



Bat Activity Survey

Mill Lane, Leixlip, Co. Kildare.



Chartered
Institute of
Ecology and
Environmental
Management

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SUMMARY

The proposal is for a social housing development on lands to the rear of Mill Lane, Leixlip, Co. Kildare. Bats were recorded commuting and foraging across and within proximity of the site on the date of the survey. No bats were observed emerging from the building during the two dusk surveys undertaken in June and July 2023. A derogation licence is not required prior to any demolition/construction works on the buildings. New roosting provision should be considered within the design of new buildings and within the site to provide net gain for local biodiversity. Excessive external lighting with the new development will need to be avoided or carefully considered to prevent disruption as the locality provides foraging and commuting habitat for several bat species, especially along the northern and western site boundaries. Habitat enhancement could be provided in the form of planting hedges/trees within the boundary of the site, along with flowering plants.

1.0 INTRODUCTION

1.1 Background

Willow Environmental was commissioned in June 2023 to carry out bat surveys at the site of proposed redevelopment at Mill lane, Leixlip, Co.Kildare (Grid Reference: 300863,236017), as shown in Map 1 and Map 2. This report describes bat activity data from the surveys of the site. The results set out within this report are valid for one year from the issue date. A follow up site visit may be required after a year if the proposed development has not commenced, to determine if there are any changes to the ecological status of the site.

1.2 Personnel and Quality Assurance

Dr. Declan Lawlor CEnv, MCIEEM, MIES (Surveyor 1)

Declan is a Chartered Environmentalist (Society for the Environment) with 20 years' experience in the public, private, research and educational sectors. His professional experience can be demonstrated by membership of several environmental bodies including Full Member of the Chartered Institute of Ecology and Environmental Management (CIEEM); Full Member of the Institution of Environmental Sciences (IES). Declan has been involved with bat surveys for several years with Willow Environmental, and for Corvus Consulting, Peach Ecology and Winchester Bat Consultancy. He has completed training in Bat Survey Techniques and Echolocation Analysis by Erika Dahlberg (MCIEEM) (appointed trainer by Natural England), Winchester Bat Consultancy in 2016, and with Lisa Worledge (Head of Conservation Services, Bat Conservation Trust) in 2022.

Declan's academic qualifications can be summarised as follows: HND Countryside Management; BSc (Hons) Environmental Science; PhD Environmental Science; PGCE Geography (Post Primary); LLM Environmental Law and Sustainable Development (QUB), and MSc Biological Recording & Ecological Monitoring (MMU 2022).

Mr. Adam Lawlor (Surveyor 2)

Adam is a junior ecologist with 6 years' experience in undertaking ecological surveys and is currently reading for a BSc Environmental Science at Ulster University. Due to his interest in field ecology, he trained in bat survey techniques with Dr Declan Lawlor, (beginning in 2015), and has carried out more than 150 bat surveys in rural, urban, and suburban contexts for training purposes between 2015 and 2023. