:

- common pipistrelle;
- soprano pipistrelle;
- Nathusius' pipistrelle;
- noctule bat;
- Leisler's bat;
- serotine;
- Myotis sp.;
- brown long-eared bat;
- lesser horseshoe bat (Annex II); and,
- greater horseshoe bat (Annex II).

Overall, common and soprano pipistrelle accounted for 84.7% of passes identified during the automated detector surveys, 5.6% of passes were identified as lesser horseshoe, 0.01% of passes were identified as greater horseshoe (three passes in total), 5.9% of passes were identified as "big bats" (4.9% noctule, 0.8% serotine and 0.2% Leisler's). Myotis sp. and brown long-eared accounted for 1.74% and 1.91% of all passes, respectively and Nathusius' pipistrelle accounted for 0.08% of all passes. The number of bat passes, and species identified per month, within the Site is summarised in Table 4-2.

Table 4-2 Summary of Automated Bat Detector Results – By Month

Deployment Month	Total Bat Passes / Species										Total Passes	Species Count
	Common pipistrelle	Soprano pipistrelle	Nathusius' pipistrelle	Noctule	Leisler's bat	Serotine	Lesser horseshoe bat	Greater horseshoe bat	Myotis sp.	Brown long-eared bat		
April	4,697	1,065	0	57	1	11	230	1	180	86	6,318	9
May	3,367	1170	0	68	6	56	212	0	30	67	4,976	8
June	1,489	339	18	410	5	36	74	0	32	4	2,407	9
July	2,672	1,955	1	126	9	54	346	1	57	39	5,260	10
August	1,216	870	0	165	16	46	193	0	40	99	2,645	8
September	736	2,014	1	478	6	10	385	1	39	131	3,801	10
October	1,006	476	3	41	1	4	94	0	95	93	1,813	9
Total Passes	**15,173**	**7,889**	**23**	**1,345**	**44**	**217**	**1,534**	**3**	**473**	**519**	**27,220**	-
Percentage passes (%)	**56**	**29**	**<1**	**5**	**<1**	**1**	**6**	**<1**	**2**	**2**		-

4.2.2.2 Spatial Distribution of Bat Activity

The data was standardised to passes/hour for each species to allow for identification of the spatial distribution of each species within the Site, as summarised in Table 4-3. Locations of static detector is shown on Figure 1.

Activity was highest at Static C (west boundary), where an average 44.71 passes/hour were recorded. On average, Static C also recorded the highest passes/hour for common pipistrelle, soprano pipistrelle, serotine, lesser horseshoe bat, and Myotis sp. Static A (eastern boundary) recorded the highest passes/hour for Nathusius' pipistrelle, greater horseshoe and brown long-eared bat. Noctule was recorded most frequently at Static B (in the north-west), and Leisler's bat was recorded most frequently at Static D (southeast corner).

The ordered dataset (bat passes/hour) for the automated bat detector deployments is provided in Appendix A.1. When sorted numerically, five out of seven deployments (April, May, June, July, September) at Static C are within the top quartile (have the most passes per hour) while four out of seven deployments at Static B (May, June, September, October) are within the bottom quartile (have the least passes per hour).

Table 4-3 Summary of Automated Bat Detector Results – By Location

Static Location	Average bat passes/hour										Average passes/ hour for all Species	Species count
	Common pipistrelle	Soprano pipistrelle	Nathusius' pipistrelle	Noctule	Leisler's bat	Serotine	Lesser horseshoe bat	Greater horseshoe bat	Myotis sp.	Brown long-eared bat		
A	11.6	3.0	<0.1	1.5	<0.1	0.2	1.6	<0.1	0.2	0.6	**18.8**	10
B	3.7	4.0	<0.1	1.6	<0.1	0.1	1.9	0	0.4	0.1	**10.4**	9
C	26.0	14.6	<0.1	0.6	<0.1	0.3	2.2	<0.1	0.9	0.1	**44.7**	10
D	9.2	3.6	0	0.7	<0.1	0.2	0.7	0	0.3	0.2	**15.0**	8
Average passes/ hour	**12.6**	**6.3**	**<0.1**	**1.1**	**<0.1**	**0.2**	**1.2**	**<0.1**	**0.4**	**0.4**	**22.2**	
Key	Highest passes/hour per species											

4.2.2.3 Temporal Distribution of Bat Activity

The number of bat passes/hour, and species identified per month, within the Site is summarised in Table 4-4. Bat activity throughout the Site was highest in July, with an average of 35.1 passes/hour recorded. This is representative of typical bat activity, with June to early July being when pups are born and the summer being the most active period.

Table 4-4 Summary of Bat Passes/Hour Recorded During Automated Bat Detector Deployment

Automated Bat Detector	Total bat passes/hour							Average Passes/ Hour
	April	May	June	July	August	September	October	
A	22.8	16.3	18.9	35.1	22.2	12.6	3.6	**18.8**
B	9.7	8.7	6.0	25.5	11.4	7.1	4.5	**10.4**
C	89.6	87.9	30.1	47.0	8.2	34.4	15.8	**44.7**
D	10.9	11.6	11.3	32.6	22.3	12.0	4.0	**15.0**
Average Passes/Hour	**33.3**	**31.1**	**16.6**	**35.1**	**16.0**	**16.5**	**7.0**	**19.0**
Species identified	9	8	9	10	8	10	9	
Key (spectral colouring)		Highest value		Midpoint		Lowest value		

Results for each static bat detector location are given in Appendix A. This includes data related to bat passes recorded within half an hour and an hour of sunset/sunrise during each deployment (Appendix A.2). This can be utilised to help identify the presence of potential roost locations in proximity to the Site, given known approximate emergence times of bats, assessment regarding this is provided in the roosting bat report[8].

4.2.2.4 Annex II Species

Given their legal status and sensitivity to development, further detailed results are provided on the timings of passes attributed to greater and lesser horseshoe bat below.

Greater Horseshoe Bat

Single greater horseshoe bat passes were recorded on three occasions, one in April at Static C (at 04:33 on 28 April), and in July and September at Static A (at 22:15 on 08 July and 21:09 on 18 September, respectively). The July pass is within one hour of sunset; however, the April and September passes are not within one hour of sunset

or sunrise. Greater horseshoe bat are known to emerge from their roost approximately half an hour after sunset[11]. Given the limited frequency and the timings of greater horseshoe bat passes within the Site, it is considered unlikely that greater horseshoe bats are roosting in proximity to the Site, and that the Site is not within the CSZ of a greater horseshoe bat roost.

The greater horseshoe bat is highly dependent on pasture, and they prefer landscapes with numerous large trees, tall hedgerows and woodland patches[23]. Greater horseshoe bats are likely opportunistically foraging and commuting through the Site and are likely utilised the commuting corridors associated with the Site boundaries.

Lesser Horseshoe Bat

The number of lesser horseshoe bat passes/hour recorded during each automated bat detector deployment is shown in Table 4-5. The first and last call time during each deployment is provided in Appendix A.3.

Lesser horseshoe bat passes were detected at every Static on every deployment. Lesser horseshoe bats were recorded active on Site within half an hour of sunset and sunrise every month. Lesser horseshoe bat passes within half an hour of sunset were highest in September – with 48 passes recorded (with 88 passes recorded within one hour of sunset. Lesser horseshoe bat are known to emerge from their roost approximately half an hour after sunset[11].

The Roosting Bat Report[8] confirms that lesser horseshoe bats are not roosting directly within the Site. The timing and frequency of lesser horseshoe bat passes within the Site indicates that bats from the Island Farm POW Camp SINC are utilising the habitats within the Site throughout the active season. The Island Farm POW Camp SINC roost is a maternity and hibernation roost and, though winter activity is outside the scope of this assessment, it is likely that bats are using the Site during winter as well as the active season. as it is within the CSZ of the hibernation roost,

The foraging ground for lesser horseshoe bats is usually within 2.5 km of a roost with linear features, such are the vegetated boundaries of the Site, acting as key commuting routes[24]. The lesser horseshoe bat tends to feed in deciduous and riparian woodland, though it may also utilise pastures and pond shore habitats[25].

Table 4-5 Lesser Horseshoe Bat Passes/Hour During Automated Bat Detector Deployment

Automated Bat Detector	Lesser Horseshoe Passes/Hour							Average Passes/Hour
	April	May	June	July	August	September	October	
A	1.5	1	0.2	5.7	2	0.6	0.4	**1.6**
B	0.2	0.2	<0.1	1.2	0.5	0.1	0.3	**0.4**
C	1.8	3.4	1.3	1.5	1	5.8	0.6	**2.2**
D	1.3	0.8	0.5	0.8	1.2	0.2	0.2	**0.7**
Average Passes/Hour	**1.2**	**1.4**	**0.5**	**2.3**	**1.2**	**1.7**	**0.4**	
Key (spectral colouring)		Highest value		Midpoint		Lowest value		

4.2.3 Night-Time Bat Walkover

4.2.3.1 Species Composition

NBW surveys identified at least five species within the Site:

- common pipistrelle;
- soprano pipistrelle;
- noctule bat;
- brown long-eared bat;
- Myotis sp.; and,
- lesser horseshoe bat.

[24] Walsh, K., Matthews, J., Halliwell, E., Morris, K., Raynor, R., & Bryce, J. (2022) *Guidelines for the Selection of Biological SSSIs. Part 2: Detailed Guidelines for Habitats and Species Groups. Chapter 16 Mammals (version 1.1)* JNCC, Peterborough.
[25] Kyheröinen, E.M. et al. (2019): Guidance on the conservation and management of critical feeding areas and commuting routes for bats. EUROBATS Publication Series. No. 9. UNEP/EUROBATS Secretariat, Bonn, Germany, 109 pp.

Overall, common and soprano pipistrelle species accounted for 91.2% of passes identified during the NBW surveys with the remaining passes identified as lesser horseshoe bat (7.4%), brown long-eared bat (0.7%), noctule (0.5%) and myotis sp. (0.2%).

The results of the NBW surveys are summarised below (Table 4-6) and illustrated on Figure 2 (Spring), Figure 3 (Summer) and Figure 4 (Autumn).

Table 4-6 Summary of NBW Survey Results

Season	Number of Passes Per Bat Species						Total Number of Passes	Species Count
	Common pipistrelle	Soprano pipistrelle	Myotis sp.	Noctule	Brown long-eared	Lesser horseshoe		
Spring	234	115	-	1	3	5	**358**	5
Summer	82	70	1	2	1	37	**193**	6
Autumn	12	29	-	-	-	2	**43**	3
Total passes	**328**	**214**	**1**	**3**	**4**	**44**	**594**	--
Percentage of total calls (%)	55	36	<1	<1	<1	7		

4.2.3.2 Spatial Distribution of Bat Activity

The distribution of bat passes recorded during the NBW is shown on Figure 2 (spring), Figure 3 (summer) and Figure 4 (autumn). It was noted that bats were more frequently recorded commuting and foraging along the treeline attached to the woodland on the west boundary, mature hedgerows, and lines of trees compared to the central scrub and the southern boundary of the Site.

4.2.3.3 Temporal Distribution of Bat Activity

Due to the limited sample, conclusions on temporal patterns of bat activity from the NBW surveys cannot be robustly drawn. The NBW recorded the highest number of bat passes during spring, and the lowest number during autumn.

4.2.3.4 Indications of Roosting in Proximity

When comparing the time of calls recorded during NBW surveys to that of sunset, it was noted that at least 20 bat passes were recorded during the first 0.5 hrs of the spring transect (see Figure 2 for the starting location) and 15 bat passes were recorded during this period of the summer transect (see Figure 3) for the starting location). Both common and soprano pipistrelle were recorded utilising the vegetated corridor along the woodland edge to the east of the Site and extending into hedgerows within the Site. Given that both species typically emerge from their roost within 30 minutes of sunset, there is potential for their roosts to be present within the woodland and buildings adjacent to the Site.

4.3 Site Assessment - Conclusions

At least ten species of bat are recorded active within the Site.

Bat activity was recorded to be highest near broadleaved woodland in both the automated detector surveys (Static C) and the NBWs. Similarly, relatively high bat activity levels were recorded at hedgerows with good connectivity to the broadleaved woodlands at the boundary of the Site during the NBWs.

Habitats within the Site likely to be of high value to commuting bats include mature and diverse hedgerows, woodland edge, scrub and treelines at the Site boundaries. The relatively low activity levels at Static B, located within scrub within the arable field, indicate that the central area of the Site is of lower importance to the commuting and foraging bats within the Site than the boundaries. Though bats, including lesser horseshoe bats, were still recorded commuting over the open arable habitat during all NBWs.

The Site is considered likely to be within the CSZ of roosts of lesser horseshoe bat, given that the species was recorded by every static on every deployment, including calls within an hour of sunset/sunrise.

It is considered likely that the Site is within the CSZ of roosts of the following species:

- common pipistrelle;
- soprano pipistrelle;
- noctule; and,
- lesser horseshoe bat.

4.4 Assessing the Importance of the Bat Assemblage

Using the scoring system recommended in the Bat Mitigation Guidelines[19], the commuting and foraging bat species assemblage at the Site was valued at Regional importance due to having a percentage score over 55% of that available within South Wales. The bat species included in the assessment, with their associated score, are outlined in Table 4-7.

Excluding greater horseshoe bat from the species assemblage, based on the low number of passes (three passes, one in spring, summer and autumn), would downgrade the Site to County importance. The inclusion of greater horseshoe bat is based on the spread of the passes (April, July, September) indicating that their presence isn't purely incidental and that they utilise the Site at least occasionally throughout the active season. The proximity of the Island Farm POW Camp SINC lesser horseshoe bat roost also justifies the Regional importance of the Site as it is utilised throughout the active season by lesser horseshow bats and is within the roosts CSZ.

Table 4-7 Bat Species Assemblage

Species Present	Rarity*	Score
Common pipistrelle	Widespread	1
Soprano pipistrelle	Widespread	1
Brown long-eared bat	Widespread	1
Whiskered bat**	Widespread but not abundant	2
Daubenton's bat**	Widespread but not abundant	2
Noctule bat	Widespread but not abundant	2
Lesser horseshoe bat	Rarer or restricted distribution	3
Serotine	Rarer or restricted distribution	3
Leisler's bat	Rarer or restricted distribution	3
Nathusius' pipistrelle	Rarer or restricted distribution	3
Greater horseshoe bat	Rarer Annex II species and very rare	4
Total score		25
Score % of total available (41)		60.97%
Overall value of assemblage		**Regional Importance**

*As categorised in Table 3.1 of the Bat Mitigation Guidelines[19]

**As Myotis bats were not identified to species level in this report, the presence of these species is assumed due to their presence within records returned by SEWBReC (Section 4.1)

5. Impact Assessment

Without mitigation, during construction, the Proposed Development has the potential to cause the following impacts:

- loss of foraging habitat through the construction of buildings and associated infrastructure;
- severance of commuting routes due to the widening of gaps in hedgerows to facilitate construction of access roads;
- fragmentation of retained habitats due to severance of commuting routes;
- disturbance to foraging and commuting bats from lighting and through the generation of noise, dust and vibration during construction; and,

Without mitigation, during operation, the Proposed Development has the potential to cause the following impacts:

- disturbance to foraging and commuting bats from lighting associated with the operation of the Proposed Development.

5.1.1 Habitat Loss

The construction of the Proposed Development will require the permanent loss of the arable and scrub habitat within the Site, as well as the loss of some improved grassland and ruderal vegetation. The loss of arable habitat is considered unlikely to have a significant direct impact on local bat populations due to the retention of similar habitat of equal or greater value within the landscape. The boundary habitats, which appear to be of higher value to commuting and foraging bats on Site, are anticipated to be retained throughout most of the Site.

As the lesser horseshoe bat typically feeds in woodlands[25],[23] and 47% of their prey species are reliant on trees and shrub plant forms[26], it is unlikely that a significant loss of foraging habitat will occur for this species as a result of the Proposed Development, if the implementation of proposed habitat buffers can be fulfilled, and the habitats remain accessible to the bats (kept ‘dark). The loss of scrub may result in a reduction in some prey species for lesser horseshoe bats, and other bat species. another

A further 44% of lesser horseshoe bat prey species are reliant on flowering plants and grasses in their larval form[26]. The improved grassland is not considered likely to support a diverse or abundant invertebrate population, however the loss of ruderal vegetation may result in a decrease in prey species numbers for bats.

5.1.2 Habitat Severance and Fragmentation

Where Site access requires the creation of new gaps in vegetation e.g. in the northeastern corner where a new road will require vegetation clearance in the eastern boundary, without mitigation, habitat fragmentation may occur. While no final designs have been seen, the required gap is assumed to be at least 5 m wide.

severance of connectivity and fragmentation of habitats adjacent to the Site and the wider landscape may result in a decrease in connectivity between roosts and foraging resources and between local populations and in the long-term loss of genetic diversity and decrease resilience of the population.

5.1.3 Lighting

No lighting designs were available the time of writing however, it is understood that additional nighttime lighting is likely to be required for the proposed car park, road, pedestrian walkways, and sports facilities (depending on the hours of operation). Lighting can cause functional habitat loss and fragmentation to light-sensitive bat species, including greater and lesser horseshoe bats and brown long-eared bats, which may make foraging habitat unsuitable or inaccessible to bats and create barriers to movement and severance between roosts and foraging habitat. Without mitigation, lighting is likely to have a permanent adverse impact on foraging and commuting bats that utilise the Site.

5.1.4 Noise Disturbance

Noise will be produced during construction activities, though this will likely be localised to small areas and temporary. There will be no noise-producing permanent infrastructure as part of the Proposed Development. None of the construction plant is anticipated to produce significant ultra-sonic noise. Construction activities associated

[26] Andrews, H. & McGill, J (2022) *Account of Bat Prey Species Associations (BPSA) for bats resident in the British Isles – 2022.* Aecol – Andrews Ecology, Barnstaple.

with the Proposed Development are therefore likely to have minimal direct impact on foraging and commuting bats and impacts to the ability of bats to successfully echolocate are therefore unlikely to occur.

5.2 Cumulative Impacts

The current Local Development Plan[27] has allocated all land surrounding the Island Farm POW Camp SINC for development, and as such it can be expected that a large amount of the immediate habitat within the CSZ for this roost will be lost in the absence of sensitive mitigation. Mitigation for the Proposed Development should therefore consider cumulative impacts.

Cumulative impacts include:

- Loss foraging habitat in proximity to a lesser horseshoe maternity and hibernation roost;
- Loss of connectivity east - west to railway line and pasture (likely foraging habitat); and,
- Degradation and disturbance of the boundary woodland.

[27] Bridgend County Borough Council (2014) Adopted Replacement Local Development Plan 2018-2033. Available online: https://www.bridgend.gov.uk/residents/planning-and-building-control/local-development-plan/adopted-replacement-local-development-plan-2018-2033/

6. Recommendations

6.1 Further Surveys

No further surveys for bat activity are required to inform the design of the Proposed Development.

Should works to facilitate the Proposed Development be delayed further than 18 months after the completion of this assessment (i.e. works begin after June 2027), a suitably experienced ecologist should be consulted to advise whether update surveys should be undertaken[28].

6.2 Recommendations for Avoidance and Mitigation

Avoidance of impacts should be incorporated during the design of the Proposed Development. Where this is not possible, mitigation will be required to reduce impacts on bats.

6.2.1 Avoidance by Design

The final design of the Proposed Development should include buffers to existing commuting corridors. A 15 m no-build buffer from any boundary hedgerows and woodland should be embedded into the design of the Proposed Development where feasible, thereby retaining the boundary habitat and green corridors. Areas requiring additional lighting should be sited as far away from commuting corridors as possible, to ensure the maintenance of the existing dark corridors.

6.2.2 Habitat Loss

The permanent and temporary loss of all semi-natural habitats for the development of building and access tracks should be minimised as far as possible by designing the smallest footprint required to meet the project needs.

A new hedgerow should be planted along the southern boundary, prioritising species (where these are suitable to the soil type and climate conditions) outlined in Appendix B, to allow continued commuting across the Site and maintain wider connectivity of the woodland to the wider landscape as compensation for other habitat loss in the context of the wider development. This hedgerow should remain unlit where possible, however where light spill cannot be avoided, this must be limited to levels of 0.2 lux on the horizontal plane and 0.4 lux on the vertical plane due to the presence of horseshoe bats.

Improvements to the retained vegetated boundaries in the north, west, and east should also be undertaken to bolster these commuting corridors. Such improvements may include supplementary planting with native shrub species and following a sensitive management scheme during operation.

Landscaping within the no-build buffer at the Site boundary (and throughout the Proposed Development) should incorporate a range of habitats including grasslands with flowering plants, native shrubs, and trees. Where the 15 m no-build buffer is not possible, landscaping should look to increase the density of native planting and increase the screening capability of the created habitat within the buffer. This habitat creation, along with the creation of a southern hedgerow and the improvement of retained vegetated boundaries will mitigate for the loss of scrub, ruderal vegetation, and improved grassland within the Site.

The Bat Mitigation Guidelines recommends consultation of the Bat Prey Species Assemblage tool[26] to identify the larval food plants of prey known to be eaten by bat species with potential to be impacted by development. This enables the prioritisation of planting to provide species of greatest value to bats known to be present within a site. In all cases, a mixture of native species should be included in landscape design, though Appendix B of this report includes plants known to support invertebrates eaten by a range of bat species present within the Site, including greater and lesser horseshoe bat.

6.2.3 Habitat Severance and Fragmentation

Avoidance of habitat severance, and retention of landscape connectivity through the Site, should be designed into the Proposed Development with the buffers mentioned above. This will reduce the potential for the Proposed Development to cause severance of connectivity and fragmentation of habitats in use by local bat populations and preserve habitats that support future opportunities for bats and a wide range of other species including their invertebrate prey.

[28] CIEEM (2019) Advice Note: On the Lifespan of Ecological Reports and Surveys. Available online: https://cieem.net/wp-content/uploads/2019/04/Advice-Note.pdf

The creation of gaps in hedgerows should be avoided as far as possible. Vegetation clearance should be kept to the minimum required for vehicular access to be provided.

Where the new road access is proposed through the eastern boundary, the road and footway should be designed to be as narrow as possible, retaining as much existing boundary vegetation up to the road as possible. New planting to fill gaps up to the road will likely be required. The planting of standard trees either side of the entrance whose canopies could be allowed to grow and extend over the road in time would provide access across the gap at height in the longer term. Lighting of the road at the point it crosses through the eastern boundary should be avoided.

Where the creation of permanent gaps greater than 5 m wide cannot be avoided, mitigation will be required and will include:

- strengthening of existing alternative commuting routes through replanting of gappy hedgerows with native local sourced plants and allowing existing heavily managed hedgerows to grow out;
- measures to improve nearby habitats (such as replanting elsewhere to ensure continued provision of nearby green corridors); and,
- provision of new alternative commuting routes, these should be well-connected to existing flight paths.

The lesser horseshoe bat is particularly reliant upon dark, linear commuting routes for connectivity throughout the landscape. A 15 m no-build buffer from any boundary hedgerows and woodland should be embedded into the design of the Proposed Development where feasible, thereby retaining the boundary habitat and green corridors. e. Where site layout has been reviewed and this buffer may still not be fully achievable, such as for the MUGA, the 4G sports pitch, residential block, service area and the school building (as indicated by the provisional 'Landscape GA Plan' (HSEN-HLM-ZZ-ZZ-D-L-0001)), the lighting scheme should be designed in such a way that the buffer and boundary does not become functionally fragmented, and the use of additional planting to provide screening should be explored. See Section 6.2.4.1 for recommendations regarding a sensitive lighting scheme.

6.2.4 Disturbance

Flight lines and foraging habitats must be maintained throughout construction and operation of the Proposed Development and not be subject to lighting or noise pollution.

6.2.4.1 Lighting

No night-time working is anticipated during construction of the Proposed Development; however, the Proposed Development is likely to require external lighting for operation. All lighting schemes should be designed in line with standing advice from the Bat Conservation Trust and Institution of Lighting Professionals[29].

There are British Standards relating to various components of lighting and there are guidelines that relate to crime prevention, prevention of vehicular accidents and amenity use[29]. There is no legislation requiring an area or road to be lit[29]. However, there is legislation requiring bats to be protected against disturbance, which includes light disturbance.

The following recommendations, in line with best practice guidance, must be incorporated into any new lighting scheme at the Site:

- in the first instance, external lighting must be designed to avoid light spill onto vegetated habitats, and trees and structures with suitability to support roosting bats, and avoid spilling beyond the Site boundary;
- If light spill onto Site boundaries cannot be avoided this must be limited to levels of 0.2 lux on the horizontal plane and 0.4 lux on the vertical plane due to the presence of horseshoe bats;
- lighting design should maintain a 'dark corridor' to allow use of the habitat for foraging, commuting and roost access; and,
- Light spill onto any new bat boxes (see Section 6) must be avoided.

[29] Institution of Lightings Professionals and Bat Conservation Trust (2023) Guidance Note 08/23: Bats and Artificial Lighting at Night. Institution of Lighting Professionals, Rugby and Bat Conservation Trust, London.

Suggestions for mitigating external lighting and achieving the lighting recommendations above are outlined in the ILP Bats and Lighting Guidance Note[29] and best practice guidance[30] [31]. These include:

- only light areas which need to be lit, and use the minimal level of lighting required to comply with guidance such as Institute of Lighting Engineers Guidance Notes for the Reduction of Obtrusive Light (2021);
- avoid aesthetic lighting which has no other function, and up lighting of trees and buildings;
- use the lowest level of illumination required for purpose;
- where lighting is proposed, use lighting modelling programs to indicate where the light spill will occur;
- all luminaires should lack or have negligible UV elements, avoid white and blue spectrums of light;
- LED luminaires should be used where possible due to their sharp cut off, low intensity, good colour rendition and dimming capability;
- a warm white spectrum (ideally <2700 Kelvin) should be adopted to reduce blue light component. Avoid neutral white, cool white and blue spectrums of light;
- Light sources should feature peak wavelengths higher than 550 nm to avoid the component of light most disturbing to bats;
- eliminate bare lamps and any upward pointing light;
- Only luminaires with a negligible or zero Upward Light Ratio, and with good optical control, should be considered.
- Luminaires should always be mounted horizontally, with no light output above 90° and/or no upward tilt. the spread of light should be at or near the horizontal, flat cut off lanterns are best;
- Internal luminaires can be recessed (as opposed to using a pendant fitting) where installed in proximity to windows to reduce glare and light spill.
- Waymarking inground markers (low output with cowls or similar to minimise upward light spill) to delineate path edges.
- Column heights should be carefully considered to minimise light spill and glare visibility. This should be balanced with the potential for increased numbers of columns and upward light reflectance as with bollards.
- external security lighting should be set on motion-sensors and set to as short a possible a timer as the risk assessment will allow. For most general residential purposes, a 1- or 2-minute timer is likely to be appropriate.
- Where appropriate, use of a Central Management System (CMS) with additional web-enabled devices to light on demand
- The use of bollard or low-level downward-directional luminaires is strongly discouraged. This is due to a considerable range of issues, such as unacceptable glare, poor illumination efficiency, unacceptable upward light output, increased upward light scatter from surfaces and poor facial recognition which makes them unsuitable for most sites. Therefore, they should only be considered in specific cases where the lighting professional and project manager are able to resolve these issues;
- limit the times that the lights are on to provide some dark periods; and/or dimming of lights during certain periods; the proposed new lighting could be turned off or dimmed by 75 % from 19:00 until 06:00 daily;
- avoid using reflective surfaces under lights; and,
- do not use a lamp greater than 150 W for security lighting.
- Only if all other options have been explored, accessories such as baffles, hoods or louvres can be used to reduce light spill and direct it only to where it is needed. However, due to the lensing and fine cut-off control of the beam inherent in modern LED luminaires, the effect of cowls and baffles is often far less than anticipated and so should not be relied upon solely.

It is recommended that an ecologist collaborates with an experienced nocturnal wildlife lighting specialist on the lighting plan to ensure guidance regarding bats and lighting are met.

This will also maintain the value of the Site and adjacent habitats for other nocturnal species.

[30] Bat Conservation Trust, (2014). Artificial Lighting and Wildlife. Interim Guidance: Recommendations to help minimise the impact artificial lighting. London: Bat Conservation Trust. June 2014.
[31] Gunnell, K., Grant, G., & Williams, C. (2012). Landscape and urban design for bats and biodiversity. London: Bat Conservation Trust.

6.3 Post-Works Monitoring

Paying due regard to bets practice, because the Site supports a bat species assemblage of Regional importance, including Annex II species, a five-year monitoring period is recommended[19]. This should include the deployment of automated static bat detectors at the same locations within this assessment for five consecutive nights each season (Spring: April-May, Summer: June-August, Autumn: September-October) in years 2, 3 and 5 following construction. This will enable comparison of the species and activity identified to the baseline data within this report to determine the requirement for additional remedial measures to reduce impacts to foraging and commuting bats, should they be required.

It is recommended that the known lesser horseshoe bat roost at Island Farm PoW Camp SINC is subject to monitoring following the construction of the Proposed Development (and other developments within the wider masterplan). This monitoring should continue for at least five years in years 2, 3, and 5 following construction and should include one summer and one winter internal inspections of the roost by a suitably licensed bat ecologist to confirm continued use at pre-construction levels (using the 2023 MPS Ecology monitoring report[16] as a baseline).

6.4 Enhancement Measures

There are currently no standing water features at the Site. The storm water retention basin proposed within the northwestern corner of the Proposed Development, per the provisional ‘Landscape GA Plan’ (HSEN-HLM-ZZ-ZZ-D-L-0001), will add habitat diversity and should be landscaped using appropriate, native vegetation to provide habitat for invertebrate species. The use of species listed in Appendix B will increase the availability and diversity of prey species on Site for bats. If the storm water retention basin is designed to hold water year-round it will provide the greatest enhancement with regards to prey availability for bat species.

Figures

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Heronsbridge School

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LEGEND

- Indicative Site Boundary
- Ecological Assessment Area
- Static Detector

NOTES

1: Basemapping: Contains OS data © Crown Copyright and database right 2025
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ISSUE PURPOSE

Heronsbridge School Bat Activity Report

PROJECT NUMBER

60704349

FIGURE TITLE

Automated Bat Detector Deployment Locations

FIGURE NUMBER

Figure 1

Revision: 0 Drawn: AM Checked: CC Approved: LM Date: 2025-12-11

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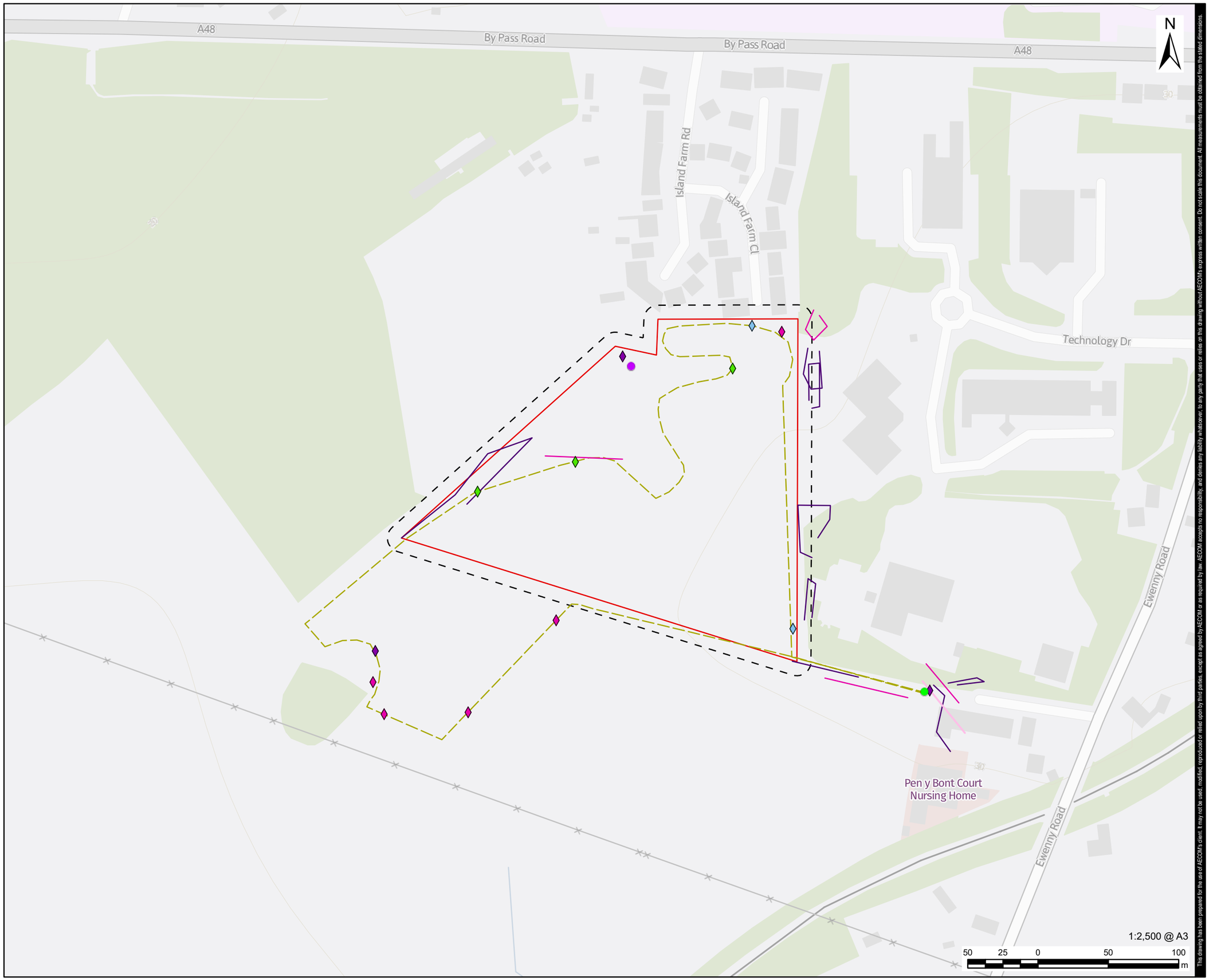

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LEGEND

- Indicative Site Boundary
- Ecological Assessment Area
- Bat Walkover Transect
- Spot count
- Transect start point

