# Appendix 5-2

## Bat Survey Report

MWP

# Bat Survey Report

## Proposed Rínn Rua Hotel and Leisure Park, Reenroe, Co. Kerry

**Rínn Rua Holiday Park LTD.**

**April 2024**

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# 1. Summary


- Bat surveys were conducted at the site of a proposed development at Reenroe, Ballinskelligs, County Kerry. Surveys within the study area comprised passive automated bat (PAB) surveys, preliminary roost assessments (PRAs) of structures, preliminary ground-level tree roost assessments, presence/absence (dusk emergence and dawn re-entry) surveys, bat foraging/commuting habitat suitability surveys and winter hibernation surveys.
- The PAB surveys were carried out during the spring of 2023 at various pre-selected sampling points within the proposed development site to passively record bat activity. These were carried out over consecutive nights in both April and May 2023 (with a total of 29 nights of nightly sampling undertaken across both months combined).
- The following species were recorded within the proposed development site during the PAB surveys:
    - Common pipistrelle (*Pipistrellus pipistrellus*) (90.98%)
    - Soprano pipistrelle (*Pipistrellus pygmaeus*) (2.45%)
    - Lesser Horseshoe (*Rhinolophus hipposideros*) (2.16%)
    - Species from the genus *Myotis* (0.48%)
    - Nathusius' pipistrelle (*Pipistrellus nathusii*) (0.33%)
    - Leisler's bat (*Nyctalus leisleri*) (0.16%)
    - Brown long-eared bat (*Plecotus auritus*) (0.04%)
    - Unidentified bats (3.4%)
- In April 2023, the highest level of activity was recorded at SP2 (located adjacent to the hotel in open grassland), where a total of 2,072 bat passes were recorded during the survey window. In May 2023, all static sampling was undertaken inside the hotel. The highest level of activity within the hotel was recorded at SP1 located on the ground-floor of the hotel 'middle tower' (which houses the main stairwell providing access to the 'bedroom block'), where a total of 1,913 bat passes were recorded during the survey window.
- Overall, the levels of bat activity recorded during the PAB surveys, were considered 'high' for common pipistrelle and 'low' for all other species recorded. It is considered that the activity levels recorded during the PAB surveys are reflective of the normal patterns that pertain to the location.
- Preliminary roost assessments of potential roosting habitat (structures) were undertaken in April 2023. The 'middle tower' of the hotel was identified as having 'moderate' suitability for roosting bats. The hotel 'bedroom block' was categorised as having 'negligible to low' suitability for roosting bats. The 'roofless section' of the hotel and adjoining 'sheds/outbuildings' were identified as having 'negligible' suitability for roosting bats. A derelict cottage, located close to the hotel, was identified as having 'moderate' suitability for roosting bats. Preliminary ground-level tree roost assessments were also undertaken in April 2023. All trees were identified as having 'low' suitability for roosting bats.
- Presence absence surveys, comprising dusk emergence and dawn re-entry surveys, were undertaken in May, June and July 2023, to determine presence/absence of roosting bats. These surveys focussed on those structures considered to have potential to support roosting bats, namely the hotel 'middle tower' and the derelict cottage. Low numbers of individuals (common pipistrelle, soprano pipistrelle and *Myotis* spp.) were recorded utilising both structures for roosting during presence/absence surveys.

- Winter hibernation surveys were undertaken in those parts of the hotel considered to comprise potentially suitable roosting habitat for bats. These comprised a daytime winter building inspection to check for signs of bat activity, completed in December 2023, and supplemented by additional inspections and PAB surveys undertaken in January and February 2024. Evidence of bat activity was recorded in both the hotel 'middle tower' and hotel 'bedroom block'.
- The hotel 'middle tower' has been found to support day/night roosts for common pipistrelle and soprano pipistrelle and potentially lesser horseshoe bat. The hotel potentially supports other roosts for common pipistrelle. The derelict cottage has been found to support day/night roosts for common pipistrelle and *Myotis* spp. The derelict cottage potentially supports other roosts for common pipistrelle and soprano pipistrelle.
- The foraging and commuting habitat suitability survey identified the mature treeline within the site to be of 'moderate' value to foraging/commuting bats. The open, improved/semi-improved grassland is considered to be of 'low to moderate' value to foraging/commuting bats.

# 2. Introduction

Malachy Walsh and Partners, Engineering and Environmental Consultants (MWP), was commissioned to carry out bat surveys on behalf of the Applicant (Rínn Rua Holiday Park LTD.) at a proposed development site located at Reenroe, Ballinskelligs, County Kerry. This report details the findings of the bat surveys undertaken within the study area.

The proposed development site is located on the coast, approximately 2 km north-east of Ballinskelligs and 4.5 km north-west of Waterville, in rural south County Kerry (see **Figure 1** below). Permission is being sought from Kerry County Council (KCC) for the renovation of the derelict Rinn Rua hotel and the development of surrounding lands as a holiday and leisure park with the aim of restoring and expanding the tourist offering in the area. The proposed development site encompasses a total area of 22.6 hectares. Please see **Chapter 2** of the **EIAR** for more information on the proposed development.

An Environmental Impact Assessment Report (EIAR), Screening for Appropriate Assessment (AA) report and Biodiversity Enhancement Plan (BEP) are also being prepared by MWP to accompany the planning application.

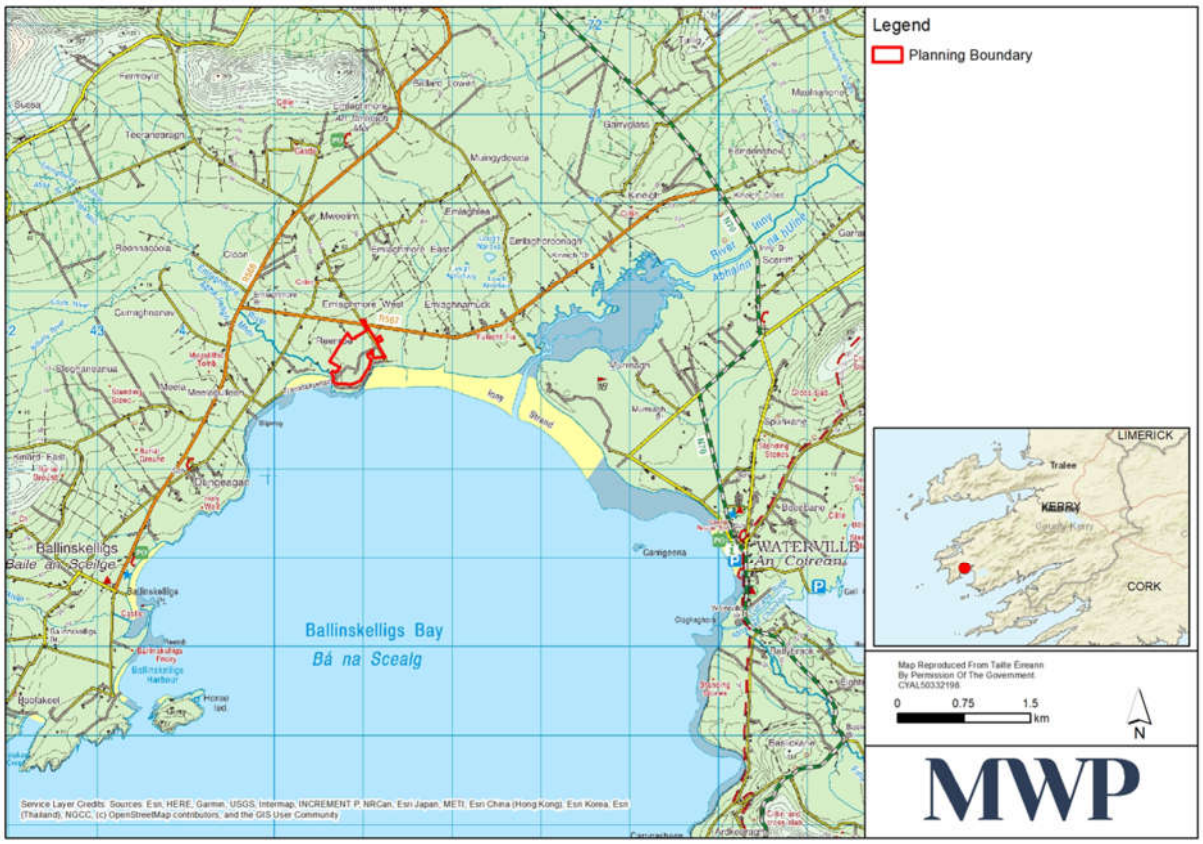


**Figure 1. Proposed development site location**

The study area for the bat surveys comprised the proposed development site as well as a portion of adjoining land which is encompassed within the Applicant's landholding, and which is proposed as a targeted biodiversity enhancement area (please refer to **Appendix 5-7** of **Volume 3** of the **EIAR** for more information). The overall study area for bat surveys is shown in **Figure 2** below.

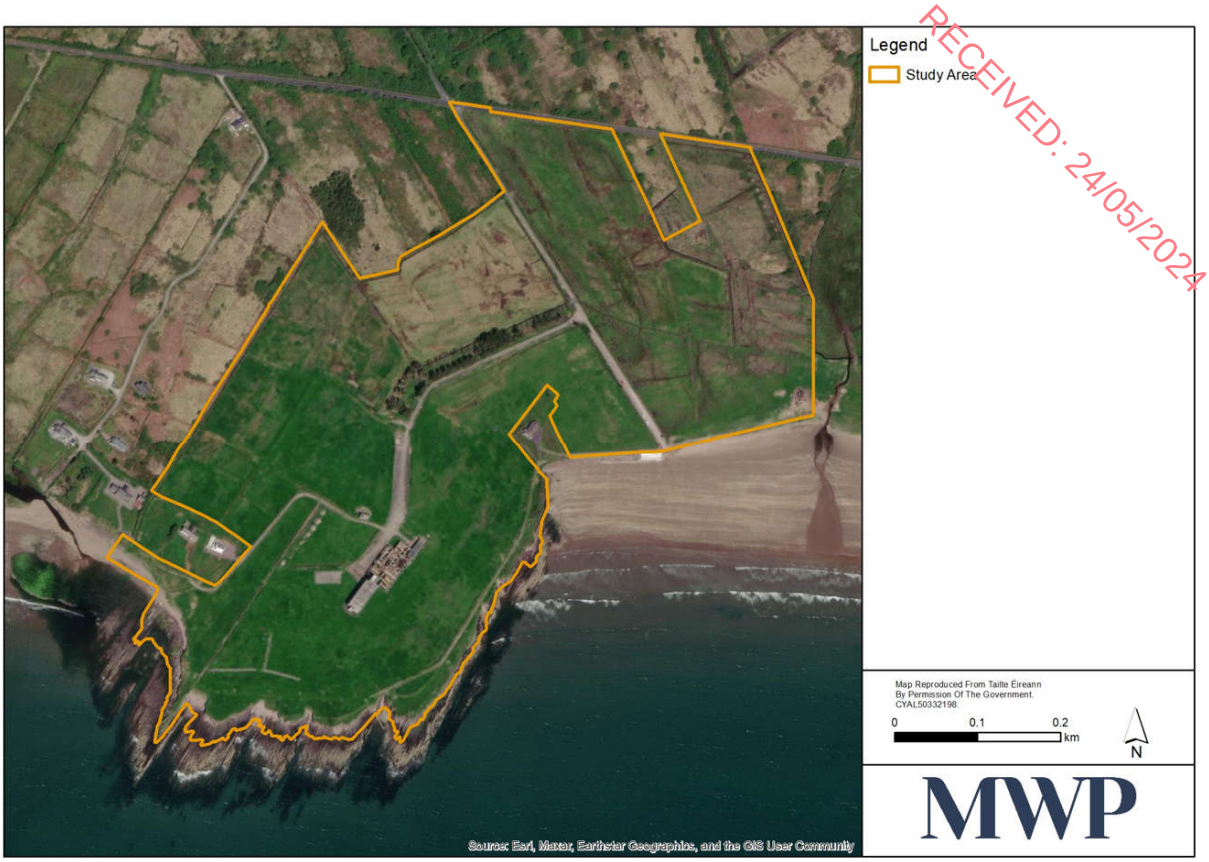


Figure 2. Study area

## 2.1 Purpose of the Surveys

The main objectives of the bat surveys were as follows:

- to establish the type and level of bat activity occurring within the proposed development site in terms of the species present.
- to establish the spatial and temporal distribution of bat activity within the proposed development site.
- to establish the presence of any bat roosts or potential roosting habitat features of value for bats within the proposed development site and wider study area.
- to identify any foraging/commuting habitat features of value for bats within the proposed development site and wider study area.
- to identify opportunities for enhancement of habitat features considered to be of value for bats within the proposed development site and wider study area.
- to collect sufficient data so as to allow for an assessment of the potential impacts of the proposed development on bats and inform the design of mitigation, enhancement and monitoring.
- and provide sufficient information to NPWS and planning authorities to assist in planning and/or licencing decisions, as required.

While various survey guidance, as outlined in **Section 2.4** below, were considered, the approach to bat survey design was undertaken with regard to the specific survey objectives outlined above, and the site-specific

characteristics of the proposed development site and surrounds. Further details on the field survey design are provided in **Sections 5.2** to **5.7**, below. The field survey results are presented in **Sections 6.2** to **6.7**, below.

The objective of this '*Bat Survey Report*' is to fully describe the baseline conditions which pertain to the proposed development site to inform a robust impact assessment and mitigation proposals in relation to bats. Summary baseline information and survey results will be incorporated into the Biodiversity chapter (**Chapter 5**) of the **EIAR** which is being prepared by MWP in relation to the proposed development and will form the basis for the assessment of the potential impacts of the proposed development on bats

A separate '*Bat Survey and Assessment Report*' has been prepared by MWP to accompany a Derogation Licence application to the Department of Housing, Local Government and Heritage (DHLGH) by MWP on behalf of the Applicant to provide sufficient information on which the Department can base a licencing decision in relation to bats and the proposed development and associated activities.

## 2.2 Statement of Competency

This report was authored by Hazel Dalton (BSc., BBus.). Hazel is a Senior Ecologist with over nine years' experience with MWP since graduating with a first-class Honours Degree in *Wildlife Biology* from Munster Technological University (MTU) in 2015. Hazel is experienced in ecological surveying and impact assessment for AA and EIAR. She has authored and contributed to numerous screening reports for AA, Natura Impact Statements (NIS) and Ecological Impact Assessment (EcIA) reports. Hazel is an experienced field ecologist with a diverse ecological survey profile including habitats and flora, mammals, bats and birds. She has held/holds National Parks and Wildlife Service (NPWS) Licences for small mammal trapping, tape lure/endoscope bird surveys, Kerry slug (*Geomalacus maculosus*) surveys, disturbance of a bat roost to facilitate bridge works, photographing wild animals (badger and otter) at their resting/breeding places and surveying bats (DER/BAT 2024-51).

This report was written with the assistance of Orla van der Noll (MSc., BSc.). Orla is an Ecologist at MWP and has been working in the ecology sector since March 2021 where she has completed numerous ecological reports for a range of projects across Ireland. She is particularly competent in bird and bat survey methodology with over two years of experience in these areas. In 2020, Orla qualified with a first-class honours Master's degree in *Marine Biology* from Bangor University, Wales, and a Bachelors (Hons) degree in *Ecology and Environmental Biology* from University College Cork in 2018. Orla is registered with the Chartered Institute of Ecology and Environmental Management (CIEEM) as a Qualifying member. Orla undertook the bat sonogram analysis and compiled and tabulated data from the static surveys undertaken for the proposed developement.

Field work was conducted by Hazel, Orla, Fiona McKenna (BSc.) and Petr Dobes. Fiona McKenna (BSc. Hons *Wildlife Biology*) is an Ecologist with MWP and has over four years' experience in ecological surveying and report writing for impact assessments. Petr Dobes is a graduate Ecologist with MWP since May 2023. Petr assisted with bat surveys and with collation and tabulation of data from static surveys. Please refer to **Appendix 5-1** of **Volume 3** of the **EIAR** for more information on surveyor profiles.

This report was reviewed by Rob Beer (BSc. in *Environmental Management and Ecology*). Rob is a Senior Ecologist with six years full-time experience, since graduating in 2017. Rob has recently joined MWP and had previously been working in the UK. Rob is experienced in a range of standard and complex ecological surveys in accordance with British standards, including but not limited to, UK habitat classification surveys and JNCC Phase 1 surveys, Biodiversity Net Gain (BNG) metric and reporting, bat surveys (stages 1 & 2), reptile surveys, badger surveys, & great crested newt (GCN) surveys. Rob is a holder of a Natural England bat license level 2, a holder of a Natural England GCN license level 1 and has a FISC level 2 certificate. Rob also has extensive experience with ecological clerk of works (ECoW) for a range of species across diverse project types, from small householder projects to large infrastructure projects such as rail and road schemes. This includes conducting supervisions and overseeing

licenced works in relation to bat, badger and GCN. Rob has extensive experience in bat related work and historically volunteered with a number of different bat groups in the UK; this has enabled him to gain a vast amount of experience in all types of bat surveys and work. In addition to his experience with stage 1 and 2 surveys he has also been part of numerous hibernation roost surveys, and other roost counts/inspections where he is proficient in the use of endoscopes and hand netting, and the handling of bat species.

## 2.3 Scientific Nomenclature: Conventions

Species nomenclature follows the standard form of the common name, followed by the binomial, on the first instance of usage in the text or the first instance of usage in a table. Thereafter, for any subsequent usage, common names only are used.

## 2.4 Relevant Guidance Documents

The following guidance documents were referred to with regard to initial and on-going bat survey design throughout the survey period, and ecological evaluation with regard to bats.

- '*Bat surveys for Professional Ecologists: Good Practice Guidelines (4th edition)*'. Bat Conservation Trust, London. (Collins, 2023).
- '*Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edition).*' Bat Conservation Trust, London. (Collins, 2016).
- '*Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes*'. (NRA, 2005)
- '*Guidelines for the Treatment of Bats During the Construction of National Road Schemes*'. (NRA, 2005b)

## 2.5 Consultation

A pre-planning meeting was held between the Applicant, MWP and KCC on the 7th June 2023. During this meeting, a general overview of the approach to ecological surveys in relation to the proposed development, including an outline of surveys and findings to date, was presented and discussed with KCC.

Consultation was also undertaken with a range of statutory and non-statutory consultees as part of preparation of the EIAR for the proposed development. As part of the scoping response received from the Department via the DAU on the 27th July 2023, the potential value of derelict buildings on site was identified as being of 'Low – Medium' value for bats.

Pre-planning consultation was also undertaken directly with the NPWS. A site visit was undertaken between staff ecologists from MWP and the NPWS local Conservation Ranger for the area on 11th January 2024 during which the proposal and ecological survey findings to date were discussed. In relation to bats specifically, the suite of bat surveys undertaken, and results obtained, were outlined. The site visit included a walk-through of the exterior and interior of the hotel building. Proposals in relation to mitigation measures for bats, including with regard to the derelict cottage adjacent to the hotel and other measures, were also discussed during the NPWS site visit.

# 3. Bat Ecology and Behaviour

## 3.1 Resident Species

There are nine resident bat species on the island of Ireland. These species are:

- Common pipistrelle (*Pipistrellus pipistrellus*)
- Soprano pipistrelle (*Pipistrellus pygmaeus*)
- Nathusius' pipistrelle (*Pipistrellus nathusii*)
- Brown long-eared bat (*Plecotus auritus*)
- Daubenton's bat (*Myotis daubentonii*)
- Leisler's bat (*Nyctalus leisleri*)
- Lesser horseshoe bat (*Rhinolophus hipposideros*)
- Natterer's bat (*Myotis nattereri*)
- Whiskered bat (*Myotis mystacinus*)

All species are insectivores that feed on insects, and all use a seasonal feeding strategy to help build fat reserves during the summer and autumn, before their hibernation during winter - a time, generally, when insects are not available. Most hunt flying prey, but some species, e.g., lesser horseshoe bat or Daubenton's bat, glean their prey from surfaces of leaves or water on which the prey have alighted.

All species hibernate during winter and typically become active in late spring and early summer. As the days and nights warm up each species flies out to forage for insects, for progressively longer periods, at night. Around late June or early July, pregnant females give birth to a single offspring which feeds on its mother's milk for 6-7 weeks at which point it can fly and learns to echolocate and to catch its own prey. Mating takes place from August onwards. Delayed fertilisation occurs wherein the female retains the sperm throughout the winter but does not ovulate and become pregnant until spring the following year. The onset of hibernation, which takes place from October/November onwards, begins once temperatures drop and insect prey abundance drops.

For individual bat species accounts please refer to **Appendix 1** of this report.

## 3.2 Legal and Conservation status of Bat Species in Ireland

All Irish bat species are protected under the Wildlife Acts 1976 to 2023[1] and by the EU Habitats Directive[2] which protects rare species, including bats, and their habitats. All bat species are listed in Annex IV of the EU Habitats Directive as species protected across their entire natural range and the lesser horseshoe bat is further listed, under Annex II, as a species for which core areas of their habitat must be protected within the Natura 2000 network of protected sites. Under Regulation 51 of the European Communities (Birds and Natural Habitats) Regulations 2011-2021, any person who, in regard to the animal species listed in Annex IV of the EU Habitats Directive:

[1] Collective citation for the following: Wildlife Act 1976 (no. 39 of 1976); Wildlife (Amendment) Act 2000 (no. 38 of 2000); Wildlife (Amendment) Act 2010 (no. 19 of 2010); Wildlife (Amendment) Act 2012 (no. 29 of 2012); Heritage Act 2018 (no. 15 of 2018), Part 3 and Planning, Heritage and Broadcasting (Amendment) Act 2021 (no.11 of 2021), Chapter 3.
[2] Council Directive 92/43/EEC

- deliberately captures or kills any specimen of these species in the wild,
- deliberately disturbs these species particularly during the period of breeding, rearing, hibernation, and migration,
- deliberately takes or destroys eggs of those species from the wild,
- damages or destroys a breeding site or resting place of such an animal, or
- keeps, transports, sells, exchanges, offers for sale, or offers for exchange any specimen of these species taken in the wild, other than those taken legally as referred to in Article 12(2) of the Habitats Directive

shall be guilty of an offence.

Any works interfering with bats and especially their roosts may only be carried out under a Derogation Licence granted via the NPWS pursuant to Regulation 54 of the European Communities (Birds and Natural Habitats) Regulations 2011 (which transposed the EU Habitats Directive into Irish law).

Across Europe, bats are further protected under the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention 1982), which, in relation to bats, exists to conserve all species and their habitats. The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention 1979) was instigated to protect migrant species across all European boundaries. The Irish government has ratified both these conventions.

Under Article 11 of the EU Habitats Directive, each member state is obliged to undertake surveillance of the conservation status of the natural habitats and species in the Annexes and, under Article 17, to report to the European Commission every six years on their status and the implementation of the measures taken under the Directive. In April 2019, Ireland submitted the third assessment of conservation status for 59 habitats and 60 species. The current Conservation Status assessments for bat species resident in Ireland are listed in **Table 1** below; the trend in the Conservation Status for each is included.

**Table 1: Overall assessment of conservation status for bat species resident in Ireland (NPWS, 2019)**

| Species | Conservation Status | Overall trend in Conservation Status |
|---|---|---|
| Brown long-eared bat | Favourable (FV) | Improving |
| Common pipistrelle | Favourable (FV) | Improving |
| Daubenton's bat | Favourable (FV) | Improving |
| Lesser horseshoe bat | Unfavourable-Inadequate (U1) | Deteriorating |
| Leisler's bat | Favourable (FV) | Improving |
| Nathusius' pipistrelle | Unknown (X) | N/A |
| Natterer's bat | Favourable (FV) | Stable |
| Soprano pipistrelle | Favourable (FV) | Improving |
| Whiskered bat | Favourable (FV) | Stable |

## 3.3 Habitat Associations

Bats in Ireland feed exclusively on insects and, in the summer, they generally emerge from their roosts at dusk. While the distances covered while foraging varies considerably between individual species, all are known to use several different foraging sites in the same night and to move between them to locate areas of high insect density.

The interplay between habitat mix, environmental conditions, topography, elevation, and availability of prey is a key determinant of whether a location is suitable for bats as is the distance between roosts and the location in question. Because bats preferentially select certain habitats and avoid others, each species has a strong association with different habitat types to which they exhibit a high level of site loyalty and species will frequently return to the same foraging sites night after night (Entwhistle *et al*., 2001). Because bats are colonial mammals, intergenerational learning is a fundamental characteristic of their biology and one that tends to reinforce site loyalty such that foraging grounds are frequented for periods of years or even decades. Juvenile bats hunt independently within weeks of birth and, therefore, acquire knowledge of foraging sites before their first hibernation period. Reliability of supply of prey biomass is foundational to each species' capacity to maintain populations at viable levels (see also **Section 3.5** below).

**Table 2** below, lists and ranks the relative importance of certain landscape features to bats for roosting/foraging and commuting (used to travel between other areas of importance). **Table 3** below, lists the types of features commonly selected as roost sites, the species typically associated with each roost-type, and the relative frequency with which each species selects each type of feature.

**Table 2. Landscape features of importance to bat species[3]**

| Features of High Importance | Features of medium importance | Features of low importance |
|---|---|---|
| Underground sites | Improved pasture | Intensive arable |
| Buildings with high bat roost potential | Drainage ditches | Dense urban, particularly lit areas |
| Broadleaved woodland and scrub | Walls and fences | |
| River valleys | Minor roads (no hedges) | |
| Small field systems with low-intensity pasture | Exposed upland sites | |
| Treelines and hedgerows | Coniferous woodland | |
| Bridges and structures with high bat roost potential | | |

[3] Adapted from the UK Department of Transport Interim Advice Note 116/08 Nature Conservation Advice in Relation to Bats

**Table 3. Species' associations with different roost types[4]**

| Species | Trees[5] | | Buildings[6] | | Underground[7] | |
|---|---|---|---|---|---|---|
| | Maternity | Hibernation | Maternity | Hibernation | Maternity | Hibernation |
| Lesser horseshoe bat | L | L | H | M | L | H |
| Daubenton's bat | M? | L? | M | L | M? | H |
| Whiskered bat | M? | M? | H | L | N | H |
| Natterer's bat | M? | M? | H | L | L | H |
| Nathusius' pipistrelle | | | H? | | | |
| Common pipistrelle | M | M | H | H | N | L |
| Soprano pipistrelle | M | M | H | H | N | L |
| Leisler's bat | M | M | H | L | N | N |
| Brown long-eared bat | H | H | H | H | N | M |

## 3.4 Distribution of Prey

At any location, the abundance of flying insects is heavily influenced by, inter alia, wind speed (Møller, 2013). Small insects generally tend to settle in areas with low wind speeds because control and manoeuvrability of flight are optimised where wind speeds are lower than the insect's flight speed (Pasek, 1988). Therefore, within any established foraging ground, existing windbreaks such as tree lines, vegetated field - or roadside - boundaries, and woodland edges create sheltered corridors where concentrations of insects accumulate leeward of these windbreaks, particularly in comparison with adjacent unsheltered areas. Within these sheltered corridors the patterns of distribution will be affected by wind speed, angle of incidence of the wind, permeability of the windbreak, turbulence, vegetative composition, and source of insects (windbreak, local fields, upwind sites) (Pasek, 1988). Bats will know from experience and repetition where insects are likely to be more abundant and will return to these areas. As a result of these variables, bats can be unevenly distributed within any given area due to the influence of localised conditions even on small scales (de Jong & Ahlén, 1991).

## 3.5 Metabolic Constraints

Two fundamental behavioural characteristics impose a high metabolic cost on all bat species: flight and the use of acoustic signalling to navigate, hunt, and communicate. As true fliers, rather than gliders, bats use flapping flight which is one of the most expensive activities in terms of metabolic cost (Winter *et al.*, 1998). In addition, the metabolic costs of acoustic signalling are about eight times that of the silent animal (Ophir *et al.*, 2010), and the cost of echolocation can be even higher. As a group, therefore, bats have evolved to favour minimal mass

[4] Species associations with roost types [adapted from Kelleher *et al.* (2006) and Marnell *et al.*, (2022)]. **N** – not recorded in recent times. **L** – low dependence; unusual but has been recorded. **M** – some usage recorded, though perhaps not the most important type of site. **H** – the most frequently recorded type of site for this species/activity.
[5] **Trees** – includes all types of crevice and hollows as well as bat-boxes attached to trees.
[6] **Buildings** – above-ground areas, with an emphasis on roof voids and other areas warmed by the sun.
[7] **Underground** – anywhere that provides cool humid conditions buffered against rapid temperature change. Includes caves, mines, tunnels, souterrains, fortifications, cellars, icehouses, limekilns, etc.

because of the energetic demands of flight, hunting, and communication and have developed behaviours that minimise other metabolic costs.

The wing of a bat resembles a modified human hand with a flexible skin membrane that extends between each long finger bone, and it is the many movable joints that make bats agile fliers. Because of the thin wing membrane, flying during the heat of the day could be hazardous causing excessive absorption of heat and resulting in dehydration and possible heat prostration. Nocturnality offers protection from the heat and helps bats maintain optimal body temperature and hydration. It also affords protection from aerial predators, most of which hunt during the day.

Even though they share the characteristics of all mammals - hair, regulated body temperature, the ability to bear live young, and to nurse them; bats are the only mammals to truly fly. Flying consumes so much energy that each female bat is only able to produce a single offspring each year and a bat typically will need to consume about 1/3 of its body weight in food per night. As insectivores, bats in Ireland feed on arthropods which contain the energy-rich carbohydrate chitin in their exoskeleton, which is indigestible for the typical mammalian gastrointestinal tract. However, European vespertilionid bat species have evolved an enzymatic adaptation (acidic mammalian chitinase) which enables them to digest the chitin present in their primary source of food to optimize resource use and energy intake (Strobel *et al.*, 2013).

This aspect of their ecology, this high metabolic demand, is a key determinant in the foraging strategies of all bat species. Speculative foraging carries too low a risk/reward ratio in that the metabolic costs of flight and echolocation are so high that bats will seek out locations that have previously rewarded energy cost inputs. This aspect of their behaviour is demonstrated by the previously mentioned high level of site loyalty exhibited by bat species and the repeated return to the same foraging sites night after night (Entwhistle *et al.*, 2001). In addition, because the cost of flight increases with decreasing body size, de Jong (1994 cited in Erickson *et al.*, 2003) hypothesized that smaller bats with slower flight could be restricted from using habitats where insect abundance was low and long-distance foraging flights were required.

Differences in activity on different nights could be the result of climatic conditions, insect availability, or morphological differences between species. Cooler and windier nights tend to suppress the flight activity of bats (Anthony *et al.*, 1981; O'Farrell, 1967; Stebbings, 1968; all cited in Erickson *et al.*, 2003) by imposing thermoregulatory stress and by reducing the activity of their insect prey. Strong winds can also increase the cost of flight and can affect the net energy gain for foraging bats (Weimerskirch *et al.*, 2012; cited in Møller, 2013).

## 3.6 Audio Signature

Because they have evolved to be active in the dark, bats use echolocation, a form of acoustic signalling, for sensing the environment and to orientate and forage at night. It is these signals that were detected and recorded during the surveys described in this report. Echolocation involves the production of pulses of high-frequency sound, usually in the ultrasound range above 20 kHz, and the detection of the returning echoes with acutely sensitive ears. By comparing the outgoing pulse with the returning echoes — which are modified versions of the outgoing pulse — their brains can assemble dynamic images of the surroundings including the size, shape, distance, and motion of their prey - the location of which can be determined, in three dimensions, from its range and direction (Jones, 2005).

Each species uses echolocation in an individualised manner adapted to its preferred habitat and flight behaviour. Species that fly high emit signals over a long-range, i.e., long signals that sweep through a narrow spectrum, which enable them to retrieve information from a long way ahead. Conversely, species that hunt where obstacles are likely to be quite near, or that glean their prey from surfaces, such as Daubenton's bat and lesser horseshoe bat, do not need to emit intense pulses because of proximity.

## 3.7 Species Detectability using Acoustic Equipment

Due to the species use echolocation in an individualised manner the detectability of each depends mainly on two factors:

- the abundance of the species and its ubiquity in the area surveyed.
- the intensity of its echolocation signals.

As a result, the probability of acoustic detection varies from species to species and this probability is also influenced by the acuity of the microphones in the units used for detection. Each species' intensity of emission is characterised in **Table 4** below; the detection range is also included.

**Table 4: Intensity of emission and detection range ('open' to 'semi-open' environment)[8]**

| Intensity of emission | Species | Detection Range (m) |
|---|---|---|
| Very weak | Lesser horseshoe bat | 5 |
| | Whiskered bat | 5 |
| | Daubenton's bat | 10 |
| | Natterer's bat | 15 |
| Medium | Brown long-eared bat | 20 |
| | Common pipistrelle | 25 |
| | Nathusius' pipistrelle | 25 |
| | Soprano pipistrelle | 25 |
| Strong[9] | N/A | N/A |
| Very strong | Leisler's bat | 80 |

# 4. Site Description

The coastal site is situated on the Iveragh Peninsula within a rural landscape on a small headland, known as Rinn Rua, on the northern shore of Ballinskelligs Bay. The site is located between the towns of Waterville and Ballinskelligs in the Uíbh Ráthaigh Gaeltacht in Co. Kerry (see **Figure 1** above). The site is part of the busy Wild Atlantic Way and Ring of Skellig tourist routes and is accessed via a network of local access roads connecting to the R567 and R566 regional roads.

The proposed development site is presently occupied by two derelict structures, namely a former hotel and a derelict cottage (see **Figure 3** below). The derelict hotel is situated in the southwestern part of the development site. This building was constructed over 50 years ago and comprises mainly mass concrete. The structure is aligned in a northeast-southwest direction and commands expansive uninterrupted views of the scenic coastline and the bay to the south.

The building comprises a single-story structure on the northern end (largely with roof missing and completely open to the elements), a tall concrete tower towards the centre, housing a stairwell to access bedroom levels,

[8] Adapted from Barataud (2020)
[9] No species in this category are resident in Ireland.

and a three-story structure at the southern end which contains the former hotel bedrooms. The various components of the building are in various states of disrepair or dereliction.

The derelict cottage is located c. 40 m to the north of the hotel building. This two-story former dwelling has both a rear and a front entrance and a chimney on both gables. The house has a slate roof, partially collapsed, and is of stone construction, although largely plastered over. Works are proposed to this structure in relation to bats, but these works do not form part of the proposed development for planning. A conifer treeline adjoins the northern side of the site access road (see **Figure 3** below).

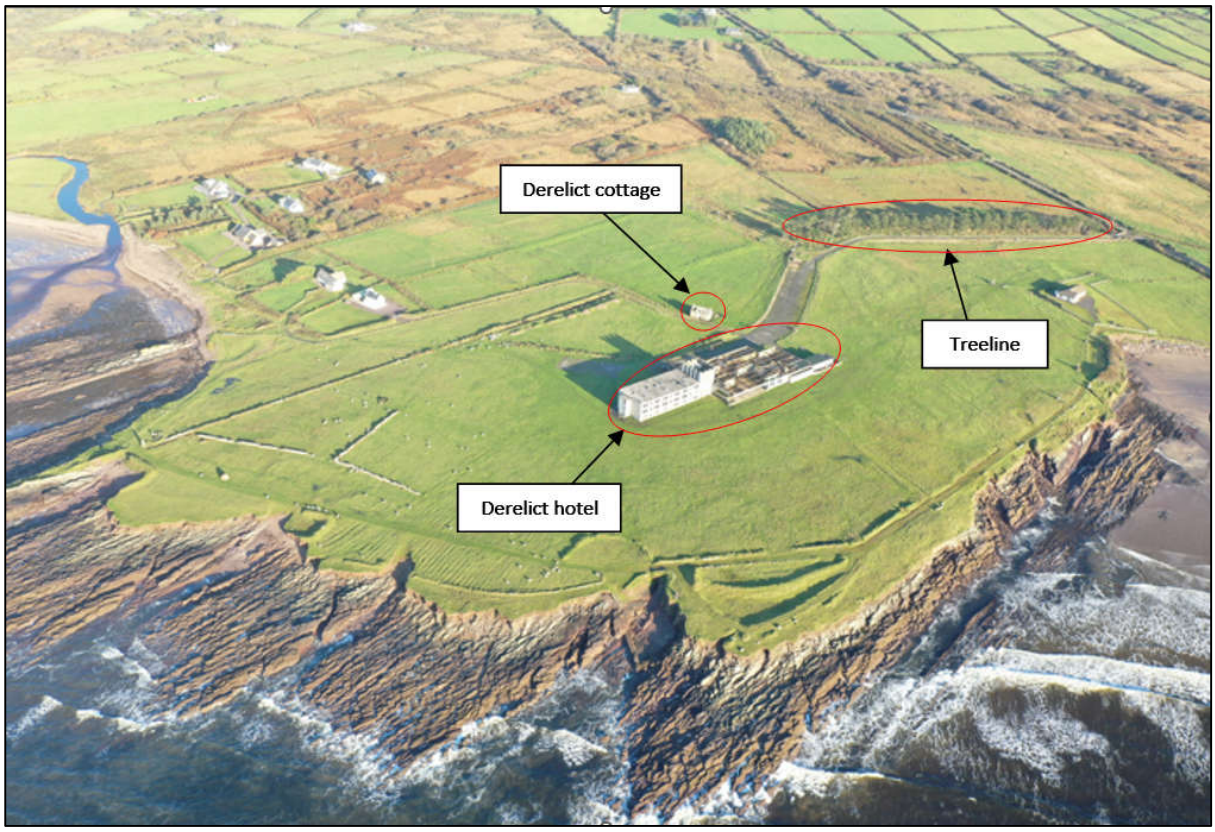


**Figure 3. Drone image of proposed development site and general surrounding area showing existing site features**

Lands within the study area are currently managed for agriculture (sheep grazing). Lands surrounding the study area are mainly in low-intensity agricultural use. There are three dwellings located outside but immediately adjacent to the proposed development site boundary, with several residential dwellings located further west (see **Figure 3** above).

To either side of the small headland on which the hotel is situated are the sandy beaches of Trá Rinn Rua to the east (also known as Inny Strand or Reenroe Beach) and Trá na Sassanach to the west. To the south, the site is fronted by rocky shore, sea cliff and the bay.

# 5. Methodology

## 5.1 Desk Study

A desk study was carried out to collate available information on the bat species likely to be present in the study area. This comprised a review of the following publications, datasets, and on-line resources:

- Ordnance Survey Ireland (OSI) Aerial photography and 1:50,000 mapping
- NPWS website, map-viewer and datasets available on-line
- Bat Conservation Ireland (BCIreland) publications, website and datasets
- Bat Conservation Trust (BCT) publications and website
- National Biodiversity Data Centre (NBDC) (on-line map-viewer)
- Aerial imagery available at Google Earth, EPA Maps and Bing Maps; and
- Other information sources and reports footnoted in the report.

### 5.1.1 Data Requests and Database Searches

#### 5.1.1.1 Bat Conservation Ireland Database

Following a data request to BCIreland for all bat data available within a 10 km radius of the approximate centre point of the proposed development site, records were provided by BCIreland on the 1st August 2023[10]. For results of the BCIreland data request, please refer to Section 6.1.1 below.

#### 5.1.1.2 NPWS Rare and Protected Species Database

A data request for records of rare and protected species was submitted to NPWS on the 29th May 2023 for all data available for the hectad V46. All available records were provided by NPWS on the 1st June 2023. No bat records were included within the dataset received from NPWS. The on-line dataset record distribution for known lesser horseshoe bat roosts retained by NPWS was also checked for records of lesser horseshoe bat roosts in the area[11] (none were identified).

#### 5.1.1.3 Bat Habitat Suitability Index (BHSI)

The desk study included a preliminary assessment of the availability of landscape features of importance to bats within the study area and within the geographical area extending away from it, based on the NBDC on-line mapping tool which includes a Bat Habitat Suitability Index (BHSI) layer[12]. This layer is derived from an analysis of the habitat and landscape associations of Irish bats compiled in Lundy *et al*. (2011). The index evaluation ratings range from 0 to 100 with 100 indicating areas considered to comprise most favourable bat habitats and 0 indicating areas considered to comprise least favourable habitats for bats. Index evaluations are available for selected locations for individual species, or an overall rating is also available for a particular area for bats generally (all species combined). Ratings are mapped on the NBDC map viewer to a 2.5 km grid square resolution.

[10] BCI stated: Provision of bat records does not constitute, and should not be construed as, consultation with Bat Conservation Ireland.
[11] https://maps.biodiversityireland.ie/Map/Terrestrial/Dataset/127
[12] https://maps.biodiversityireland.ie/Map

These ratings, while not predictive, provide meaningful metrics that characterise the probable value of an area to bats. They are an indicator as to the likelihood that different bat species are, or are not, likely to, typically, be a significant presence in an area. The BHSI ratings can, therefore, be used to indicate the probability that bats may use an area. The BHSI ratings for the area encompassing and extending away from the study area were reviewed. For results, please refer to Section 6.1.2 below.

## 5.2 Bat Foraging and Commuting Habitat Suitability Survey

As part of initial site walkovers on 4th April and 20th April 2023, general habitats and linear habitat features, such as hedgeorws and treelines, occurring within the study area were evaluated in terms of bat foraging and commuting potential. Linear features were described in terms of plant species occurring, overall condition and structure and degree of connectivity within the wider landscape, in relation to evaluating their potential suitability for foraging and commuting bats. Habitat features occurring were assigned a suitability rating ranging between 'negligible', 'low', 'moderate' or 'high', as per Colllins (2016).

## 5.3 Bat Roost Inspection Surveys – Structures

Preliminary surveys of buildings and other built structures within the study area were undertaken to identify any actual or potential bat roosts which could be either directly or indirectly impacted by the proposal.

### 5.3.1 Preliminary Roost Assessments (PRAs)

The Preliminary Roost Assessments (PRAs) of stuctures were completed on the 4th April and 20th April 2023. The surveys involved daytime inspections of both the interior and exterior of structures to identify features that could support roosting bats, and/or identify any evidence of bat activity. Survey effort and timings were in line with that recommended in Collins (2016).

The structures surveyed comprised the hotel building (divided into four main sections for the purposes of surveying and referred to hereafter in this report as the hotel 'roofless section', 'middle tower', 'bedroom block' and 'shed/outbuildings', and the adjacent derelict cottage (see Figure 4 and Plate 1 below). The only other built structure identified within the study area comprises an artificial, stone-built mock 'beehive hut', located at the far western edge of the headland, south-west of the hotel.

During the PRA surveys, each structure was examined externally and internally for actual or potential bat entry/exit points e.g., openings, cracks and crevices, actual or potential bat roosting locations, live bats or dead specimens, or any other evidence of old or recent bat usage, such as droppings, staining, feeding remains etc. Structures were evaluated in terms of structural integrity, degree of dampness, degree of shelter/protection and potential as bat roosting habitat.

External inspections involved surveyors visually inspecting the exterior surfaces of all structures from ground - level using torches and binoculars, as well as the areas of ground in the immediate vicinity of all structures, with a particular focus on the areas beneath potential bat access points, such as open windows, gaps in window frames etc. Internal structure inspections involved systematic surveys of all internal rooms/areas, including walls, windowsills, floors, furniture and other surfaces, crevices, cracks and gaps behind peeling plaster in rooms and other spaces.

On completion of the PRAs, each structure was categorized as having either 'negligible', 'low', 'moderate' or 'high' suitability for roosting bats, as per Collins (2016). The results of the PRAs determined whether further surveys were required for each structure.

A follow-up internal inspection survey was undertaken within the hotel structure during the daytime on 3rd May 2023 to check for any signs of bat activity in the intervening period since the previous site visit. This inspection was undertaken in tandem with the deployment of static units within the hotel (see Section 5.6.1.2 below). During the inspection, clean plastic sheeting was left in-situ on the floor of the middle tower second-floor landing at two separate locations where old bat droppings had been previously recorded in April. The purpose of the plastic sheeting was to provide a clean surface on which to capture potential future bat droppings. Information gathered would complement data captured from both static surveys and presence/absence surveys to inform the overall picture of bat activity and usage of this part of the hotel structure.

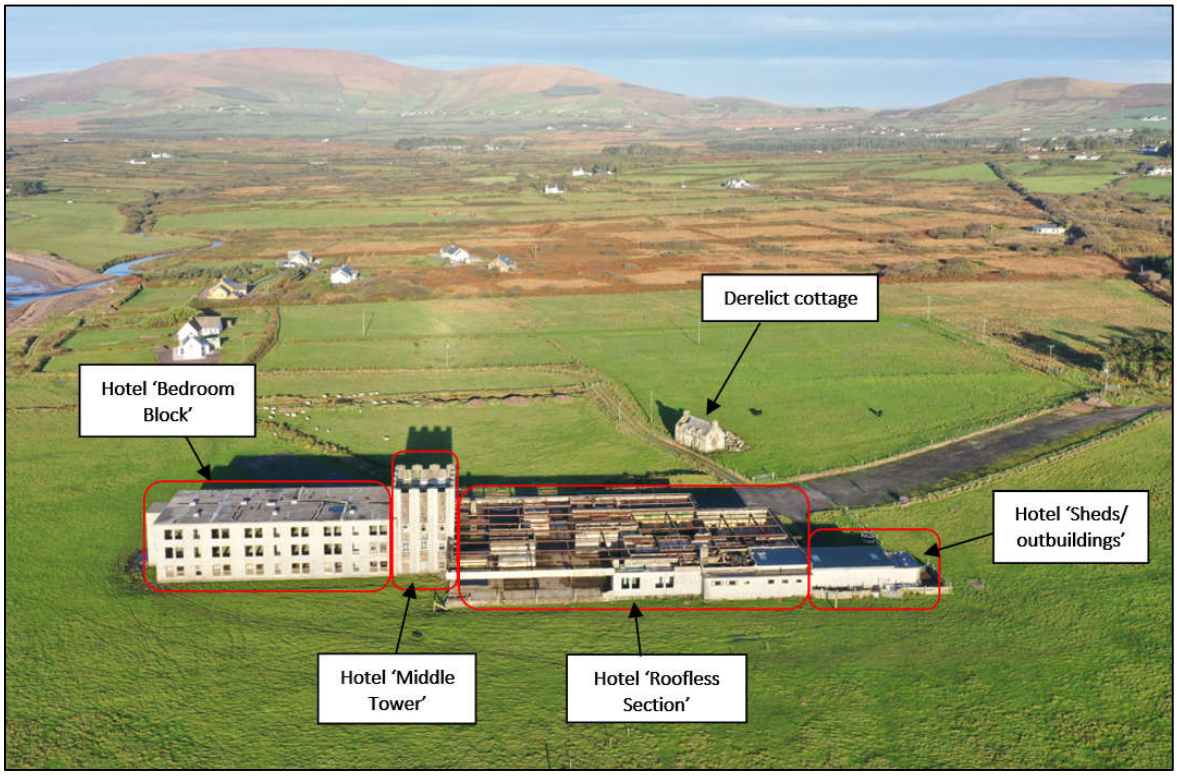


**Figure 4. PRA survey areas (Hotel – Bedroom block, middle tower, roofless section, sheds/outbuildings, and Derelict cottage)**

**Plate 1. Left) View of derelict cottage (rear elevation) and right) eastern gable end of structure**

## 5.4 Bat Roost Inspection Surveys – Trees

Preliminary ground-level roost assessments of trees within the study area were undertaken to identify any actual or potential tree roosts which could be either directly or indirectly impacted by the proposal.

### 5.4.1 Preliminary Ground-level Roost Assessments

The study area is largely devoid of tree cover. The only trees with any potential to support roosting bats by virtue of their species and/or size comprise a double treeline of non-native conifer, adjoining the internal site access in the east of the proposed development site (see Plate 2 below). Marnell *et al*., (2022) outlines various factors which can affect the probability of trees being used by roosting bats. This guidance was reviewed and used to assist in characterising the potential value of the trees occurring as bat roosting habitat and the general potential of the trees to support roosts of any significance (see Section 6.4.1 below).

The preliminary ground-level roost assessments involved detailed daytime inspections of the exteriors of the trees, in line with Collins (2016), undertaken on 4th April 2023. The trees were inspected from ground-level with the aid of a binoculars and torch for the presence of Potential Roost Features (PRF's) (features with potential to support roosting bats, such as holes, cracks, crevices and splits, loose bark, dense ivy etc.). Signs of roosting bats, such as droppings, staining etc., were also searched for.

On completion of the preliminary ground-level roost assessments, each tree was evaluated in line with Collins (2016) with regard to its potential suitability as bat roosting habitat and categorized as having either 'negligible', 'low', 'moderate' or 'high' suitability for roosting bats. The results of the preliminary ground-level roost assessments of trees determined whether further surveys were required.

**Plate 2. View of treeline within east of development site. Left) looking east along internal access road towards site entrance and right) looking south-west along internal access road towards hotel**

## 5.5 Presence/Absence Surveys (Emergence/Re-entry Surveys)

Following the roost inspection surveys of structures and trees encompassed within the study area, presence/absence surveys (comprising dusk emergence and dawn re-entry surveys) were undertaken at those areas considered to have potential to support roosting bats. The purpose of the surveys was to confirm the presence or absence of roosting bats by recording bats either emerging or returning, identify roost exit/entry points, and confirm the species and numbers occurring, which would be used to assist in categorising the type of roost present.

Collins (2016) outlines the recommended timings and minimum survey effort required in relation to presence/absence surveys of structures to have confidence in a negative result, based on the suitability of the structure for roosting (see Table 5 below).

**Table 5. Recommended timings and minimum survey effort for presence/absence surveys (structures) in context of degree of roost suitability (adapted from Collins, 2016).**

| | Roost suitability Category | Further survey requirements |
|---|---|---|
| Buildings | High | Three separate survey visits (at least one dawn and one dusk survey) spaced at least two weeks apart. May to September, with at least two surveys between May and August. |
| | Moderate | Two separate survey visits (one dusk and one dawn) preferably spaced at least two weeks apart. May to September, with at least one visit between May and August. |
| | Low | One survey visit (dusk or dawn) between May to August. |
| | Negligible | No additional surveys required |

It is noted that Collins (2016) recommends that for trees assigned a 'low' roost suitability, then no further surveys are required. Therefore, on the basis of the preliminary ground-level roost assessments of trees undertaken (see Section 5.4.1 above and Section 6.4.1 below), the presence/absence surveys focussed on structures within the site considered to have suitability for roosting bats.

On the basis of the roost suitability ratings assigned following the PRA surveys of structures (see Section 5.3.1 above and Section 6.3.1 below), separate emergence/re-entry survey visits were undertaken at both the hotel (three visits) and the derelict cottage (two visits). With regard to the hotel, on the basis of the evidence of bats recorded within the hotel middle tower during the PRAs, dusk emergence and dawn re-entry surveys undertaken focussed on this part of the hotel. The details of the dusk and dawn surveys undertaken are outlined in Table 6 below. The number of survey visits and the survey timings meet the minimum survey requirements as per Collins (2016).

**Table 6. Overview of dusk (emergence) and dawn (re-entry) surveys undertaken at the hotel 'middle tower' and 'derelict cottage'**

| Survey Area | Survey Type | Date | Weather Conditions |
|---|---|---|---|
| Hotel – Middle Tower | Dusk | 16th May 2023 | Wind direction: S<br>Wind speed (Beaufort): F2<br>Temperature: 10 °C<br>Rain: Dry |
| Hotel – Middle Tower | Dusk | 27th June 2023 | Wind direction: W/SW<br>Wind speed (Beaufort): F1 to 2<br>Temperature: 15 to 17°C<br>Rain: Dry |
| Hotel – Middle Tower | Dawn | 21st July 2023 | Wind direction: NW<br>Wind speed (Beaufort): F3<br>Temperature: 11°C<br>Rain: Dry |
| Derelict Cottage | Dawn | 28th June 2023 | Wind direction: NE<br>Wind speed (Beaufort): F4 to F5<br>Temperature: 16°C<br>Rain: Light turning heavy |
| Derelict Cottage | Dusk | 20th July 2023 | Wind direction: NW<br>Wind speed (Beaufort): F3 |

| Survey Area | Survey Type | Date | Weather Conditions |
|---|---|---|---|
| | | | Temperature: 14°C<br>Rain: Dry |



Due to uncertainty with regard to the age of the bat droppings recorded inside the hotel middle tower during the PRA surveys in April 2023, a dusk watch of potential roost entry/exit points on the second floor of the middle tower was undertaken on the 16th May 2023. To avoid any disturbance of potential roosts, this watch was undertaken by one surveyor from a safe distance with no artificial lighting used.

Subsequent dusk and dawn surveys of the hotel middle tower focussed on the buildings external face (land-ward side of the middle tower) where multiple potential access points had been noted during the PRAs. This was in contrast to the seaward side of the middle tower, where all windows had been previously found to be well-sealed, with no other access points noted. During these watches of the middle tower, surveyors also had a view of the landward side of the bedroom block. With regard to the derelict cottage, the entirety of the structure was visible to surveyors during the dusk and dawn surveys completed at this location.

During each dusk or dawn survey, surveyors positioned themselves at pre-selected locations considered to comprise appropriate vantage points to watch for either emerging or returning bats, using bat detection equipment to record any bats occurring. Surveyors were equipped with Wildlife Acoustics – Echo Meter Touch 2 software on Samsung tablets, as well as hand-held Batscanner heterodyne detectors, to listen for/record bats, and manual handheld clickers to assist in counting any individual bats observed.

In line with Collins (2016), dusk surveys commenced at least 15 minutes before sunset and continued until approximately 1.5-2 hours after sunset. Dawn surveys commenced at least 1.5 hours before sunrise and continued until approximately 15 mins after sunrise or until bat activity ceased.

## 5.6 Passive Automated Bat Surveys (PABS)

Automatic activity surveys utilising static units (units deployed at fixed locations) to record bat actively remotely were undertaken within the proposed development site.

Preliminary Site Investigation

The findings of the desk study were supplemented by a preliminary, ground-truthing, daytime survey carried out on 4th April 2023 in advance of the first deployment of the units at the site. The purpose of this daytime survey was to ensure that the locations of the bio-acoustic units would intersect with a habitat mix that was representative of the proposed development site and would, therefore, accurately sample the activity of any bat populations present. When determining which landscape features were of potential importance to bats, cognisance was taken, during both the desktop and ground-truthing exercise, of the criteria listed in **Table 2** and **Table 3**, above, of Marnell *et al*., (2022), Collins (2023; 2016) and NRA (2005; 2005b).

Survey Equipment

Surveys were undertaken using bio-acoustic units (static bat detectors) set up on site to record bat activity over extended periods. Static detectors were deployed at pre-selected sampling locations (SPs) to capture data on the level of bat activity at the site and its spatial and temporal distribution.

The bio-acoustic equipment used comprised Song Meter Mini Full Spectrum bio-acoustic recording units. Full Spectrum (FS) detectors continuously record all frequencies and retain details of the call structure. The sound recordings from these detectors are typically very high quality and are stored on the units for later analysis. Because FS detectors record sounds at the full frequency, i.e., ultrasonic sounds are not converted to a lower frequency to make them audible, they can capture, and record sound in real-time at a high level of detail. The

resulting sound files are very large, so these detectors use a triggering system to ensure that recordings are made only when sounds detected are above certain frequency and amplitude thresholds.

The units deployed were programmed to begin recording half an hour before sunset each evening and to continue until half an hour after dawn the next morning, in line with Collins (2016). Before deployment, the latitude, longitude, and time zone for each survey location was inputted to each unit, after which units then automatically determined the dawn and dusk times, thereby reducing the likelihood of operator error. Each unit has an omnidirectional microphone that detects bat ultrasonic calls. Calls emitted by bats that passed within the detecting range of the units, during the period of activation, were recorded and sound files stored on internal SD cards for later analysis. All units were deployed and collected during daytime hours.

PAB Survey Periods

Ground-level static surveys were undertaken at the proposed development site in April and May 2023, corresponding to the spring bat survey period, as described by Collins (2016).

The static bio-acoustic units were deployed as follows:

- **April 2023 – Wider Development Site:** Five static detectors deployed from 5th – 20th April 2023, inclusive (16 consecutive nights)
- **May 2023 – Hotel Interior**: Six static detectors deployed from 3rd – 15th May 2023, inclusive (13 consecutive nights)

The April and May static surveys are discussed in more detail in the following sub-sections. Static units were also deployed during the winter period in early 2024 (please refer to **Section 5.7** below for more information in relation to winter surveys).

#### 5.6.1.1 April 2023 - Wider Development Site

The bio-acoustic recording units deployed in April 2023 aimed to capture bat activity throughout the proposed development site. The site generally comprises open and exposed coastal grassland with little in the way of linear habitat features or tall vegetation. Locations for units were chosen to be representative of the different habitats and features occurring likely to be of relatively higher importance for foraging or commuting bats. The only linear habitat feature of note within the site comprises a conifer treeline located adjacent to the access road in the east of the site. This linear feature, an area of open grassland, and the hotel building and derelict cottage, were selected as SP locations to investigate the level of bat activity occurring/degree of usage of the site by bats.

The SP locations used in April 2023 are outlined in **Table 7** below and are shown in **Figure 5** below.

**Table 7: Locations of sampling points for PAB surveys (April 2023) and corresponding descriptions**

| Sampling Point (SP) | Location | ITM | | Location Description |
|---|---|---|---|---|
| | | Easting (X) | Northing (Y) | |
| SP1 | Hotel - Middle Tower | 445892 | 568115 | Inside stairwell on ground floor, attached to stair rail |
| SP2 | Outside hotel | 445898 | 568108 | At south-eastern elevation of hotel, facing open coastal grassland |
| SP3 | Derelict cottage | 445879 | 568190 | Inside structure (ground-floor) |
| SP4 | Treeline | 445935 | 568355 | Attached to mature conifer |
| SP5 | Treeline | 446049 | 568414 | Attached to mature conifer |


Figure 5. Distribution of Sampling Points (5 no.) for static detectors (April 2023)

#### 5.6.1.2 May 2023 – Hotel Interior

Following the April 2023 PAB surveys, it was decided to focus subsequent PAB surveys on the hotel interior to investigate bat activity within the structure. Supplementary SPs were chosen at various locations within the hotel tower and bedroom wings, as these areas were considered most likely to support roosting bats, based on the results of the PRA surveys (see Section 6.3.1.1 below). Sampling points were selected based on the presence of potentially suitable roosting features, potential bat access points such as gaps and holes in walls, ceilings, around window frames and/or at locations where evidence of bat activity e.g., bat droppings, had been identified. The SP locations used in May 2023 are outlined in Table 8 below and are shown in Figure 6 below.

**Table 8: Locations of sampling points for PAB surveys within hotel structure (May 2023) and corresponding location descriptions**

| Sampling Point (SP) | Location | ITM | | Location Description |
|---|---|---|---|---|
| | | Easting (X) | Northing (Y) | |
| SP1 | Hotel - Middle Tower | 445892 | 568115 | Inside stairwell on ground floor, attached to stair rail |
| SP2 | Hotel - Bedroom block | 445879 | 568093 | Ground floor (main corridor) |
| SP3 | Hotel - Bedroom block | 445878 | 568100 | First floor (workroom) |
| SP4 | Hotel - Middle tower | 445892 | 568112 | Second floor landing (outside bedroom wing entrance) |

| Sampling Point (SP) | Location | ITM | | Location Description |
|---|---|---|---|---|
| | | Easting (X) | Northing (Y) | |
| SP5 | Hotel - Middle tower | 445894 | 568111 | Second floor landing (second landing area) |
| SP6 | Hotel - Middle tower | 445892 | 568115 | Top floor of tower (roof entrance landing), attached to stair rail |


**Figure 6. Location of static bat detectors (red markers) deployed within the hotel in May 2023. The floor plans shown in this figure show the various levels (ground-floor, first-floor, second floor and roof plan) of the middle tower (indicated in green) and bedroom block (indicated in blue) combined.**

### 5.6.1.3 Sonogram Analysis of Data Recorded during PABs

Post PAB surveys, the sound files were downloaded from the SD cards and converted using proprietary software[13] to produce sonograms (graphs of the sound recorded). As each species has a unique audio signature, the sonograms, or graphs, can be used to distinguish between one species and another. Using training and experience of sonogram analysis, a staff ecologist used the software to eliminate all data files that were not generated by bats e.g. background environmental noise such as bird song or rain. Once an individual call is identified the recording is automatically labelled using tools available in the specialised software. During an audit of all data, all non-*Pipistrellus* calls were manually verified in line with the Collins (2023) guidelines.

Not every call emitted by a bat is the echolocation call that is characteristic of the species in question. Many bat species use differently structured echolocation calls, adapted to their habitat structure or foraging situation (Miller & Degn, 1981; Fenton, 1987; Rydell, 1990; Kalko, Schnitzler & Schnitzler, 1993; Jones, 1995; all cited in Pfalzer *et al*., 2003). In addition to echolocation calls, bats use 'social' calls which are structurally different from

[13] Kaleidoscope Pro Analysis Software.

echolocation calls. Pfalzer *et al*. (2003) categorises these into 4 types, as follows: squawk, trill (repeated), cheep (curved), and song (complex). While these can readily be attributed to bats, they cannot be used to differentiate between species. Using the specialised software, any calls that match the parameters outlined in the preceding sentences are automatically designated as 'unidentified' and are reported as such in this report. Counts of sonograms of this category are shown in the various output tables in Section 6.6 and 6.7.2 and in Appendix 2 of this report under the column heading 'NoID'.

## 5.7 Winter Hibernation Surveys

Many bats typically use underground sites for hibernating; however, some species such as Leisler's bat, common and soprano pipistrelle, and brown long-eared bat, can utilise buildings as hibernation sites. Due to the potential for the structures to support hibernating bats, and the nature of the proposed works to the hotel, winter hibernation surveys were undertaken in line with Collins (2023).

### 5.7.1 Winter Building Inspection Surveys

Daytime winter inspection surveys were undertaken in the hotel on 18th December 2023, 11th January and 19th February 2024, corresponding to the survey effort and timing outlined in Collins (2023), which recommends a minimum of two visits, including one in mid-January and one in mid-February. These inspection surveys were undertaken mainly in conjunction with the deployment and collection of static units (discussed in Section 5.7.2 below).

The winter building inspection surveys comprised daytime walkthroughs of the interior of the hotel middle tower and hotel bedroom block to assess the potential suitability of these parts of the structure for hibernating bats and search for evidence of bat activity. The methodology employed was in line with the structural inspection surveys undertaken in April and May 2023 (please see Section 5.3 above). Photographs of areas of interest (i.e., where evidence of bats had been previously found) were taken and compared with older photographs of the same areas to assist in determining whether there was any change over time.

Surveys were undertaken using the minimal number of surveyors (maximum two for H&S) and in the shortest time possible, while allowing sufficient time to visually inspect all internal areas of these parts of the hotel. There were no inspections of any known or suspected roost-sites within the structure.

### 5.7.2 Winter Passive Automated Bat Surveys

Collins (2023) outlines that winter inspections can indicate whether a structure has the potential to be used by roosting bats; however, while evidence of bat activity e.g., droppings, indicates that the building is used, this alone cannot determine the timing of usage, as evidence can persist for extended periods. In addition, where bats are utilising a structure for hibernating, they may become active during this period, periodically arousing to drink or feed, if ambient conditions become suitable. Collins (2023) outlines the use of static detectors to complement winter inspection surveys and outlines their particular usefulness where all crevices cannot be fully inspected.

Due to the scale of the structure and the potential for bats to be hibernating deep in crevices etc, within the hotel interior, the daytime visual building inspection, as described above, was supplemented by the deployment of automatic static detectors, to gather additional data on winter bat activity within the structure.

Collins (2023) recommends that for structures with a moderate to high likelihood of supporting hibernating bats, static detectors should be deployed for a minimum two week period in each month encompassing the period December to February, with four weeks between surveys. Collins (2023) also advises that surveys are conducted when weather conditions are coldest as the highest number of bats can be expected to be present during these

periods. On this basis, and considering the physical characteristics of the hotel structure, a slightly modified approach to winter PAB surveys was employed comprising an approximate two-week deployment period in both January and February 2024, with over 3 weeks intervening between each survey period.

Static detectors were deployed over the winter period, as follows:

- **January 2024 – Hotel Interior:** Four static detectors deployed from 11th – 26th January 2024, inclusive (15 consecutive nights)
- **February 2024 – Hotel and Wider Site:** Seven static detectors deployed from 19th February – 1st March 2024, inclusive (11 consecutive nights)

As per PAB surveys in April and May 2023, selection of the winter static survey SPs was informed by the presence of potentially suitable roost features/access points and/or evidence of potential winter bat activity to ascertain general winter activity levels at various locations within the site. The four SP locations utilised in January 2024 (SP1-4) were resurveyed in February 2024 with the addition of an extra three SPs in February (SP5-7), including one unit deployed within the derelict cottage on a precautionary basis.

**Table 9** below outlines the winter SPs used during the January and February PAB surveys. These are shown on **Figure 7** below).

**Table 9: Locations of sampling points for winter PAB surveys within hotel structure (January & February 2024) and corresponding location descriptions**

| Sampling Point (SP) | Location | ITM | | Location Description | January 2024 | February 2024 |
|---|---|---|---|---|---|---|
| | | Easting (X) | Northing (Y) | | | |
| SP1 | Hotel - Middle Tower | 445892 | 568115 | Inside stairwell on ground floor, attached to stair rail | ✓ | ✓ |
| SP2 | Hotel - Middle tower | 445892 | 568115 | Top floor of tower (roof entrance landing), attached to stair rail | ✓ | ✓ |
| SP3 | Hotel - Middle tower | 445894 | 568111 | Second floor landing (outside tiled room) | ✓ | ✓ |
| SP4 | Hotel – Bedroom block | 445872 | 568093 | First floor bedroom, landward side of building | ✓ | ✓ |
| SP5 | Hotel – Bedroom block | 445879 | 568093 | Ground floor (main corridor) | N/a | ✓ |
| SP6 | Derelict cottage | 445879 | 568190 | Inside structure (ground-floor) | N/a | ✓ |
| SP7 | Treeline | 446018 | 568396 | Approximately halfway along treeline | N/a | ✓ |

In addition to the daytime building inspection surveys and daytime deployment and/or collection of winter static detectors within the hotel, the plastic sheeting previously set out on the floor of the second-floor middle tower landing was inspected and/or refreshed on each date. The purpose of this was to gather additional information to complement data captured from the internal hotel building inspections and the winter static units to inform the overall picture of bat activity and usage of this part of the hotel structure.




**Figure 7. Location of static bat detectors (red markers) deployed within the hotel in January and/or February 2024 (*see Table 10 above*). The floor plans shown in this figure show the various levels (ground-floor, first-floor, second floor and roof plan) of the middle tower (indicated in green), and also the bedroom block (indicated in blue).**

## 5.8 Survey Effort, Limitations and Constraints

### 5.8.1 Survey Effort

A suite of bat surveys were undertaken throughout the study area to gather baseline data on bat activity at the site and inform the impact assessment. Table 10 below summarises the survey effort (hours) for each survey type.

**Table 10. Overview of total hours of survey effort on site for bats**

| Survey Type | Total No. of Hours Completed |
|---|---|
| Daytime Surveys | 23 |
| Night-time Surveys | 15 |
| Static Surveillance | 816 |
| **Total hours** | **854** |

Regarding static (PAB) surveys during the typical bat active season, statics were not deployed in the summer or autumn periods; however, extended sampling was undertaken in both April and May (spring period) (total of 29 nights across both months combined). Collins (2023, 2016) states that sampling should be designed so as to provide a sufficient level of data to assess potential impacts on bats, and should take the likelihood of bats being

present, likely species concerned, number of individuals, type of habitats affected, predicted impacts of the development and the type and scale of development into consideration when designing the survey approach.

It is considered that the overall survey effort, including the PAB surveys in combination with the suite of other bat surveys undertaken at the study area, was proportional to the site characteristics and nature and scale of the proposed works, and that sufficient data has been gathered to allow for a robust assessment of potential impacts to bats which may arise as a result of the proposed development.



### 5.8.2 Survey Limitations and Constraints

#### 5.8.2.1 Structural Surveys

The overall hotel building comprises a substantial structure. The scale of the building, the degree to which the building is open, both to the external environment and internally, and the extent to which the various structural components have deteriorated through dereliction and abandonment, has resulted in a plethora of potential roost sites available to bats at any one time. The various hotel building components (middle tower, three-storey bedroom block, roofless section and sheds/outbuildings) are in various states of disrepair. Similarly, the adjacent derelict cottage is in poor structural condition, in particular internally. For example, much of the first-floor area of the cottage has completely collapsed. Due to considerable H&S concerns, access to the first floor of the cottage was not possible and therefore the internal inspection of the cottage interior was undertaken from the ground floor. External surveys of all structures were also undertaken from ground-level. Access to the flat roofs of both the middle tower and bedroom block of the hotel was not possible at the time of survey and so these areas of the hotel building were not inspected.

These minor limitations regarding structural inspections are not considered to have significantly impacted upon the collection of sufficient data to inform a robust impact assessment on bats.

#### 5.8.2.2 PAB Surveys

Bats will typically fly over and back along short sections of habitat, if prey is readily available, and use linear features to navigate through the landscape, to and from roosts, and within foraging sites. An individual bat making multiple passes within range of a static detector can therefore be the source of many recorded calls. Therefore, the number of calls recorded is not a direct measure of the number of individuals of a particular species present. The number of calls recorded is likely to be much greater than the number of bats that generated them.

Although acoustic surveys cannot be used to determine the absolute abundance of bats, since a given individual may be recorded multiple times, the number of calls recorded can however be used as a reliable proxy for the relative levels of bat activity for species recorded and therefore the relative abundance of species in an area at the time of survey.

#### 5.8.2.3 Bat Sonogram Analysis

There are three species of the genus *Myotis* resident in Ireland namely, Daubenton's bat, whiskered bat, and Natterer's bat. The echolocation calls of these three species are very similar, and oftentimes indistinguishable, therefore the sonograms generated by recordings of these species' calls cannot reliably be identified to species level based on sonogram analysis alone. Therefore, any bat passes attributed to the genus *Myotis* by the automatic identification software used are simply identified as *Myotis* spp., and are specified as such in this report, as is common practice in studies regarding this group.

#### 5.8.2.4 Preliminary Ground-level Tree Roost Assessments

For this survey, Collins (2016) recommends that surveys are conducted between December and March to avoid implications for tree foliage potentially obscuring PRFs at other times of the year. The tree roost assessment was carried out on 4th April 2023. Although several days outside the optimum tree survey period for bats, considering that the trees concerned comprised exclusively of conifer, rather than broad-leaved species, this negligible deviation from the recommended tree survey period is not considered to have constrained the survey undertaken in any way.

## 5.9 Ecological Evaluation

The ecological evaluation outlined in this report has had regard to methodologies set out in 'Guidelines for Ecological Impact Assessment in the UK and Ireland' (CIEEM, 2018) and 'Guidelines for Assessment of Ecological Impacts of National Roads Schemes' (NRA, 2009). These guidelines set out the context for the determination of value on a geographical basis with a hierarchy ('International' through to 'Local'/'Negligible') assigned based on the importance of any particular ecological receptor.

The NRA criteria are specific to circumstances in Ireland and, therefore, have been used in this report to assess the value of individual species of bat recorded, based on the information obtained during the desktop study and field surveys. The value of individual bat species is assessed on biodiversity value, legal status and conservation status. Biodiversity value is based on its national distribution, abundance or rarity, and associated trends.

With regard to evaluating the ecological value of roosts, Marnell *et al*., (2022) is used to categorise roost status and thus inform mitigation requirements, in conjunction with professional judgement.

# 6. Results

## 6.1 Desktop Study

### 6.1.1 Bat Conservation Ireland Database Records

Following review of data received from BCIreland as part of the data request undertaken, it was determined that records for common pipistrelle (10 no. records), soprano pipistrelle (2 no. records) and Leisler's bat (2 no. records) are retained by BCIreland for the area within a 10 km radius of the approximate centre point of the proposed development site. These all comprise ad hoc observations sourced from BATLAS 2020 from July 2018. The closest record comprised a record of common pipistrelle located approximately 1.2 km north-west of the proposed development site.

The BCIreland data provided as part of the data request did not identify any known bat roosts within the 10 km search radius. However, it must be noted that the absence of bat roosts or other bat records does not imply the absence of roosts or bats in the area.

### 6.1.2 Bat Habitat Suitability Index (BHSI)

A review of the NBDC's Bat Habitat Suitability Index available on-line determined that for the area encompassed within the proposed development site, and also including the lands extending away from the proposed development site, the BHSI rating that has been assigned for 'all bats' is 22.33 out of 100, based on the analysis of the habitat and landscape associations of Irish bats compiled in Lundy *et al.* (2011). The maximum rating given for any individual species is 38, with a minimum rating of 1 (see **Table 11** below). The BHSI ratings assigned for bats indicate that the Site and surrounding area is of relatively low overall value for bats.

**Table 11: BHSI Rating for 2.5 km grid square encompassing and extending away from the proposed development site (adapted from NBDC on-line)**

| Common name | Scientific name | BHSI Rating |
|---|---|---|
| **All Bats** | - | **22.33** |
| Brown long-eared bat | *Plecotus auritus* | 38 |
| Common pipistrelle | *Pipistrellus pipistrellus* | 25 |
| Daubenton's bat | *Myotis daubentonii* | 23 |
| Leisler's bat | *Nyctalus leisleri* | 29 |
| Lesser Horseshoe bat | *Rhinolophus hipposideros* | 18 |
| Nathusius's pipistrelle | *Pipistrellus nathusii* | 1 |
| Natterer's bat | *Myotis nattereri* | 22 |
| Soprano pipistrelle | *Pipistrellus pygmaeus* | 35 |
| Whiskered bat | *Myotis mystacinus* | 10 |

## 6.2 Bat Foraging and Commuting Habitat Suitability Survey

The proposed development site is dominated by the derelict hotel building which is surrounded by expansive, open, flat, coastal grassland occurring on an exposed headland (see **Plate 3** below). The only linear feature occurring within the proposed development site considered to have any real value to either foraging or commuting bats is the conifer treeline in the east of the site (see **Plate 4** below). This feature adjoins the northern side of the site access road and extends for an approximate distance of 260 m. It is connected, to some degree at its eastern end, to the wider landscape to the north by small willows which sparsely line the beach access road, extending northwards from the site entrance (see **Plate 5** below). It is not connected to any other linear features at any other location.

Other than the treeline, there are no other linear features of note encompassed within the proposed development site. Some sections of the site boundary do, however, comprise gappy hedgerow, comprising willows (*Salix* spp.) and bramble (*Rubus fructicosus*) on earth banks, and/or adjoin more scrubby areas located outside but adjacent to the boundary, in particular in the north-eastern corner of the development site (see **Plate 5** below).

A short (c. 70 m) section of vegetated earth bank occurs along the boundary in the west of the site, topped with bramble, and scattered, stunted willows. This taller vegetation peters out after a short distance. There is no real connectivity between this feature and other linear features in the surrounding area. These linear features, although not considered to be of high value on an individual basis due to their small size, limited extent and/or sparse character, provide some connectivity between the conifer treeline, described above, and the wider landscape extending northwards from the site. A series of artificial drainage ditches occur throughout the northern half of the site.

Having regard to Collins (2023) and habitat associations of bats, discussed in **Section 3.3** above, the conifer treeline encompassed within the development site is considered to be of 'moderate' value to foraging/commuting bats, while the linear boundary features described above are assigned 'low to moderate' value. The other habitats occurring within the development site, comprising a mix of predominantly improved grassland and rushy wet grassland, are considered to be of 'low to moderate' value to bats.

Within the wider study area, encompassing a proposed biodiversity enhancement area to the east of the local beach access road, perimeter hedgerow/vegetated earth banks, pockets of willow scrub, and drainage ditches are also considered to be of 'low-moderate' value to bats. The value of the site for foraging and commuting bats is discussed further in **Section 7.1.1** below.


**Plate 3. Examples of improved/semi-improved grassland habitats in the vicinity of the hotel. Left) looking south-west from the seaward side of building, and right) looking southeast at front of hotel bedroom block and tower**

**Plate 4. Left) View of treeline within the site and right) example of semi-improved wet grassland habitat in field area north of the treeline**

**Plate 5. Examples of boundary hedgerows/vegetated earth banks associated with drainage ditches along parts of the site perimeter. Left) looking south-east at gappy willows adjoining local beach access road and, right) view from north-west corner of site looking north-eastwards along site boundary**

## 6.3 Bat Roost Inspection Surveys – Structures

### 6.3.1 Preliminary Roost Assessments (PRAs)

#### 6.3.1.1 Hotel Building

The hotel building comprises a large, flat-roofed (where present), modern mass concrete and steel structure which has been disused and falling into dereliction for the past 40 years (see **Plate 6** below). The majority of the building is in poor structural condition, and is open to the elements. Some parts of the hotel, which are in relatively good condition and/or are relatively sealed off from the elements, are currently used for storage and/or as active workshops, tool rooms. There is still a power supply to the building and power tools were noted charging in some of the workshop rooms. One of the rooms on the first floor of the bedroom block is set up to provide basic canteen facilities e.g., kettle etc. There is therefore some degree of on-going, although likely intermittent, human activity within and around the hotel building. Evidence of vandalism was noted in both interior and exterior parts of the hotel building and grounds.

**Plate 6. Drone image of the hotel building showing 'roofless section', 'middle tower' and 'bedroom block'**

For the purposes of assigning suitability ratings in line with Collins (2023), due to the overall size of the structure, the different external and internal structural characteristics encountered, and the varying degrees of potential suitability for roosting bats, the hotel building is discussed hereunder in the context of the different structural components ('roofless section', 'middle tower', 'bedroom block' and 'sheds/outbuildings'). Please refer to **Figure 4** above.

##### 6.3.1.1.1 *Roofless Section*

The single-storey (northern) section of the hotel structure is completely roof-less with just exposed and corroded steel beams remaining at roof-level. This section of the hotel is presumed to have once contained the main hotel

entranceway and reception area, dining area/function room, office space and the former leisure area including swimming pool, changing rooms etc. In terms of potential bat roosting habitat, some crevices were noted in the exposed blockwork masonry of internal walls which could potentially be used by small numbers/individual bats; however, this section of the hotel is extremely exposed and open to the elements (see **Plate 7** below). No evidence of bat activity was recorded.

Having regard to guidelines in Collins (2016), in light of the above characteristics and considering the highly exposed coastal setting and degree of exposure, and the availability of more suitable potential roosting habitat in the immediate vicinity, in the context of the surrounding area, this section of the hotel was classed as having 'negligible' suitability for roosting bats.

**Plate 7. Views of various parts of the hotels roofless single-storey section.**

### 6.3.1.1.2 *Middle Tower*

The middle tower, structurally, is in relatively good condition and houses various disused rooms as well as some storerooms which are in use (see **Plate 8** below). All rooms are located off a main stairwell which provides access from the ground-floor entrance up through each level. Continuing upwards from the second-floor landing, the stairway leads to a small landing area/room which provides access out onto the flat roof of the bedroom block via a poorly sealed glazed PVC door, as well as access onto the roof of the tower, via a 'ceiling hatch', comprising an

aluminium PVC window, which is ajar (see **Plate 9** below). The stairwell also provides access on each level (ground-floor, first-floor and second floor) to the bedroom block (see **Section 6.3.1.1.3** below).

The extent to which the windows in this middle section of the hotel are sealed varies; some window openings still retain windows of modern aluminium PVC construction. These are protected in some instances with wire mesh grills, placed over the windows due to issues with vandalism. Some windows are unsealed or partially sealed with plywood sheeting and/or Perspex, in various states of disrepair. Swallows utilise some areas within the tower for nesting with old nests and droppings noted throughout.



**Plate 8. Views of various parts of the interior of the hotel 'middle tower' showing examples of potential bat access points and suitable roosting features for bats**

Potential bat entry and exit points observed comprised unsealed and partially sealed windows and/or damaged window coverings, as well as various gaps and crevices around window/door frames. In terms of potential suitability for roosting bats, this section of the hotel comprises the most sheltered part of the overall structure, relative to other areas. Many of the rooms within the middle tower are relatively well-sealed, warm and stable internally, although water ingress is also apparent in some locations. Within the ceilings of the stairwell landings on various levels, crevices and holes in exposed blockwork, which could potentially be used by bats, were also

noted. Having regard to guidelines in Collins (2016), in light of the above characteristics, the middle tower section of the hotel was classed as having 'moderate' suitability for roosting bats.



**Plate 9. Views of the middle tower 'roof landing' area showing potential bat access points (gaps around windows and doors) and suitable roosting features (crevices and gaps in exposed blockwork in ceiling).**

During the PRA undertaken on 20th April 2023, evidence of bat activity, comprising bat droppings, was recorded at three locations within the middle tower, outlined as follows:

Location 1 - Second-floor landing

Bat droppings were recorded scattered on the floor of the landing outside the sealed door which leads to the bedroom wing second floor. The material appeared quite old and was very broken down in appearance. Bird droppings (assumed to be from swallows) was also present on the floor at the same location and throughout the general area. No other evidence of bats was recorded. An inspection of the ceiling directly above identified a small crevice in exposed blockwork at the top of the wall (see **Plate 10** below), potentially suitable for roosting bats. In the same general area, several other small holes, as well as a large, protruding, open-ended, corroded pipe, were also noted - all considered to comprise potentially suitable bat roosting habitat.

**Plate 10. View of 'Location 1' on second-floor landing of hotel middle tower immediately outside sealed door to bedroom wing showing degraded bat droppings gathered in corner of floor, and small crevice in blockwork located directly above.**

Location 2 - Second-floor landing

Bat droppings were also recorded at a second location close-by (approximately 3 m away) on the same landing floor. Here, an accumulation of droppings, although again, very degraded in appearance, appearing 'powder-like', and very scattered in distribution was noted on the floor, underneath a relatively large hole in the suspended ceiling above (see **Plate 11** below). This hole has been formed due to the ceiling partially collapsing. From floor-level, the hole was estimated to measure approximately 0.75 m width x 0.7 m length x 0.5 m height. The blockwork of the floor above and pipework, presumed for heating or ventilation, are visible from floor-level within the exposed ceiling void above. No other evidence of bats was recorded at this location.


**Plate 11. View of 'Location 2' on second-floor landing of hotel middle tower showing larger accumulation of scattered and degraded droppings on floor beneath hole in suspended ceiling which leads into a small cavity between ceiling and floor above.**

Location 3 – Roof landing

Bat droppings were recorded at the top of the stairs on the top floor of middle tower where a small landing area leads out onto roof-level. Droppings were also noted on top of lidded buckets and paint cans stored in this general landing area. No other evidence of bats was recorded. A small opening to the outside was noted at the base of the wall at the top of the stairs. Elsewhere, gaps were apparent around the door frame leading out onto the flat

roof and the ceiling hatch leading onto the tower roof was ajar. Some holes and crevices were also noted in exposed blockwork of both the walls and ceiling in this area (see **Plate 12** below).

**Plate 12. Evidence of bats and potential access points/roosting crevices identified in the roof landing area of the middle tower. Top) droppings on floor at top of stairs and small hole at base of wall to outside. Bottom left) bat droppings on lid of bucket. Bottom right) small crevice in exposed blockwork of ceiling in this area shown as an example of a crevice potentially suitable for bats**

During the follow-up internal inspection survey undertaken within the hotel structure on 3rd May 2023, the areas where old, degraded bat droppings had been previously recorded on the second-floor landing of the middle tower were checked for any evidence of bat activity. No additional evidence of bats was found to indicate activity in the intervening period since the area had been checked previously on 20th April 2023. Plastic sheeting was laid out at

two locations on the second-floor landing (Location 1 and Location 2, as discussed above) to capture any potential future bat droppings and assist in determining level of bat activity at these locations.

#### 6.3.1.1.3 *Bedroom Block*

Internally, the bedroom wings of the hotel are physically separated from the middle tower on all levels by well-sealed doors which are either locked or barricaded. Some of the rooms within the eastern end of the bedroom block are used as tool and equipment storage areas, workshops or very basic canteen facilites e.g. with kettle, microwave etc.; however, overall, the multitude of former bedrooms on all levels of the bedroom block are predominantly bare and devoid of furniture and fittings (see **Plate 13** and **Plate 14** below).

Some of the rooms are in relatively good condition, with no major structural damage apparent, while in the en-suite bathrooms adjoining several bedrooms, the suspended ceilings have fully or partially collapsed. Where sections of ceiling are missing, degraded insulation is exposed/collapsing and the blockwork and timber joists of the floor above are exposed. Many of the former bathroom areas adjoining rooms contain old swallows' nests, with accumulations of bird droppings, and in some instances, skeletal remains of presumably young birds, on the floor, along with old nests which have become dislodged. Wood pigeons were also encountered within parts of the bedroom block on occasion, and likely use the building to roost and nest. The ceilings in much of the main corridors in this part of the hotel are missing, with block and concrete work of the floor above, or flat roof in the case of the uppermost floor, exposed.

**Plate 13. View of some of the rooms within the eastern end of the bedroom block (various locations) showing degree of human usage**


**Plate 14. View of some of the more derelict parts of the bedroom block (various locations) showing examples of former bedrooms, partially/fully collapsed suspended ceilings in former bathrooms, corridors with exposed blockwork in ceilings and open shafts in internal walls**

The vast majority of window openings on all levels of both the seaward and landward sides of the bedroom block are completely unsealed, meaning that the interior of this part of the hotel structure is very exposed, draughty and open to the elements, allowing strong coastal winds and rain to enter this part of the building. Due to an absence of any bedroom doors or any other internal doors, other than the sealed door on each individual level providing access to the middle tower, there can be a considerable degree of wind blowing through this part of the building, from one side of the structure through to the other.

During the PRAs, the majority of the rooms in the bedroom block were found to be very drafty, cold and in places, very damp and/or with water ingress. In some rooms, water was noted trickling down walls, and small 'stalactite' formations were observed growing on interior ceilings in some locations. The bedroom wings are therefore far less sheltered in comparison to the relatively more stable conditions noted within the middle tower.

In terms of potential roosting sites, small gaps and crevices or other small spaces associated with sections of collapsed suspended ceiling and/or exposed blockwork or timber floor joists, as well as other openings, such as former vent openings, located in each bedroom, are considered to comprise potentially suitable bat roosting features (see **Plate 14** above). The multitude of open, unsealed windows on both sides of the bedroom block, existing gaps in window-surrounds and/or window hoarding, where present, and other openings noted, such as those associated with wiring etc, were considered to comprise potential access points for bats between the outside environment and interior of the various bedroom levels. No evidence of bats was recorded within the bedroom block during the PRA surveys.

Having regard to guidelines in Collins (2016), in light of the characteristics of the structure, this section of the hotel was classed as having 'negligible' to 'low' suitability for roosting bats.

#### 6.3.1.1.4 ***Shed/Outbuildings***

A number of sheds/outbuildings adjoin the hotel structure at its northern end. These are in good condition structurally and are currently in-use for agricultural and/or storage purposes, with farm machinery and equipment noted. Internal inspections determined that walls and ceilings are intact and plastered, with no crevices or cracks observed (see **Plate 15** below). Externally, no obvious bat entry/exit points were noted, other than gaps within and around doors. No evidence of bats was recorded either externally or internally in relation to these structures.

Having regard to guidelines in Collins (2016), in light of the characteristics of the structures, this section of the hotel was classed as having 'negligible' suitability for roosting bats.

**Plate 15. View of sheds/outbuildings adjoined to northern end of hotel, used for storage/farm activity**

#### 6.3.1.2 Derelict Cottage

A derelict cottage, of a traditional farmhouse design in character, is situated at a short remove (40 m) from the hotel. This structure comprises a two-storey former dwelling which is in poor condition structurally, in particular the interior (see **Plate 16** below). The structure is originally of stone construction, subsequently plastered over, with a slate tile roof, and a chimney at both gable ends. Both the southern and northern elevations of the building have doorways and windows present, with timber window frames still in situ. The eastern gable also has one window present. All windows and doors are open/unsealed. **Table 12** below outlines the characteristics of the building with regard to '*Bat Survey Guidelines: Traditional Farm Buildings Scheme*' Aughney *et al.*, (2008).

**Table 12. Derelict cottage building characteristics (adapted from Aughney, *et al.*, 2008)**

| | |
|---|---|
| **Building type:** | Traditional farmhouse, two-storey, dormer windows |
| **Age:** | 150+ years (structure shown on OSI 6-inch mapping)[14] |
| **Wall construction:** | Stone (rendered) |
| **Roof covering:** | Slate tile, partially collapsed |
| **Roof lining:** | Timber lining/sarking |
| **Loft insulation:** | None |
| **Adjacent habitat:** | Semi-improved coastal pasture, built ground |

**Plate 16. View of exterior and interior of derelict cottage showing considerable degree of deterioration, in particular internally**

[14] https://webapps.geohive.ie/mapviewer/index.html Accessed 16-04-24

Externally, part of the original stonework of the east gable wall is visible where render has fallen away (see **Plate 16** above). Otherwise, the external faces of the building are intact with either render or pebble-dash finish. Where stonework is exposed on the eastern gable, any form of mortar has largely disappeared and remaining gaps and crevices between stones are plentiful. The roof on the northern elevation is largely intact, although there are two small holes present. The roof on the southern side has a large hole and several smaller holes present, with some missing slates, in particular at the western end where vegetation is also growing from a section of roof.

Internally, the building was inspected from ground-floor only as the upper-level floor has largely collapsed. The ground-floor ceiling is largely collapsed. Where the ceiling has already come away, the remaining timber floor-joists of the upper level are exposed and completely rotten in appearance. The plasterwork on walls is largely intact, although walls are mouldy and damp. The interior of the building is very draughty due to the open windows, doors and the multiple holes in the roof. The floor of the interior of the structure is strewn with fallen timber joists, beams etc and other debris and rubbish, along with a thick layer of sheep dung and bird droppings. The building is used by sheep as shelter and both jackdaws and starlings' nest in the structure.

On the upper level, in the centre of the roof, there is no ceiling, and the roof void is largely open and visible with timber roof-joists exposed (see **Plate 17** below). At both the western and eastern ends of the building, sections of the upper-floor ceiling, comprising timber panelling, still remain in-situ, in particular at the eastern end; however, the roof-void above/behind is accessible due to large holes in internal walls or where the ceiling has collapsed.

**Plate 17. View of part of upper floor and roof-space of derelict cottage showing degree of deterioration**

During the PRA, gaps in stonework, internally and externally, and externally between plasterwork and adjacent exposed stone were noted and examined, where possible. No evidence of bats was recorded within or around the derelict cottage; however, the structure contains numerous features which could potentially be used by roosting bats. These include, but are not limited to, gaps and crevices around window and door frames and in exposed masonry, crevices, holes and voids behind false ceilings, or in the roof space or roof tiles, chimneys etc.

Having regard to guidelines in Collins (2016), in light of the characteristics of the building, this structure was classed as having 'moderate' suitability for roosting bats.

#### 6.3.1.3 Other Built Structures

The only other built structure encompassed within the study area comprises a small, artificial, stone-built, mock 'beehive hut', located at the far western edge of the headland, south-west of the hotel. This structure was inspected externally and internally. No evidence of bats was found. Having regard to guidelines in Collins (2016), this structure was deemed to be of 'negligible' suitability for roosting bats.

## 6.4 Bat Roost Inspection Surveys – Trees

### 6.4.1 Preliminary Ground-level Roost Assessments

The treeline which adjoins the internal access road in the east of the proposed development site comprises a mix of non-native sitka spruce (*Picea sitchensis*) and Norway spruce (*Picea abies*). This treeline is connected to the wider landscape to some degree at its northern end only. With regard to Marnell *et al.*, (2022), factors which are considered to decrease the probability of bats utilising these trees for roosting are considered to include the types of tree species concerned (non-native conifers), the nature and condition of the trees (simple growth form, little in the way of visible damage and an absence of obvious holes and cracks) and the setting of the treeline and it's context in the surround area (isolated and not well-connected, and located within a very open and exposed landscape).

During ground-level assessments, some of the larger specimen conifers were found to have some PRFs, such as minor areas of loose bark and small gaps; however, these features were considered to provide limited roosting potential for bats (see **Plate 18** below). No evidence of bats (droppings, staining etc.) was recorded. Having regard to guidelines in Collins (2016), all of the trees surveyed were classed as having 'low' suitability for roosting bats and therefore no further surveys were undertaken.

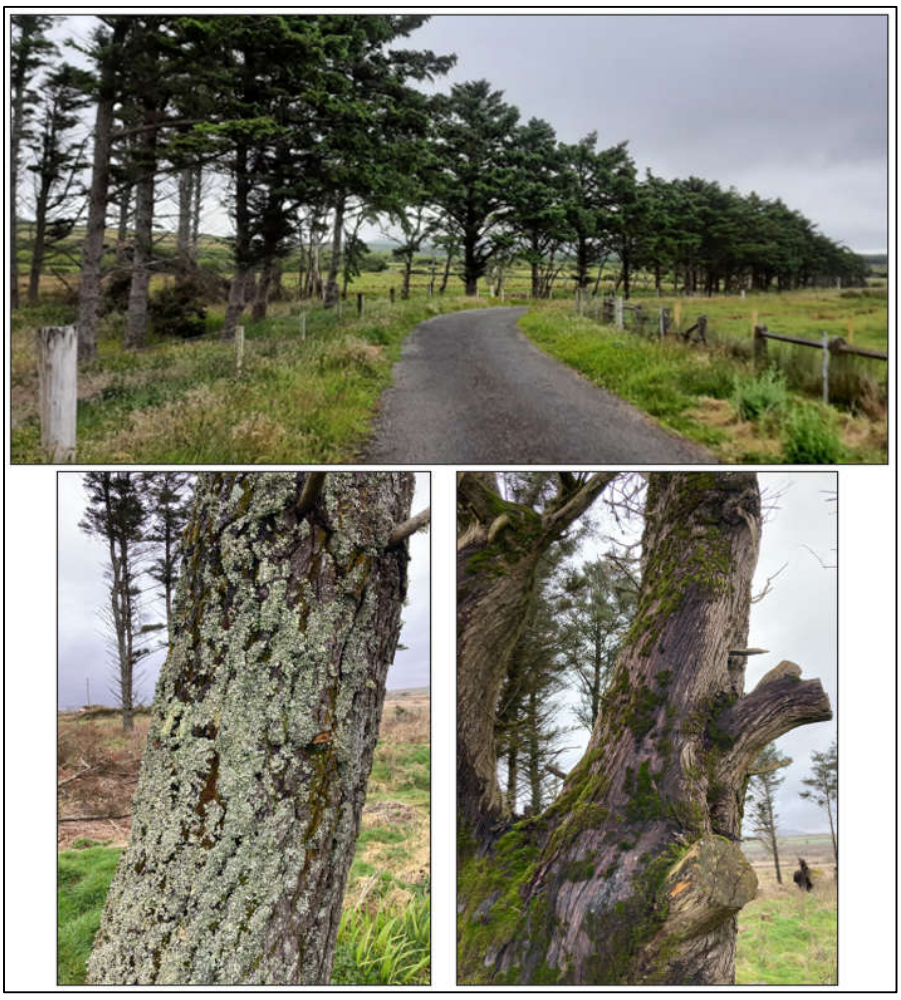

**Plate 18. View of treeline adjoining internal access road and examples of characteristics of trees occurring**

## 6.5 Presence/Absence Surveys (Emergence/Re-entry Surveys)

Two dusk and one dawn survey were conducted at the middle tower and landward side of the bedroom block, as discussed in **Section 5.5** above. These surveys met the minimum survey requirements in line with Colins (2016). The results are summarised in **Table 13** below.

**Table 13. Summary of presence/absence survey results for the hotel**

| Survey Type | Date | Results |
|---|---|---|
| Dusk | 16th May 2023 | One soprano pipistrelle was observed emerging from a small hole in exposed blockwork on the second-floor landing at 22:00 Hrs. The surveyor immediately exited the building and continued the watch from outside. **Soprano pipistrelle (1 no.) confirmed roosting within middle tower.** |
| Dusk | 27th June 2023 | Approximately five common pipistrelles were recorded emerging from broken windows/window frame gaps on the landward side of the middle tower. The first bat was recorded emerging at 22:22 Hrs. **Common pipistrelle (5 no.) confirmed roosting within middle tower.** |
| Dawn | 21st July 2023 | Common pipistrelle, Leisler's bat and M*yotis* spp. were recorded on detectors during the dawn survey; however, no bats were seen entering the structure. **No evidence of roosting.** |

Both a dusk and dawn survey were conducted at the derelict cottage, in line with Colins (2016), as discussed in **Section 5.5** above. The results are summarised in **Table 14** below.

**Table 14. Summary of presence/absence surveys of the derelict cottage**

| Survey Type | Date | Results |
|---|---|---|
| Dawn | 28th June 2023 | No signs of bat activity around the house, and no bats seem returning to roost. Poor weather may have influenced bat activity. **No evidence of roosting.** |
| Dusk | 20th July 2023 | No bat activity during the first hour of the survey.<br>At 22:26 Hrs two common pipistrelles observed at the front of the house. One flew off around the western gable and the other circled and foraged around the house before flying east.<br>At 22:35 Hrs one common pipistrelle observed foraging around the house for 10 minutes.<br>At 22:45 Hrs one bat (*Myotis* spp.) recorded emerging from a large hole in the roof (west side of southern roof elevation).<br>At 22:50 Hrs one common pipistrelle recorded flying out of the same hole in the roof.<br>At 22:52 Hrs one common pipistrelle foraging at the front of the house.<br>At 23:12 Hrs – 23:15 Hrs one common pipistrelle foraging at south elevation of house.<br>***Myotis* spp. (1 no.) and common pipistrelle (1 no.) emerged from derelict house.** |

## 6.7 Passive Automated Bat Surveys (PABS)

As outlined in **Section 5.6** above, static units were deployed in both April and May 2023, for 16 nights and 13 nights respectively, giving a combined total of 29 nights of static data. A combined total of 10,313 bat passes were recorded over the April (6,602 passes) and May (3,711 passes) deployment periods.

Combining April and May 2023 PABS data, common pipistrelle had the highest number of passes recorded (90.98%) at the proposed development site. All species recorded, with their combined total percentage passes, are as follows:

- Common pipistrelle (90.98%),
- Soprano pipistrelle (2.45%),
- Nathusius' pipistrelle (0.33%)
- Leisler's bat (0.16%),
- Brown long-eared bat (0.04%),
- Lesser horseshoe bat (2.16%)

In addition to the above, calls recorded which could not be attributed to a species and/or genus during the PAB surveys are as follows:

- Unidentified (3.4%)
- Species from the genus *Myotis* (0.48%)

The following sub-sections provide further detail on the PABS results for April and May 2023. The nightly and hourly averages of the bat passes recorded for each species at each sampling point in each survey month, including also bat passes to which a species or genus could not be attributed, are tabulated in **Appendix 2** of this report. The results are discussed in **Section 6.7.1** and **Section 6.7.2** below.

### 6.7.1 April 2023 - Wider Development Site

#### 6.7.1.1 Species Recorded & Activity Levels

A total of 6,609 passes, including passes to which a species or genus could not be attributed, were recorded during the 16 nights of deployment. Common pipistrelle was the most frequently recorded species, and the total number of bat passes attributed to this species (6,147 passes) comprised 93.0% of the total, with the next most frequently recorded species comprising soprano pipistrelle with 164 passes (2.5% of the total).

Bats from the genus *Myotis* (44 bat passes), Nathusius' pipistrelle (25 bat passes), Leisler's bat (9 bat passes), lesser horseshoe bat (4 bat passes) and brown long-eared bat (4 bat passes) were recorded in relatively low numbers, accounting for a combined total of 86 passes (corresponding to 1.28% of all calls recorded over the 16-night survey period). Bat passes recorded, which could not be attributed to a species or genus, comprised 3.2% (212 passes) of the total number recorded. The species recorded are listed in **Table 15** below, with the percentage of the total number of bat passes/calls per species and the BHSI rating for each species outlined.

**Table 15. Percentage of total bat calls recorded in April 2023, categorised by species and with corresponding BHSI Rating for the area**

| Species | % of total bat calls recorded | BHSI Rating |
|---|---|---|
| Common pipistrelle | 93.0 | 25 |
| Soprano pipistrelle | 2.5 | 35 |
| *Myotis* spp. | 0.7 | 22 |
| Natterer's bat/ Daubenton's bat/ Whiskered bat | | 23 |
| | | 10 |
| Nathusius' pipistrelle | 0.35 | 1 |

| Species | % of total bat calls recorded | BHSI Rating |
|---|---|---|
| Leisler's bat | 0.13 | 29 |
| Brown long-eared bat | 0.06 | 38 |
| Lesser horseshoe bat | 0.06 | 18 |
| Unidentified bats | 3.2 | N/A |

The BHSI ratings are considered to be somewhat at odds with the level of activity recorded on-site. As discussed in **Section 5.1.1.3** above, the BHSI ratings are not predictive and are intended to be interpreted on a broad, landscape-scale, rather than on a local scale (a specific location). For example, those landscape features considered to be of particular significance to brown long-eared bat may be abundantly available in the wider landscape but not at the subject site. At the local level, the relative abundance and distribution of the species recorded is likely primarily influenced by the types of factors which are discussed in **Sections 0** to **3.4** above. Therefore, the discordances noted are not considered to have any implications for the interpretation of the survey data.

#### 6.7.1.2 Bat passes Recorded at Individual Sampling Points

The total numbers of bat passes recorded at each sampling point during the April survey period are shown below in **Table 16** below. These are broken down by species or genus, and also include the calls for which a species or genus could not be attributed. Sampling points are ranked highest to lowest, in terms of total calls recorded/level of activity. The total activity recorded at each sampling point as a percentage of the overall total activity recorded is also included.

Common pipistrelle was the most frequently recorded species at all sampling points (SPs). The highest number of calls attributable to this species at any one location occurred at SP2 (located on the exterior face of the hotels southern elevation), where a total of 1,989 passes were recorded, although an almost equally high number of common pipistrelle calls (1,827) were recorded at SP1 (on the ground floor of the middle tower), during the same period. The highest level of bat activity overall was recorded at SP2 (outside the hotel) (31.4% of all calls recorded) followed by SP1 (inside the hotel) (29.4%); the lowest level was recorded at SP5 (treeline) (10.8%).

Cells highlighted yellow indicate the largest number of bat passes recorded at a sampling point for each species; the cell highlighted green is the largest sampling point total over the survey period.

**Table 16. Number of bat passes of each species recorded at each sampling point during the April 2023 survey**

| SP | Location | *Myotis* spp. | Leisler's bat | Nath pip | Com pip | Sop pip | Brown long-eared bat | Lesser Horseshoe | NoID | Total | % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | Outside hotel, facing open grassland | 15 | 2 | 9 | 1989 | 12 | 0 | 3 | 42 | 2072 | 31.4 |
| 1 | Middle tower, ground-floor | 1 | 0 | 8 | 1827 | 6 | 0 | 1 | 97 | 1940 | 29.4 |
| 4 | Treeline | 7 | 2 | 0 | 956 | 76 | 0 | 0 | 54 | 1095 | 16.6 |
| 3 | Derelict house (ground-floor) | 2 | 1 | 0 | 757 | 9 | 0 | 0 | 10 | 779 | 11.8 |
| 5 | Treeline | 20 | 4 | 6 | 615 | 60 | 4 | 0 | 7 | 716 | 10.8 |
| **Total** | | **45** | **9** | **23** | **6144** | **163** | **4** | **4** | **210** | **6602** | |
| **%** | | **0.7** | **0.13** | **0.35** | **93.0** | **2.5** | **0.06** | **0.06** | **3.2** | | |

#### 6.7.1.3 Overview of Levels of Bat Activity recorded during PAB surveys April 2023

The results pertaining to each species recorded during the April 2023 PAB surveys are outlined and summarised in this section. At least seven of the nine bat species which are normally resident in Ireland were recorded during the April 2023 passive surveys. Recorded calls which could not be attributed to a species or genus were also recorded within the proposed site. These include one or more species belonging to the genus *Myotis* (which includes Natterer's, Daubenton's and whiskered bat) (see **Section 5.8.2.3** above). Across all SPs, bat activity was recorded on 15 of the 16 survey nights, although bat activity was somewhat intermittent at some SPs over the survey window. The breakdown of nights where bat activity was recorded at each SP is shown in **Table 17** below.

**Table 17. Overview of general levels of bat activity recorded at each sampling point in April 2023**

| SP | Location | No. of Positive Nights Bat Activity/ No. Nights in Survey Window |
|---|---|---|
| 1 | Middle tower, ground-floor | 13/16 nights deployment |
| 2 | Outside hotel, facing open grassland | 14/16 nights deployment |
| 3 | Derelict house (ground-floor) | 11/16 nights deployment |
| 4 | Treeline | 13/16 nights deployment |
| 5 | Treeline | 15/16 nights deployment |

To determine the level of bat activity it is important to look at the nightly and hourly averages of bat calls recorded. The level of nightly/hourly bat activity was divided into three brackets, as outlined below:

- Low = <10 bat passes per night/hour;
- Medium = 10 – 49 bat passes per night/hour and,
- High = ≥50 bat passes per night/hour.

For each species and SP, the average nightly and average hourly rates recorded were compared, and the highest rating assigned (either on a nightly or hourly basis) used to indicate the overall level of species activity at each SP location. On the basis of the nightly/hourly average calls, for common pipistrelle an overall activity rating of 'High' was assigned for SPs 1-4, while a 'Medium' activity rating was assigned for SP5. For all other species recorded, the activity rating was assigned 'Low' for all SP locations during the April survey period (see **Table 18** below, species have been ranked highest to lowest in terms of overall number of nights recorded on-site in April 2023).

**Table 18. Overview of individual species activity recorded in April 2023 with overall species activity rating assigned**

| Species | No. of positive nights activity across site/ No. nights in survey window | No. of positive SPs/ No. SP locations | SP with highest total calls | SP with highest nightly total calls | Overall activity rating assigned/ SP* |
|---|---|---|---|---|---|
| **Common pipistrelle** | 15/16 nights deployment | 5/5 | 2 | 2 | SP1 – SP4 = **High**<br>SP5 = **Medium** |
| **Soprano pipistrelle** | 11/16 nights deployment | 5/5 | 4 | 4 | SP1 – 5 = **Low** |
| **Myotis spp.** | 12/16 nights deployment | 4/5 | 5 | 2 | SP1 – 5 = **Low** |
| **Nathusius' pipistrelle** | 8/16 nights deployment | 3/5 | 2 | 1 | SP1 – 5 = **Low** |
| **Leisler's bat** | 4/16 nights deployment | 4/5 | 5 | 5 | SP1 – 5 = **Low** |
| **Brown long-eared bat** | 3/16 nights deployment | 1/5 | 5 | 5 | SP1 – 5 = **Low** |
| **Lesser horseshoe bat** | 1/16 nights deployment | 2/5 | 2 | 2 | SP1 – 5 = **Low** |

*based on the nightly/hourly averages of species calls recorded

The average nightly and hourly rates of calls for each species are tabulated in **Appendix 2** of this report. Further information on PAB results for species which were detected close to sunset and/or sunrise times is provided in **Appendix 3** of this report, for relevant species and SPs.

The levels of bat activity recorded in the context of the value of the site for foraging and commuting bats are discussed in **Section 7.1.1** below. The levels of bat activity recorded in the context of the value of the site for roosting bats are discussed in **Section 7.1.2** below.

### 6.7.2 May 2023 - Hotel Interior

#### 6.7.2.1 Species Recorded & Activity Levels

A total of 3,711 bat passes, including passes to which a species or genus could not be attributed, were recorded during the 13 nights of deployment. Common pipistrelle was the most frequently recorded species and the total number of bat passes attributed to this species (3,239 passes) comprised 87.28% of the total, with the next most frequently recorded species comprising lesser horseshoe bat with 219 passes (5.9% of the total). Soprano pipistrelle (90 passes), Nathusius' pipistrelle (11 passes), Leisler's bat (7 passes), and bats from the genus *Myotis* (4 passes) were recorded in relatively low numbers, accounting for a combined total of 112 passes, corresponding to 3.03% of all calls recorded over the 13-night survey period.

Bat passes recorded which could not be attributed to a species or genus comprised 3.79% (141 passes) of the total number recorded. The species recorded are listed in **Table 19** below, with the percentage of the total number of bat passes/calls per species and the BHSI rating for each species outlined.

**Table 19. Percentage of total bat calls recorded in May 2023, categorised by species and with corresponding BHSI Rating for the area**

| Species | % of total bat calls recorded | BHSI Rating |
|---|---|---|
| Common pipistrelle | 87.28 | 25 |
| Lesser Horseshoe Bat | 5.9 | 18 |
| Soprano pipistrelle | 2.45 | 35 |
| Nathusius' pipistrelle | 0.29 | 1 |
| Leisler's bat | 0.19 | 29 |
| *Myotis* spp. | 0.1 | 22 |
| Natterer's bat/ | | 23 |
| Daubenton's bat/ | | |
| Whiskered bat | | 10 |
| Brown long-eared bat | 0 | 38 |
| Unidentified bats | 3.79 | N/A |

As for the April results, the BHSI ratings which have been assigned to the general area are somewhat at odds with the level of activity recorded on-site. The relative abundance and distribution of the species recorded is likely primarily influenced by the types of factors which are discussed in **Section 3.3** to **3.4** above and the discordances noted are not considered to have any implications for the interpretation of the survey data.

#### 6.7.2.2 Bat passes Recorded at Individual Sampling Points

The total numbers of bat passes recorded at each sampling point during the May survey period are shown below in **Table 20**. These are broken down by species or genus, and also include the calls for which a species or genus could not be attributed. Sampling points are ranked highest to lowest, in terms of total calls recorded/level of

activity. The total activity recorded at each sampling point as a percentage of the overall total activity recorded is also included.

Common pipistrelle was the most frequently recorded species at all sampling points (SPs). The highest number of calls attributable to this species at any one location occurred at SP1 (on the ground floor of the middle tower), where a total of 1,832 passes were recorded. High numbers of common pipistrelle were also recorded at SP2 (ground floor of bedroom block) during the same period. The highest level of activity generally was recorded at SP1 (on the ground floor of the middle tower) (51.5% of all calls recorded), followed by SP2 (ground floor bedroom block) (35.3%); the lowest level was recorded at SP3 (bedroom block – first floor room) (0.02%). Cells highlighted yellow indicate the largest number of bat passes recorded at a sampling point for each species; the cell highlighted green is the largest sampling point total over the survey period.

**Table 20. Number of bat passes of each species recorded at each sampling point during the May 2023 survey**

| SP | Location | *Myotis* spp. | Leisler's bat | Nathusius' pipistrelle | Common pipistrelle | Soprano pipistrelle | Brown long-eared bat | Lesser Horseshoe | NoID | Total | % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Middle tower (ground floor) | 4 | 2 | 3 | 1832 | 57 | 0 | 5 | 10 | 1913 | 51.5 |
| 2 | Bedroom block (ground floor) | 0 | 0 | 7 | 1246 | 4 | 0 | 0 | 51 | 1308 | 35.3 |
| 5 | Middle tower (2nd floor landing) | 0 | 0 | 1 | 2 | 0 | 0 | 197 | 18 | 218 | 5.9 |
| 4 | Middle tower (2nd floor landing) | 0 | 4 | 0 | 114 | 13 | 0 | 16 | 25 | 172 | 4.6 |
| 6 | Middle tower (roof entrance) | 0 | 1 | 0 | 45 | 16 | 0 | 0 | 37 | 99 | 2.7 |
| 3 | Bedroom block (first floor room) | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0.02 |
| **Total** | | **4** | **7** | **11** | **3239** | **90** | **0** | **219** | **141** | **3711** | |
| **%** | | **0.1** | **0.19** | **0.29** | **87.28** | **2.45** | **0** | **5.9** | **3.79** | | |

### 6.7.2.3 Overview of Levels of Bat Activity recorded during PAB surveys in May 2023

The results pertaining to each species recorded during the May 2023 PAB surveys are outlined and summarised in this section. At least six of the nine bat species which are normally resident in Ireland were recorded during the May 2023 passive surveys. Recorded calls which could not be attributed to a species or genus were also recorded within the proposed site. These include one or more species belonging to the genus *Myotis* (which includes Natterer's, Daubenton's and whiskered bat) (see **Section 5.8.2.3** above). Across all SPs, bat activity was recorded on all survey nights, although bat activity was somewhat intermittent at some SPs over the survey window. The breakdown of nights where bat activity was recorded at each SP is shown in **Table 21** below.

**Table 21. Overview of general levels of bat activity recorded at each sampling point in May 2023**

| SP | Location | No. of Positive Nights Bat Activity/ No. Nights in Survey Window |
|---|---|---|
| 1 | Middle tower (ground floor) | 13/13 nights deployment |
| 2 | Bedroom block (ground floor) | 12/13 nights deployment |
| 3 | Bedroom block (first floor room) | 1/13 nights deployment |
| 4 | Middle tower (2nd floor landing) | 12/13 nights deployment |
| 5 | Middle tower (2nd floor landing) | 11/13 nights deployment |
| 6 | Middle tower (roof entrance) | 12/13 nights deployment |

As for the April PAB results, the level of nightly/hourly bat activity was divided into three brackets (see **Section 6.6.1.3** above). For each species and SP, the average nightly and average hourly rates recorded were compared, and the highest rating assigned (either on a nightly or hourly basis) used to indicate the overall level of species activity at each SP location. On the basis of the nightly/hourly average calls, an overall activity rating of 'High' was assigned for SP1 and SP2 for common pipistrelle, while a 'Medium' activity rating was assigned for SP5 for lesser horseshoe bat. For all other species recorded, the activity rating was considered 'Low' for all SP locations during the May survey period (see **Table 22** below, species have been ranked highest to lowest in terms of overall number of nights recorded on-site).

**Table 22. Overview of individual species activity recorded in May 2023 with overall species activity rating assigned**

| Species | No. of positive nights activity across site/ No. nights in survey window | No. of positive SPs/ No. SP locations | SP with highest total calls | SP with highest nightly total calls | Overall activity rating assigned/ SP* |
|---|---|---|---|---|---|
| **Common pipistrelle** | 13/13 nights deployment | 5/6 | 1 | 1 | SP1 & SP2 = **High**<br>SP3-SP6 = **Low** |
| **Soprano pipistrelle** | 13/16 nights deployment | 4/6 | 1 | 1 | SP1 – 6 = **Low** |
| **Nathusius' pipistrelle** | 9/16 nights deployment | 3/6 | 2 | 2 | SP1 – 6 = **Low** |
| **Lesser horseshoe bat** | 7/16 nights deployment | 4/6 | 5 | 5 | SP5 = **Medium**<br>SP1-4, SP6 **= Low** |
| **Leisler's bat** | 4/16 nights deployment | 3/6 | 4 | 4 | SP1 – 6 = **Low** |
| **Myotis spp.** | 3/16 nights deployment | 1/6 | 1 | 1 | SP1 – 6 = **Low** |
| **Brown long-eared bat** | 0/16 nights deployment | 0/6 | N/a | N/a | N/a |

*based on the nightly/hourly averages of species calls recorded

The average nightly and hourly rates of calls for each species are tabulated in **Appendix 2** of this report**.** Further information on PAB results for species which were detected close to sunset and/or sunrise times is provided in **Appendix 3** of this report, for relevant species and SPs.

The levels of bat activity recorded in the context of the value of the site for foraging and commuting bats are discussed in **Section 7.1.1** below. The levels of bat activity recorded in the context of the value of the site for roosting bats are discussed in **Section 7.1.2** below.

## 6.8 Winter Hibernation Surveys

### 6.8.1 Winter Roost Inspection Surveys

Daytime building inspection surveys were undertaken within the hotel over the winter period to inspect the interior of the structure (hotel middle tower and bedroom block) for physical evidence of bats and assist in determining whether any part of the hotel had the potential to be used as a roost. January and February 2024 building inspections were undertaken in conjunction with the deployment and collection of static units. As per **Section 6.3** above, the results for the middle tower are discussed in terms of the two separate locations on the second-floor landing (**Table 23** and **Table 24)**, as well as the roof landing (**Table 25**), where physical evidence of bats (droppings) was previously recorded. Results in relation to winter inspections of the hotel bedroom block are outlined in **Table 26** below.

**Table 23. Overview of results of winter building inspection surveys in hotel middle tower (Location 1 on second-floor landing)**

| Location | Results | | | | |
|---|---|---|---|---|---|
| | 18th Dec 2023 | 11th Jan 2024 | 26th Jan 2024 | 19th Feb 2024 | 1st Mar 2024 |
| **Middle tower** | Location 1 – Second floor landing<br>An examination of the floor of the second-floor landing (outside the door to the bedroom block) located the previously recorded droppings under the soprano roost site location (hole where the soprano pipistrelle was previously seen to emerge from) (see **Plate 19** below). **No new physical evidence since April 2023.** | No change. | No change. | No change. | No change. |
| | An examination of the plastic sheeting which was in-situ on the floor adjacent to this area found a **small number (approx. 15) of individual droppings** (see **Plate 19** below). **These droppings were captured sometime in the intervening period since early May 2023 when the plastic was deployed.** | No change. | **One potential dropping captured in 2-week period intervening since last check.** | No change. | No change. |
| | An accumulation of degraded droppings was found elsewhere in the same general area. This **accumulation, broadly linear in shape and concentrated in distribution, was located beneath a small hole in blockwork** above (see **Plate 19** below) (which had been identified as a potentially suitable roost site location during the PRAs undertaken in April 2023). **These droppings were captured sometime in the intervening period since early May 2023.** | No change. | No change. | No change. | No change. |

**Plate 19. Results of winter building inspection survey in the hotel Middle Tower on 18/12/23 at Location 1 - second-floor landing. Top left) 'new' droppings on floor under small crevice at top of wall (inset), Top Centre) small number of droppings on plastic sheet laid beneath metal pipe (inset) in same general area, Top Right) same droppings as from April 2023 – no apparent change, Bottom) Overview of 'Location 1' landing area showing all the above.**

**Table 24. Overview of results of winter building inspection surveys in hotel middle tower (Location 2 on second-floor landing)**

| Location | Results | | | | |
|---|---|---|---|---|---|
| | 18th Dec 2023 | 11th Jan 2024 | 26th Jan 2024 | 19th Feb 2024 | 1st Mar 2024 |
| Middle tower | Location 2 – Second-floor landing<br>An examination of the plastic sheeting which was still in-situ underneath the relatively large hole in the ceiling in this part of the Middle tower landing identified new droppings. These were largely degraded and amassed into relatively large clumps, although a small number (<20) of individual droppings were identifiable. The clumps exhibited a scattered distribution across the plastic; however, were more concentrated on one side of the plastic sheet (comprising the right-hand side, same side as the doorway of the tiled shower room). **Accumulation of droppings on top of the plastic, captured sometime since early May 2023** (see **Plate 20** below left).<br><br>Possible feeding remains were also recorded. These comprised 1-2 pairs of large, clear, laced unidentified insect wings (found on the floor in close proximity to the plastic sheeting, discussed above), as well as five individual butterfly wings (small tortoiseshell butterfly), found several metres away on the floor of the bedroom adjacent. These were in poor condition, appearing ragged and faded and looked to have been in place for some time. **Possible feeding remains recorded, deposited sometime since early May 2023** (see **Plate 20** below left). | No change. | **One potential dropping captured in 2-week period intervening.** A small amount of water pooled on plastic. | **Approx. 10 droppings on top of plastic sheet in 3-week period intervening*** <br><br>See **Plate 20** below right. | No change. |

*The droppings (approx. 10) located on top of the plastic sheet at Location 2 on 19th February 2024 were sitting in pooled water. From floor-level, water ingress was apparent throughout the hole in suspending ceiling directly above (trickling/dripping water on blockwork, wood and pipework within the hole in ceiling).

**Plate 20. Left) Accumulation of droppings on top of plastic sheeting and possible feeding remains located at/in vicinity of Location 2. Located on 18/12/23 and deposited sometime since early May 2023. Right) Approximately ten droppings sitting in pooled water on same plastic sheet, located on 19/02/24, deposited over January and February 2024.**

**Table 25. Overview of results of winter building inspection surveys in hotel middle tower (Location 3 – roof landing area)**

| Location | Results | | | | |
|---|---|---|---|---|---|
| | 18th Dec 2023 | 11th Jan 2024 | 26th Jan 2024 | 19th Feb 2024 | 1st Mar 2024 |
| Middle tower | Location 3 – Roof landing<br>An examination of the roof landing area of the hotel middle tower did not yield any additional evidence of bats. The droppings which had been noted previously in April 2023 were still in-situ. **No new physical evidence since April 2023.** | No change. | No change. | No change. | No change. |

**Table 26. Overview of results of winter building inspection surveys in hotel bedroom block (Location 4, first-floor bedroom on landward side)**

| Location | Results | | | | |
|---|---|---|---|---|---|
| | 18th Dec 2023 | 11th Jan 2024 | 26th Jan 2024 | 19th Feb 2024 | 1st Mar 2024 |
| Bedroom Block | Location 4 – Bedroom block (1st floor, landward side)<br><br>Not surveyed. | Some potential bat droppings located on floor and attached to wall beneath an old vent opening in bedroom. Bird droppings also present on floor in same location.<br><br>**Potential droppings located.** | No change. | No change. | No change. |

### 6.8.2 Winter Passive Automated Bat Surveys

#### 6.8.2.1 January 2024 – Hotel Interior

Species Recorded & Activity Levels

A total of 113 bat passes, including passes to which a species or genus could not be attributed, were recorded during the 15 nights of deployment of passive units in January 2024. Common pipistrelle comprised the only species recorded with a total of 103 passes, comprising 91.15 % of all calls. Bat passes which could not be attributed to a species or genus comprised 8.85 % (10 passes) of the total number recorded (see **Table 27** below).

Bat passes Recorded at Individual Sampling Points

The total numbers of bat passes recorded at each sampling point during the January survey period are shown below in **Table 27**. These are broken down by species or genus, and also include the calls for which a species or genus could not be attributed. The total activity recorded at each sampling point as a percentage of the overall total activity recorded is also included.

The highest number of common pipistrelle calls was recorded at SP4 (on the first floor of the bedroom block, second bedroom on the right facing inland), where a total of 102 passes were recorded. One common pipistrelle call was also recorded in the roof landing area. Cells highlighted yellow indicate the largest number of bat passes recorded at a sampling point for each species; the cell highlighted green is the largest sampling point total over the survey period.

**Table 27. Total numbers of bat passes recorded for each species at each sampling point in January 2024**

| SP | *Myotis* spp. | Leisler's bat | Nathusius' pipistrelle | Common pipistrelle | Soprano pipistrelle | Brown long-eared bat | Lesser Horseshoe | NoID | Total | % |
|---|---|---|---|---|---|---|---|---|---|---|
| **(1)** Ground floor of tower just inside entrance door attached to stairs banister | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0.88 |
| **(2)** In roof area of tower attached to stairs banister | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 4 | 5 | 4.42 |
| **(3)** Second floor landing of tower, outside tiled bathroom | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 4 | 3.54 |
| **(4)** Bedroom wing, first floor landward side | 0 | 0 | 0 | 102 | 0 | 0 | 0 | 1 | 103 | 91.15 |
| **Total** | **0** | **0** | **0** | **103** | **0** | **0** | **0** | **10** | **113** | |
| **%** | **0** | **0** | **0** | **91.15** | **0** | **0** | **0** | **8.85** | | |

The average nightly and hourly rates of calls for each species are tabulated in **Appendix 2** of this report. Further information on PAB results for species which were detected close to sunset and/or sunrise times is provided in **Appendix 3** of this report, for relevant species and SPs.

#### 6.8.2.2 February 2024 – Hotel Interior and Wider Site

Species Recorded & Activity Levels

A total of 1,534 bat passes, including passes to which a species or genus could not be attributed, were recorded during the 11 nights of deployment of passive units in February 2024. Four bat species were recorded. Common pipistrelle accounted for the vast majority of all calls with a total of 1,421 passes recorded, comprising 92.63% of all calls. For the remaining three species identified, 15 passes were attributed to soprano pipistrelle, 3 passes were attributed to *Myotis* spp., and one pass was attributed to lesser horseshoe bat, accounting for 0.99%, 0.2% and 0.06% of all calls respectively. Bat passes which could not be attributed to a species or genus comprised 6.12 % (94 passes) of the total number recorded (see **Table 28** below).

Bat passes Recorded at Individual Sampling Points

The total numbers of bat passes recorded at each sampling point during the February survey period are shown below in **Table 28**. These are broken down by species or genus, and also include the calls for which a species or genus could not be attributed. The total activity recorded at each sampling point as a percentage of the overall total activity recorded is also included.

The highest number of common pipistrelle calls was recorded at SP4 (bedroom on first floor of the bedroom block), where a total of 552 passes were recorded. Common pipistrelle was also recorded at SP2 (roof landing area of middle tower), SP3 (second-floor landing of middle tower), SP5 (ground-floor hallway of bedroom block), SP6 (inside derelict cottage) and at SP7 (along treeline). The highest number of soprano pipistrelle calls was recorded at SP7 (along treeline), with very small numbers of calls also recorded at locations within the hotel middle tower and bedroom block and within the derelict cottage (SP2, SP4, SP6). One lesser horseshoe bat call was recorded in the derelict cottage. Cells highlighted yellow indicate the largest number of bat passes recorded at a sampling point for each species; the cell highlighted green is the largest sampling point total over the survey period.

**Table 28. Total numbers of bat passes recorded for each species at each sampling point in February 2024**

| SP | *Myotis* spp. | Leisler's bat | Nathusius' pipistrelle | Common pipistrelle | Soprano pipistrelle | Brown long-eared bat | Lesser Horseshoe | NoID | Total | % |
|---|---|---|---|---|---|---|---|---|---|---|
| **(1)** Ground floor of Middle tower | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 4 | 0.3 |
| **(2)** Middle tower roof area | 0 | 0 | 0 | 24 | 3 | 0 | 0 | 23 | 50 | 3.3 |
| **(3)** Middle tower, second floor landing | 0 | 0 | 0 | 79 | 0 | 0 | 0 | 15 | 94 | 6.1 |
| **(4)** Bedroom block, first floor bedroom | 1 | 0 | 0 | 552 | 4 | 0 | 0 | 14 | 571 | 37.2 |
| **(5)** Bedroom block ground floor corridor | 0 | 0 | 0 | 348 | 0 | 0 | 0 | 18 | 366 | 23.9 |
| **(6)** Derelict cottage | 0 | 0 | 0 | 143 | 1 | 0 | 1 | 0 | 145 | 9.4 |
| **(7)** Treeline | 2 | 0 | 0 | 275 | 7 | 0 | 0 | 20 | 304 | 19.8 |
| **Total** | **3** | **0** | **0** | **1421** | **15** | **0** | **1** | **94** | **1534** | |
| **%** | **0.2** | **0** | **0** | **92.63** | **0.99** | **0** | **0.06** | **6.12** | | |

The average nightly and hourly rates of calls for each species are tabulated in **Appendix 2** of this report. Further information on PAB results for species which were detected close to sunset and/or sunrise times is provided in **Appendix 3** of this report, for relevant species and SPs.

# 7. Discussion

### 7.1.1 Value of Site for Foraging and Commuting Bats

The proposed development site is lacking in the types of linear habitat features (hedgerows, treelines and watercourses) which are typically associated with relatively higher degrees of usage by foraging or commuting bats generally. The linear treeline in the east of the site comprises the only linear habitat feature of note within the development site.

Two static units were deployed along this treeline during the April PAB surveys (comprising SP4 and SP5) (see **Section 6.6.1.2** above). Across the site, the highest total calls for soprano pipistrelle were recorded at SP4 while the highest total calls for *Myotis* spp, Leisler's bat and brown long-eared bat were recorded at SP5. In terms of activity levels, based on the nightly and hourly call averages, a 'Low' activity level was assigned for all species recorded at SP4 and SP5, except for common pipistrelle which ranged between 'Moderate' and 'High' at the two SPs. A static unit was also deployed along the treeline in February 2024 (SP7) to gain an understanding of bat usage of this area during the winter season. Across the site, the highest total calls for soprano pipistrelle and *Myotis* spp., were recorded at SP7 in February, although the total number of calls recorded for each species was negligible (see **Section 6.7.2.2** above).

As outlined in **Section 6.2** above, this feature is connected, to some degree, to scrub and other linear features in the wider landscape, via sparse, low-growing hedgerow adjoining the beach access road; however, it is not connected to any linear features, or any of the structures, encompassed within the proposed development site, being situated at a remove of 110 m and 130 m from the derelict cottage and nearest point of the hotel respectively. The distance between the treeline and the nearest point of the intact section of the hotel, taken to comprise the middle tower and bedroom block, which bats were recorded using, is greater, at approximately 180m.

Baseline surveys undertaken at the proposed development site have determined that bats are using both of these structures. Therefore, despite any linear connection between either of these structures and the nearest linear feature (treeline), it is evident that bats are crossing surrounding areas of open habitat to move between both the derelict cottage and derelict hotel and different parts of the site/the wider landscape.

April 2023 PAB surveys at SP2 (located just south of the hotel facing seaward onto open and exposed coastal grassland) recorded the highest total calls for Nathusius' pipistrelle, common pipistrelle and lesser horseshoe bat[15] from across all SPs, and also the highest total calls overall for the survey period (see **Section 6.6.1.2** above). In terms of activity levels, based on the nightly and hourly call averages, a 'Low' activity level was assigned for all species recorded at SP2, except for common pipistrelle for which a 'High' activity rating was assigned.

The grassland habitats surrounding the hotel, although highly exposed with virtually nothing in the way of sheltering or protective features, as per Collins (2023) and not well connected to the wider landscape, still retains a degree of value to foraging bats. Species such as Natterer's bat, Leisler's bat, common pipistrelle, soprano pipistrelle and Nathusius' pipistrelle, can all utilise grassland/pasture for foraging (Collin, 2023). It is considered that the absence of artificial lighting within the site allows a greater degree of usage of more open habitats within

[15] Three LHS passes recorded at SP2 on 10th April 2023 (the first of which was recorded at 21:24 Hrs).

the site by bats, which would not be the case, at least to the same degree, if artificial lighting was present. Lesser horseshoe bat, for example, recorded inside the hotel, are a highly light-sensitive species and are usually reliant on linear features to navigate through the landscape, rarely travelling across open ground, however, will do so if conditions are very dark (Schofield, 2008), as is the case at the proposed development site.

### 7.1.2 Value of Site for Roosting Bats

Marnell *et al.*, (2022) outlines various factors which can affect the probability of bats being present within a structure (specifically summer usage of buildings by bats). This guidance was reviewed and used to assist in characterising the value of the various structures as bat roosting habitat and the general potential of structures to support roosts of any significance.

Factors relevant to the hotel, as per Marnell *et al.*, (2022), which are considered to increase the probability of bats occurring comprise its low level of usage, largely undisturbed, rural setting, and the high occurrence of open windows and other potential bat entry and exit points. Factors which are considered to decrease the probability of the hotel being used by bats comprise primarily its modern construction. The derelict cottage is considered to have an increased probability of usage in summer by virtue of its lack of human usage, its large roof void, warmed by the sun, with unobstructed flying space, its many potential entry/exit points and its rural, undisturbed setting.

With regard to bat activity, the levels which have been recorded are of note with particular regard to the landscape setting of the proposed development site and absence of linear features. While the site comprises a very open, exposed and seemingly harsh environment, the presence of the structures, despite their poor condition overall, and levels of, albeit low, human activity in the case of the hotel, likely increases the value of the overall site to bats in what is otherwise a relatively barren landscape in terms of features typically associated with high bat activity.

Bats have been confirmed roosting on-site. In the context of the local surrounding landscape and potentially the availability of roosting habitat locally, the structures are of value to local populations of some species as they provide places of refuge and shelter in an area not impacted by artificial lighting.

#### 7.1.2.1 Roost Characterisation

Hotel Middle Tower

On the basis of the results regarding both common and soprano pipistrelle, including the results of PRA surveys (droppings recorded at three locations, possible feeding remains recorded and a 'moderate' roost suitability assigned) (see Section 6.3.1.1.2 above), the results of the dusk/dawn surveys (see Section 6.5.1 above), where very low numbers of both species were recorded roosting within the Middle Tower, (five and one individual, respectively), and preliminary analysis of the timestamps of individual calls recorded during April and May PAB surveys (see Appendix 3 of this report), with early detection times recorded on multiple dates, it is considered that the middle tower supports day/night roosts for both these species. The results indicate that significant roosts are not present.

The PAB survey results from within the hotel middle tower, most notably in May 2023, recorded lesser horseshoe bat, including during the typical post-sunset roost emergence period for this species (see Appendix 3 of this report). On the basis of the May 2023 PAB survey results in this part of the hotel, comprising low levels of intermittent activity for lesser horseshoe bat, in conjunction with the results of the PRA surveys, it is considered that the hotel middle tower potentially supported a day/night roost for low numbers (likely individuals) of this species at the time of the survey.

This conclusion regarding the potential presence of a lesser horseshoe bat roost within the hotel middle tower is based on PAB and PRA survey results. This species was not recorded during either the dusk emergence or dawn

re-entry surveys undertaken at the hotel in May, June and July 2023. The hotel middle tower does not contain any form of roof void, loft/attic or other similar large space which would be considered to comprise typical roosting habitat for lesser horseshoe bat; therefore, the structure is not considered to be suitable to support any type of significant roost for this species based on the structural characteristics of the hotel and an absence of typical suitable roosting areas. However, smaller crevices and voids which could potentially be used by individual or small numbers of lesser horseshoe bat are present within this part of the hotel.

The winter PAB results within the roof-landing area of the hotel middle tower indicate that common pipistrelle were potentially roosting within proximity to the SP during the winter survey window. This finding is based solely on preliminary analysis of the timestamps of individual calls recorded during PAB surveys (see **Appendix 3** of this report). No new physical evidence of roosting bats (e.g. droppings, feeding remains etc), other than that recorded in April 2023 (see **Section 6.3.1.1.2** above), was recorded anywhere within the middle tower roof landing area over the course of the winter 2023/24 period. On the basis of the survey evidence, it is considered that this part of the hotel may support a common pipistrelle hibernation roost.

Hotel Bedroom Block

On the basis of the May PAB survey results regarding common pipistrelle, it is considered that the bedroom block ground-floor potentially supports a roost for this species. This finding is based solely on preliminary analysis of the timestamps of individual calls recorded during May PAB surveys (see **Appendix 3** of this report). No physical evidence of roosting bats (e.g. droppings, feeding remains etc) were recorded anywhere within the bedroom block during spring/summer/autumn 2023.

Due to the results of PRA surveys and considering the structural characteristics of the hotel which mean that the building is unlikely to provide sufficiently warm internal summer temperatures, it is considered that the likelihood of a significant/maternity roost being present is reduced. However, on a highly precautionary basis, and with sole regard to the May PAB results, it is considered that the presence of a common pipistrelle summer/maternity roost within the ground-floor of the bedroom block cannot be ruled out.

On the basis of physical evidence of bats recorded within the bedroom block during winter inspection surveys (See **Section 6.7.1** above) and including preliminary analysis of the timestamps of individual calls recorded during both the January and February 2024 PAB surveys (see **Appendix 3** of this report), it is considered that the bedroom block (both the first floor and ground-floor) potentially supports minor hibernation roosts for common pipistrelle.

Derelict cottage

On the basis of the dusk emergence and dawn re-entry surveys undertaken in June and July 2023 (see **Section 6.5.2** above), and the April PAB results, including preliminary analysis of the timestamps of individual calls recorded (see **Appendix 3** of this report), it is considered that the derelict cottage supports a day/night roost for common pipistrelle (and potentially also soprano pipistrelle & *Myotis* spp.). The derelict cottage potentially supports a minor hibernation roost for common pipistrelle; however, this finding is solely based on preliminary analysis of the timestamps of individual calls recorded during the February 2024 PAB surveys (see **Appendix 3** of this report), no physical evidence of bats was found within or around the structure during any surveys. **Table 29** below provides and overview and characterisation of confirmed or possible bat roosts on-site.

**Table 29. Overview and characterisation of bat roosts on-site**

| General location | Roost Type | Confirmed/Likely Roost Location & Physical Characteristics | Bat Species & No. | Access points | Current Vegetation and Lighting Arrangement at Access Points | Level of Human Disturbance |
|---|---|---|---|---|---|---|
| **Hotel – Middle Tower** | Day/Night Roost | Second-floor landing – crevices in blockwork/ hole in suspended ceiling. One crevice confirmed for SP. | **Common pipistrelle** x 5 minimum; **Soprano pipistrelle** x 1 minimum; **Lesser horseshoe bat** x 1 minimum | Open windows/gaps in window hoardings, gaps around window/door frames | No tall vegetation present. No artificial lighting. | Low |
| **Hotel – Middle Tower** | ***Potential*** Hibernation roost (minor) (***based on static detector results only***) | Roof-landing area - crevices in blockwork | **Common pipistrelle** | | | |
| **Hotel – Bedroom Block** | ***Potential*** Summer (non-breeding) or Maternity Roost ***(based on static detector results only)*** | Ground-floor (specific location not determined). | **Common pipistrelle** | Open windows throughout floor. | No tall vegetation present. No artificial lighting. | Low |
| **Hotel – Bedroom Block** | ***Potential*** Hibernation roost (minor) (***based on static detector results and building survey***) | First-floor bedroom (wall vent); Ground-floor (specific location not determined). | **Common pipistrelle** | | | |
| **Derelict Cottage** | Day/Night Roost | Building interior (gaps, crevices, loft space) – specific location not determined. | **Common pipistrelle x 1, *Myotis* spp. x 1** (*potentially also Soprano pipistrelle based on static detector results only*) | Open windows & doors, gaps around window & door frames, holes in roof. | No tall vegetation present. No artificial lighting. | Negligible |
| **Derelict Cottage** | ***Potential*** Hibernation roost (minor) (***based on static detector results only***) | Building interior (gaps, crevices, loft space) – specific location not determined (access issues to upper floor re H&S). | **Common pipistrelle** | | | |

# 8. Ecological Evaluation

The following table (**Table 30**) outlines the ecological evaluation assigned to each species recorded during surveys with regard to the proposed development site, including the roost evaluation, where relevant.

**Table 30. Ecological evaluation assigned to each species recorded during surveys**

| Species | Survey Results | Ecological value relative to study area | Roost Evaluation (Marnell *et al.*, 2022) |
|---|---|---|---|
| **Common pipistrelle** | Day/Night Roost<br>Summer or Maternity Roost (*potential*)<br>Hibernation Roosts (minor) (*potential*)<br>Foraging/commuting | Local importance (higher value) | 'Hibernation sites for small numbers of common/rarer species' and potentially 'Maternity site of common species' – Moderate significance |
| **Soprano pipistrelle** | Day/Night Roost<br>Foraging/commuting | Local importance (higher value) | 'Small numbers of common species. Not a maternity site' – Low significance |
| **Lesser horseshoe bat** *Myotis* **spp.** | Day/Night Roost<br>Foraging/commuting | Local importance (higher value) | 'Small numbers of rarer species. Not a maternity site' – Moderate significance |
| **Leisler's bat**<br>**Nathusius' pipistrelle** | Foraging/commuting | Local importance (higher value) | N/a |
| **Brown long-eared bat** | Foraging/commuting | Negligible | N/a |

# 9. Conclusion

The following species were recorded within the proposed development site during the PAB surveys; common pipistrelle, soprano pipistrelle, lesser horseshoe bat, species from the genus *Myotis*, Nathusius' pipistrelle, Leisler's bat and brown long-eared bat.

The site does not contain an abundance of high-value foraging and commuting habitat. The mature conifer treeline within the site to considered to be of 'moderate' value, while the open, improved/semi-improved grassland is considered to be of 'low to moderate' value. Overall, the levels of bat activity recorded were considered 'high' for common pipistrelle and 'low' for all other species recorded. It is considered that the activity levels recorded during the PAB surveys are reflective of the normal patterns that pertain to the location.

Surveys have determined low numbers of bats (common pipistrelle, soprano pipistrelle, lesser horseshoe bat and *Myotis* spp.) to be utilising the hotel and/or derelict cottage for roosting. Bat activity was also recorded in different parts of the hotel over the winter period indicating potential presence of hibernating bats. The hotel middle tower has been found to support day/night roosts for common pipistrelle, soprano pipistrelle and lesser horseshoe bat. The hotel potentially supports other roosts for common pipistrelle. The derelict cottage has been found to support day/night roosts for common pipistrelle and *Myotis* spp. The derelict cottage potentially supports other a roost for soprano pipistrelle and other roosts for common pipistrelle.

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# Appendix 1

## Irish Bat Species Profiles

Common pipistrelle (*Pipistrellus pipistrellus*) – Peak call frequency 45kHz

The common pipistrelle is one of Irelands smallest and most common bat. Like all bat species found in Ireland they are nocturnal, feeding on midges, moths and other flying insects that they find in the dark by using echolocation and can be found in both rural and urban areas. A single pipistrelle (weighing approximately 5-6 grams, the weight of a 1-euro coin) can consume as many as 3,000 of these insects in one night (BCI, 2024)[1], providing an ecosystem service as nature's pest control. Common pipistrelles emerge around 20 minutes after sunset and are fast flying species and tend to zig-zag whilst flying which helps them to catch their insect prey (UOB, 2024)[2] and usually fly approximately 5 to 10 meters from the ground (Russ, 1999)[3].

The common pipistrelle's distribution is widespread and is found throughout the island of Ireland (NBDC, 2024)[4]. The common pipistrelle frequents a large range of different habitats for foraging and roosting such as urban areas (often feeding around streetlights that their insect prey can be attracted to), woodlands, farmland, gardens, lakes, rivers, hedgerows and tree lines, using the latter linear features to commute across the landscape. Common pipistrelles are known to be crevice dwellers and can fit through openings between 15mm and 20mm and are known to use new and old buildings in gaps and crevices between roof tile, brick work, behind panelling, shutters and eaves as well as roosting in bat boxes and trees throughout spring and summer (UOB, 2024). Maternity roosts tend to be found in close proximity to good foraging and commuting habitat such as improved grassland, built-up areas and close to water and hedgerows/tree lines. During the winter months whilst in hibernation, common pipistrelles can be found to be roosting in trees and buildings, but rarely underground.

Current NPWS Article 17 distribution mapping for common pipistrelle has determined that the species known range and distribution encompasses the relevant hectad, V46 (NPWS, 2019). The common pipistrelle's conservation status in Ireland is currently found to be favourable and improving (NPWS, 2019)[5] with an Irish Red List status of 'Least concern' (Marnell, *et al*., 2019). The population size in Ireland is estimated at 1.2 – 2.8 million (2007-2012) with an estimated core area of 56,485 km$^2$ (Roche, *et al*., 2014).

Soprano pipistrelle (*Pipistrellus pygmaeus*) - Peak call frequency 55kHz

The soprano pipistrelle is also one of Ireland's most common and smallest bat species and shares many traits with the common pipistrelle. The soprano pipistrelle's distribution is also widespread and is found throughout the island of Ireland (NBDC, 2024). The soprano pipistrelle is slightly smaller than the common pipistrelle, and its fur is reddish and is one colour from the roots to the tip and its skin is pale pink as opposed to the common pipistrelle's black skin, found on the ears and face (NBDC, 2024)[6]. A post-calcarial lobe is present on the tail membrane but a ridge between the nostrils distinguishes the soprano from the common pipistrelle, as well as a difference in the pattern of the elastic fibres within the wing membranes (BCI, 2024)[7].

Soprano pipistrelles also emerge around 20 minutes after sunset and are also a fast-flying species. There is also overlap between the soprano and common pipistrelle is that they can be found in similar habitats with soprano

[1] Bat Conservation Ireland (BCI), 2024, *Common and Soprano Pipistrelle*, available from https://www.batconservationireland.org/irish-bats/species/common-and-soprano-pipistrelle accessed March 2024.

[2] University of Bristol (UOB), 2024, *Common Pipistrelle Pipistrellus pipistrellus biology,* available from https://www.bio.bris.ac.uk/research/bats/britishbats/batpages/commonpipi.htm accessed March 2024

[3] Jon Russ, 1999, *The bats of Britain and Ireland echolocation calls, sound analysis and species identification*

[4] National Biodiversity Data Centre (NBDC), 2024, *Common Pipistrelle Pipistrellus pipistrellus profile*, available from https://species.biodiversityireland.ie/profile.php?taxonId=119762#Taxonomy accessed March 2024.

[5] National Parks and Wildlife Service (NWPS), 2019, *The Status of EU Protected Habitats and Species in Ireland. Volume 1: Summary Overview. Unpublished NPWS report.*

[6] National Biodiversity Data Centre (NBDC), 2024, *Soprano Pipistrelle Pipistrellus pygmaeus profile*, available from https://species.biodiversityireland.ie/profile.php?taxonId=119441&taxonGroupName=terrestrial%20mammal&taxonDesignationId=2#Taxonomy accessed March 2024

[7] Bat Conservation Ireland (BCI), 2024, *Common and Soprano Pipistrelle*, available from https://www.batconservationireland.org/irish-bats/species/common-and-soprano-pipistrelle accessed March 2024.

pipistrelle's preferring lakes, rivers and riparian habitats (Vaughan *et al.*, 1997)[8]. Soprano pipistrelles have overlap with the common pipistrelle in regard to roosting preferences. Soprano pipistrelles are also known to be crevice dwellers and will roost in new and old buildings in gaps and crevices between roof tile, brick work, behind panelling, shutters and eaves as well as roosting in bat boxes and trees throughout spring and summer (UOB, 2024)[9]. Winter roosting preferences are also the same as common pipistrelle, roosting in trees and buildings and rarely underground.

Current NPWS Article 17 distribution mapping for soprano pipistrelle has determined that the species known range and distribution does not encompass the relevant hectad, V46 (NPWS, 2019). The soprano pipistrelle's conservation status in Ireland is currently found to be favourable and improving (NPWS 2019) with an Irish Red List status of 'Least concern' (Marnell, *et al.*, 2019). The population size in Ireland is estimated at 0.54 – 1.2 million (2007-2012) with an estimated core area of 62,020 km$^2$ (Roche, *et al.*, 2014).

Nathusius' pipistrelle (*Pipistrellus nathusii*) - Peak call frequency 38kHz (36-40khz)

The Nathusius' pipistrelle is much rarer in Ireland than the common and soprano pipistrelles, its distribution is scarce and scattered across the island of Ireland but is potentially more widespread than the data would suggest, as this species could easily be confused with the other two resident species of pipistrelle (NBDC, 2024)[10]. Since its discovery in Ireland (circa 1996-1997), roosts of this species have been recorded in Armagh, Derry, Down and Fermanagh and species records have been recorded in Cavan, Cork, Dublin, Kerry, Laois, Longford, Mayo, Meath, Waterford and Wicklow (NBDC, 2024).

Nathusius' pipistrelles emerge at early dusk, are fast flying species, and fly with deep wing beats (UOB, 2024)[11] and usually fly approximately 4 to 15 meters from the ground (Russ, 1999). Nathusius' pipistrelles are mainly associated with woodland habitats from moist deciduous woodlands to dry coniferous forests (CI, 2024)[12]. Nathusius' pipistrelles are also associated with wetlands, rivers and waterbodies (BCT, 2024)[13] but are known to forage within parks, farmland and woodland edges too (CI, 2024) and are found less often than the common and soprano pipistrelles in urban areas (UOB, 2024). They are known to roost in old buildings under soffit boards and roof tile, fissures in rocks and tree hollows and bat boxes (BCT, 2024). During the winter months Nathusius' pipistrelles will roost in cracks in walls, trees, caves and sheltered cliff crevices (NBDC, 2024).

Current NPWS Article 17 distribution mapping for Nathusius' pipistrelle has determined that the species known range and distribution does not encompass the relevant hectad, V46 (NPWS, 2019). The Nathusius' pipistrelle's conservation status in Ireland is currently unknown (NPWS 2019) with an Irish Red List status of 'Least concern' (Marnell, *et al.*, 2019). The population size in Ireland is estimated at 10,000 to 18,000 (2007-2012) with an estimated core area of 13,543 km$^2$ (Roche, *et al.*, 2014).

[8] Vaughan, N., Jones, G., & Harris, S. (1997). Habitat Use by Bats (Chiroptera) Assessed by Means of a Broad-Band Acoustic Method. *Journal of Applied Ecology*, *34*(3), 716–730.

[9] University of Bristol (UOB), 2024, *Soprano Pipistrelle Pipistrellus pygmaeus biology* https://www.bio.bris.ac.uk/research/bats/britishbats/batpages/sopranopipi.htm accessed March 2024

[10] National Biodiversity Data Centre (NBDC), 2024, *Nathusius Pipistrelle Pipistrellus nathusii profile*, available from https://species.biodiversityireland.ie/profile.php?taxonId=119466#Taxonomy accessed March 2024.

[11] University of Bristol (UOB), 2024, *Nathusius Pipistrelle Pipistrellus nathusii biology* available from https://www.bio.bris.ac.uk/research/bats/britishbats/batpages/nathusiuspipi.htm accessed March 2024.

[12] *Conserve Ireland (CI), 2024, Nathusius pipistrelle profile, available at https://www.conserveireland.com/mammals/nathusius_pipistrelle.php accessed March 2024*

[13] Bat Conservation Trust (BCT), 2024, *UK Bats: Nathusius Pipestrelle* available at https://www.bats.org.uk/about-bats/what-are-bats/uk-bats/nathusius-pipistrelle accessed March 2024.

Brown long-eared bat (*Plecotus auritus*) - Peak call frequency 35kHz (25-50khz)

The brown long eared bat (BLE) is medium sized bat with distinctive long ears which can be up to three quarters of the size of its total head and body length (2.5cm) (CI, 2024)[14]. These large ears enable this species of bat to have extraordinary hearing abilities which help them to hunt especially when gleaning their prey from foliage (BCT, 2024)[15]. BLE are late emergers and prefer to leave their roosts in complete darkness and therefore emergence times can be up to an hour after sunset (Russ, 1999). As a void dwelling species of bat these bats can often be active and make short flights within a roosting area such as a loft before emergence, as agile flyers they are equipped to using confined spaces to fly in. Their flight is slow and fluttering often likened to that of a butterfly and fly low, usually close to vegetation (UOB, 2024)[16].

The BLE's distribution is widespread, and this species can be found throughout the island of Ireland (NBDC, 2024)[17]. BLE prefer sheltered habitats such as valleys, parks and gardens and are also known to forage in open deciduous and coniferous woodland and orchards (BCT, 2024). As mentioned, BLE bats are typically void dwelling and will roost in older buildings, in lofts, barns, stables and tend to cluster along the central ridge beam or next to a chimney. BLE will also make use of trees and bat boxes (BCI, 2024)[18]. During the winter, BLE can be found roosting in caves, tunnels, mines, ice houses and occasionally deep hollows of mature trees and buildings (BCT, 2024).

Current NPWS Article 17 distribution mapping for BLE bat has determined that the species known range and distribution does not encompass the relevant hectad, V46 (NPWS, 2019). The BLE bat's conservation status in Ireland is currently found to be favourable and improving (NPWS 2019) with an Irish Red List status of 'Least concern' (Marnell, *et al*., 2019). The population size in Ireland is estimated at 64,000 to 115,000 (2007-2012) with an estimated core area of 49,929 km$^2$ (Roche, *et al*., 2014).

Daubenton's bat (*Myotis daubentonii*) - Call frequency ranges from 35 to 85kHz (loudest at 45 to 50kHz)

Daubenton's bat is a medium sized bat and is widely known as the 'water bat' due to its strong association with water bodes and rivers (PTES, 2024)[19]. These bats are low and fast flying, and typically skim the water's surface to catch their prey and are known to use their ventral fur to collect water to drink (UOB, 2024)[20]. Emergence times of this species of bat ranges and there are even difference between times in males and females (Andrews Ecology, 2017)[21] with data suggesting that some females leave the roost earlier than the males. On average the emergence time for this species is 84 minutes after sunset (UOB, 2024).

[14] Conserve Ireland (CI), 2024, *Brown long eared profile*, available at https://www.conserveireland.com/mammals/brown-longeared-bat.php accessed March 2024

[15] Bat Conservation Trust (BCT), 2024, *UK Bats: Brown Long eared* available at https://www.bats.org.uk/about-bats/what-are-bats/uk-bats/brown-long-eared-bat accessed March 2024

[16] University of Bristol (UOB), 2024, *Brown long-eared bat Plecotus auritus biology* available from https://www.bio.bris.ac.uk/research/bats/britishbats/batpages/brownlongeared.htm accessed March 2024

[17] National Biodiversity Data Centre (NBDC), 2024, *Brown long-eared bat Plecotus auritus profile*, available from https://species.biodiversityireland.ie/profile.php?taxonId=119441&taxonGroupName=terrestrial%20mammal&taxonDesignationId=2#Taxonomy accessed March 2024

[18] Bat Conservation Ireland (BCI), 2024, *Brown long eared bat,* available from https://www.batconservationireland.org/irish-bats/species/brown-long-eared-bat accessed March 2024.

[19] People's Trust for Endangered Species (PTES), 2024, *Daubenton's Bat: Facts and Figures* https://ptes.org/get-informed/facts-figures/daubentons-bat/ accessed March 2024

[20] University of Bristol (UOB), 2024, *Daubenton's bat Myotis daubentonii biology* available from https://www.bio.bris.ac.uk/research/bats/britishbats/batpages/daubentons.htm accessed March 2024

[21] Andrews ecology Ltd, (2019), *A review of empirical data in respect of emergence and return times reported for the UK's 17 Native Bat Species*, available from http://battreehabitatkey.co.uk/wp-content/uploads/2017/06/AEcol-REVIEW-OF-EMERGENCE-AND-RETURN-EMPIRICAL-DATA-2017-Ver.-4.pdf accessed March 2024.

Daubenton's bat distribution is widespread and can be found throughout the island of Ireland (NBDC, 2024)[22]. Although this species is heavily associated with waterways and water bodies, preferring to feed on its prey over calm slow-moving water, they are often also found foraging along woodland rides and edges and are less common in urban areas. Roosting preferences include caves, mines, tunnels, trees, ice houses but rarely new building types (BCT, 2024)[23]. These species are often recorded as sharing roosting habitats with other species of bats such as natterers, pipistrelles and brown long eared (UOB, 2024). Daubenton's bat roosting preferences differ very little over the year regardless of season (BCT, 2024).

Current NPWS Article 17 distribution mapping for Daubenton's bat has determined that the species known range and distribution does not encompass the relevant hectad, V46 (NPWS, 2019). Daubenton's bat conservation status in Ireland is currently found to be favourable and improving (NPWS 2019) with an Irish Red List status of 'Least concern' (Marnell, *et al*., 2019). The population size in Ireland is estimated at 81,000 to 103,000 (2007-2012) with an estimated core area of 41,285 km$^2$ (Roche, *et al*., 2014).

Leisler's bat (*Nyctalus leisleri*) - Peak call frequency 25kHz (15 to 45kHz)

The Leisler's bat is Irelands biggest species with a combined head and body of approximately 54-64mm (NBDC, 2024)[24]. The Leisler's is a high-flying species (10-70m from ground level (Russ, 1999) and also one of the earliest to emerge from its roosts. Typically emerging at sunset or even before it, their activity is closely linked to temperature (Russ at al, 2002)[25].

Although rarer in Britian and the rest of Europe, Leisler's are widely distributed across Ireland (BCI, 2024)[26]. Leisler's bats are primarily a woodland species but will occupy parklands and urban areas that can provide all of their habitat requirements (CI, 2024)[27]. Preferring open habitats, rivers lakes and woodlands, and unlike other bat species do not need to use linear features to navigate the landscape (UOB, 2024)[28]. Often associated with woodlands, they can be found to roost within tree holes and deep cavities and sometimes bat boxes. The Leisler's bat is also known to roost in buildings, both old and new, within lofts, between tiles and underfelt, under ridge tiles, above large soffit boards, behind hanging tiles, behind window shutters and in disused chimneys (UOB, 2024). During the winter months they can be found roosting within deep hollows of mature trees and crevices in buildings (BCT, 2024)[29].

Current NPWS Article 17 distribution mapping for Leisler's bat has determined that the species known range does encompass the relevant hectad, V46, but the species known distribution does not (NPWS, 2019).Leisler's bat conservation status in Ireland is currently found to be favourable and improving (NPWS 2019) with an Irish Red List status of 'Least concern' (Marnell, *et al*., 2019). The population size in Ireland is estimated at 73,000 to 130,000 (2007-2012) with an estimated core area of 52,820 km$^2$ (Roche, *et al*., 2014).

[22] National Biodiversity Data Centre (NBDC), 2024, *Daubenton's bat Myotis daubentonii profile*, available from https://maps.biodiversityireland.ie/Dataset/128/Survey/268 accessed March 2024

[23] Bat Conservation Ireland (BCI), 2024, *Daubenton's bat,* available from https://www.bats.org.uk/about-bats/what-are-bats/uk-bats/daubentons-bat accessed March 2024

[24] National Biodiversity Data Centre (NBDC), 2024, *Leisler's bat Nyctalus leisleri profile*, available from https://species.biodiversityireland.ie/profile.php?taxonId=119464 accessed March 2024.

[25] Russ *et al*., (2003), *Seasonal patterns in activity and habitat use by bats (Pipistrellus spp. and Nyctalus leisleri) in Northern Ireland, determined using a driven transect*, Journal of Zoology 259. 289-299.

[26] Bat Conservation Ireland (BCI), 2024, *Leisler's bat* https://www.batconservationireland.org/irish-bats/species/leislers-bat accessed March 2024.

[27] Conserve Ireland (CI), 2024, *Leisler's bat profile*, available at https://www.conserveireland.com/mammals/leislers_bat.php accessed March 2024.

[28] University of Bristol (UOB), 2024, *Leisler's bat Nyctalus leisleri* available at https://www.bio.bris.ac.uk/research/bats/britishbats/batpages/leislers.htm accessed accessed March 2024.

[29] Bat Conservation Trust (BCT), 2024, *UK Bats: Leisler's bat,* available at https://www.bats.org.uk/about-bats/what-are-bats/uk-bats/leislers-bat accessed March 2024.

Lesser horseshoe bat (*Rhinolophus hipposideros*) - Peak call frequency 110kHz (109-115khz)

The lesser horseshoe bat (LHB) is one of Ireland's smallest bat species with a combined head and body of approximately 35-44mm (CI, 2024)[30]. Its name comes from its unique and complex noseleaf shape which resembles a horseshoe shape and helps this species of bat to echolocate (BCT, 2024)[31] and is distinguished from the greater horseshoe by size, as the lesser horseshoe is smaller and has a smaller forearm length (UOB, 2024)[32]. The LHB emerges anywhere from 30 minutes to 60 minutes after sunset (UOB, 2024) and generally flies low and is extremely agile (Russ, 1999) meaning it can hunt for prey between vegetation and or hedgerows (CI, 2024) but are an extremely light sensitive species and is not typically found in well-lit areas.

The lesser horseshoe is restricted in its distribution to the west of Ireland and is mainly found in Mayo, Galway, Clare, Limerick, Kerry and Cork (BCI,2024)[33]. LHB are associated with foraging in habitats such as sheltered valleys, woodland edge, pasture and wetlands, mixed woodlands and hedgerows (UOB, 2024). LHB were originally cave dwellers and will still use this sort of habitat along with tunnels, mines, and cellars for roosting when hibernating during the winter months (BCT, 2024). They can be found roosting within the warmer months in old buildings, rural buildings such as barns and stables and outhouses (BCI, 2024).

Current NPWS Article 17 distribution mapping for lesser horseshoe bat has determined that the species known range and distribution does not encompass the relevant hectad, V46 (NPWS, 2019). The lesser horseshoe bat's conservation status in Ireland is currently found to be Inadequate and declining (NPWS 2019) with an Irish Red List status of 'Least concern' (Marnell, *et al*., 2019). The population size in Ireland is estimated at 14,000 (2010-2011) with an estimated core area of 5,993 km$^2$ (Roche, *et al*., 2014).

Natterer's bat (*Myotis nattereri*) - Peak call frequency 50kHz (35-80khz)

The Natterer's bat is a medium sized bat with moderately long ears (NBDC, 2024)[34]. Its broad wings allow for agile, low and slow flight (UOB, 2024)[35] which gives them the ability to hover and also enables them to hunt their prey whilst in flight and by gleaning them from vegetation and are even able to catch spiders from their webs (BCI, 2024)[36]. Natterer's tend to be late emergers with an average emergence time of 75 minutes after sunset (Duvergé, P. L, *et al*., 2000)[37]. Natterer's are slightly rarer in Ireland than Britian and the rest of Europe but can still be found across the island of Ireland with fewer recorded in the southwest than the rest of the isle (NBDC, 2024). A study in the early nineties showed that in the west of Ireland this species typically gleaned its prey from vegetation rather than catching it in flight due to the type of insects available to this species of bat in that part of the country (Sheil *et al*.,1991)[38].

[30] Conserve Ireland (CI), 2024, *Lesser Horseshoe bat profile*, available at https://www.conserveireland.com/mammals/lesser_horseshoe_bat.php accessed March 2024

[31] Bat Conservation Trust (BCT), 2024, *UK Bats: Lesser Horseshoe bat,* available at https://www.bats.org.uk/about-bats/what-are-bats/uk-bats/lesser-horsehoe accessed March 2024

[32] University of Bristol (UOB), 2024, *Lesser Horseshoe bat Rhinolophus hipposideros*, available at https://www.bio.bris.ac.uk/research/bats/britishbats/batpages/lesserhorseshoe.htm accessed March 2024.

[33] Bat Conservation Ireland (BCI), 2024, *Lesser Horseshoe Bat*, available at https://www.batconservationireland.org/irish-bats/species/lesser-horseshoe-bat accessed March 2024.

[34] National Biodiversity Data Centre (NBDC), 2024, Natterer's bat Myotis nattereri: profile, available at https://species.biodiversityireland.ie/profile.php?taxonId=119463 accessed March 2024.

[35] University of Bristol (UOB), 2024, *Natterer's bat Myotis nattereri* available at https://www.bio.bris.ac.uk/research/bats/britishbats/batpages/leislers.htm accessed March 2024.

[36] Bat Conservation Ireland (BCI), 2024, *Natterer's bat* https://www.batconservationireland.org/irish-bats/species/natterers-bat accessed March 2024.

[37] Duvergé, P. L., Jones, G., Rydell, J., & Ransome, R. D. (2000). *Functional Significance of Emergence Timing in Bats*. Ecography, *23*(1), 32–40.

[38] Sheil. C. B., McAney. C. M., & Fairley. J. S, (1991), *Analysis of the diet of Natterer's bat Myotis nattereri and the common long-eared bat Plecotus auritus in the West of Ireland*, 223(2), 299-305. Justor

The Natterer's bat is associated with woodland habitats both deciduous and coniferous and will use tree lines and hedgerow as a way of commuting (BCT, 2024)[39]. This species of bat will also hunt low over open water and but typically hunts higher than the Daubenton's bat (NBDC, 2024). These bats can also be found to forage in urban areas, parkland, and over agricultural land (CI, 2024)[40]. Natterers will roost in trees, bat boxes, old stone buildings like barns and churches, as well as structures such as tunnels, caves, mines and under bridges (BCT, 2024). During the winter months they can be found hibernating in underground structures like tunnels, mines and caves and are also known to share their roosting spaces with other species of bat such as the brown long eared and Daubenton's (NBDC, 2024).

Current NPWS Article 17 distribution mapping for Natterer's bat has determined that the species known range and distribution does not encompass the relevant hectad, V46 (NPWS, 2019). Natterer's bat conservation status in Ireland is currently found to be favourable and stable (NPWS 2019) with an Irish Red List status of 'Least concern' (Marnell, *et al*., 2019). The population size in Ireland is 'unknown' with an estimated core area of 52,864 km$^2$ (Roche, *et al*., 2014).

Whiskered bat (*Myotis mystacinus*) - Call frequency ranges from 32 to 89kHz (loudest at 45kHz)

The whiskered bat is a small bat and is found to be rarer in Ireland, although widespread across Britian and the rest of Europe (BCT,2024)[41]. The whiskered bat is also Europe's smallest *Myotis* bat species and is related to the other *Myotis* species found in Ireland; the Daubenton's bat and the Natterer's bat (BCI, 2024). As mentioned, this species is not common although can be found across Ireland, its distribution is disjointed (NPWS 2019). This could also be a reflection of the difficulty of separating their echolocation calls from other *Myotis* species as typically identification in-hand ultimately confirms the species type (BCT,2024). The whiskered bat will on average emerge from the roost within 30 minutes of sunset (Jones & Rydell, 1994)[42]. The whiskered bat is a medium to fast, agile flyer and usually flies approximately 20m above ground level (UOB, 2024)[43].

The whiskered bat can be found foraging in habitats such as open meadows and woodland that are often found in close proximity to waterbodies (BCI, 2024)[44]. Summer roosting habitat includes buildings, within loft spaces and eaves, between roof tile and hanging tiles and soffits, under bridges and hollows within mature trees (BCT,2024). Winter hibernation sites will include underground structures, such as caves, mines, and tunnels (CI, 2024)[45].

Current NPWS Article 17 distribution mapping for whiskered bat has determined that the species known range and distribution does not encompass the relevant hectad, V46 (NPWS, 2019). The whiskered bat conservation status in Ireland is currently found to be favourable and stable (NPWS 2019) with an Irish Red List status of 'Least concern' (Marnell, *et al*., 2019). The population size in Ireland is 'unknown' with an estimated core area of 29,222 km$^2$ (Roche, *et al*., 2014).

[39] Bat Conservation Trust (BCT), 2024, *UK Bats: Natterer's bat,* available at https://www.bats.org.uk/about-bats/what-are-bats/uk-bats/natterers-bat accessed March 2024.
[40] Conserve Ireland (CI), 2024, *Natterer's bat profile*, available at https://www.conserveireland.com/mammals/natterers_bat.php accessed March 2024.
[41] Bat Conservation Trust (BCT), 2024, *UK Bats: Whiskered bat Myotis mystacinus*, available at https://www.bats.org.uk/about-bats/what-are-bats/uk-bats/whiskered-bat accessed March 2024.
[42] Jones, G., & Rydell, J. (1994). *Foraging strategy and predation risk as factors influencing emergence time in echolocating bats*, 346(1318), The Royal Society
[43] University of Bristol (UOB), 2024, *Whiskered bat Myotis mystacinus* available at https://www.bio.bris.ac.uk/research/bats/britishbats/batpages/whiskered.htm accessed March 2024.
[44] Bat Conservation Ireland (BCI), 2024, *Whiskered bat,* available at https://www.batconservationireland.org/irish-bats/species/whiskered-bat accessed March 2024.
[45] Conserve Ireland (CI), 2024, Whiskered bat profile, available at https://www.conserveireland.com/mammals/whiskered_bat.php accessed March 2024.

# Appendix 2

## PAB Survey Summary Results Tables

## Winter PAB Surveys - January (Hotel Interior)

Table 1. Total number of bat passes of each species recorded at each sampling point during the January 2024 survey[1]

| SP | *Myotis* spp. | Leisler's bat | Nathusius' pipistrelle | Common pipistrelle | Soprano pipistrelle | Brown long-eared bat | Lesser Horseshoe | Noctule | Total | % |
|---|---|---|---|---|---|---|---|---|---|---|
| (1) Ground floor of tower just inside entrance door attached to stairs banister | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0.88 |
| (2) In roof area of tower attached to stairs banister | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 4 | 5 | 4.42 |
| (3) Second floor landing of tower, outside tiled bathroom | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 4 | 3.54 |
| (4) Bedroom wing, first floor, second bedroom on the right facing inland | 0 | 0 | 0 | 102 | 0 | 0 | 0 | 1 | 103 | 91.15 |
| **Total** | **0** | **0** | **0** | **103** | **0** | **0** | **0** | **10** | **113** | |
| **%** | **0** | **0** | **0** | **91.15** | **0** | **0** | **0** | **8.85** | | |

[1] Cells highlighted yellow indicate the largest number of bat passes recorded at a sampling point for each species; the cell highlighted green is the largest sampling point total over the survey period.

Table 2. Average nightly rates[2] for species recorded at each sampling point during the January 2024 PAB survey

| SP | *Myotis spp.* | Leisler's bat | Nathusius' pipistrelle | Common pipistrelle | Soprano pipistrelle | Brown long-eared bat | Lesser Horseshoe | NoID |
|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.066 |
| 2 | 0 | 0 | 0 | 0.066 | 0 | 0 | 0 | 0.266 |
| 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.266 |
| 4 | 0 | 0 | 0 | 6.8 | 0 | 0 | 0 | 0.066 |

Table 3. Average hourly rates for species recorded at each sampling point during the January 2024 PAB survey[3]

| SP | *Myotis spp.* | Leisler's bat | Nathusius' pipistrelle | Common pipistrelle | Soprano pipistrelle | Brown long-eared bat | Lesser Horseshoe | NoID |
|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.004 |
| 2 | 0 | 0 | 0 | 0.004 | 0 | 0 | 0 | 0.02 |
| 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.02 |
| 4 | 0 | 0 | 0 | 0.44 | 0 | 0 | 0 | 0.004 |

Table 4. Nightly breakdown of total calls recorded for each species by sampling point during the January 2024 PAB survey

| Sampling Point | Date | Myotis | Leisler's | N. Pip | C. Pip | S. Pip | BLE | LHS | NoID | Total | Rain (mm) | Max Temp (°C) | Min Temp (°C) | Mean Windspeed (knot) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SP1 | 11/01/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 0 | 7.7 | -1.5 | 3.1 |
| | 12/01/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 0 | 4.8 | -2 | 3.9 |
| | 13/01/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 0 | 6 | 0.8 | 3.1 |
| | 14/01/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 0 | 7.6 | 1.4 | 4.4 |
| | 15/01/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 0 | 6.3 | -2.6 | 3.8 |

[2] Activity categories used: Low = <10 bat passes per night; Medium = 10 – 49 bat passes per night (Orange cells) and High = ≥50 bat passes per night (Red cells).
[3] Hours between sunset and sunrise 17:00 to 08:30 = 15.5 hours of foraging. Activity categories used: Low = <10 bat passes per hour; Medium = 10 – 49 bat passes per hour (Orange cells) and High = ≥50 bat passes per hour (Red cells).

| Sampling Point | Date | Myotis | Leisler's | N. Pip | C. Pip | S. Pip | BLE | LHS | NoID | Total | Rain (mm) | Max Temp (°C) | Min Temp (°C) | Mean Windspeed (knot) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 16/01/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 0 | 4.5 | -3.9 | 3.3 |
| | 17/01/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 0.6 | 4.5 | -2.6 | 4.4 |
| | 18/01/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 0 | 7.1 | -2.8 | 2.8 |
| | 19/01/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 3.7 | 9.3 | -2.1 | 12.2 |
| | 20/01/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 19.8 | 11.1 | 7.8 | 15.3 |
| | 21/01/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 12.4 | 13.8 | 8.8 | 26 |
| | 22/01/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 1.6 | 10.1 | 6.8 | 18.4 |
| | 23/01/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 19.2 | 13.3 | 9.2 | 23.4 |
| | 24/01/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | **1** | 3.7 | 11.7 | 9.1 | 9.9 |
| | 25/01/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 7.7 | 13 | 6.8 | 18.5 |
| SP2 | 11/01/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 0 | 7.7 | -1.5 | 3.1 |
| | 12/01/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 0 | 4.8 | -2 | 3.9 |
| | 13/01/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 0 | 6 | 0.8 | 3.1 |
| | 14/01/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | **3** | 0 | 7.6 | 1.4 | 4.4 |
| | 15/01/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 0 | 6.3 | -2.6 | 3.8 |
| | 16/01/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 0 | 4.5 | -3.9 | 3.3 |
| | 17/01/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 0.6 | 4.5 | -2.6 | 4.4 |
| | 18/01/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 0 | 7.1 | -2.8 | 2.8 |
| | 19/01/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 3.7 | 9.3 | -2.1 | 12.2 |
| | 20/01/2024 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | **2** | 19.8 | 11.1 | 7.8 | 15.3 |
| | 21/01/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 12.4 | 13.8 | 8.8 | 26 |
| | 22/01/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 1.6 | 10.1 | 6.8 | 18.4 |
| | 23/01/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 19.2 | 13.3 | 9.2 | 23.4 |
| | 24/01/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 3.7 | 11.7 | 9.1 | 9.9 |
| | 25/01/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 7.7 | 13 | 6.8 | 18.5 |

| Sampling Point | Date | Myotis | Leisler's | N. Pip | C. Pip | S. Pip | BLE | LHS | NoID | Total | Rain (mm) | Max Temp (°C) | Min Temp (°C) | Mean Windspeed (knot) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SP3 | 11/01/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 0 | 7.7 | -1.5 | 3.1 |
| | 12/01/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 0 | 4.8 | -2 | 3.9 |
| | 13/01/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 0 | 6 | 0.8 | 3.1 |
| | 14/01/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 0 | 7.6 | 1.4 | 4.4 |
| | 15/01/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 0 | 6.3 | -2.6 | 3.8 |
| | 16/01/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 0 | 4.5 | -3.9 | 3.3 |
| | 17/01/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 0.6 | 4.5 | -2.6 | 4.4 |
| | 18/01/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 0 | 7.1 | -2.8 | 2.8 |
| | 19/01/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 3.7 | 9.3 | -2.1 | 12.2 |
| | 20/01/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 19.8 | 11.1 | 7.8 | 15.3 |
| | 21/01/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 12.4 | 13.8 | 8.8 | 26 |
| | 22/01/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 1.6 | 10.1 | 6.8 | 18.4 |
| | 23/01/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 19.2 | 13.3 | 9.2 | 23.4 |
| | 24/01/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | **4** | 3.7 | 11.7 | 9.1 | 9.9 |
| | 25/01/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 7.7 | 13 | 6.8 | 18.5 |
| SP4 | 11/01/2024 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | **1** | 0 | 7.7 | -1.5 | 3.1 |
| | 12/01/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 0 | 4.8 | -2 | 3.9 |
| | 13/01/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 0 | 6 | 0.8 | 3.1 |
| | 14/01/2024 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | **4** | 0 | 7.6 | 1.4 | 4.4 |
| | 15/01/2024 | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | **5** | 0 | 6.3 | -2.6 | 3.8 |
| | 16/01/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | **1** | 0 | 4.5 | -3.9 | 3.3 |
| | 17/01/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 0.6 | 4.5 | -2.6 | 4.4 |
| | 18/01/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 0 | 7.1 | -2.8 | 2.8 |
| | 19/01/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 3.7 | 9.3 | -2.1 | 12.2 |
| | 20/01/2024 | 0 | 0 | 0 | 81 | 0 | 0 | 0 | 0 | **81** | 19.8 | 11.1 | 7.8 | 15.3 |

| Sampling Point | Date | Myotis | Leisler's | N. Pip | C. Pip | S. Pip | BLE | LHS | NoID | Total | Rain (mm) | Max Temp (°C) | Min Temp (°C) | Mean Windspeed (knot) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 21/01/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 12.4 | 13.8 | 8.8 | 26 |
| | 22/01/2024 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | **2** | 1.6 | 10.1 | 6.8 | 18.4 |
| | 23/01/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 19.2 | 13.3 | 9.2 | 23.4 |
| | 24/01/2024 | 0 | 0 | 0 | 9 | 0 | 0 | 0 | 0 | **9** | 3.7 | 11.7 | 9.1 | 9.9 |
| | 25/01/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 7.7 | 13 | 6.8 | 18.5 |

Table 5. Time of earliest and/or latest bat pass recorded for each species in context of sunset and sunrise times for each sampling point during the January PAB surveys[4]

| SP | Date | Sunset | Sunrise | Species | Time of Earliest Bat Pass | Hours After Sunset[5] | Time of Latest Bat Pass | Hours Before Sunrise[6] |
|---|---|---|---|---|---|---|---|---|
| 1 | 24/01/2024 | 17:14 | 08:32 | NoID | 18:38:15 | 01:24:15 | - | - |
| 2 | 14/01/2024 | 16:42 | 08:42 | NoID | 19:48:21 | 03:06:21 | - | - |
| 2 | 14/01/2024 | 16:42 | 08:42 | NoID | 19:49:03 | 03:07:03 | - | - |
| 2 | 14/01/2024 | 16:42 | 08:42 | NoID | 19:49:47 | 03:07:47 | - | - |
| 2 | 20/01/2024 | 17:07 | 08:36 | NoID | 20:24:51 | 03:17:51 | - | - |
| 2 | 20/01/2024 | 17:07 | 08:36 | C. Pip | 19:17:03 | 02:10:03 | - | - |
| 3 | 24/01/2024 | 17:14 | 08:32 | NoID | 18:33:42 | 01:19:42 | - | - |
| 3 | 24/01/2024 | 17:14 | 08:32 | NoID | 18:33:49 | 01:19:49 | - | - |
| 3 | 24/01/2024 | 17:14 | 08:32 | NoID | 18:33:57 | 01:19:57 | - | - |
| 3 | 24/01/2024 | 17:14 | 08:32 | NoID | 18:34:10 | 01:20:10 | - | - |
| 4 | 16/01/2024 | 16:56 | 08:40 | NoID | 20:04:40 | 03:08:40 | - | - |
| 4 | 14/01/2024 | 16:53 | 08:42 | C. Pip | 19:41:39 | 02:48:39 | - | - |
| 4 | 15/01/2024 | 16:54 | 08:41 | C. Pip | 23:44:29 | 06:50:29 | - | - |
| 4 | 20/01/2024 | 17:03 | 08:36 | C. Pip | 19:01:29 | 01:58:29 | - | - |
| 4 | 22/01/2024 | 17:06 | 08:34 | C. Pip | 17:43:46 | 00:37:46 | - | - |
| 4 | 24/01/2024 | 17:14 | 08:32 | C. Pip | 17:40:44 | 00:26:44 | 06:17:22 | 02:14 |

[4] All recorded bat passes included for SP1, SP2 and SP3. Earliest bat passes included for each date at SP4.
[5] Light orange: Bat pass recorded within the first hour after sunset; Dark orange: Bat pass recorded within the first half-hour after sunset.
[6] Light orange: Bat pass recorded within the first 2 hours before sunrise; Dark orange: Bat pass recorded within the hour before sunrise.

## Winter PAB Surveys - February (Hotel Interior and Wider Site)

Table 6. Total number of bat passes of each species recorded at each sampling point during the February 2024 survey

| SP | *Myotis* spp. | Leisler's bat | Nathusius' pipistrelle | Common pipistrelle | Soprano pipistrelle | Brown long-eared bat | Lesser Horseshoe | NoID | Total | % |
|---|---|---|---|---|---|---|---|---|---|---|
| **(1)** Middle tower - Ground floor stairwell | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 4 | 0.3 |
| **(2)** Middle tower - Roof landing area | 0 | 0 | 0 | 24 | 3 | 0 | 0 | 23 | 50 | 3.3 |
| **(3)** Middle tower - Second floor landing | 0 | 0 | 0 | 79 | 0 | 0 | 0 | 15 | 94 | 6.1 |
| **(4)** Bedroom block, first floor bedroom | 1 | 0 | 0 | 552 | 4 | 0 | 0 | 14 | 571 | 37.2 |
| **(5)** Bedroom block – Ground floor hallway | 0 | 0 | 0 | 348 | 0 | 0 | 0 | 18 | 366 | 23.9 |
| **(6)** Derelict House | 0 | 0 | 0 | 143 | 1 | 0 | 1 | 0 | 145 | 9.4 |
| **(7)** Treeline | 2 | 0 | 0 | 275 | 7 | 0 | 0 | 20 | 304 | 19.8 |
| **Total** | **3** | **0** | **0** | **1421** | **15** | **0** | **1** | **94** | **1534** | |
| **%** | **0.2** | **0** | **0** | **92.63** | **0.99** | **0** | **0.06** | **6.12** | | |

Table 7. Average nightly rates[7] for species recorded at each sampling point during the February 2024 PAB survey

| SP | *Myotis spp.* | Leisler's bat | Nathusius' pipistrelle | Common pipistrelle | Soprano pipistrelle | Brown long-eared bat | Lesser Horseshoe | NoID |
|---|---|---|---|---|---|---|---|---|
| **1** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.36 |
| **2** | 0 | 0 | 0 | 2.18 | 0.27 | 0 | 0 | 2.09 |
| **3** | 0 | 0 | 0 | 7.18 | 0 | 0 | 0 | 1.36 |
| **4** | 0.09 | 0 | 0 | 50.18 | 0.36 | 0 | 0 | 1.27 |
| **5** | 0 | 0 | 0 | 31.63 | 0 | 0 | 0 | 1.64 |
| **6** | 0 | 0 | 0 | 13 | 0.09 | 0 | 0.09 | 0 |
| **7** | 0.18 | 0 | 0 | 25 | 0.64 | 0 | 0 | 1.82 |

Table 8. Average hourly rates for species recorded at each sampling point during the February 2024 PAB survey[8]

| SP | *Myotis spp.* | Leisler's bat | Nathusius' pipistrelle | Common pipistrelle | Soprano pipistrelle | Brown long-eared bat | Lesser Horseshoe | NoID |
|---|---|---|---|---|---|---|---|---|
| **1** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.03 |
| **2** | 0 | 0 | 0 | 0.16 | 0.02 | 0 | 0 | 0.15 |
| **3** | 0 | 0 | 0 | 0.53 | 0 | 0 | 0 | 0.10 |
| **4** | 0.006 | 0 | 0 | 3.7.2 | 0.02 | 0 | 0 | 0.09 |
| **5** | 0 | 0 | 0 | 2.34 | 0 | 0 | 0 | 0.12 |
| **6** | 0 | 0 | 0 | 0.96 | 0.006 | 0 | 0.006 | 0 |
| **7** | 0.01 | 0 | 0 | 1.85 | 0.05 | 0 | 0 | 0.13 |

[7] Activity categories used: Low = <10 bat passes per night; Medium = 10 – 49 bat passes per night (Orange cells) and High = ≥50 bat passes per night (Red cells).
[8] Hours between sunset and sunrise 18:00 – 07.30 = 13.5 hours of foraging. Activity categories used: Low = <10 bat passes per hour; Medium = 10 – 49 bat passes per hour (Orange cells) and High = ≥50 bat passes per hour (Red cells).