Bat Activity Point

- Common pipistrelle
- Soprano pipistrelle
- Lesser horseshoe bat
- Noctule

Bat Flight Path

- Common pipistrelle
- Soprano pipistrelle
- Indeterminate pipistrelle

NOTES

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ISSUE PURPOSE

Heronsbridge School Bat Activity Report

PROJECT NUMBER

60704349

FIGURE TITLE

Nighttime Bat Walkover Survey Results: Spring

FIGURE NUMBER

Figure 2

Revision: 0 Drawn: AM Checked: CC Approved: LM Date: 2025-12-11

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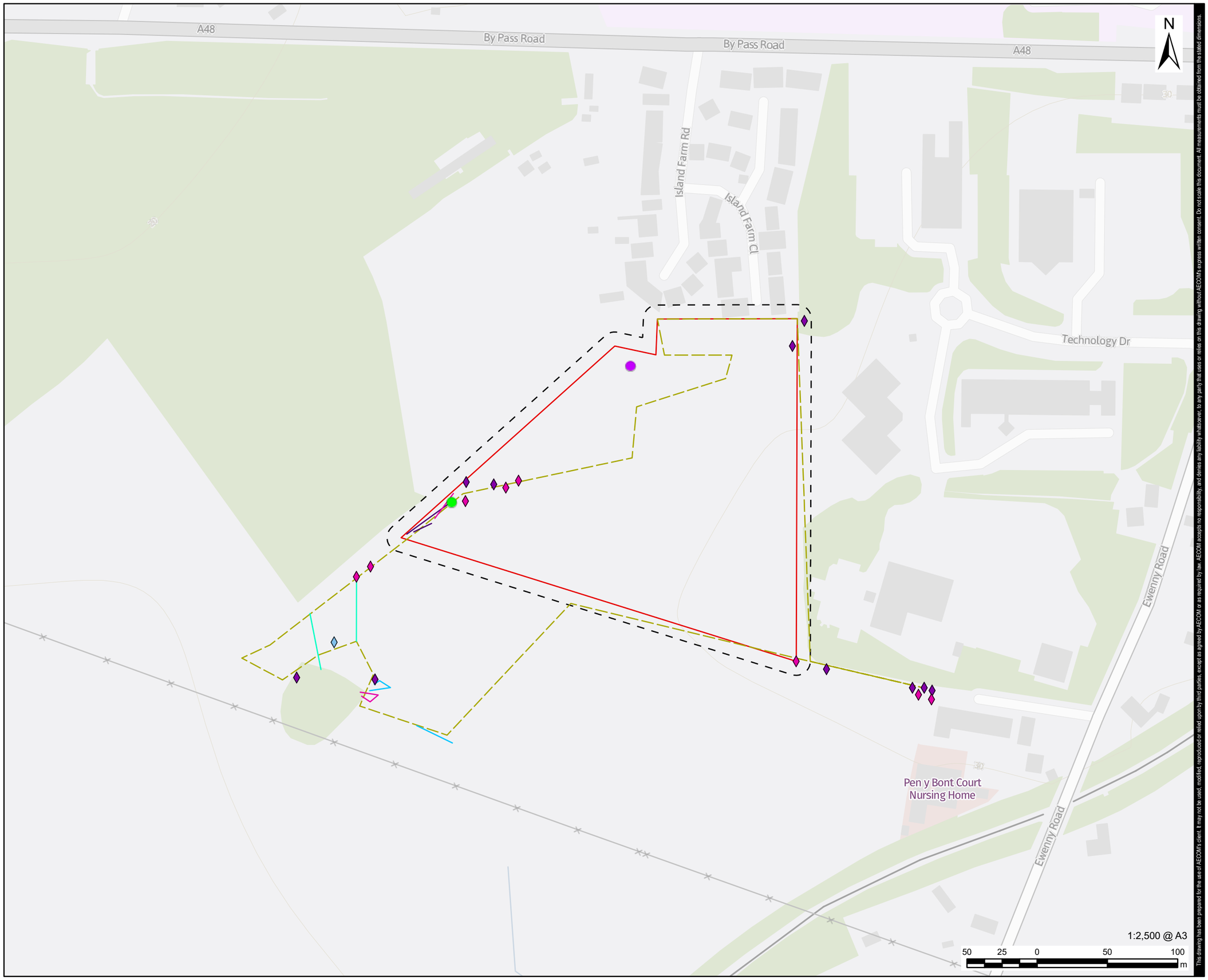

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LEGEND

- Indicative Site Boundary
- Ecological Assessment Area
- Bat Walkover Transect
- Spot count
- Transect start point

Bat Activity Point

- Common pipistrelle
- Soprano pipistrelle
- Lesser horseshoe bat

Bat Flight Path

- Common pipistrelle
- Lesser horseshoe
- Soprano pipistrelle
- Myotis

NOTES

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ISSUE PURPOSE

Heronsbridge School Bat Activity Report

PROJECT NUMBER

60704349

FIGURE TITLE

Nighttime Bat Walkover Survey Results: Summer

FIGURE NUMBER

Figure 3

Revision: 0 Drawn: AM Checked: CC Approved: LM Date: 2025-12-11

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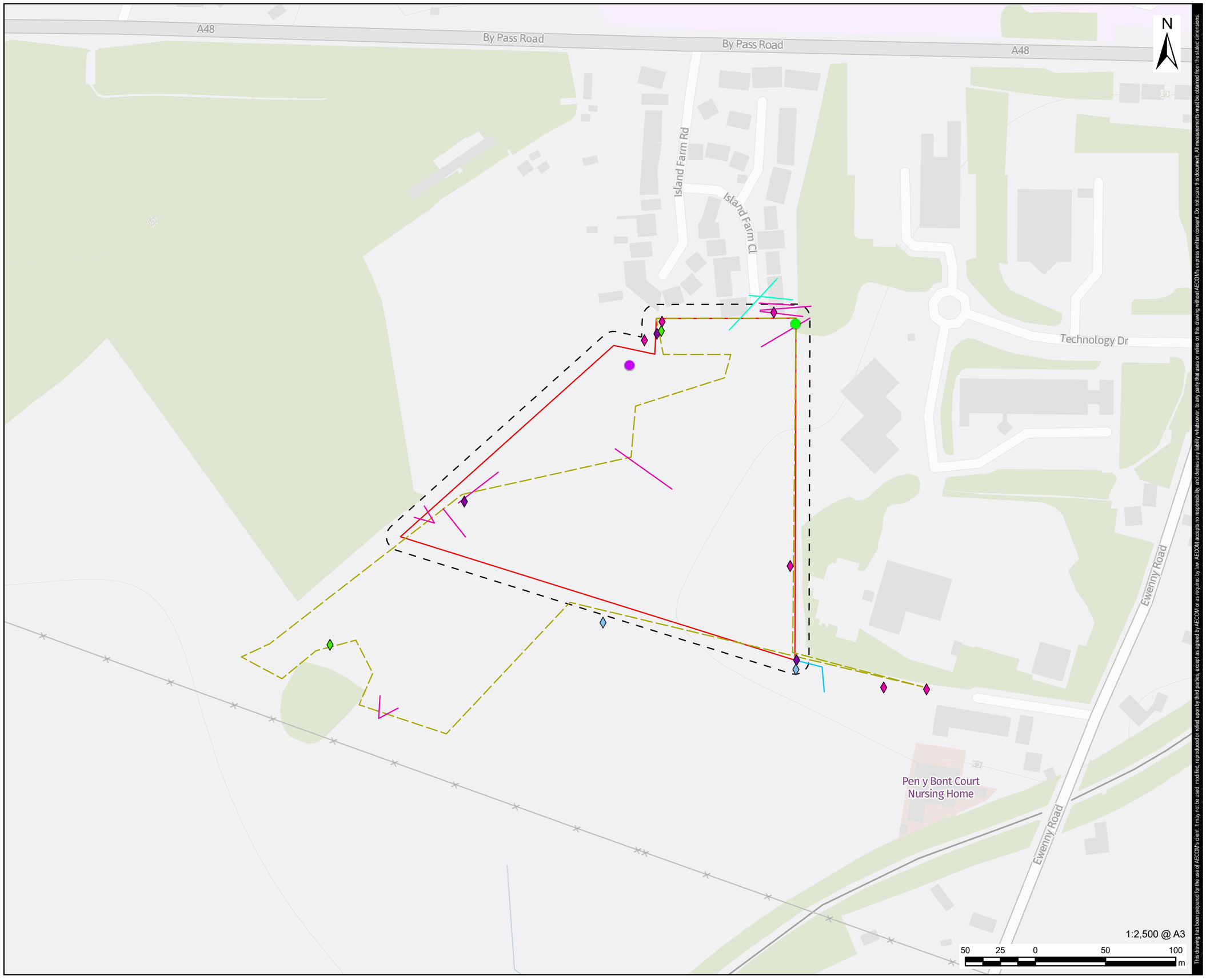

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LEGEND

- Indicative Site Boundary
- Ecological Assessment Area
- Bat Walkover Transect
- Spot count
- Transect start point

Bat Activity Point

- Common pipistrelle
- Soprano pipistrelle
- Lesser horseshoe bat
- Noctule

Bat Flight Path

- Lesser horseshoe
- Soprano pipistrelle
- Myotis

NOTES

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ISSUE PURPOSE

Heronsbridge School Bat Activity Report

PROJECT NUMBER

60704349

FIGURE TITLE

Nighttime Bat Walkover Survey Results: Autumn

FIGURE NUMBER

Figure 4

Appendix A Automated Bat Detector Deployment Results

A.1 Bat Passes/Hour Sorted into Quartiles

Quartile	Bat Passes/Hour	Static Location (Figure 1)	Deployment Month (2025)
1	3.58	A	October
1	3.98	D	October
1	4.51	B	October
1	6.01	B	June
1	7.06	B	September
1	8.17	C	August
1	8.70	B	May
2	9.71	B	April
2	10.88	D	April
2	11.34	D	June
2	11.44	B	August
2	11.55	D	May
2	12.03	D	September
2	12.59	A	September
3	15.82	C	October
3	16.30	A	May
3	18.92	A	June
3	22.23	A	August
3	22.28	D	August
3	22.84	A	April
3	25.52	B	July
4	30.12	C	June
4	32.64	D	July
4	34.41	C	September
4	35.12	A	July
4	46.99	C	July
4	87.85	C	May
4	89.58	C	April

A.2 Bat Pass Counts Close to Sunset/Sunrise

Bat passes identified below are those recorded within an hour of sunset and sunrise during automated bat detector deployment. These may be compared to the average emergence times identified in the best practice survey guidelines[11] to indicate the presence of roosts in the nearby landscape.

Static A

Month	Sunset time	Sunrise time	Species*	First pass time	Number of passes within half an hour of sunset	Number of passes within one hour of sunset	Last pass time	Passes within half an hour of sunrise	Passes within one hour of sunrise
April	20:35	05:55	Common pipistrelle	20:41	121	254	05:23	0	10
April	20:35	05:55	Soprano pipistrelle	20:59	11	23	05:21	0	4
April	20:35	05:55	Noctule	20:36	3	5	No passes recorded within an hour of sunrise		
April	20:35	05:55	Brown long-eared	21:29	0	1	No passes recorded within an hour of sunrise		
April	20:35	05:55	Lesser horseshoe	20:55	4	14	05:29	3	35
May	20:45	05:45	Common pipistrelle	21:02	30	178	05:09	0	17
May	20:45	05:45	Soprano pipistrelle	21:01	7	19	05:02	0	2
May	20:45	05:45	Noctule	20:46	5	6	04:59	0	2
May	20:45	05:45	Myotis sp.	21:41	0	1	No passes recorded within an hour of sunrise		
May	20:45	05:45	Brown long-eared	21:42	0	2	No passes recorded within an hour of sunrise		
May	20:45	05:45	Lesser horseshoe	21:20	0	11	05:02	0	9
June	21:40	05:00	Common pipistrelle	21:57	14	131	04:31	0	27
June	21:40	05:00	Soprano pipistrelle	21:56	9	39	04:33	2	9
June	21:40	05:00	Nathusius' pipistrelle	22:03	1	2	04:32	1	2
June	21:40	05:00	Noctule	21:20	32	83	04:32	5	21
June	21:40	05:00	Lesser horseshoe	22:19	0	2	04:06	0	2
July	21:30	05:10	Common pipistrelle	21:54	22	181	04:48	4	140

Month	Sunset time	Sunrise time	Species*	First pass time	Number of passes within half an hour of sunset	Number of passes within one hour of sunset	Last pass time	Passes within half an hour of sunrise	Passes within one hour of sunrise
July	21:30	05:10	Soprano pipistrelle	21:51	10	55	04:38	0	5
July	21:30	05:10	Noctule	22:18	0	4	04:43	1	0
July	21:30	05:10	Serotine	No passes recorded within an hour of sunset			04:19	0	1
July	21:30	05:10	Lesser horseshoe	22:26	0	1	04:24	0	3
July	21:30	05:10	Greater horseshoe	22:15	0	1	No passes recorded within an hour of sunrise		
August	20:45	06:00	Common pipistrelle	20:10	144	202	05:38	44	159
August	20:45	06:00	Soprano pipistrelle	20:58	22	59	05:43	8	40
August	20:45	06:00	Noctule	20:26	24	31	05:37	2	3
August	20:45	06:00	Myotis sp.	21:32	0	1	No passes recorded within an hour of sunrise		
August	20:45	06:00	Lesser horseshoe	21:04	6	33	05:29	0	17
September	19:30	07:00	Common pipistrelle	19:23	125	139	06:32	2	16
September	19:30	07:00	Soprano pipistrelle	19:27	41	73	06:39	5	8
September	19:30	07:00	Noctule	19:01	69	90	07:08	2	2
September	19:30	07:00	Leisler's	19:23	2	2	No passes recorded within an hour of sunrise		
September	19:30	07:00	Myotis sp.	20:15	0	2	No passes recorded within an hour of sunrise		
September	19:30	07:00	Brown long-eared	20:27	0	1	No passes recorded within an hour of sunrise		
September	19:30	07:00	Lesser horseshoe	19:50	1	1	06:30	2	15
October	18:30	07:40	Common pipistrelle	18:39	19	44	07:19	1	3
October	18:30	07:40	Soprano pipistrelle	18:37	20	35	07:07	0	16
October	18:30	07:40	Noctule	18:36	3	5	No passes recorded within an hour of sunrise		
October	18:30	07:40	Myotis sp.	19:08	0	6	No passes recorded within an hour of sunrise		
October	18:30	07:40	Brown long-eared	19:20	0	2	No passes recorded within an hour of sunrise		

Month	Sunset time	Sunrise time	Species*	First pass time	Number of passes within half an hour of sunset	Number of passes within one hour of sunset	Last pass time	Passes within half an hour of sunrise	Passes within one hour of sunrise
October	18:30	07:40	Lesser horseshoe	18:48	3	3	07:13	1	10

*Where a species is not listed, no passes were identified within an hour of sunset or sunrise during the deployment

Static B

Month	Sunset time	Sunrise time	Species*	First pass time	Number of passes within half an hour of sunset	Number of passes within one hour of sunset	Last pass time	Passes within half an hour of sunrise	Passes within one hour of sunrise
April	20:35	05:55	Common pipistrelle	20:56	17	40	05:06	0	2
April	20:35	05:55	Soprano pipistrelle	20:53	3	29	05:32	1	2
April	20:35	05:55	Noctule	21:16	0	3	No passes recorded within an hour of sunrise		
April	20:35	05:55	Brown long-eared	21:32	0	1	No passes recorded within an hour of sunrise		
May	20:45	05:45	Common pipistrelle	21:08	2	19	05:10	0	3
May	20:45	05:45	Soprano pipistrelle	20:19	4	32	05:08	0	5
May	20:45	05:45	Noctule	20:58	9	13	No passes recorded within an hour of sunrise		
June	21:40	05:00	Common pipistrelle	21:52	2	12	04:27	0	7
June	21:40	05:00	Nathusius' pipistrelle	22:19	0	2	No passes recorded within an hour of sunrise		
June	21:40	05:00	Noctule	21:20	43	59	04:48	12	37
July	21:30	05:10	Common pipistrelle	22:00	1	193	04:40	2	15
July	21:30	05:10	Soprano pipistrelle	21:57	3	335	04:39	0	6
July	21:30	05:10	Noctule	21:29	7	10	04:43	1	4
July	21:30	05:10	Lesser horseshoe	22:18	0	13	04:25	0	1
August	20:45	06:00	Common pipistrelle	21:09	1	15	05:33	1	17

Month	Sunset time	Sunrise time	Species*	First pass time	Number of passes within half an hour of sunset	Number of passes within one hour of sunset	Last pass time	Passes within half an hour of sunrise	Passes within one hour of sunrise
August	20:45	06:00	Soprano pipistrelle	21:10	3	22	05:35	2	18
August	20:45	06:00	Noctule	20:32	17	28	05:49	3	4
August	20:45	06:00	Leisler's	21:33	0	1	No passes recorded within an hour of sunrise		
August	20:45	06:00	Lesser horseshoe	21:16	0	2	05:00	0	1
September	19:30	07:00	Common pipistrelle	19:31	13	19	06:32	1	6
September	19:30	07:00	Soprano pipistrelle	19:33	12	18	06:33	1	7
September	19:30	07:00	Noctule	18:49	171	173	07:23	38	48
September	19:30	07:00	Brown long-eared	No passes recorded within an hour of sunset			06:04	0	1
October	18:30	07:40	Common pipistrelle	18:26	26	67	07:04	0	7
October	18:30	07:40	Soprano pipistrelle	18:36	16	33	07:21	3	8
October	18:30	07:40	Nathusius' pipistrelle	18:55	1	1	No passes recorded within an hour of sunrise		
October	18:30	07:40	Noctule	18:31	4	9	No passes recorded within an hour of sunrise		
October	18:30	07:40	Myotis sp.	19:08	0	2	No passes recorded within an hour of sunrise		
October	18:30	07:40	Brown long-eared	19:20	0	2	No passes recorded within an hour of sunrise		
October	18:30	07:40	Lesser horseshoe	19:04	0	3	06:56	0	2