Table 9. Nightly breakdown of total calls recorded for each species by sampling point during the May 2023 PAB survey

| Sampling Point | Date | Myotis | Leisler's | N. Pip | C. Pip | S. Pip | BLE | LHS | NoID | Total | Rain (mm) | Max Temp (°C) | Min Temp (°C) | Mean Windspeed (knot) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 19/02/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 0.8 | 12.9 | 9.9 | 10.2 |
| 1 | 20/02/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | **4** | 5.6 | 12 | 9.1 | 10.1 |
| 1 | 21/02/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 16.3 | 12.6 | 7.1 | 16.7 |
| 1 | 22/02/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 4.2 | 8.6 | 4 | 16.2 |
| 1 | 23/02/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 13.8 | 8.3 | 3.1 | 17.1 |
| 1 | 24/02/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 2.4 | 10.1 | 6.4 | 9.3 |
| 1 | 25/02/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 7 | 9 | 5.8 | 14.9 |
| 1 | 26/02/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 0 | 9.8 | 4.4 | 9.2 |
| 1 | 27/02/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 3.3 | 11.1 | 6.7 | 8.8 |
| 1 | 28/02/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 15.1 | 11.9 | 7.6 | 13.9 |
| 1 | 29/02/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 8.3 | 8.9 | 3.1 | 14.6 |
| 1 | 01/03/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | | | | |
| 2 | 19/02/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 0.8 | 12.9 | 9.9 | 10.2 |
| 2 | 20/02/2024 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 23 | **24** | 5.6 | 12 | 9.1 | 10.1 |
| 2 | 21/02/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 16.3 | 12.6 | 7.1 | 16.7 |
| 2 | 22/02/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 4.2 | 8.6 | 4 | 16.2 |
| 2 | 23/02/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 13.8 | 8.3 | 3.1 | 17.1 |
| 2 | 24/02/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 2.4 | 10.1 | 6.4 | 9.3 |
| 2 | 25/02/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 7 | 9 | 5.8 | 14.9 |
| 2 | 26/02/2024 | 0 | 0 | 0 | 5 | 1 | 0 | 0 | 0 | **6** | 0 | 9.8 | 4.4 | 9.2 |
| 2 | 27/02/2024 | 0 | 0 | 0 | 19 | 1 | 0 | 0 | 0 | **20** | 3.3 | 11.1 | 6.7 | 8.8 |
| 2 | 28/02/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 15.1 | 11.9 | 7.6 | 13.9 |
| 2 | 29/02/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 8.3 | 8.9 | 3.1 | 14.6 |
| 2 | 01/03/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | | | | |
| 3 | 19/02/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | **1** | 0.8 | 12.9 | 9.9 | 10.2 |

| Sampling Point | Date | Myotis | Leisler's | N. Pip | C. Pip | S. Pip | BLE | LHS | NoID | Total | Rain (mm) | Max Temp (°C) | Min Temp (°C) | Mean Windspeed (knot) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | 20/02/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | **3** | 5.6 | 12 | 9.1 | 10.1 |
| 3 | 21/02/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 16.3 | 12.6 | 7.1 | 16.7 |
| 3 | 22/02/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 4.2 | 8.6 | 4 | 16.2 |
| 3 | 23/02/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 13.8 | 8.3 | 3.1 | 17.1 |
| 3 | 24/02/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 2.4 | 10.1 | 6.4 | 9.3 |
| 3 | 25/02/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 7 | 9 | 5.8 | 14.9 |
| 3 | 26/02/2024 | 0 | 0 | 0 | 38 | 0 | 0 | 0 | 2 | **40** | 0 | 9.8 | 4.4 | 9.2 |
| 3 | 27/02/2024 | 0 | 0 | 0 | 41 | 0 | 0 | 0 | 9 | **50** | 3.3 | 11.1 | 6.7 | 8.8 |
| 3 | 28/02/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 15.1 | 11.9 | 7.6 | 13.9 |
| 3 | 29/02/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 8.3 | 8.9 | 3.1 | 14.6 |
| 3 | 01/03/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | | | | |
| 4 | 19/02/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 0.8 | 12.9 | 9.9 | 10.2 |
| 4 | 20/02/2024 | 0 | 0 | 0 | 465 | 2 | 0 | 0 | 0 | **467** | 5.6 | 12 | 9.1 | 10.1 |
| 4 | 21/02/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 16.3 | 12.6 | 7.1 | 16.7 |
| 4 | 22/02/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 4.2 | 8.6 | 4 | 16.2 |
| 4 | 23/02/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 13.8 | 8.3 | 3.1 | 17.1 |
| 4 | 24/02/2024 | 0 | 0 | 0 | 17 | 0 | 0 | 0 | 0 | **17** | 2.4 | 10.1 | 6.4 | 9.3 |
| 4 | 25/02/2024 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | **1** | 7 | 9 | 5.8 | 14.9 |
| 4 | 26/02/2024 | 1 | 0 | 0 | 56 | 0 | 0 | 0 | 5 | **62** | 0 | 9.8 | 4.4 | 9.2 |
| 4 | 27/02/2024 | 0 | 0 | 0 | 13 | 2 | 0 | 0 | 9 | **24** | 3.3 | 11.1 | 6.7 | 8.8 |
| 4 | 28/02/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 15.1 | 11.9 | 7.6 | 13.9 |
| 4 | 29/02/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 8.3 | 8.9 | 3.1 | 14.6 |
| 4 | 01/03/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | | | | |
| 5 | 19/02/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 0.8 | 12.9 | 9.9 | 10.2 |
| 5 | 20/02/2024 | 0 | 0 | 0 | 267 | 0 | 0 | 0 | 17 | **284** | 5.6 | 12 | 9.1 | 10.1 |

| Sampling Point | Date | Myotis | Leisler's | N. Pip | C. Pip | S. Pip | BLE | LHS | NoID | Total | Rain (mm) | Max Temp (°C) | Min Temp (°C) | Mean Windspeed (knot) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | 21/02/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 16.3 | 12.6 | 7.1 | 16.7 |
| 5 | 22/02/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 4.2 | 8.6 | 4 | 16.2 |
| 5 | 23/02/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 13.8 | 8.3 | 3.1 | 17.1 |
| 5 | 24/02/2024 | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | **5** | 2.4 | 10.1 | 6.4 | 9.3 |
| 5 | 25/02/2024 | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | **5** | 7 | 9 | 5.8 | 14.9 |
| 5 | 26/02/2024 | 0 | 0 | 0 | 43 | 0 | 0 | 0 | 0 | **43** | 0 | 9.8 | 4.4 | 9.2 |
| 5 | 27/02/2024 | 0 | 0 | 0 | 28 | 0 | 0 | 0 | 1 | **29** | 3.3 | 11.1 | 6.7 | 8.8 |
| 5 | 28/02/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 15.1 | 11.9 | 7.6 | 13.9 |
| 5 | 29/02/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 8.3 | 8.9 | 3.1 | 14.6 |
| 5 | 01/03/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | | | | |
| 6 | 19/02/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 0.8 | 12.9 | 9.9 | 10.2 |
| 6 | 20/02/2024 | 0 | 0 | 0 | 34 | 0 | 0 | 0 | 0 | **34** | 5.6 | 12 | 9.1 | 10.1 |
| 6 | 21/02/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 16.3 | 12.6 | 7.1 | 16.7 |
| 6 | 22/02/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 4.2 | 8.6 | 4 | 16.2 |
| 6 | 23/02/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 13.8 | 8.3 | 3.1 | 17.1 |
| 6 | 24/02/2024 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | **4** | 2.4 | 10.1 | 6.4 | 9.3 |
| 6 | 25/02/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 7 | 9 | 5.8 | 14.9 |
| 6 | 26/02/2024 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | **2** | 0 | 9.8 | 4.4 | 9.2 |
| 6 | 27/02/2024 | 0 | 0 | 0 | 104 | 1 | 0 | 0 | 0 | **105** | 3.3 | 11.1 | 6.7 | 8.8 |
| 6 | 28/02/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 15.1 | 11.9 | 7.6 | 13.9 |
| 6 | 29/02/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 8.3 | 8.9 | 3.1 | 14.6 |
| 6 | 01/03/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | | | | |
| 7 | 19/02/2024 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | **4** | 0.8 | 12.9 | 9.9 | 10.2 |
| 7 | 20/02/2024 | 0 | 0 | 0 | 166 | 6 | 0 | 0 | 20 | **192** | 5.6 | 12 | 9.1 | 10.1 |
| 7 | 21/02/2024 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | **2** | 16.3 | 12.6 | 7.1 | 16.7 |

| Sampling Point | Date | Myotis | Leisler's | N. Pip | C. Pip | S. Pip | BLE | LHS | NoID | Total | Rain (mm) | Max Temp (°C) | Min Temp (°C) | Mean Windspeed (knot) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | 22/02/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 4.2 | 8.6 | 4 | 16.2 |
| 7 | 23/02/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 13.8 | 8.3 | 3.1 | 17.1 |
| 7 | 24/02/2024 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | **2** | 2.4 | 10.1 | 6.4 | 9.3 |
| 7 | 25/02/2024 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | **3** | 7 | 9 | 5.8 | 14.9 |
| 7 | 26/02/2024 | 1 | 0 | 0 | 34 | 0 | 0 | 0 | 0 | **35** | 0 | 9.8 | 4.4 | 9.2 |
| 7 | 27/02/2024 | 1 | 0 | 0 | 64 | 1 | 0 | 0 | 0 | **66** | 3.3 | 11.1 | 6.7 | 8.8 |
| 7 | 28/02/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 15.1 | 11.9 | 7.6 | 13.9 |
| 7 | 29/02/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 8.3 | 8.9 | 3.1 | 14.6 |
| 7 | 01/03/2024 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | | | | |

Table 10. Time of earliest and/or latest bat pass recorded for each species in context of sunset and sunrise times for each sampling point during the May PAB surveys

| SP | Date | Sunset | Sunrise | Species | Time of Earliest Bat Pass | Hours After Sunset[9] | Time of Latest Bat Pass | Hours Before Sunrise[10] |
|---|---|---|---|---|---|---|---|---|
| 1 | 20/02/2024 | 18:03 | 07:46 | No ID | 19:13 | 01:10 | - | |
| 2 | 20/02/2024 | 18:03 | 07:34 | No ID | 18:31 | 00:28 | - | - |
| 2 | 26/02/2024 | 18:14 | 07:34 | C. Pip | 18:39 | 00:25 | - | - |
| 2 | 26/02/2024 | 18:14 | 07:34 | S. Pip | 20:25 | 02:11 | - | - |
| 3 | 19/02/2024 | 18:01 | 07:48 | No ID | 18:29 | 00:28 | - | - |
| 3 | 26/02/2024 | 18:14 | 07:34 | C. Pip | 18:48 | 00:34 | - | - |
| 4 | 20/02/2024 | 18:03 | 07:34 | C. Pip | 18:16 | 00:13 | - | - |
| 4 | 20/02/2024 | 18:03 | 07:34 | S. Pip | 18:28 | 00:25 | - | - |
| 4 | 26/02/2024 | 18:14 | 07:34 | No ID | 18:42 | 00:28 | | |
| 4 | 26/02/2024 | 18:14 | 07:34 | Myotis | 21:52 | 03:38 | | |
| 5 | 20/02/2024 | 18:03 | 07:46 | No ID | 18:14 | 00:11 | - | - |
| 5 | 20/02/2024 | 18:03 | 07:46 | C. Pip | 18:22 | 00:19 | - | - |
| 6 | 20/02/2024 | 18:03 | 07:34 | C. Pip | 18:34 | 00:31 | - | - |
| 6 | 27/02/2024 | 18:16 | 07:32 | S. Pip | 21:39 | 03:23 | - | - |
| 6 | 26/02/2024 | 18:14 | 07:34 | LHS | 21:57 | 03:43 | - | - |

[9] Light orange: Bat pass recorded within the first hour after sunset; Dark orange: Bat pass recorded within the first half-hour after sunset.
[10] Light orange: Bat pass recorded within the first 2 hours before sunrise; Dark orange: Bat pass recorded within the hour before sunrise.

| SP | Date | Sunset | Sunrise | Species | Time of Earliest Bat Pass | Hours After Sunset[9] | Time of Latest Bat Pass | Hours Before Sunrise[10] |
|---|---|---|---|---|---|---|---|---|
| 7 | 20/02/2024 | 18:03 | 07:34 | C. Pip | 18:23 | 00:20 | - | - |
| 7 | 20/02/2024 | 18:03 | 07:34 | No ID | 18:44 | 00:41 | - | - |
| 7 | 20/02/2024 | 18:03 | 07:34 | S. Pip | 18:49 | 00:46 | - | |
| 7 | 27/02/2024 | 18:16 | 07:32 | Myotis | 19:33 | 01:17 | - | - |

## PAB Surveys - April (Wider Site)

*Table 11. Total number of bat passes of each species recorded at each sampling point during the April 2023 survey*[11]

| SP | Location | *Myotis* spp. | Leisler's bat | Nath pip | Com pip | Sop pip | Brown long-eared bat | Lesser Horseshoe | NoID | Total | % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | Outside hotel, facing open grassland | 15 | 2 | 9 | 1989 | 12 | 0 | 3 | 42 | 2072 | 31.4 |
| 1 | Middle tower, ground-floor | 1 | 0 | 8 | 1827 | 6 | 0 | 1 | 97 | 1940 | 29.4 |
| 4 | Treeline | 7 | 2 | 0 | 956 | 76 | 0 | 0 | 54 | 1095 | 16.6 |
| 3 | Derelict house (ground-floor) | 2 | 1 | 0 | 757 | 9 | 0 | 0 | 10 | 779 | 11.8 |
| 5 | Treeline | 20 | 4 | 6 | 615 | 60 | 4 | 0 | 7 | 716 | 10.8 |
| **Total** | | **45** | **9** | **23** | **6144** | **163** | **4** | **4** | **210** | **6602** | |
| **%** | | **0.7** | **0.13** | **0.35** | **93.0** | **2.5** | **0.06** | **0.06** | **3.2** | | |

[11] Cells highlighted yellow indicate the largest number of bat passes recorded at a sampling point for each species; the cell highlighted green is the largest sampling point total over the survey period.

*Table 12. Average nightly rates[12] for species recorded at each sampling point during the April 2023 PAB survey*

| SP | *Myotis spp.* | Leisler's bat | Nathusius' pipistrelle | Common pipistrelle | Soprano pipistrelle | Brown long-eared bat | Lesser Horseshoe | NoID |
|---|---|---|---|---|---|---|---|---|
| **1** | 0.06 | 0 | 0.5 | 114.19 | 0.37 | 0 | 0.06 | 6.10 |
| **2** | 0.94 | 0.12 | 0.56 | 124.31 | 0.75 | 0 | 0.19 | 2.62 |
| **3** | 0.12 | 0.06 | 0 | 47.31 | 0.56 | 0 | 0 | 0.62 |
| **4** | 0.44 | 0.12 | 0 | 59.75 | 4.75 | 0 | 0 | 3.37 |
| **5** | 1.25 | 0.25 | 0.37 | 38.44 | 3.75 | 0.25 | 0 | 0.44 |

*Table 13. Average hourly rates for species recorded at each sampling point during the April 2023 PAB survey[13]*

| SP | *Myotis spp.* | Leisler's bat | Nathusius' pipistrelle | Common pipistrelle | Soprano pipistrelle | Brown long-eared bat | Lesser Horseshoe | NoID |
|---|---|---|---|---|---|---|---|---|
| **1** | 0.07 | 0 | 0.57 | 130.5 | 0.43 | 0 | 0.07 | 6.93 |
| **2** | 1.07 | 0.14 | 0.64 | 142.10 | 0.86 | 0 | 0.21 | 3 |
| **3** | 0.14 | 0.07 | 0 | 54.07 | 0.64 | 0 | 0 | 0.71 |
| **4** | 0.5 | 0.14 | 0 | 68.30 | 5.43 | 0 | 0 | 3.86 |
| **5** | 1.43 | 0.28 | 0.43 | 43.92 | 4.28 | 0.28 | 0 | 0.5 |

[12] Activity categories used: Low = <10 bat passes per night; Medium = 10 – 49 bat passes per night (Orange cells) and High = ≥50 bat passes per night (Red cells).

[13] Hours between sunset and sunrise 19.30 – 07.30 = 14 hours of foraging. Activity categories used: Low = <10 bat passes per hour; Medium = 10 – 49 bat passes per hour (Orange cells) and High = ≥50 bat passes per hour (Red cells).

*Table 14. Nightly breakdown of total calls recorded for each species by sampling point during the April 2023 PAB survey*

| Sampling Point | Date | Myotis | Leisler's | N. Pip | C. Pip | S. Pip | BLE | LHS | NoID | Total | Rain (mm) | Max Temp (°C) | Min Temp (°C) | Mean Windspeed (knot) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SP1 | 05/04/2023 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 2.1 | 12.9 | 8.9 | 8.9 |
| | 06/04/2023 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | **1** | 0.6 | 11.6 | 4.5 | 5.8 |
| | 07/04/2023 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 0 | 12.9 | 4.3 | 10.6 |
| | 08/04/2023 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 0.3 | 12.7 | 10.2 | 11.5 |
| | 09/04/2023 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 10.3 | 12.1 | 10.1 | 12.3 |
| | 10/04/2023 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | **1** | 7.3 | 11.5 | 6.4 | 12.7 |
| | 11/04/2023 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 15.6 | 10.4 | 4.8 | 15.2 |
| | 12/04/2023 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | **2** | 13.2 | 10.8 | 4.5 | 22.9 |
| | 13/04/2023 | 0 | 0 | 0 | 493 | 2 | 0 | 0 | 3 | **498** | 2.5 | 10.7 | 4.7 | 6.4 |
| | 14/04/2023 | 0 | 0 | 7 | 134 | 0 | 0 | 0 | 13 | **154** | 2 | 11.9 | 5.3 | 6.2 |
| | 15/04/2023 | 1 | 0 | 0 | 5 | 0 | 0 | 0 | 2 | **8** | 3.3 | 11.8 | 4 | 8.4 |
| | 16/04/2023 | 0 | 0 | 0 | 200 | 2 | 0 | 0 | 12 | **214** | 0.4 | 14.8 | 11.1 | 9.2 |
| | 17/04/2023 | 0 | 0 | 0 | 139 | 0 | 0 | 0 | 20 | **159** | 0 | 14.7 | 10.4 | 8.2 |
| | 18/04/2023 | 0 | 0 | 1 | 320 | 1 | 0 | 0 | 28 | **350** | 0 | 17.6 | 10 | 8.7 |
| | 19/04/2023 | 0 | 0 | 0 | 295 | 0 | 0 | 0 | 7 | **302** | 0 | 15.2 | 8.2 | 8.2 |
| | 20/04/2023 | 0 | 0 | 0 | 240 | 1 | 0 | 0 | 10 | **251** | 0 | 15.3 | 9.5 | 10.5 |
| SP2 | 05/04/2023 | 2 | 2 | 2 | 486 | 4 | 0 | 0 | 23 | **519** | 2.1 | 12.9 | 8.9 | 8.9 |

| Sampling Point | Date | Myotis | Leisler's | N. Pip | C. Pip | S. Pip | BLE | LHS | NoID | Total | Rain (mm) | Max Temp (°C) | Min Temp (°C) | Mean Windspeed (knot) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 06/04/2023 | 1 | 0 | 0 | 381 | 1 | 0 | 0 | 8 | **391** | 0.6 | 11.6 | 4.5 | 5.8 |
| | 07/04/2023 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | **2** | 0 | 12.9 | 4.3 | 10.6 |
| | 08/04/2023 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 0.3 | 12.7 | 10.2 | 11.5 |
| | 09/04/2023 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 10.3 | 12.1 | 10.1 | 12.3 |
| | 10/04/2023 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | **3** | 7.3 | 11.5 | 6.4 | 12.7 |
| | 11/04/2023 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | **2** | 15.6 | 10.4 | 4.8 | 15.2 |
| | 12/04/2023 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | **4** | 13.2 | 10.8 | 4.5 | 22.9 |
| | 13/04/2023 | 1 | 0 | 0 | 172 | 1 | 0 | 0 | 1 | **175** | 2.5 | 10.7 | 4.7 | 6.4 |
| | 14/04/2023 | 2 | 0 | 2 | 633 | 1 | 0 | 0 | 3 | **641** | 2 | 11.9 | 5.3 | 6.2 |
| | 15/04/2023 | 5 | 0 | 0 | 88 | 0 | 0 | 0 | 0 | **93** | 3.3 | 11.8 | 4 | 8.4 |
| | 16/04/2023 | 0 | 0 | 0 | 41 | 0 | 0 | 0 | 3 | **44** | 0.4 | 14.8 | 11.1 | 9.2 |
| | 17/04/2023 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | **3** | 0 | 14.7 | 10.4 | 8.2 |
| | 18/04/2023 | 0 | 0 | 0 | 70 | 3 | 0 | 0 | 1 | **74** | 0 | 17.6 | 10 | 8.7 |
| | 19/04/2023 | 3 | 0 | 0 | 86 | 1 | 0 | 0 | 0 | **90** | 0 | 15.2 | 8.2 | 8.2 |
| | 20/04/2023 | 1 | 0 | 3 | 24 | 1 | 0 | 0 | 2 | **31** | 0 | 15.3 | 9.5 | 10.5 |
| SP3 | 05/04/2023 | 0 | 0 | 0 | 150 | 0 | 0 | 0 | 1 | **151** | 2.1 | 12.9 | 8.9 | 8.9 |
| | 06/04/2023 | 0 | 1 | 0 | 93 | 0 | 0 | 0 | 0 | **94** | 0.6 | 11.6 | 4.5 | 5.8 |
| | 07/04/2023 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 0 | 12.9 | 4.3 | 10.6 |

| Sampling Point | Date | Myotis | Leisler's | N. Pip | C. Pip | S. Pip | BLE | LHS | NoID | Total | Rain (mm) | Max Temp (°C) | Min Temp (°C) | Mean Windspeed (knot) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 08/04/2023 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 0.3 | 12.7 | 10.2 | 11.5 |
| | 09/04/2023 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | **1** | 10.3 | 12.1 | 10.1 | 12.3 |
| | 10/04/2023 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | **1** | 7.3 | 11.5 | 6.4 | 12.7 |
| | 11/04/2023 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 15.6 | 10.4 | 4.8 | 15.2 |
| | 12/04/2023 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 13.2 | 10.8 | 4.5 | 22.9 |
| | 13/04/2023 | 0 | 0 | 0 | 68 | 1 | 0 | 0 | 0 | **69** | 2.5 | 10.7 | 4.7 | 6.4 |
| | 14/04/2023 | 1 | 0 | 0 | 87 | 1 | 0 | 0 | 1 | **90** | 2 | 11.9 | 5.3 | 6.2 |
| | 15/04/2023 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 3.3 | 11.8 | 4 | 8.4 |
| | 16/04/2023 | 0 | 0 | 0 | 58 | 0 | 0 | 0 | 1 | **59** | 0.4 | 14.8 | 11.1 | 9.2 |
| | 17/04/2023 | 0 | 0 | 0 | 8 | 0 | 0 | 0 | 1 | **9** | 0 | 14.7 | 10.4 | 8.2 |
| | 18/04/2023 | 0 | 0 | 0 | 205 | 3 | 0 | 0 | 4 | **212** | 0 | 17.6 | 10 | 8.7 |
| | 19/04/2023 | 1 | 0 | 0 | 66 | 1 | 0 | 0 | 1 | **69** | 0 | 15.2 | 8.2 | 8.2 |
| | 20/04/2023 | 0 | 0 | 0 | 20 | 3 | 0 | 0 | 1 | **24** | 0 | 15.3 | 9.5 | 10.5 |
| SP4 | 05/04/2023 | 0 | 0 | 0 | 50 | 3 | 0 | 0 | 0 | **53** | 2.1 | 12.9 | 8.9 | 8.9 |
| | 06/04/2023 | 2 | 1 | 0 | 89 | 2 | 0 | 0 | 1 | **95** | 0.6 | 11.6 | 4.5 | 5.8 |
| | 07/04/2023 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **2** | 0 | 12.9 | 4.3 | 10.6 |
| | 08/04/2023 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 0.3 | 12.7 | 10.2 | 11.5 |
| | 09/04/2023 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 10.3 | 12.1 | 10.1 | 12.3 |

| Sampling Point | Date | Myotis | Leisler's | N. Pip | C. Pip | S. Pip | BLE | LHS | NoID | Total | Rain (mm) | Max Temp (°C) | Min Temp (°C) | Mean Windspeed (knot) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 10/04/2023 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | **1** | 7.3 | 11.5 | 6.4 | 12.7 |
| | 11/04/2023 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 15.6 | 10.4 | 4.8 | 15.2 |
| | 12/04/2023 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 3 | **5** | 13.2 | 10.8 | 4.5 | 22.9 |
| | 13/04/2023 | 0 | 0 | 0 | 83 | 1 | 0 | 0 | 1 | **85** | 2.5 | 10.7 | 4.7 | 6.4 |
| | 14/04/2023 | 0 | 0 | 0 | 94 | 2 | 0 | 0 | 0 | **96** | 2 | 11.9 | 5.3 | 6.2 |
| | 15/04/2023 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | **1** | 3.3 | 11.8 | 4 | 8.4 |
| | 16/04/2023 | 0 | 0 | 0 | 15 | 0 | 0 | 0 | 2 | **17** | 0.4 | 14.8 | 11.1 | 9.2 |
| | 17/04/2023 | 0 | 0 | 0 | 36 | 0 | 0 | 0 | 4 | **40** | 0 | 14.7 | 10.4 | 8.2 |
| | 18/04/2023 | 3 | 1 | 0 | 105 | 25 | 0 | 0 | 7 | **141** | 0 | 17.6 | 10 | 8.7 |
| | 19/04/2023 | 0 | 0 | 0 | 172 | 11 | 0 | 0 | 7 | **190** | 0 | 15.2 | 8.2 | 8.2 |
| | 20/04/2023 | 0 | 0 | 0 | 308 | 32 | 0 | 0 | 29 | **369** | 0 | 15.3 | 9.5 | 10.5 |
| SP5 | 05/04/2023 | 0 | 0 | 0 | 147 | 0 | 0 | 0 | 0 | **147** | 2.1 | 12.9 | 8.9 | 8.9 |
| | 06/04/2023 | 0 | 3 | 0 | 144 | 12 | 0 | 0 | 1 | **160** | 0.6 | 11.6 | 4.5 | 5.8 |
| | 07/04/2023 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | **1** | 0 | 12.9 | 4.3 | 10.6 |
| | 08/04/2023 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 0.3 | 12.7 | 10.2 | 11.5 |
| | 09/04/2023 | 0 | 0 | 0 | 16 | 0 | 1 | 0 | 0 | **17** | 10.3 | 12.1 | 10.1 | 12.3 |
| | 10/04/2023 | 2 | 0 | 2 | 5 | 0 | 0 | 0 | 0 | **9** | 7.3 | 11.5 | 6.4 | 12.7 |
| | 11/04/2023 | 4 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | **5** | 15.6 | 10.4 | 4.8 | 15.2 |

| Sampling Point | Date | Myotis | Leisler's | N. Pip | C. Pip | S. Pip | BLE | LHS | NoID | Total | Rain (mm) | Max Temp (°C) | Min Temp (°C) | Mean Windspeed (knot) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 12/04/2023 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | **3** | 13.2 | 10.8 | 4.5 | 22.9 |
| | 13/04/2023 | 1 | 0 | 0 | 61 | 3 | 0 | 0 | 0 | **65** | 2.5 | 10.7 | 4.7 | 6.4 |
| | 14/04/2023 | 1 | 0 | 0 | 88 | 0 | 0 | 0 | 0 | **89** | 2 | 11.9 | 5.3 | 6.2 |
| | 15/04/2023 | 4 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | **6** | 3.3 | 11.8 | 4 | 8.4 |
| | 16/04/2023 | 0 | 1 | 0 | 13 | 9 | 0 | 0 | 0 | **23** | 0.4 | 14.8 | 11.1 | 9.2 |
| | 17/04/2023 | 4 | 0 | 0 | 43 | 4 | 0 | 0 | 3 | **54** | 0 | 14.7 | 10.4 | 8.2 |
| | 18/04/2023 | 2 | 0 | 0 | 42 | 7 | 0 | 0 | 0 | **51** | 0 | 17.6 | 10 | 8.7 |
| | 19/04/2023 | 2 | 0 | 1 | 22 | 5 | 2 | 0 | 0 | **32** | 0 | 15.2 | 8.2 | 8.2 |
| | 20/04/2023 | 0 | 0 | 2 | 33 | 19 | 0 | 0 | 0 | **54** | 0 | 15.3 | 9.5 | 10.5 |

*Table 15. Time of earliest and/or latest bat pass recorded foe each species in context of sunset and sunrise times for each sampling point during the April PAB surveys*

| SP | Date | Sunset | Sunrise | Species | Time of Earliest Bat Pass | Hours After Sunset[14] | Time of Latest Bat Pass | Hours Before Sunrise[15] |
|---|---|---|---|---|---|---|---|---|
| SP1 | 05/04/2023 | 20:20 | 07:07 | - | - | - | - | - |
| SP1 | 06/04/2023 | 20:22 | 07:05 | C. Pip | 21:17:00 | 00:55 | - | |
| SP1 | 07/04/2023 | 20:24 | 07:03 | - | - | - | - | - |
| SP1 | 08/04/2023 | 20:26 | 07:01 | - | - | - | - | - |
| SP1 | 09/04/2023 | 20:27 | 06:58 | - | - | - | - | - |
| SP1 | 10/04/2023 | 20:29 | 06:56 | LHS | 21:37:00 | 01:08 | - | - |
| SP1 | 11/04/2023 | 20:31 | 06:54 | - | - | - | - | - |
| SP1 | 12/04/2023 | 20:32 | 06:52 | No id | - | - | 03:57 | 02:55 |
| SP1 | 13/04/2023 | 20:34 | 06:49 | No id | 20:53 | 00:19 | - | - |
| SP1 | 13/04/2023 | 20:34 | 06:49 | C. Pip | 20:45 | 00:11 | - | - |
| SP1 | 13/04/2023 | 20:34 | 06:49 | S. Pip | 21:41 | 01:07 | - | - |
| SP1 | 14/04/2023 | 20:36 | 06:47 | N. Pip | 23:04 | 02:28 | - | - |
| SP1 | 14/04/2023 | 20:36 | 06:47 | C. Pip | 21:06 | 00:30 | 01:42 | 05:05 |
| SP1 | 14/04/2023 | 20:36 | 06:47 | No id | 23:05 | 02:29 | - | - |
| SP1 | 15/04/2023 | 20:37 | 06:45 | Myotis | - | - | 05:21 | 01:24 |
| SP1 | 15/04/2023 | 20:37 | 06:45 | No id | - | - | 00:27 | 06:18 |

[14] Light orange: Bat pass recorded within the first hour after sunset; Dark orange: Bat pass recorded within the first half-hour after sunset.
[15] Light orange: Bat pass recorded within the first 2 hours before sunrise; Dark orange: Bat pass recorded within the hour before sunrise.

| SP | Date | Sunset | Sunrise | Species | Time of Earliest Bat Pass | Hours After Sunset[14] | Time of Latest Bat Pass | Hours Before Sunrise[15] |
|---|---|---|---|---|---|---|---|---|
| SP1 | 15/04/2023 | 20:37 | 06:45 | C. Pip | - | - | 00:11 | 06:34 |
| SP1 | 16/04/2023 | 20:39 | 06:43 | S. Pip | 22:36 | 01:57:00 | - | - |
| SP1 | 16/04/2023 | 20:39 | 06:43 | C. Pip | 21:02 | 00:23 | - | - |
| SP1 | 16/04/2023 | 20:39 | 06:43 | No id | 21:04 | 00:25 | - | - |
| SP1 | 17/04/2023 | 20:41 | 06:41 | No id | 21:14 | 00:33 | 06:09 | 00:32 |
| SP1 | 17/04/2023 | 20:41 | 06:41 | C. Pip | 21:13 | 00:32 | 06:11 | 00:18 |
| SP1 | 18/04/2023 | 20:43 | 06:39 | No id | 21:14 | 00:31 | - | - |
| SP1 | 18/04/2023 | 20:43 | 06:39 | N. Pip | 21:53 | 01:10 | - | - |
| SP1 | 18/04/2023 | 20:43 | 06:39 | C. Pip | 21:14 | 00:31 | 00:04 | 06:35 |
| SP1 | 18/04/2023 | 20:43 | 06:39 | S. Pip | 22:33 | 01:50 | - | - |
| SP1 | 19/04/2023 | 20:44 | 06:37 | No id | 21:11 | 00:27 | 00:31 | 06:06 |
| SP1 | 19/04/2023 | 20:44 | 06:37 | C. Pip | 21:11 | 00:27 | 03:41 | 02:56 |
| SP1 | 20/04/2023 | 20:46 | 06:34 | S. Pip | - | - | 02:40 | 03:54 |
| SP1 | 20/04/2023 | 20:46 | 06:34 | C. Pip | - | - | 05:34 | 01:00 |
| SP1 | 20/04/2023 | 20:46 | 06:34 | No id | - | - | 03:06 | 03:28 |
| SP2 | 05/04/2023 | 20:20 | 07:07 | S. Pip | 20:59 | 00:39 | - | - |
| SP2 | 05/04/2023 | 20:20 | 07:07 | Myotis | 21:03 | 00:43 | - | - |
| SP2 | 05/04/2023 | 20:20 | 07:07 | No id | 20:21 | 00:01 | 04:40 | 02:27 |

| SP | Date | Sunset | Sunrise | Species | Time of Earliest Bat Pass | Hours After Sunset[14] | Time of Latest Bat Pass | Hours Before Sunrise[15] |
|---|---|---|---|---|---|---|---|---|
| SP2 | 05/04/2023 | 20:20 | 07:07 | Leisler's | 21:33 | 01:13 | - | - |
| SP2 | 05/04/2023 | 20:20 | 07:07 | C. Pip | 20:21 | 00:01 | - | - |
| SP2 | 05/04/2023 | 20:20 | 07:07 | N. Pip | 21:04 | 00:44 | - | - |
| SP2 | 06/04/2023 | 20:22 | 07:05 | S. Pip | 20:57 | 00:35 | - | - |
| SP2 | 06/04/2023 | 20:22 | 07:05 | Myotis | 23:46 | 03:24 | - | - |
| SP2 | 06/04/2023 | 20:22 | 07:05 | No id | - | - | 02:37 | 04:28 |
| SP2 | 06/04/2023 | 20:22 | 07:05 | C. Pip | 20:47 | 00:25 | 06:26 | 00:39 |
| SP2 | 07/04/2023 | 20:24 | 07:03 | No id | - | - | 00:24 | 06:39 |
| SP2 | 07/04/2023 | 20:24 | 07:03 | C. Pip | - | - | 01:27 | 05:36 |
| SP2 | 08/04/2023 | 20:26 | 07:01 | - | - | - | - | - |
| SP2 | 09/04/2023 | 20:27 | 06:58 | - | - | - | - | - |
| SP2 | 10/04/2023 | 20:29 | 06:56 | LHS | 21:24 | 00:55 | - | - |
| SP2 | 11/04/2023 | 20:31 | 06:54 | C. Pip | 21:35 | 01:04 | - | - |
| SP2 | 12/04/2023 | 20:32 | 06:52 | C. Pip | 20:59 | 00:27 | - | - |
| SP2 | 12/04/2023 | 20:32 | 06:52 | N. Pip | - | - | 03:41 | 03:11 |
| SP2 | 13/04/2023 | 20:34 | 06:49 | S. Pip | 21:42 | 01:08 | - | - |
| SP2 | 13/04/2023 | 20:34 | 06:49 | Myotis | - | - | 00:59 | 05:50 |
| SP2 | 13/04/2023 | 20:34 | 06:49 | No id | 22:24 | 01:50 | - | - |

| SP | Date | Sunset | Sunrise | Species | Time of Earliest Bat Pass | Hours After Sunset[14] | Time of Latest Bat Pass | Hours Before Sunrise[15] |
|---|---|---|---|---|---|---|---|---|
| SP2 | 13/04/2023 | 20:34 | 06:49 | C. Pip | 20:46 | 00:12 | - | - |
| SP2 | 14/04/2023 | 20:36 | 06:47 | Myotis | - | - | 05:19 | 01:28 |
| SP2 | 14/04/2023 | 20:36 | 06:47 | No id | 23:15 | 02:39 | - | - |
| SP2 | 14/04/2023 | 20:36 | 06:47 | N. Pip | 23:21 | 02:45 | 00:29 | 06:18 |
| SP2 | 14/04/2023 | 20:36 | 06:47 | C. Pip | 20:55 | 00:19 | 01:43 | 05:04 |
| SP2 | 14/04/2023 | 20:36 | 06:47 | S. Pip | 22:05 | 01:29 | - | - |
| SP2 | 15/04/2023 | 20:37 | 06:45 | Myotis | - | - | 05:21 | 01:24 |
| SP2 | 15/04/2023 | 20:37 | 06:45 | C. Pip | - | - | 00:41 | 06:04 |
| SP2 | 16/04/2023 | 20:39 | 06:43 | No id | 21:19 | 00:40 | - | - |
| SP2 | 16/04/2023 | 20:39 | 06:43 | C. Pip | 21:07 | 00:28 | - | - |
| SP2 | 17/04/2023 | 20:41 | 06:41 | C. Pip | 22:10 | 01:29 | - | - |
| SP2 | 18/04/2023 | 20:43 | 06:39 | No id | 23:56 | 03:13 | - | - |
| SP2 | 18/04/2023 | 20:43 | 06:39 | C. Pip | 21:15 | 00:32 | - | - |
| SP2 | 18/04/2023 | 20:43 | 06:39 | S. Pip | 22:32 | 01:49 | - | - |
| SP2 | 19/04/2023 | 20:44 | 06:37 | Myotis | - | - | 05:01 | 01:36 |
| SP2 | 19/04/2023 | 20:44 | 06:37 | C. Pip | 22:43 | 01:59 | 04:40 | 01:57 |
| SP2 | 19/04/2023 | 20:44 | 06:37 | S. Pip | 22:27 | 01:43 | - | - |
| SP2 | 20/04/2023 | 20:46 | 06:34 | Myotis | - | - | 02:15 | 04:19 |

| SP | Date | Sunset | Sunrise | Species | Time of Earliest Bat Pass | Hours After Sunset[14] | Time of Latest Bat Pass | Hours Before Sunrise[15] |
|---|---|---|---|---|---|---|---|---|
| SP2 | 20/04/2023 | 20:46 | 06:34 | No id | - | - | 02:44 | 03:50 |
| SP2 | 20/04/2023 | 20:46 | 06:34 | N. Pip | - | - | 02:42 | 03:52 |
| SP2 | 20/04/2023 | 20:46 | 06:34 | C. Pip | - | - | 03:35 | 02:59 |
| SP2 | 20/04/2023 | 20:46 | 06:34 | S. Pip | - | - | 02:57 | 03:37 |
| SP3 | 05/04/2023 | 20:20 | 07:07 | C. Pip | 21:27 | 01:07 | - | - |
| SP3 | 06/04/2023 | 20:22 | 07:05 | Leisler's | 21:31 | 01:09 | - | - |
| SP3 | 06/04/2023 | 20:22 | 07:05 | C. Pip | 20:52 | 00:30 | 04:55 | 02:10 |
| SP3 | 07/04/2023 | 20:24 | 07:03 | - | - | - | - | - |
| SP3 | 08/04/2023 | 20:26 | 07:01 | - | - | - | - | - |
| SP3 | 09/04/2023 | 20:27 | 06:58 | C. Pip | 21:25 | 00:58 | - | - |
| SP3 | 10/04/2023 | 20:29 | 06:56 | C. Pip | 21:42 | 01:13 | - | - |
| SP3 | 11/04/2023 | 20:31 | 06:54 | - | - | - | - | - |
| SP3 | 12/04/2023 | 20:32 | 06:52 | - | - | - | - | - |
| SP3 | 13/04/2023 | 20:34 | 06:49 | C. Pip | 21:05 | 00:31 | - | - |
| SP3 | 13/04/2023 | 20:34 | 06:49 | S. Pip | 21:31 | 00:57 | - | - |
| SP3 | 14/04/2023 | 20:36 | 06:47 | Myotis | - | - | 05:34 | 01:13 |
| SP3 | 14/04/2023 | 20:36 | 06:47 | No id | 23:08 | 02:32 | - | - |
| SP3 | 14/04/2023 | 20:36 | 06:47 | C. Pip | 21:11 | 00:35 | 01:05 | 05:42 |