*Where a species is not listed, no passes were identified within an hour of sunset or sunrise during the deployment

Static C

Month	Sunset time	Sunrise time	Species*	First pass time	Number of passes within half an hour of sunset	Number of passes within one hour of sunset	Last pass time	Passes within half an hour of sunrise	Passes within one hour of sunrise
April	20:35	05:55	Common pipistrelle	20:48	27	66	05:16	0	22

Month	Sunset time	Sunrise time	Species*	First pass time	Number of passes within half an hour of sunset	Number of passes within one hour of sunset	Last pass time	Passes within half an hour of sunrise	Passes within one hour of sunrise
April	20:35	05:55	Soprano pipistrelle	20:45	11	26	05:32	3	44
April	20:35	05:55	Noctule	20:19	4	5	05:15	0	1
April	20:35	05:55	Leisler's	No passes recorded within an hour of sunset			05:39	1	1
April	20:35	05:55	Myotis sp.	No passes recorded within an hour of sunset			04:55	0	22
April	20:35	05:55	Lesser horseshoe	21:03	5	12	04:55	0	33
May	20:45	05:45	Common pipistrelle	21:04	119	466	05:12	0	93
May	20:45	05:45	Soprano pipistrelle	20:54	66	263	05:12	0	12
May	20:45	05:45	Noctule	21:04	1	3	No passes recorded within an hour of sunrise		
May	20:45	05:45	Myotis sp.	No passes recorded within an hour of sunset			04:50	0	3
May	20:45	05:45	Lesser horseshoe	21:12	13	40	05:11	0	60
June	21:40	05:00	Common pipistrelle	21:47	54	220	04:38	6	143
June	21:40	05:00	Soprano pipistrelle	21:58	2	19	04:32	0	6
June	21:40	05:00	Noctule	21:40	2	5	04:58	3	6
June	21:40	05:00	Serotine	21:40	1	1	No passes recorded within an hour of sunrise		
June	21:40	05:00	Lesser horseshoe	21:48	22	27	04:40	2	9
July	21:30	05:10	Common pipistrelle	21:53	19	121	04:37	0	51
July	21:30	05:10	Soprano pipistrelle	21:49	48	261	04:40	1	72
July	21:30	05:10	Noctule	21:40	2	6	4:30	1	33
July	21:30	05:10	Serotine	22:29	0	4	No passes recorded within an hour of sunrise		
July	21:30	05:10	Lesser horseshoe	21:56	9	30	04:29	0	6
August	20:45	06:00	Common pipistrelle	21:02	6	12	05:13	0	3
August	20:45	06:00	Soprano pipistrelle	20:44	2	8	05:30	2	5

Month	Sunset time	Sunrise time	Species*	First pass time	Number of passes within half an hour of sunset	Number of passes within one hour of sunset	Last pass time	Passes within half an hour of sunrise	Passes within one hour of sunrise
August	20:45	06:00	Noctule	20:49	2	8	06:15	2	2
August	20:45	06:00	Myotis sp.	21:38	0	2	No passes recorded within an hour of sunrise		
August	20:45	06:00	Lesser horseshoe	20:50	18	28	05:27	0	1
September	19:30	07:00	Common pipistrelle	19:31	74	98	06:32	2	6
September	19:30	07:00	Soprano pipistrelle	19:13	150	249	07:21	29	60
September	19:30	07:00	Noctule	19:00	93	93	07:23	1	1
September	19:30	07:00	Serotine	19:39	1	2	No passes recorded within an hour of sunrise		
September	19:30	07:00	Myotis sp.	19:57	1	4	06:46	1	1
September	19:30	07:00	Brown long-eared	No passes recorded within an hour of sunset			06:46	1	2
September	19:30	07:00	Lesser horseshoe	19:32	46	85	07:21	14	76
October	18:30	07:40	Common pipistrelle	18:34	48	188	07:21	2	12
October	18:30	07:40	Soprano pipistrelle	18:36	32	63	07:19	1	15
October	18:30	07:40	Nathusius' pipistrelle	18:55	1	1	No passes recorded within an hour of sunrise		
October	18:30	07:40	Noctule	18:50	1	1	No passes recorded within an hour of sunrise		
October	18:30	07:40	Myotis sp.	19:20	0	1	No passes recorded within an hour of sunrise		
October	18:30	07:40	Lesser horseshoe	18:50	5	8	07:27	17	20

*Where a species is not listed, no passes were identified within an hour of sunset or sunrise during the deployment

Static D

Month	Sunset time	Sunrise time	Species*	First pass time	Number of passes within half an hour of sunset	Number of passes within one hour of sunset	Last pass time	Passes within half an hour of sunrise	Passes within one hour of sunrise
April	20:35	05:55	Common pipistrelle	20:44	23	64	05:03	0	1
April	20:35	05:55	Soprano pipistrelle	20:56	4	24	05:22	0	4
April	20:35	05:55	Noctule	20:40	1	3	No passes within an hour of sunrise		
April	20:35	05:55	Serotine	21:30	0	1	No passes within an hour of sunrise		
April	20:35	05:55	Lesser horseshoe	21:20	0	4	05:07	0	4
May	20:45	05:45	Common pipistrelle	21:07	24	144	05:02	0	22
May	20:45	05:45	Soprano pipistrelle	21:05	2	9	04:52	0	7
May	20:45	05:45	Noctule	20:57	3	7	04:55	0	1
May	20:45	05:45	Serotine	21:22	0	1	No passes within an hour of sunrise		
May	20:45	05:45	Lesser horseshoe	21:21	0	5	No passes within an hour of sunrise		
June	21:40	05:00	Common pipistrelle	22:00	12	99	04:28	0	64
June	21:40	05:00	Soprano pipistrelle	22:10	1	13	04:24	0	2
June	21:40	05:00	Noctule	21:32	16	19	04:35	0	20
June	21:40	05:00	Myotis sp.	22:21	0	2	No passes within an hour of sunrise		
June	21:40	05:00	Lesser horseshoe	22:22	0	3	04:17	0	5
July	21:30	05:10	Common pipistrelle	21:47	26	151	04:40	1	77
July	21:30	05:10	Soprano pipistrelle	22:05	0	30	04:38	0	4
July	21:30	05:10	Noctule	21:28	9	16	04:46	3	8
July	21:30	05:10	Lesser horseshoe	22:07	0	7	04:11	0	1
August	20:45	06:00	Common pipistrelle	20:46	51	74	05:40	15	133
August	20:45	06:00	Soprano pipistrelle	20:50	17	51	05:39	22	99

Month	Sunset time	Sunrise time	Species*	First pass time	Number of passes within half an hour of sunset	Number of passes within one hour of sunset	Last pass time	Passes within half an hour of sunrise	Passes within one hour of sunrise
August	20:45	06:00	Noctule	20:35	5	12	05:48	2	2
August	20:45	06:00	Serotine	21:17	0	1	No passes within an hour of sunrise		
August	20:45	06:00	Brown long-eared	No passes within an hour of sunset			05:02	0	1
August	20:45	06:00	Lesser horseshoe	21:14	1	21	05:07	0	1
September	19:30	07:00	Common pipistrelle	19:24	25	38	06:38	9	13
September	19:30	07:00	Soprano pipistrelle	19:24	13	51	06:43	1	22
September	19:30	07:00	Noctule	19:07	19	19	No passes recorded within an hour of sunrise		
September	19:30	07:00	Leisler's	19:57	1	1	No passes recorded within an hour of sunrise		
September	19:30	07:00	Lesser horseshoe	19:49	1	2	06:01	0	1
October	18:30	07:40	Common pipistrelle	18:40	16	29	07:04	3	27
October	18:30	07:40	Soprano pipistrelle	18:29	46	75	07:19	10	21
October	18:30	07:40	Noctule	18:38	6	10	No passes recorded within an hour of sunrise		
October	18:30	07:40	Myotis sp.	19:30	0	1	No passes recorded within an hour of sunrise		
October	18:30	07:40	Lesser horseshoe	18:51	1	5	No passes within an hour of sunrise		

*Where a species is not listed, no passes were identified within an hour of sunset or sunrise during the deployment

A.3 Earliest and Latest Lesser Horseshoe Bat Passes

Automated Bat Detector	Month	Sunset Time	Sunrise Time	Lesser Horseshoe Bat Passes/Hour	Earliest Lesser Horseshoe Bat Call	Latest Lesser Horseshoe Bat Call
A	April	20:35	05:55	1.495	20:59	05:56
A	May	20:45	05:45	1.000	20:55	05:29
A	June	21:45	05:00	0.221	22:19	04:06
A	July	21:30	05:10	5.733	22:26	04:24
A	August	20:45	06:00	2.036	21:04	05:29
A	September	19:30	07:00	0.574	19:50	06:30
A	October	18:30	07:40	0.385	18:48	07:13
B	April	20:35	05:55	0.232	22:40	04:41
B	May	20:45	05:45	0.200	23:39	03:57
B	June	21:45	05:00	0.028	00:31	N/A – only one call
B	July	21:30	05:10	1.227	22:18	04:25
B	August	20:45	06:00	0.485	21:16	05:00
B	September	19:30	07:00	0.122	21:02	03:44
B	October	18:30	07:40	0.338	19:04	06:56
C	April	20:35	05:55	1.789	21:03	05:19
C	May	20:45	05:45	3.350	21:12	05:11
C	June	21:45	05:00	1.297	21:48	04:40
C	July	21:30	05:10	1.467	21:56	04:29
C	August	20:45	06:00	0.994	20:50	05:27
C	September	19:30	07:00	5.791	19:32	07:21
C	October	18:30	07:40	0.569	18:50	07:27
D	April	20:35	05:55	1.326	21:20	05:07
D	May	20:45	05:45	0.750	21:21	03:58
D	June	21:45	05:00	0.497	22:22	04:17
D	July	21:30	05:10	0.800	22:07	04:11
D	August	20:45	06:00	1.164	21:14	05:07
D	September	19:30	07:00	0.209	19:49	06:01
D	October	18:30	07:40	0.154	18:51	04:19

Passes recorded within one hour of sunset/sunrise | Passes recorded within 1.5 hrs of sunset/sunrise

The average emergence time for lesser horseshoe bat is half an hour after sunset[11].

The CSZ for lesser horseshoe bat is 2 km[11].

Appendix B Plant Species Associated with Bat Prey Invertebrates

The below tables provide suggested plant species to be included in replanting efforts for the mitigation and compensation of impacts likely to occur as a result of the Proposed Development. The listed are adapted from the Bat Prey Species Associations tool and Table A2 of the associated guide[26]. The species included here are those known to support prey species of barbastelle and lesser horseshoe bat, as well as a number of other species of bat identified present within the Site. For the purpose of this report, this species list is considered in relation to bat species only, no consideration has been given the conditions, topography or soils present on-site. The suitability of these species for the soil and climate conditions at proposed planting areas must be determined by the landscape architect.

B.1 Trees and Shrubs

Species Common Name	Species Latin Name	Number of UK Bat Species Known to Prey on Associated Invertebrates
Field maple	*Acer campestre*	15
Sycamore	*Acer pseudoplatanus*	12
Horse chestnut	*Aesculus hippocastanum*	11
Alder	*Alnus glutinosa*	15
Silver birch	*Betula pendula*	15
Downy birch	*Betula pubescens*	14
Hornbeam	*Carpinus betulus*	15
Sweet chestnut	*Castanea sativa*	16
Hazel	*Corylus avellana*	15
Hawthorn	*Crataegus monogyna*	13
Beech	*Fagus sylvatica*	15
Alder buckthorn	*Frangula alnus*	10
Ash	*Fraxinus excelsior*	15
Holly	*Ilex aquifolium*	12
Common juniper	*Junierpus communis*	8
Apple	*Malus domestica*	14
Crab apple	*Malus sylvestris*	11
Scots pine	*Pinus sylvestris*	13
Black poplar	*Populus nigra*	9
Aspen	*Populus tremula*	12
Wild plum	*Prunus domestica*	12
Blackthorn	*Prunus spinosa*	14
Sessile oak	*Quercus petraea*	13
Pedunculate oak	*Quercus robur*	13
Goat willow	*Salix caprea*	10
Grey willow	*Salix cinerea*	7
Rowan	*Sorbus aucuparia*	13
Yew	*Taxus baccata*	10
Dogwood	*Cornus sanguinea*	8
Broom	*Cytisus scoparius*	12
Wild privet	*Ligustrum vulgare*	13
Elder	*Sambucus nigra*	8

Species Common Name	Species Latin Name	Number of UK Bat Species Known to Prey on Associated Invertebrates
Gorse	*Ulex europaeus*	10
Bilberry	*Vaccinium myrtillus*	14
Wayfaring tree	*Viburnum lantana*	5

B.2 Climbers and Scramblers

Species Common Name	Species Latin Name	Number of UK Bat Species Known to Prey on Associated Invertebrates
Traveller's joy	*Clematis vitalba*	12
Common ivy	*Hedera helix*	11
Hop	*Humulus lupulus*	12
Honeysuckle	*Lonicera periclymenum*	12
Bramble	*Rubus fruticosus*	12

B.3 Flowering Plants

Species Common Name	Species Latin Name	Number of UK Bat Species Known to Prey on Associated Invertebrates
Yarrow	*Achillea millefolium*	11
Angelica	*Althaea officinalis*	9
Wild celery	*Apium graveolens*	8
Burdocks	*Arctium spp.*	10
Mugwort	*Artemisia vulgaris*	11
Oraches	*Atriplex spp.*	10
Borages	*Borago spp.*	8
Wild cabbage	*Brassica oleracea*	11
Common knapweed	*Centaurea nigra*	11
Goosefoots	*Chenopodium spp.*	11
Foxglove	*Digitalis purpurea*	10
Teasels	*Dipsacus spp.*	8
Willowherbs	*Epilobium spp.*	8
Meadowsweet	*Filipendula mulmaria*	8
Wild strawberry	*Fragaria vesca*	12
Cleavers	*Galium aparine*	11
Bedstraws	*Galium spp.*	10
Wood avens	*Geum urbanum*	7
Common ragwort	*Jacobaea vulgaris*	7
Prickly lettuce	*Lactuca serriola*	8
White dead nettle	*Lamium album*	10
Common toadflax	*Linaria vulgaris*	9
Dog's mercury	*Mercurialis perennis*	7
Common restharrow	*Ononis repens*	9
Geraniums	*Pelargonium spp.*	9

Species Common Name	Species Latin Name	Number of UK Bat Species Known to Prey on Associated Invertebrates
Ribwort plantain	*Plantago lanceolata*	9
Greater plantain	*Plantago major*	6
Primrose	*Primula vulgaris*	11
Selfheal	*Prunella vulgaris*	6
Buttercups	*Ranunculus spp.*	9
Groundsel	*Senecio vulgaris*	11
Woundworts	*Stachys spp.*	7
Comon chickweed	*Stellaria media*	12
Stitchworts	*Sellaria spp.*	10
Dandelion	*Taraxacum spp.*	15
Clovers	*Trifolium spp.*	13
Mulleins	*Verbascum spp.*	11

B.4 Grasses

Species Common Name	Species Latin Name	Number of UK Bat Species Known to Prey on Associated Invertebrates
False oat grass	*Arrhenatherum elatius*	9
False brome	*Brachypodium sylvaticum*	12
Cock's foot	*Dactylis glomerata*	10
Annual meadow grass	*Poa annua*	12

B.5 Sedges and Rushes

There are no sedges (*Carex* spp.*)* or rushes (*Juncus* spp.) known to be associated with the prey species of barbastelle bat. Several are associated with the prey species of the lesser horseshoe bat, including but not limited to:

Species Common Name	Species Latin Name	Number of UK Bat Species Known to Prey on Associated Invertebrates
Pendulous sedge	*Carex pendula*	2
Greater pond sedge	*Carex riparia*	2
Galingale	*Cyperus longus*	5
Common spike-rush	*Eleocharis palustris*	1
Common club-rush	*Schoenoplectus lacustris*	2
Sharp-flowered rush	*Juncus acutiflorus*	6
Jointed rush	*Juncus articulatus*	2
Compact rush	*Juncus conglomeratus*	7
Soft-rush	*Juncus effusus*	6
Hard rush	*Juncus inflexus*	2

Appendix C Site Photographs

Photograph 1: Ruderal vegetation within the Site, and the western boundary with mature trees

Photograph 2: Scattered scrub within the Site

Photograph 3: Improved grassland within the Site, adjacent to the western boundary

Photograph 4: Arable cropland present throughout the Site

Photograph 5: Static A, on a fence by a hedgerow in the northeast of the Site

Photograph 6: Static B, located on butter-fly bush scrub within the Site

Photograph 7: Static C, located within a line of trees in the southwest of the Site

Photograph 8: Static D, located on a fence adjacent to scrub in the southeast of the Site