| SP | Date | Sunset | Sunrise | Species | Time of Earliest Bat Pass | Hours After Sunset[14] | Time of Latest Bat Pass | Hours Before Sunrise[15] |
|---|---|---|---|---|---|---|---|---|
| SP3 | 14/04/2023 | 20:36 | 06:47 | S. Pip | 21:25 | 00:49 | - | - |
| SP3 | 15/04/2023 | 20:37 | 06:45 | - | - | - | - | - |
| SP3 | 16/04/2023 | 20:39 | 06:43 | No id | - | - | 05:36 | 01:07 |
| SP3 | 16/04/2023 | 20:39 | 06:43 | C. Pip | 21:21 | 00:42 | - | - |
| SP3 | 17/04/2023 | 20:41 | 06:41 | No id | - | - | 06:09 | 00:32 |
| SP3 | 17/04/2023 | 20:41 | 06:41 | C. Pip | 21:15 | 00:34 | 05:47 | 00:54 |
| SP3 | 18/04/2023 | 20:43 | 06:39 | C. Pip | 21:29 | 00:46 | - | - |
| SP3 | 18/04/2023 | 20:43 | 06:39 | S. Pip | 22:00 | 01:17 | - | - |
| SP3 | 18/04/2023 | 20:43 | 06:39 | No id | 21:34 | 00:51 | - | - |
| SP3 | 19/04/2023 | 20:44 | 06:37 | No id | 21:29 | 00:45 | - | - |
| SP3 | 19/04/2023 | 20:44 | 06:37 | Myotis | 22:07 | 01:23 | - | - |
| SP3 | 19/04/2023 | 20:44 | 06:37 | C. Pip | 21:21 | 00:37 | 01:17 | 05:20 |
| SP3 | 19/04/2023 | 20:44 | 06:37 | S. Pip | - | - | 02:00 | 04:37 |
| SP3 | 20/04/2023 | 20:46 | 06:34 | No id | - | - | 01:01 | 05:33 |
| SP3 | 20/04/2023 | 20:46 | 06:34 | C. Pip | - | - | 04:42 | 01:52 |
| SP3 | 20/04/2023 | 20:46 | 06:34 | S. Pip | - | - | 02:43 | 03:51 |
| SP4 | 05/04/2023 | 20:20 | 07:07 | S. Pip | 20:43 | 00:23 | - | - |
| SP4 | 05/04/2023 | 20:20 | 07:07 | C. Pip | 20:43 | 00:23 | - | - |

| SP | Date | Sunset | Sunrise | Species | Time of Earliest Bat Pass | Hours After Sunset[14] | Time of Latest Bat Pass | Hours Before Sunrise[15] |
|---|---|---|---|---|---|---|---|---|
| SP4 | 06/04/2023 | 20:22 | 07:05 | No id | 21:39 | 01:17 | - | - |
| SP4 | 06/04/2023 | 20:22 | 07:05 | Myotis | 21:41 | 01:19 | - | - |
| SP4 | 06/04/2023 | 20:22 | 07:05 | Leisler's | 21:33 | 01:11 | - | - |
| SP4 | 06/04/2023 | 20:22 | 07:05 | C. Pip | 20:51 | 00:29 | 02:24 | 04:41 |
| SP4 | 06/04/2023 | 20:22 | 07:05 | S. Pip | 22:18 | 01:56 | 00:09 | 06:56 |
| SP4 | 07/04/2023 | 20:24 | 07:03 | Myotis | - | - | 02:47 | 04:16 |
| SP4 | 08/04/2023 | 20:26 | 07:01 | - | - | - | - | - |
| SP4 | 09/04/2023 | 20:27 | 06:58 | - | - | - | - | - |
| SP4 | 10/04/2023 | 20:29 | 06:56 | C. Pip | 21:25 | 00:56 | - | - |
| SP4 | 11/04/2023 | 20:31 | 06:54 | - | - | - | - | - |
| SP4 | 12/04/2023 | 20:32 | 06:52 | C. Pip | 22:23 | 01:51 | - | - |
| SP4 | 12/04/2023 | 20:32 | 06:52 | No id | - | - | 03:57 | 02:55 |
| SP4 | 13/04/2023 | 20:34 | 06:49 | No id | 22:53 | 02:19 | - | - |
| SP4 | 13/04/2023 | 20:34 | 06:49 | C. Pip | 20:57 | 00:23 | - | - |
| SP4 | 13/04/2023 | 20:34 | 06:49 | S. Pip | 21:25 | 00:51 | - | - |
| SP4 | 14/04/2023 | 20:36 | 06:47 | S. Pip | - | - | 00:47 | 06:00 |
| SP4 | 14/04/2023 | 20:36 | 06:47 | C. Pip | 21:01 | 00:25 | 01:01 | 05:46 |
| SP4 | 15/04/2023 | 20:37 | 06:45 | C. Pip | - | - | 00:13 | 06:32 |

| SP | Date | Sunset | Sunrise | Species | Time of Earliest Bat Pass | Hours After Sunset[14] | Time of Latest Bat Pass | Hours Before Sunrise[15] |
|---|---|---|---|---|---|---|---|---|
| SP4 | 16/04/2023 | 20:39 | 06:43 | C. Pip | 21:09 | 00:30 | - | - |
| SP4 | 16/04/2023 | 20:39 | 06:43 | No id | 21:53 | 01:14 | - | - |
| SP4 | 17/04/2023 | 20:41 | 06:41 | No id | 23:42 | 03:01 | 03:41 | 03:00 |
| SP4 | 17/04/2023 | 20:41 | 06:41 | C. Pip | 21:15 | 00:34 | 05:50 | 00:51 |
| SP4 | 18/04/2023 | 20:43 | 06:39 | No id | 21:33 | 00:50 | 00:01 | 06:38 |
| SP4 | 18/04/2023 | 20:43 | 06:39 | Myotis | 21:49 | 01:06 | - | - |
| SP4 | 18/04/2023 | 20:43 | 06:39 | Leisler's | 21:23 | 00:40 | - | - |
| SP4 | 18/04/2023 | 20:43 | 06:39 | C. Pip | 21:11 | 00:28 | 00:03 | 06:36 |
| SP4 | 18/04/2023 | 20:43 | 06:39 | S. Pip | 21:31 | 00:48 | - | - |
| SP4 | 19/04/2023 | 20:44 | 06:37 | No id | 21:11 | 00:27 | 00:30 | 06:07 |
| SP4 | 19/04/2023 | 20:44 | 06:37 | C. Pip | 21:11 | 00:27 | 05:25 | 01:12 |
| SP4 | 19/04/2023 | 20:44 | 06:37 | S. Pip | 21:10 | 00:26 | 02:27 | 04:10 |
| SP4 | 20/04/2023 | 20:46 | 06:34 | No id | - | - | 04:51 | 01:43 |
| SP4 | 20/04/2023 | 20:46 | 06:34 | C. Pip | - | - | 05:00 | 01:34 |
| SP4 | 20/04/2023 | 20:46 | 06:34 | S. Pip | - | - | 03:00 | 03:34 |
| SP5 | 05/04/2023 | 20:20 | 07:07 | C. Pip | 20:46 | 00:26 | 00:17 | 06:50 |
| SP5 | 06/04/2023 | 20:22 | 07:05 | No id | 21:03 | 00:41 | - | - |
| SP5 | 06/04/2023 | 20:22 | 07:05 | Leisler's | 21:32 | 01:10 | - | - |

| SP | Date | Sunset | Sunrise | Species | Time of Earliest Bat Pass | Hours After Sunset[14] | Time of Latest Bat Pass | Hours Before Sunrise[15] |
|---|---|---|---|---|---|---|---|---|
| SP5 | 06/04/2023 | 20:22 | 07:05 | C. Pip | 20:48 | 00:26 | 06:21 | 00:44 |
| SP5 | 06/04/2023 | 20:22 | 07:05 | S. Pip | 20:47 | 00:25 | 04:11 | 02:54 |
| SP5 | 07/04/2023 | 20:24 | 07:03 | S. Pip | - | - | 03:19 | 03:44 |
| SP5 | 08/04/2023 | 20:26 | 07:01 | - | - | - | - | - |
| SP5 | 09/04/2023 | 20:27 | 06:58 | C. Pip | 20:59 | 00:32 | - | - |
| SP5 | 09/04/2023 | 20:27 | 06:58 | BLE | 23:28 | 03:01 | - | - |
| SP5 | 10/04/2023 | 20:29 | 06:56 | C. Pip | 20:57 | 00:28 | - | - |
| SP5 | 10/04/2023 | 20:29 | 06:56 | N. Pip | - | - | 06:49 | 00:07 |
| SP5 | 10/04/2023 | 20:29 | 06:56 | Myotis | - | - | 00:14 | 06:42 |
| SP5 | 11/04/2023 | 20:31 | 06:54 | Myotis | - | - | 05:36 | 01:18 |
| SP5 | 11/04/2023 | 20:31 | 06:54 | C. Pip | - | - | 00:01 | 06:53 |
| SP5 | 12/04/2023 | 20:32 | 06:52 | No id | - | - | 06:48 | 00:04 |
| SP5 | 13/04/2023 | 20:34 | 06:49 | S. Pip | 21:16 | 00:42 | - | - |
| SP5 | 13/04/2023 | 20:34 | 06:49 | C. Pip | 20:58 | 00:24 | - | - |
| SP5 | 13/04/2023 | 20:34 | 06:49 | Myotis | 22:30 | 01:56 | - | - |
| SP5 | 14/04/2023 | 20:36 | 06:47 | C. Pip | 21:11 | 00:35 | 01:06 | 05:41 |
| SP5 | 14/04/2023 | 20:36 | 06:47 | Myotis | 21:47 | 01:11 | - | - |
| SP5 | 15/04/2023 | 20:37 | 06:45 | BLE | 22:58 | 02:21 | - | - |

| SP | Date | Sunset | Sunrise | Species | Time of Earliest Bat Pass | Hours After Sunset[14] | Time of Latest Bat Pass | Hours Before Sunrise[15] |
|---|---|---|---|---|---|---|---|---|
| SP5 | 15/04/2023 | 20:37 | 06:45 | N. Pip | - | - | 06:36 | 00:09 |
| SP5 | 15/04/2023 | 20:37 | 06:45 | Myotis | - | - | 03:51 | 02:54 |
| SP5 | 16/04/2023 | 20:39 | 06:43 | S. Pip | 21:35 | 00:56 | - | - |
| SP5 | 16/04/2023 | 20:39 | 06:43 | C. Pip | 21:10 | 00:31 | - | - |
| SP5 | 16/04/2023 | 20:39 | 06:43 | Leisler's | 21:10 | 00:31 | - | - |
| SP5 | 17/04/2023 | 20:41 | 06:41 | No id | 21:11 | 00:30 | 05:37 | 01:04 |
| SP5 | 17/04/2023 | 20:41 | 06:41 | Myotis | 23:47 | 03:06 | 03:02 | 03:39 |
| SP5 | 17/04/2023 | 20:41 | 06:41 | C. Pip | 21:15 | 00:34 | 05:51 | 00:50 |
| SP5 | 17/04/2023 | 20:41 | 06:41 | S. Pip | 21:49 | 01:08 | 03:42 | 02:59 |
| SP5 | 18/04/2023 | 20:43 | 06:39 | S. Pip | 21:22 | 00:39 | - | - |
| SP5 | 18/04/2023 | 20:43 | 06:39 | C. Pip | 21:23 | 00:40 | 03:54 | 02:45 |
| SP5 | 18/04/2023 | 20:43 | 06:39 | Myotis | 22:15 | 01:32 | - | - |
| SP5 | 19/04/2023 | 20:44 | 06:37 | BLE | - | - | 04:07 | 02:30 |
| SP5 | 19/04/2023 | 20:44 | 06:37 | S. Pip | 21:38 | 00:54 | 03:34 | 03:03 |
| SP5 | 19/04/2023 | 20:44 | 06:37 | C. Pip | 21:23 | 00:39 | 05:40 | 00:57 |
| SP5 | 19/04/2023 | 20:44 | 06:37 | N. Pip | - | - | 06:13 | 00:24 |
| SP5 | 19/04/2023 | 20:44 | 06:37 | Myotis | 23:35 | 02:51 | 03:01 | 03:36 |
| SP5 | 20/04/2023 | 20:46 | 06:34 | S. Pip | - | - | 03:12 | 03:22 |

| SP | Date | Sunset | Sunrise | Species | Time of Earliest Bat Pass | Hours After Sunset[14] | Time of Latest Bat Pass | Hours Before Sunrise[15] |
|---|---|---|---|---|---|---|---|---|
| SP5 | 20/04/2023 | 20:46 | 06:34 | C. Pip | - | - | 04:46 | 01:48 |
| SP5 | 20/04/2023 | 20:46 | 06:34 | N. Pip | - | - | 06:28 | 00:06 |

## PAB Surveys - May (Hotel Interior)

Table 16. Total number of bat passes of each species recorded at each sampling point during the May 2023 survey[16]

| SP | Location | *Myotis* spp. | Leisler's bat | Nathusius' pipistrelle | Common pipistrelle | Soprano pipistrelle | Brown long-eared bat | Lesser Horseshoe | NoID | Total | % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Middle tower (ground floor) | 4 | 2 | 3 | 1832 | 57 | 0 | 5 | 10 | 1913 | 51.5 |
| 2 | Bedroom block (ground floor) | 0 | 0 | 7 | 1246 | 4 | 0 | 0 | 51 | 1308 | 35.3 |
| 5 | Middle tower (2nd floor landing) | 0 | 0 | 1 | 2 | 0 | 0 | 197 | 18 | 218 | 5.9 |
| 4 | Middle tower (2nd floor landing) | 0 | 4 | 0 | 114 | 13 | 0 | 16 | 25 | 172 | 4.6 |
| 6 | Middle tower (roof entrance) | 0 | 1 | 0 | 45 | 16 | 0 | 0 | 37 | 99 | 2.7 |
| 3 | Bedroom block (first floor room) | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0.02 |
| **Total** | | **4** | **7** | **11** | **3239** | **90** | **0** | **219** | **141** | **3711** | |
| **%** | | **0.1** | **0.19** | **0.29** | **87.28** | **2.45** | **0** | **5.9** | **3.79** | | |

[16] Cells highlighted yellow indicate the largest number of bat passes recorded at a sampling point for each species; the cell highlighted green is the largest sampling point total over the survey period.

Table 17. Average nightly rates[17] for species recorded at each sampling point during the May 2023 PAB survey

| SP | *Myotis spp.* | Leisler's bat | Nathusius' pipistrelle | Common pipistrelle | Soprano pipistrelle | Brown long-eared bat | Lesser Horseshoe | NoID |
|---|---|---|---|---|---|---|---|---|
| **1** | 0.31 | 0.15 | 0.23 | 140.9 | 4.38 | 0 | 0.38 | 0.77 |
| **2** | 0 | 0 | 0.54 | 95.85 | 0.31 | 0 | 0 | 3.92 |
| **3** | 0 | 0 | 0 | 0 | 0 | 0 | 0.07 | 0 |
| **4** | 0 | 0.30 | 0 | 8.77 | 1 | 0 | 1.23 | 1.92 |
| **5** | 0 | 0 | 0.08 | 0.15 | 0 | 0 | 15.15 | 1.38 |
| **6** | 0 | 0.08 | 0 | 3.46 | 1.23 | 0 | 0 | 2.85 |

Table 18. Average hourly rates for species recorded at each sampling point during the May 2023 PAB survey[18]

| SP | *Myotis spp.* | Leisler's bat | Nathusius' pipistrelle | Common pipistrelle | Soprano pipistrelle | Brown long-eared bat | Lesser Horseshoe | NoID |
|---|---|---|---|---|---|---|---|---|
| **1** | 0.33 | 0.17 | 0.25 | 152.6 | 4.75 | 0 | 0.42 | 0.83 |
| **2** | 0 | 0 | 0.58 | 103.8 | 0.33 | 0 | 0 | 4.25 |
| **3** | 0 | 0 | 0 | 0 | 0 | 0 | 0.08 | 0 |
| **4** | 0 | 0.33 | 0 | 9.5 | 1.08 | 0 | 1.33 | 2.08 |
| **5** | 0 | 0 | 0.08 | 0.17 | 0 | 0 | 16.42 | 1.5 |
| **6** | 0 | 0.08 | 0 | 3.75 | 1.33 | 0 | 0 | 3.08 |

[17] Activity categories used: Low = <10 bat passes per night; Medium = 10 – 49 bat passes per night (Orange cells) and High = ≥50 bat passes per night (Red cells).
[18] Hours between sunset and sunrise 20.30 – 06.30 = 12 hours of foraging. Activity categories used: Low = <10 bat passes per hour; Medium = 10 – 49 bat passes per hour (Orange cells) and High = ≥50 bat passes per hour (Red cells).

Table 19. Nightly breakdown of total calls recorded for each species by sampling point during the May 2023 PAB survey

| SP | Date | Myotis spp. | Leisler's | N. Pip | C. Pip | S. Pip | BLE | LHS | NoID | Total | Rain (mm) | Max Temp (°C) | Min Temp (°C) | Mean Windspeed (knot) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SP1 | 03/05/2023 | 0 | 0 | 0 | 23 | 0 | 0 | 0 | 0 | **23** | 0 | 18.2 | 12.8 | 15.4 |
| | 04/05/2023 | 0 | 0 | 0 | 47 | 2 | 0 | 0 | 3 | **52** | 13.6 | 14 | 10.3 | 7.9 |
| | 05/05/2023 | 0 | 1 | 0 | 127 | 4 | 0 | 0 | 0 | **132** | 2.7 | 14.6 | 10.5 | 7.5 |
| | 06/05/2023 | 0 | 0 | 1 | 143 | 5 | 0 | 0 | 0 | **149** | 0.2 | 15.9 | 11.4 | 7.1 |
| | 07/05/2023 | 0 | 0 | 0 | 264 | 3 | 0 | 1 | 1 | **269** | 21.4 | 13.9 | 11.7 | 11.2 |
| | 08/05/2023 | 0 | 0 | 0 | 220 | 22 | 0 | 1 | 0 | **243** | 1.3 | 15.5 | 11.6 | 8.5 |
| | 09/05/2023 | 0 | 0 | 0 | 405 | 4 | 0 | 3 | 3 | **415** | 2.5 | 14.6 | 9.7 | 9.7 |
| | 10/05/2023 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | **3** | 5 | 13.3 | 9.9 | 13.2 |
| | 11/05/2023 | 0 | 0 | 0 | 8 | 0 | 0 | 0 | 0 | **8** | 0.7 | 13.6 | 10.7 | 12.6 |
| | 12/05/2023 | 1 | 1 | 1 | 149 | 9 | 0 | 0 | 0 | **161** | 0 | 17.4 | 9.7 | 6.5 |
| | 13/05/2023 | 1 | 0 | 1 | 421 | 8 | 0 | 0 | 3 | **434** | 0 | 17.6 | 6.7 | 6.2 |
| | 14/05/2023 | 0 | 0 | 0 | 8 | 0 | 0 | 0 | 0 | **8** | 7.5 | 13.4 | 9.5 | 10 |
| | 15/05/2023 | 2 | 0 | 0 | 14 | 0 | 0 | 0 | 0 | **16** | 0 | 13.3 | 8.8 | 7.1 |
| SP2 | 03/05/2023 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 0 | 18.2 | 12.8 | 15.4 |
| | 04/05/2023 | 0 | 0 | 0 | 18 | 1 | 0 | 0 | 0 | **19** | 13.6 | 14 | 10.3 | 7.9 |
| | 05/05/2023 | 0 | 0 | 0 | 17 | 1 | 0 | 0 | 0 | **18** | 2.7 | 14.6 | 10.5 | 7.5 |
| | 06/05/2023 | 0 | 0 | 0 | 20 | 0 | 0 | 0 | 0 | **20** | 0.2 | 15.9 | 11.4 | 7.1 |

| SP | Date | Myotis spp. | Leisler's | N. Pip | C. Pip | S. Pip | BLE | LHS | NoID | Total | Rain (mm) | Max Temp (°C) | Min Temp (°C) | Mean Windspeed (knot) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 07/05/2023 | 0 | 0 | 1 | 8 | 0 | 0 | 0 | 0 | **9** | 21.4 | 13.9 | 11.7 | 11.2 |
| | 08/05/2023 | 0 | 0 | 0 | 20 | 0 | 0 | 0 | 0 | **20** | 1.3 | 15.5 | 11.6 | 8.5 |
| | 09/05/2023 | 0 | 0 | 0 | 23 | 0 | 0 | 0 | 0 | **23** | 2.5 | 14.6 | 9.7 | 9.7 |
| | 10/05/2023 | 0 | 0 | 0 | 125 | 0 | 0 | 0 | 0 | **125** | 5 | 13.3 | 9.9 | 13.2 |
| | 11/05/2023 | 0 | 0 | 0 | 197 | 1 | 0 | 0 | 2 | **200** | 0.7 | 13.6 | 10.7 | 12.6 |
| | 12/05/2023 | 0 | 0 | 0 | 226 | 1 | 0 | 0 | 6 | **233** | 0 | 17.4 | 9.7 | 6.5 |
| | 13/05/2023 | 0 | 0 | 0 | 65 | 0 | 0 | 0 | 5 | **70** | 0 | 17.6 | 6.7 | 6.2 |
| | 14/05/2023 | 0 | 0 | 0 | 259 | 0 | 0 | 0 | 9 | **268** | 7.5 | 13.4 | 9.5 | 10 |
| | 15/05/2023 | 0 | 0 | 6 | 268 | 0 | 0 | 0 | 29 | **297** | 0 | 13.3 | 8.8 | 7.1 |
| SP3 | 03/05/2023 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 0 | 18.2 | 12.8 | 15.4 |
| | 04/05/2023 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 13.6 | 14 | 10.3 | 7.9 |
| | 05/05/2023 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 2.7 | 14.6 | 10.5 | 7.5 |
| | 06/05/2023 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 0.2 | 15.9 | 11.4 | 7.1 |
| | 07/05/2023 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 21.4 | 13.9 | 11.7 | 11.2 |
| | 08/05/2023 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 1.3 | 15.5 | 11.6 | 8.5 |
| | 09/05/2023 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 2.5 | 14.6 | 9.7 | 9.7 |
| | 10/05/2023 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 5 | 13.3 | 9.9 | 13.2 |
| | 11/05/2023 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 0.7 | 13.6 | 10.7 | 12.6 |

| SP | Date | Myotis spp. | Leisler's | N. Pip | C. Pip | S. Pip | BLE | LHS | NoID | Total | Rain (mm) | Max Temp (°C) | Min Temp (°C) | Mean Windspeed (knot) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 12/05/2023 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | **1** | 0 | 17.4 | 9.7 | 6.5 |
| | 13/05/2023 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 0 | 17.6 | 6.7 | 6.2 |
| | 14/05/2023 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 7.5 | 13.4 | 9.5 | 10 |
| | 15/05/2023 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 0 | 13.3 | 8.8 | 7.1 |
| SP4 | 03/05/2023 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | **2** | 0 | 18.2 | 12.8 | 15.4 |
| | 04/05/2023 | 0 | 2 | 0 | 6 | 5 | 0 | 0 | 2 | **15** | 13.6 | 14 | 10.3 | 7.9 |
| | 05/05/2023 | 0 | 1 | 0 | 9 | 2 | 0 | 0 | 1 | **13** | 2.7 | 14.6 | 10.5 | 7.5 |
| | 06/05/2023 | 0 | 1 | 0 | 7 | 0 | 0 | 0 | 0 | **8** | 0.2 | 15.9 | 11.4 | 7.1 |
| | 07/05/2023 | 0 | 0 | 0 | 9 | 0 | 0 | 9 | 4 | **22** | 21.4 | 13.9 | 11.7 | 11.2 |
| | 08/05/2023 | 0 | 0 | 0 | 16 | 1 | 0 | 5 | 0 | **22** | 1.3 | 15.5 | 11.6 | 8.5 |
| | 09/05/2023 | 0 | 0 | 0 | 33 | 2 | 0 | 0 | 2 | **37** | 2.5 | 14.6 | 9.7 | 9.7 |
| | 10/05/2023 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 3 | **6** | 5 | 13.3 | 9.9 | 13.2 |
| | 11/05/2023 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 0.7 | 13.6 | 10.7 | 12.6 |
| | 12/05/2023 | 0 | 0 | 0 | 5 | 0 | 0 | 2 | 5 | **12** | 0 | 17.4 | 9.7 | 6.5 |
| | 13/05/2023 | 0 | 0 | 0 | 23 | 1 | 0 | 0 | 3 | **27** | 0 | 17.6 | 6.7 | 6.2 |
| | 14/05/2023 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | **2** | 7.5 | 13.4 | 9.5 | 10 |
| | 15/05/2023 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 4 | **6** | 0 | 13.3 | 8.8 | 7.1 |
| SP5 | 03/05/2023 | 0 | 0 | 0 | 0 | 0 | 0 | 25 | 0 | **25** | 0 | 18.2 | 12.8 | 15.4 |

| SP | Date | Myotis spp. | Leisler's | N. Pip | C. Pip | S. Pip | BLE | LHS | NoID | Total | Rain (mm) | Max Temp (°C) | Min Temp (°C) | Mean Windspeed (knot) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 04/05/2023 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | **2** | 13.6 | 14 | 10.3 | 7.9 |
| | 05/05/2023 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 2 | **5** | 2.7 | 14.6 | 10.5 | 7.5 |
| | 06/05/2023 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 0.2 | 15.9 | 11.4 | 7.1 |
| | 07/05/2023 | 0 | 0 | 0 | 0 | 0 | 0 | 87 | 1 | **88** | 21.4 | 13.9 | 11.7 | 11.2 |
| | 08/05/2023 | 0 | 0 | 0 | 0 | 0 | 0 | 28 | 0 | **28** | 1.3 | 15.5 | 11.6 | 8.5 |
| | 09/05/2023 | 0 | 0 | 0 | 0 | 0 | 0 | 22 | 1 | **23** | 2.5 | 14.6 | 9.7 | 9.7 |
| | 10/05/2023 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | **1** | 5 | 13.3 | 9.9 | 13.2 |
| | 11/05/2023 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | **2** | 0.7 | 13.6 | 10.7 | 12.6 |
| | 12/05/2023 | 0 | 0 | 0 | 0 | 0 | 0 | 21 | 1 | **22** | 0 | 17.4 | 9.7 | 6.5 |
| | 13/05/2023 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 1 | **8** | 0 | 17.6 | 6.7 | 6.2 |
| | 14/05/2023 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 7.5 | 13.4 | 9.5 | 10 |
| | 15/05/2023 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 7 | **14** | 0 | 13.3 | 8.8 | 7.1 |
| SP6 | 03/05/2023 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 1 | **3** | 0 | 18.2 | 12.8 | 15.4 |
| | 04/05/2023 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 3 | **6** | 13.6 | 14 | 10.3 | 7.9 |
| | 05/05/2023 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 5 | **7** | 2.7 | 14.6 | 10.5 | 7.5 |
| | 06/05/2023 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | **1** | 0.2 | 15.9 | 11.4 | 7.1 |
| | 07/05/2023 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | **1** | 21.4 | 13.9 | 11.7 | 11.2 |
| | 08/05/2023 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | **2** | 1.3 | 15.5 | 11.6 | 8.5 |

| SP | Date | Myotis spp. | Leisler's | N. Pip | C. Pip | S. Pip | BLE | LHS | NoID | Total | Rain (mm) | Max Temp (°C) | Min Temp (°C) | Mean Windspeed (knot) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 09/05/2023 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 3 | **4** | 2.5 | 14.6 | 9.7 | 9.7 |
| | 10/05/2023 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 8 | **10** | 5 | 13.3 | 9.9 | 13.2 |
| | 11/05/2023 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 0.7 | 13.6 | 10.7 | 12.6 |
| | 12/05/2023 | 0 | 1 | 0 | 11 | 0 | 0 | 0 | 5 | **16** | 0 | 17.4 | 9.7 | 6.5 |
| | 13/05/2023 | 0 | 0 | 0 | 11 | 1 | 0 | 0 | 5 | **17** | 0 | 17.6 | 6.7 | 6.2 |
| | 14/05/2023 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 0 | **5** | 7.5 | 13.4 | 9.5 | 10 |
| | 15/05/2023 | 0 | 0 | 0 | 21 | 0 | 0 | 0 | 5 | **26** | 0 | 13.3 | 8.8 | 7.1 |

Table 20. Time of earliest and/or latest bat pass recorded foe each species in context of sunset and sunrise times for each sampling point during the May PAB surveys

| SP | Date | Sunset | Sunrise | Species | Time of Earliest Bat Pass | Hours After Sunset[19] | Time of Latest Bat Pass | Hours Before Sunrise[20] |
|---|---|---|---|---|---|---|---|---|
| SP1 | 03/05/2023 | 21:08 | 06:08 | C. Pip | 21:38 | 00:30 | - | |
| SP1 | 04/05/2023 | 21:09 | 06:07 | No id | 23:48 | 02:39 | - | - |
| SP1 | 04/05/2023 | 21:09 | 06:07 | C. Pip | 21:41 | 00:32 | 05:24 | 00:43 |
| SP1 | 04/05/2023 | 21:09 | 06:07 | S. Pip | 23:53 | 02:44 | - | - |
| SP1 | 05/05/2023 | 21:11 | 06:05 | S. Pip | 22:53 | 01:42 | - | - |
| SP1 | 05/05/2023 | 21:11 | 06:05 | C. Pip | 21:38 | 00:27 | 05:34 | 00:31 |
| SP1 | 05/05/2023 | 21:11 | 06:05 | Leisler's | - | - | 00:27 | 05:38 |
| SP1 | 06/05/2023 | 21:13 | 06:03 | S. Pip | 23:11 | 01:58 | 01:32 | 04:31 |
| SP1 | 06/05/2023 | 21:13 | 06:03 | C. Pip | 21:37 | 00:24 | 05:30 | 00:33 |
| SP1 | 06/05/2023 | 21:13 | 06:03 | N. Pip | 22:41 | 01:28 | - | - |
| SP1 | 07/05/2023 | 21:14 | 06:01 | No id | - | - | 00:39 | 05:22 |
| SP1 | 07/05/2023 | 21:14 | 06:01 | C. Pip | 22:02 | 00:48 | 05:28 | 00:33 |
| SP1 | 07/05/2023 | 21:14 | 06:01 | S. Pip | - | - | 02:04 | 03:57 |
| SP1 | 07/05/2023 | 21:14 | 06:01 | LHS | - | - | 00:30 | 05:31 |
| SP1 | 08/05/2023 | 21:16 | 06:00 | LHS | 23:23 | 02:07 | - | - |

[19] Light orange: Bat pass recorded within the first hour after sunset; Dark orange: Bat pass recorded within the first half-hour after sunset.
[20] Light orange: Bat pass recorded within the first 2 hours before sunrise; Dark orange: Bat pass recorded within the hour before sunrise.

| SP | Date | Sunset | Sunrise | Species | Time of Earliest Bat Pass | Hours After Sunset[19] | Time of Latest Bat Pass | Hours Before Sunrise[20] |
|---|---|---|---|---|---|---|---|---|
| SP1 | 08/05/2023 | 21:16 | 06:00 | S. Pip | 22:48 | 01:32 | - | - |
| SP1 | 08/05/2023 | 21:16 | 06:00 | C. Pip | 21:30 | 00:14 | 05:26 | 00:34 |
| SP1 | 09/05/2023 | 21:17 | 05:58 | LHS | - | - | 03:01 | 02:57 |
| SP1 | 09/05/2023 | 21:17 | 05:58 | S. Pip | - | - | 02:57 | 03:01 |
| SP1 | 09/05/2023 | 21:17 | 05:58 | C. Pip | 22:54 | 01:37 | 05:21 | 00:37 |
| SP1 | 09/05/2023 | 21:17 | 05:58 | No id | - | - | 03:25 | 02:33 |
| SP1 | 10/05/2023 | 21:19 | 05:56 | C. Pip | 21:52 | 00:33 | 01:02 | 04:54 |
| SP1 | 11/05/2023 | 21:21 | 05:54 | C. Pip | 23:03 | 01:42 | 05:12 | 00:42 |
| SP1 | 12/05/2023 | 21:22 | 05:53 | S. Pip | 23:07 | 01:45 | 03:47 | 02:06 |
| SP1 | 12/05/2023 | 21:22 | 05:53 | C. Pip | 22 | 00:38 | 04:56 | 00:57 |
| SP1 | 12/05/2023 | 21:22 | 05:53 | N. Pip | - | - | 04:06 | 01:47 |
| SP1 | 12/05/2023 | 21:22 | 05:53 | Leisler's | - | - | 02:55 | 02:58 |
| SP1 | 12/05/2023 | 21:22 | 05:53 | Myotis spp. | 22:32 | 01:10 | - | - |
| SP1 | 13/05/2023 | 21:24 | 05:51 | S. Pip | - | - | 04:04 | 01:47 |
| SP1 | 13/05/2023 | 21:24 | 05:51 | C. Pip | 21:45 | 00:21 | 05:03 | 00:48 |
| SP1 | 13/05/2023 | 21:24 | 05:51 | N. Pip | - | - | 01:57 | 03:54 |
| SP1 | 13/05/2023 | 21:24 | 05:51 | No id | - | - | 03:41 | 02:10 |

| SP | Date | Sunset | Sunrise | Species | Time of Earliest Bat Pass | Hours After Sunset[19] | Time of Latest Bat Pass | Hours Before Sunrise[20] |
|---|---|---|---|---|---|---|---|---|
| SP1 | 13/05/2023 | 21:24 | 05:51 | Myotis spp. | - | - | 04:22 | 01:29 |
| SP1 | 14/05/2023 | 21:25 | 05:50 | C. Pip | 22:01 | 00:36 | 04:40 | 01:10 |
| SP1 | 15/05/2023 | 21:27 | 05:48 | C. Pip | 22:10 | 00:43 | 04:26 | 01:22 |
| SP1 | 15/05/2023 | 21:27 | 05:48 | Myotis spp. | - | - | 04:22 | 01:26 |
| SP2 | 03/05/2023 | 21:08 | 06:08 | - | - | - | - | - |
| SP2 | 04/05/2023 | 21:09 | 06:07 | S. Pip | 23:45 | 02:36 | - | - |
| SP2 | 04/05/2023 | 21:09 | 06:07 | C. Pip | 23:50 | 02:41 | 05:23 | 00:44 |
| SP2 | 05/05/2023 | 21:11 | 06:05 | S. Pip | - | - | 01:39 | 04:26 |
| SP2 | 05/05/2023 | 21:11 | 06:05 | C. Pip | 21:39 | 00:28 | 02:46 | 03:19 |
| SP2 | 06/05/2023 | 21:13 | 06:03 | C. Pip | - | - | 05:28 | 00:35 |
| SP2 | 07/05/2023 | 21:14 | 06:01 | C. Pip | 22:57 | 01:43 | 03:33 | 02:28 |
| SP2 | 07/05/2023 | 21:14 | 06:01 | N. Pip | - | - | 00:17 | 05:44 |
| SP2 | 08/05/2023 | 21:16 | 06:00 | C. Pip | 21:50 | 00:34 | 05:11 | 00:49 |
| SP2 | 09/05/2023 | 21:17 | 05:58 | C. Pip | 21:49 | 00:32 | 05:19 | 00:39 |
| SP2 | 10/05/2023 | 21:19 | 05:56 | C. Pip | 21:46 | 00:27 | - | - |
| SP2 | 11/05/2023 | 21:21 | 05:54 | No id | 22:01 | 00:40 | - | - |
| SP2 | 11/05/2023 | 21:21 | 05:54 | C. Pip | 21:52 | 00:31 | 05:20 | 00:34 |

| SP | Date | Sunset | Sunrise | Species | Time of Earliest Bat Pass | Hours After Sunset[19] | Time of Latest Bat Pass | Hours Before Sunrise[20] |
|---|---|---|---|---|---|---|---|---|
| SP2 | 11/05/2023 | 21:21 | 05:54 | S. Pip | 22:01 | 00:40 | - | - |
| SP2 | 12/05/2023 | 21:22 | 05:53 | No id | - | - | 04:25 | 01:28 |
| SP2 | 12/05/2023 | 21:22 | 05:53 | C. Pip | 21:52 | 00:30 | 05:02 | 00:51 |
| SP2 | 12/05/2023 | 21:22 | 05:53 | S. Pip | - | - | 00:03 | 05:50 |
| SP2 | 13/05/2023 | 21:24 | 05:51 | No id | - | - | 03:35 | 02:16 |
| SP2 | 13/05/2023 | 21:24 | 05:51 | C. Pip | - | - | 05:01 | 00:50 |
| SP2 | 14/05/2023 | 21:25 | 05:50 | No id | 22:07 | 00:42 | - | - |
| SP2 | 14/05/2023 | 21:25 | 05:50 | C. Pip | 21:54 | 00:29 | - | - |
| SP2 | 15/05/2023 | 21:27 | 05:48 | No id | 22:04 | 00:37 | 04:46 | - |
| SP2 | 15/05/2023 | 21:27 | 05:48 | N. Pip | - | - | 04:40 | 01:08 |
| SP2 | 15/05/2023 | 21:27 | 05:48 | C. Pip | 21:53 | 00:26 | 05:05 | 00:43 |
| SP3 | 03/05/2023 | 21:08 | 06:08 | - | - | - | - | - |
| SP3 | 04/05/2023 | 21:09 | 06:07 | - | - | - | - | - |
| SP3 | 05/05/2023 | 21:11 | 06:05 | - | - | - | - | - |
| SP3 | 06/05/2023 | 21:13 | 06:03 | - | - | - | - | - |
| SP3 | 07/05/2023 | 21:14 | 06:01 | - | - | - | - | - |
| SP3 | 08/05/2023 | 21:16 | 06:00 | - | - | - | - | - |
| SP3 | 09/05/2023 | 21:17 | 05:58 | - | - | - | - | - |

| SP | Date | Sunset | Sunrise | Species | Time of Earliest Bat Pass | Hours After Sunset[19] | Time of Latest Bat Pass | Hours Before Sunrise[20] |
|---|---|---|---|---|---|---|---|---|
| SP3 | 10/05/2023 | 21:19 | 05:56 | - | - | - | - | - |
| SP3 | 11/05/2023 | 21:21 | 05:54 | - | - | - | - | - |
| SP3 | 12/05/2023 | 21:22 | 05:53 | LHS | 23:28 | 02:06 | - | - |
| SP3 | 13/05/2023 | 21:24 | 05:51 | - | - | - | - | - |
| SP3 | 14/05/2023 | 21:25 | 05:50 | - | - | - | - | - |
| SP3 | 15/05/2023 | 21:27 | 05:48 | - | - | - | - | - |
| SP4 | 03/05/2023 | 21:08 | 06:08 | C. Pip | 21:38 | 00:30 | - | - |
| SP4 | 03/05/2023 | 21:08 | 06:08 | S. Pip | 21:44 | 00:36 | - | - |
| SP4 | 04/05/2023 | 21:09 | 06:07 | No id | 23:32 | 02:23 | - | - |
| SP4 | 04/05/2023 | 21:09 | 06:07 | Leisler's | 22:58 | 01:49 | - | - |
| SP4 | 04/05/2023 | 21:09 | 06:07 | C. Pip | 23:47 | 02:38 | 00:19 | 05:48 |
| SP4 | 04/05/2023 | 21:09 | 06:07 | S. Pip | 21:40 | 00:31 | - | - |
| SP4 | 05/05/2023 | 21:11 | 06:05 | No id | - | - | 01:18 | 04:47 |
| SP4 | 05/05/2023 | 21:11 | 06:05 | Leisler's | - | - | 00:27 | 05:38 |
| SP4 | 05/05/2023 | 21:11 | 06:05 | C. Pip | 21:38 | 00:27 | 01:04 | 05:01 |
| SP4 | 05/05/2023 | 21:11 | 06:05 | S. Pip | 21:38 | 00:27 | - | - |
| SP4 | 06/05/2023 | 21:13 | 06:03 | C. Pip | 23:16 | 02:03 | 02:10 | 03:53 |
| SP4 | 06/05/2023 | 21:13 | 06:03 | Leisler's | - | - | 03:48 | 02:15 |

| SP | Date | Sunset | Sunrise | Species | Time of Earliest Bat Pass | Hours After Sunset[19] | Time of Latest Bat Pass | Hours Before Sunrise[20] |
|---|---|---|---|---|---|---|---|---|
| SP4 | 07/05/2023 | 21:14 | 06:01 | LHS | 22:18 | 01:04 | 05:18 | 00:43 |
| SP4 | 07/05/2023 | 21:14 | 06:01 | C. Pip | - | - | 05:05 | 00:56 |
| SP4 | 07/05/2023 | 21:14 | 06:01 | No id | - | - | 03:35 | 02:26 |
| SP4 | 08/05/2023 | 21:16 | 06:00 | LHS | 21:50 | 00:34 | - | - |
| SP4 | 08/05/2023 | 21:16 | 06:00 | S. Pip | 23:19 | 02:03 | - | - |
| SP4 | 08/05/2023 | 21:16 | 06:00 | C. Pip | 21:50 | 00:34 | - | - |
| SP4 | 09/05/2023 | 21:17 | 05:58 | S. Pip | 23:24 | 02:07 | 02:36 | 03:22 |
| SP4 | 09/05/2023 | 21:17 | 05:58 | C. Pip | - | - | 05:21 | 00:37 |
| SP4 | 09/05/2023 | 21:17 | 05:58 | No id | 21:46 | 00:29 | 05:16 | 00:42 |
| SP4 | 10/05/2023 | 21:19 | 05:56 | C. Pip | 23:32 | 02:13 | 00:52 | 05:04 |
| SP4 | 10/05/2023 | 21:19 | 05:56 | No id | - | - | 00:51 | 05:05 |
| SP4 | 11/05/2023 | 21:21 | 05:54 | - | - | - | - | - |
| SP4 | 12/05/2023 | 21:22 | 05:53 | C. Pip | 22:35 | 01:13 | 03:23 | 02:30 |
| SP4 | 12/05/2023 | 21:22 | 05:53 | LHS | 23:41 | 02:19 | - | - |
| SP4 | 12/05/2023 | 21:22 | 05:53 | No id | 22:35 | 01:13 | 04:54 | 00:59 |
| SP4 | 13/05/2023 | 21:24 | 05:51 | S. Pip | 23:40 | 02:16 | - | - |
| SP4 | 13/05/2023 | 21:24 | 05:51 | C. Pip | 21:45 | 00:21 | 04:55 | 00:56 |
| SP4 | 13/05/2023 | 21:24 | 05:51 | No id | - | - | 01:46 | 04:05 |

| SP | Date | Sunset | Sunrise | Species | Time of Earliest Bat Pass | Hours After Sunset[19] | Time of Latest Bat Pass | Hours Before Sunrise[20] |
|---|---|---|---|---|---|---|---|---|
| SP4 | 14/05/2023 | 21:25 | 05:50 | S. Pip | - | - | 00:57 | 04:53 |
| SP4 | 14/05/2023 | 21:25 | 05:50 | No id | 22:10 | 00:45 | - | - |
| SP4 | 15/05/2023 | 21:27 | 05:48 | C. Pip | 22:29 | 01:02 | - | - |
| SP4 | 15/05/2023 | 21:27 | 05:48 | No id | 21:59 | 00:32 | - | - |
| SP5 | 03/05/2023 | 21:08 | 06:08 | LHS | 21:16 | 00:08 | - | - |
| SP5 | 04/05/2023 | 21:09 | 06:07 | No id | 23:48 | 02:39 | - | - |
| SP5 | 05/05/2023 | 21:11 | 06:05 | N. Pip | - | - | 01:04 | 05:01 |
| SP5 | 05/05/2023 | 21:11 | 06:05 | C. Pip | - | - | 01:04 | 05:01 |
| SP5 | 05/05/2023 | 21:11 | 06:05 | No id | 21:01 | 00:10 before sunset | - | - |
| SP5 | 06/05/2023 | 21:13 | 06:03 | - | - | - | - | - |
| SP5 | 07/05/2023 | 21:14 | 06:01 | LHS | 21:28 | 00:14 | 05:17 | 00:44 |
| SP5 | 07/05/2023 | 21:14 | 06:01 | No id | - | - | 05:28 | 00:33 |
| SP5 | 08/05/2023 | 21:16 | 06:00 | LHS | 21:50 | 00:34 | - | - |
| SP5 | 09/05/2023 | 21:17 | 05:58 | LHS | - | - | 03:48 | 02:10 |
| SP5 | 09/05/2023 | 21:17 | 05:58 | No id | 23:24 | 02:07 | - | - |
| SP5 | 10/05/2023 | 21:19 | 05:56 | No id | - | - | 05:42 | 00:14 |
| SP5 | 11/05/2023 | 21:21 | 05:54 | No id | - | - | 06:08 | 00:14 after sunrise |
| SP5 | 12/05/2023 | 21:22 | 05:53 | LHS | 23:29 | 02:07 | - | - |

| SP | Date | Sunset | Sunrise | Species | Time of Earliest Bat Pass | Hours After Sunset[19] | Time of Latest Bat Pass | Hours Before Sunrise[20] |
|---|---|---|---|---|---|---|---|---|
| SP5 | 12/05/2023 | 21:22 | 05:53 | No id | - | - | 05:10 | 00:43 |
| SP5 | 13/05/2023 | 21:24 | 05:51 | LHS | - | - | 02:59 | 02:52 |
| SP5 | 13/05/2023 | 21:24 | 05:51 | No id | - | - | 05:48 | 00:03 |
| SP5 | 14/05/2023 | 21:25 | 05:50 | - | - | - | - | - |
| SP5 | 15/05/2023 | 21:27 | 05:48 | LHS | - | - | 03:59 | 01:49 |
| SP5 | 15/05/2023 | 21:27 | 05:48 | No id | 21:59 | 00:32 | 05:07 | 00:41 |
| SP6 | 03/05/2023 | 21:08 | 06:08 | No id | 21:38 | 00:30 | - | - |
| SP6 | 03/05/2023 | 21:08 | 05:48 | S. Pip | 21:44 | 00:36 | - | - |
| SP6 | 04/05/2023 | 21:09 | 06:07 | S. Pip | 22:27 | 01:18 | - | - |
| SP6 | 04/05/2023 | 21:09 | 05:48 | No id | 21:40 | 00:31 | 00:34 | 05:14 |
| SP6 | 05/05/2023 | 21:11 | 06:05 | S. Pip | - | - | 01:18 | 04:47 |
| SP6 | 05/05/2023 | 21:11 | 05:48 | No id | 21:38 | 00:27 | 01:19 | 04:29 |
| SP6 | 06/05/2023 | 21:13 | 06:03 | No id | 21:51 | 00:38 | - | - |
| SP6 | 07/05/2023 | 21:14 | 06:01 | No id | 21:25 | 00:11 | 03:58 | 02:03 |
| SP6 | 08/05/2023 | 21:16 | 06:00 | C. Pip | 21:53 | 00:37 | - | - |
| SP6 | 09/05/2023 | 21:17 | 05:58 | S. Pip | 23:18 | 02:01 | - | - |
| SP6 | 09/05/2023 | 21:17 | 05:58 | No id | 21:46 | 00:29 | - | - |
| SP6 | 10/05/2023 | 21:19 | 05:56 | S. Pip | 23:33 | 02:14 | - | - |

| SP | Date | Sunset | Sunrise | Species | Time of Earliest Bat Pass | Hours After Sunset[19] | Time of Latest Bat Pass | Hours Before Sunrise[20] |
|---|---|---|---|---|---|---|---|---|
| SP6 | 10/05/2023 | 21:19 | 05:56 | No id | 21:52 | 00:33 | 01:07 | 04:49 |
| SP6 | 11/05/2023 | 21:21 | 05:54 | - | - | - | - | - |
| SP6 | 12/05/2023 | 21:22 | 05:53 | C. Pip | 22:08 | 00:46 | 03:17 | 02:36 |
| SP6 | 12/05/2023 | 21:22 | 05:53 | Leisler's | - | - | 01:37 | 04:16 |
| SP6 | 12/05/2023 | 21:22 | 05:53 | No id | 21:51 | 00:29 | 05:08 | 00:45 |
| SP6 | 13/05/2023 | 21:24 | 05:51 | S. Pip | 23:04 | 01:40 | - | - |
| SP6 | 13/05/2023 | 21:24 | 05:51 | C. Pip | - | - | 05:03 | 00:48 |
| SP6 | 13/05/2023 | 21:24 | 05:51 | No id | - | - | 01:20 | 04:31 |
| SP6 | 14/05/2023 | 21:25 | 05:50 | S. Pip | 22:01 | 00:36 | 01:57 | 03:53 |
| SP6 | 15/05/2023 | 21:27 | 05:48 | C. Pip | 22:08 | 00:41 | - | - |
| SP6 | 15/05/2023 | 21:27 | 05:48 | No id | 21:59 | 00:32 | 00:41 | 05:07 |

# Appendix 3

## PAB Detection Times Breakdown

## Hotel Middle Tower

### Bat Active Season

*Common pipistrelle*

In April, common pipistrelle was recorded at SP1 (within middle tower, ground floor) within an hour of sunset on six nights during the survey window. On four of these nights, this species was detected within a half-hour of sunset. No other species recorded during the April PAB surveys within the hotel (SP1) were found to have first detection times early enough to indicate a proximal roost.

**Table 1** below outlines the dates, number of passes and first time detected for common pipistrelle where early detections (i.e., within an hour of sunset) were recorded. The nightly breakdown with first detection times for all species can be found in **Appendix 2**.

Table 1. Breakdown of April 2023 PAB results for SP1 (middle tower, ground floor) for common pipistrelle in the context of sunset/sunrise times and proximity of roosts

| Date | Total No. Calls/Passes | Time of First Call[1] | Time of last Call | Time of Sunset/Sunrise |
|---|---|---|---|---|
| **06/04/23** | 1 | 21:17 | - | 20:22 |
| **13/04/23** | 493 | 20:45 | | 20:34 |
| **14/04/23** | 134 | 21:06 | 01:42 | 20:36 |
| **15/04/23** | 5 | | 00:11 | 06:45 |
| **16/04/23** | 200 | 21:02 | | 20:39 |
| **17/04/23** | 139 | 21:13 | | 20:41 |
| **18/04/23** | 320 | 21:14 | | 20:43 |
| **19/04/23** | 295 | 21:11 | | 20:44 |
| **20/04/23** | 240 | | 05:34 | 06:34 |

On the 13th April, the first common pipistrelle was recorded at 20:45 Hrs, indicating the presence of a day roost due to the emergence time close to sunset, with activity continuing until 01:42 Hrs. Activity was broadly similar on both the 14th and 16th April, with the first individual recorded at 21:06 Hrs and 21:02 Hrs respectively, with activity continuing until between 00.11 Hrs and 01:55 Hrs.

On the morning of 17th April, there was a low number of calls (n=5) recorded between 04:51 Hrs and 05:47 Hrs (sunrise time 06:41 Hrs). Later that evening, the first call was detected at 21:13 Hrs, continuing until 00:04 Hrs. The first call on the 18th April was detected slightly later than previously, at 21:14 Hrs, with the main activity period continuing until 01:06 Hrs. The first call on the 19th April was detected at 21:11 Hrs. The main activity continued until 03:16 Hrs, with two calls detected at 05.33 Hrs and 05.34 Hrs.

In May, common pipistrelle was recorded within a half-hour of sunset on five dates during the survey window and was recorded within an hour of sunset on six other dates in the same period. The earliest time this species was detected was 21:30 Hrs (recorded at SP1 on 8th May, 14 minutes after sunset). **Table 2** below outlines the dates, number of passes and first time detected for this species where early detections (i.e., within an hour of sunset) have been recorded.

[1] The darker oranges colour indicates first calls detected within a half-hour of sunset, while the lighter orange indicates first calls detected within an hour of sunset

Table 2. Breakdown of May 2023 PAB results for SP1 (middle tower, ground floor), SP4 (middle tower, second-floor landing) and SP6 (middle tower, roof landing) for common pipistrelle in the context of sunset/ sunrise times and proximity of roosts

| Date | SP1 | | | SP4 | | | SP6 | | | Time of Sunset/ Sunrise |
|---|---|---|---|---|---|---|---|---|---|---|
| | Total No. Calls/ Passes | Time of First Call[2] | Time of last Call | Total No. Calls/ Passes | Time of First Call | Time of last Call | Total No. Calls/ Passes | Time of First Call | Time of last Call | |
| **03/05/23** | 23 | 21:38 | - | 1 | 21:38 | - | - | - | - | 21:08 |
| **04/05/23** | 47 | 21:41 | - | 6 | 23:47 | - | - | - | - | 21:09 |
| **05/05/23** | 127 | 21:38 | - | 9 | 21:38 | - | - | - | - | 21:11 |
| **06/05/23** | 143 | 21:37 | - | 7 | 23:16 | - | - | - | - | 21:13 |
| **07/05/23** | 264 | 22:02 | - | 9 | - | 05:05 | - | - | - | 21:14 |
| **08/05/23** | 220 | 21:30 | - | 16 | 21:50 | - | 2 | 21:53 | | 21:16 |
| **09/05/23** | 405 | 22:54 | - | 33 | - | 05:21 | - | - | - | |
| **10/05/23** | 3 | 21:52 | - | 3 | 23:32 | - | - | - | - | 21:19 |
| **11/05/23** | 8 | 23:03 | - | - | - | - | - | - | - | 21:21 |
| **12/05/23** | 149 | 22:00 | - | 5 | 22:35 | - | 11 | 22:08 | - | 21:22 |
| **13/05/23** | 421 | 21:45 | - | 23 | 21:45 | - | 11 | - | 05:03 | 21:24 |
| **14/05/23** | 8 | 22:01 | - | - | - | - | - | - | - | 21:25 |
| **15/05/23** | 14 | 22:10 | - | 2 | 22:29 | - | - | - | - | 21:27 |

On 3rd May, the first common pipistrelle was detected at 21:38 Hrs at SP1 (ground-floor middle tower). There was a very brief period of activity, continuing until 21:44 hrs, after which the next call was not detected until 00:19 Hrs, when a low number (n=4) of calls were recorded, again over a brief period (00:19 Hrs to 00:34 Hrs). Activity picked up again between 04:59 Hrs and 05:24 Hrs, approaching sunrise.

Activity on 4th May recommenced at 21:41 Hrs and continued throughout much of the night, with the last call recorded at 05:34 Hrs. The first call on the evening of the 5th May was detected at 21:38 Hrs, continuing through the night until 05:30 Hrs. On 6th May, the first individual was recorded at 21:37 Hrs, with activity continuing through the night until 05:28 Hrs. On 7th May, a call was recorded at 22:02 Hrs, with another call at 02:39 Hrs and another at 05:26 Hrs. On the 8th May, the first individual was recorded at 21:30 Hrs. Activity continued throughout the night with the last call recorded at 05.21 Hrs.

On the evening of 9th May, a call was detected at 22.54 Hrs, with only two additional calls that night (at 00.00 Hrs and 01:02 Hrs). There was no further activity on the morning of 10th May. On the evening of 10th May, a call was recorded at 21:52 Hrs with the next call not recorded until 00:26 Hrs. Activity then ceased until 03:36 Hrs after which a low number of calls (n=4) were recorded (last call at 05:12 Hrs). On the evening of 11th May, there were two calls at 23:03 Hrs with no further activity picked up until between 02:38 Hrs and 04:56 Hrs.

On the evening of 12th May, the first individual was recorded at 22:00 Hrs with activity continuing through the night until the last call recorded at 05:03 Hrs. On the 13th May, the first individual was recorded at 21:45 Hrs. A low number of early morning calls (n=5) were recorded on the morning of 14th May, with the last call recorded at 04:40 Hrs. On the evening of 14th May, a call was detected at 22:01 Hrs. Low levels of activity continued through the night (n=6) with the last call detected at 04:26 Hrs on the morning of the 15th May. On the evening of 15th May, a call was detected at 22:10 Hrs. A further nine calls were recorded with the last call recorded at 23:02 Hrs.

[2] The darker oranges colour indicates first calls detected within a half-hour of sunset, while the lighter orange indicates first calls detected within an hour of sunset

*Soprano pipistrelle*

In May, soprano pipistrelle was recorded within a half-hour of sunset on one date (SP4 on 5th May at 21:38 Hrs). This comprised the earliest detection record for this species in this month. Soprano pipistrelle was recorded within an hour of sunset on three other dates. **Table 3** below outlines the dates, number of passes and first time detected for this species where early detections (i.e., within an hour of sunset) were recorded. The nightly breakdown with first detection times for all species can be found in **Appendix 2**.

Table 3. Breakdown of May 2023 PAB results for SP4 (middle tower, second-floor landing) and SP6 (middle tower, roof landing) for soprano pipistrelle in the context of sunset/ sunrise times and proximity of roosts

| Date | SP4 | | | SP6 | | | Time of Sunset/ Sunrise |
|---|---|---|---|---|---|---|---|
| | Total No. Calls/ Passes | Time of First Call[3] | Time of last Call | Total No. Calls/ Passes | Time of First Call | Time of last Call | |
| **03/05/23** | 1 | 21:44 | - | 2 | 21:44 | - | 21:08 |
| **04/05/23** | 5 | 21:40 | - | 3 | 22:27 | - | 21:09 |
| **05/05/23** | 2 | 21:38 | - | 2 | 01:18 | - | 21:11 |
| **08/05/23** | 1 | 23:19 | - | 0 | - | - | 21:16 |
| **09/05/23** | 2 | 23:24 | - | 1 | 23:18 | - | |
| **10/05/23** | 0 | - | - | 2 | 23.33 | - | 21:19 |
| **13/05/23** | 1 | 23:40 | - | 1 | 23:04 | - | 21:24 |
| **14/05/23** | 1 | 00:57 | - | 5 | 22:01 | - | 21:25 |

On the 3rd May, a soprano pipistrelle was detected at SP4 at 21:44 Hrs, with no further activity recorded for the rest of the night or following morning. On the evening of the 4th May, the first call was recorded at 21:40 Hrs. A very low number of subsequent calls were recorded (n=4) with the last call recorded at 23:48 Hrs. The next activity was not picked up until the evening of 5th May (two calls only, one at 21:28 Hrs and a second at 22:52 Hrs). Soprano pipistrelle activity was not picked up again at SP4 until the evening of 8th May (one call recorded at 23:19 Hrs with a second at 02:36 Hrs). For the remaining survey nights (9th, 13th and 14th May, only one call was recorded on each night, none of which were close to sunset time). Across the overall May survey window, no early morning (sunrise period) calls were detected for soprano pipistrelle at either SP4 or SP6.

*Lesser horseshoe bat*

In May, lesser horseshoe bat was recorded within a half-hour of sunset on two dates at SP5 (3rd and 7th May) and within an hour of sunset on one other date within the survey window. The earliest detection for this species was recorded at 21:16 Hrs. **Table 4** below outlines the dates, number of passes and first time detected for this species where early detections (i.e., within an hour of sunset) have been recorded (see also **Appendix 2**).

Table 4. Breakdown of May 2023 PAB results for SP4 and SP5 (both located in middle tower on second-floor landing) for lesser horseshoe bat in the context of sunset/ sunrise times and proximity of roosts

| Date | SP4 | | | SP5 | | | Time of Sunset/ Sunrise |
|---|---|---|---|---|---|---|---|
| | Total No. Calls/ Passes | Time of First Call[4] | Time of last Call | Total No. Calls/ Passes | Time of First Call | Time of last Call | |
| **03/05/23** | - | - | - | 25 | 21:16 | - | 21:08 |
| **07/05/23** | 9 | 22:18 | - | 87 | 21:28 | - | 21:14 |
| **08/05/23** | 5 | 21:50 | - | 28 | 21:50 | | 21:16 |
| **09/05/23** | - | - | - | 22 | - | 03:48 | 05:58 |

[3] The darker oranges colour indicates first calls detected within a half-hour of sunset, while the lighter orange indicates first calls detected within an hour of sunset

[4] The darker oranges colour indicates first calls detected within a half-hour of sunset, while the lighter orange indicates first calls detected within an hour of sunset

| Date | SP4 | | | SP5 | | | Time of Sunset/ Sunrise |
|---|---|---|---|---|---|---|---|
| | Total No. Calls/ Passes | Time of First Call[4] | Time of last Call | Total No. Calls/ Passes | Time of First Call | Time of last Call | |
| **12/05/23** | 2 | 23:41 | - | 21 | 23:29 | - | 21:22 |
| **13/05/23** | - | - | - | 7 | - | 02:59 | 05:51 |
| **15/05/23** | - | - | - | 7 | - | 03:59 | 05:48 |

At SP4, on the early morning of 7th May, four lesser horseshoe bat calls were recorded between 00:30 Hrs and 05:18 Hrs. Later on the evening of 7th May, this species was first detected at 22:18 Hrs (over 1 hour after sunset). A low level of activity (n=5 calls) was recorded between 22:18 Hrs and 22:42 Hrs). No further activity was recorded for the remainder of this night or the following morning. On the evening of 8th May, the first call was detected at 21:50 (within 1 hour of sunset). Again, a low number of calls (n=5) were recorded between this time and 23:21 Hrs, again with no further activity recorded. No activity was recorded for the next three days/nights. The next lesser horseshoe bat call was recorded at SP4 on 12th May (two calls only, both as 23:41 Hrs).

At SP5, on 3rd May the first call was recorded at 21:16 Hrs with the last call at 22:03 Hrs. No activity was recorded for the next three days/nights. On the early morning of 7th May, activity was mainly recorded at SP5 between 00:30 Hrs and 02:22 Hrs, with a low number of calls (n=4) recorded between 05:16 Hrs and 05:17 Hrs (sunrise 06:01 Hrs). On the evening of 7th May, this species was first detected at SP5 at 21:28 Hrs (within 15 minutes of sunset). Activity continued until 22:42 Hrs that evening after which no further calls were recorded on this date. Lesser horseshoe bat was not detected again at SP5 until the following evening (8th May) when the first call was recorded at 21:50 Hrs. Activity continued through the night until the last call was registered at 03:48 Hrs in the early morning of 9th May. No activity was recorded for the next three days/nights. The next call was recorded at 23:29 Hrs on the night of 12th May with activity continuing through the night until 02:59 Hrs in the early morning of 13th May. Activity by lesser horseshoe bat is not detected again at SP5 until two days later when a low number of calls (n=7) were recorded in the early morning of 15th May between 03:25 Hrs and 03:59 Hrs.

### Hibernation Period

Of the three static units deployed within the middle tower of the hotel over a 2-week period in January 2024 (SP1, SP2 and SP3), one common pipistrelle call, recorded at SP2 (located in the roof landing area of the middle tower), was detected on 20th January 2024 at 19:17 Hrs. At the same location, common pipistrelle was recorded on two dates during the February survey window. A total of 5 calls were recorded on the 26th February between 18:39 Hrs and 19:46 Hrs, while on the evening of 27th February, a total of 19 calls were recorded between 18:45 Hrs and 19:44 Hrs. For soprano pipistrelle, although not recorded during the January PAB surveys at any location in the middle tower, three calls were recorded all on separate dates at SP2 (roof landing area) during the February survey window, the earliest of which was recorded at 20:25 Hrs on the 26th February.

## Hotel Bedroom Block

### Bat Active Season

*Common pipistrelle*

In May, common pipistrelle was recorded at SP2 (bedroom block ground-floor) within a half-hour of sunset on four dates during the survey window and was recorded within an hour of sunset on four separate dates in the same period. The earliest time this species was detected was 21:39 Hrs (recorded on 5th May). **Table 5** below outlines the dates, number of passes and first time detected for this species where early detections (i.e., within an hour of sunset) have been recorded. The nightly breakdown with first detection times for all species can be found in **Appendix 2**.

Table 5. Breakdown of May 2023 PAB results for SP2 (bedroom block, ground floor) for common pipistrelle in the context of sunset/sunrise times and proximity of roosts

| Date | Total No. Calls/Passes | Time of First Call[5] | Time of last Call | Time of Sunset/Sunrise |
|---|---|---|---|---|
| 04/05/23 | 18 | 23:50 | - | 21:09 |
| 05/05/23 | 17 | 21:39 | - | 21:11 |
| 06/05/23 | 20 | - | 05:28 | 06:03 |
| 07/05/23 | 8 | 22:57 | - | 21:14 |
| 08/05/23 | 20 | 21:50 | - | 21:16 |
| 09/05/23 | 23 | 21:49 | - | 21:17 |
| 10/05/23 | 125 | 21:46 | - | 21:19 |
| 11/05/23 | 197 | 21:52 | - | 21:21 |
| 12/05/23 | 226 | 21:52 | - | 21:22 |
| 13/05/23 | 65 | - | 05:01 | 05:51 |
| 14/05/23 | 259 | 21:54 | - | 21:25 |
| 15/05/23 | 268 | 21:53 | - | 21:27 |

On the morning of 4th May, nine common pipistrelle calls were recorded at SP2 between 05:22 and 05.23 Hrs (sunrise 06:07 Hrs). Later that evening, the first call was detected at 23:50 Hrs (more than 2.5 hours post-sunset). Activity continued until 02:46 Hrs. On the evening of 5th May, the first call was recorded at 21:29 Hrs and continued until 02:08 Hrs, with another peak from 05:25 Hrs.

No activity was recorded on the evening of 6th May until 00:44 Hrs continuing until 03:33 Hrs. On the evening of 7th May there was one call at 22:57 Hrs, with a low number of calls (n=3) subsequently recorded between 01:27 hrs and 05:11 Hrs. On the evening of 8th May there were three calls between 21:51 Hrs and 21:57 Hrs, with no further activity until 00:38 Hrs, continuing until 05:13 Hrs. On the evening of 9th May, the first call was recorded at 21:49 Hrs, with a total of five calls recorded, the last of which was at 21:56 hrs. There was no further activity until the following evening (10th May) when the first call was detected at 21:46 Hrs. Activity continued throughout the night with a high level of activity (n= 185) recorded overnight (last call recorded at 05:20 Hrs). On the evening of 11th May, the first call was recorded at 21:52 Hrs, again continuing through the night until 05:02 Hrs. On the evening of 12th May, the first call was again recorded at 21:52 Hrs, again continuing through the night until 05:01 Hrs. There was no activity recorded for the night of 13th May. The next call was detected at 21:54 Hrs on 14th May, again continuing through the night until 05:05 Hrs. On the evening of 15th May, the first call was recorded at 21:53 Hrs continuing until 23:02 Hrs after which no other calls were recorded.

*Soprano pipistrelle*

There was one early record of soprano pipistrelle at SP2 on 11th May when one call/pass was recorded at 22:01 Hrs (within an hour post sunset). Neither common nor soprano pipistrelle were recorded at SP3 (workroom, first floor bedroom block) at any stage during the May PAB survey. No other species were recorded around sunset time at either SP2 or SP3 (both within the bedroom block) in May. The full nightly breakdown with first detection times for all species can be found in **Appendix 2**.

[5] The darker oranges colour indicates first calls detected within a half-hour of sunset, while the lighter orange indicates first calls detected within an hour of sunset

### Hibernation Period

During the winter inspection survey, potential bat droppings were located within one of the first-floor bedrooms. This comprised the only physical evidence of bats recorded in the bedroom block. This location corresponded to SP4 for the January and February winter PAB surveys. Results in relation to this particular location and the bedroom block generally are discussed hereunder.

During the January PAB surveys, the highest level of bat activity by far was recorded at SP4 where a total of 103 call/passes were recorded. These were overwhelmingly attributed to common pipistrelle (n=102), the other call comprising a 'noID'.

On the 11th January, only one call was recorded (18:12 Hrs). On the 14th January, a total of four calls were recorded between 19:41 Hrs and 19:51 Hrs. On 15th January, a total of five calls were recorded between 23:44 Hrs and 23:46 Hrs. No further activity was recorded until the evening of 20th January when there was a particularly high number of calls recorded (n= 81), with activity concentrated within a short window (19:01 Hrs to 20:41 hrs). The earliest calls at this SP over the survey window were recorded on 22nd and 24th January 2024, when first calls were detected at 17:42 Hrs and 17:40 Hrs respectively, both occurring within the first hour/first half-hour post-sunset respectively. Two early morning calls were also recorded on the morning of 24th January (the last of which was recorded at 06:17 hrs) with activity picking up again at 17:40 Hrs that evening, continuing until 18:53 Hrs (n=7).

During the February PAB surveys, the highest level of bat activity was again recorded at SP4 where a total of 571 call/passes were recorded. Again, these were overwhelmingly attributed to common pipistrelle (n=552), the other calls comprising *Myotis* spp. (1 call), soprano pipistrelle (4 calls) and 'noID' (14 calls).

For common pipistrelle, the majority of calls were recorded on 20th February (n=465) between 18:30 Hrs and 21:14 Hrs. The next bout of activity was on the 24th February when a total of 17 calls were recorded between 18:48 Hrs and 18:51 Hrs. The next bouts of activity were recorded on the 26th February when a total of 56 calls were detected mainly between 18:43 Hrs and 19:45 Hrs, and again on 27th February (n=13) between 18:39 Hrs and 20:43 Hrs.

In addition to the above sampling point, an extra sampling point (SP5) was used at a separate location (ground-floor corridor) within the bedroom block in February. The only species recorded at this location comprised common pipistrelle with a total of 348 calls recorded across four dates during the survey window. The earliest detection time recorded for this species was 18:22 Hrs, with the latest call recorded at 21:11 Hrs, both recorded on 20th February.

## Derelict Cottage

### Bat Active Season

During a dusk survey on 20th July 2023, one *Myotis* spp. and one common pipistrelle were observed emerging from a large hole in the western side of the roof (southern elevation). The *Myotis* spp. individual was recorded at 22:45 Hrs while the common pipistrelle was observed at 22:50 Hrs (both emergences within one-hour post-sunset). The nightly breakdown with first detection times for all species can be found in **Appendix 2**.

*Common pipistrelle*

Common pipistrelles were first detected within a half-hour of sunset on two dates and within an hour of sunset on six dates during the survey window. The earliest time this species was detected overall was 20:52 Hrs on 6th April 2023 (30 minutes post-sunset) (see **Table 6** below).

Table 6. Breakdown of April 2023 PAB results for SP3 (derelict cottage) for common pipistrelle in the context of sunset/sunrise times and proximity of roosts

| Date | Total No. Calls/Passes | Time of First Call[6] | Time of last Call | Time of Sunset/Sunrise |
|---|---|---|---|---|
| **05/04/23** | 150 | 21:27 | | 20:20 |
| **06/04/23** | 93 | 20:52 | | 20:22 |
| **09/04/23** | 1 | 21:25 | | 20:27 |
| **10/04/23** | 1 | 21:42 | | 20:29 |
| **13/04/23** | 68 | 21:05 | | 20:34 |
| **14/04/23** | 87 | 21:11 | | 20:36 |
| **16/04/23** | 58 | 21:21 | | 20:39 |
| **17/04/23** | 8 | 21:15 | | 20:41 |
| **18/04/23** | 205 | 21:29 | | 20:43 |
| **19/04/23** | 66 | 21:21 | | 20:44 |
| **20/04/23** | 20 | | 04:42 | 06:34 |

On 5th April, the first common pipistrelle was recorded at SP3 at 21:27 Hrs with activity continuing through the night until 04:55 Hrs. On 6th April, the first individual was recorded at 20:52 Hrs with activity continuing until 21:28 Hrs. No further activity was recorded for the remainder of this night, or the next two nights. The next activity was picked up on 9th April at 21:25 hrs (only call on this date). Similarly, the next call was detected at 21:24 hrs on 10th April (again, no other calls recorded on this date).

Activity picked up again on 13th April, with a relatively higher level of calls (n=87) picked up between 21:05 Hrs and 01:05 Hrs. On 14th April, the first individual was recorded at 21:11 Hrs with the last call at 23:36 Hrs. There was no activity recorded on 15th April. On 16th April, the first call was recorded at 21:21 Hrs continuing until 05:47 Hrs (sunrise 06:43 Hrs). On 17th April, a low number of calls (n=4) were recorded between 21:15 Hrs and 23:04 Hrs. Activity picked up again on 18th April, with a relatively higher level of calls (n=235) picked up between 21:29 Hrs and 01:17 Hrs. On 19th April, the first call was recorded at 21:21 Hrs and activity continued through much of the night until the last call at 04:42 Hrs.

*Soprano pipistrelle*

Overall, the level of activity by soprano pipistrelle at SP3 was relatively low throughout the survey window. Although no calls were detected within a half-hour of sunset, early detections (within an hour of sunset) were recorded for this species on two dates, the earliest of these comprising a call at 21:25 on 14th April 2023 (49 minutes post-sunset) (see **Table 7** below). Analysis of the time stamped sound files and the results of the dusk and dawn surveys have not indicated the presence of a roost within the derelict cottage for this species; however, soprano pipistrelle may use this structure as a day/night roost on occasion.

Table 7. Breakdown of April 2023 PAB results for SP3 (derelict cottage) for soprano pipistrelle in the context of sunset/sunrise times and proximity of roosts

| Date | Total No. Calls/Passes | Time of First Call | Time of last Call | Time of Sunset/Sunrise |
|---|---|---|---|---|
| **13/04/23** | 1 | 21:31 | | 20:34 |
| **14/04/23** | 1 | 21:25 | | 20:36 |
| **18/04/23** | 3 | 22:00 | | 20:43 |
| **19/04/23** | 1 | | 02:00 | 06:37 |
| **20/04/23** | 3 | | 02:43 | 06:34 |

[6] The darker oranges colour indicates first calls detected within a half-hour of sunset, while the lighter orange indicates first calls detected within an hour of sunset

## Hibernation Period

During winter PAB surveys in February, a total of 143 calls by common pipistrelle were detected at SP6 located within the derelict cottage across four dates during the period of deployment. The main periods of activity occurred on the 20th February between 18:34 Hrs and 19:30 Hrs and on the 27th February between 18:49 Hrs and 20:12 Hrs. There was one lesser horseshoe bat call recorded on the 26th February; however, this was at 21:57 Hrs. The nightly breakdown with first detection times for all species can be found in **Appendix 2**.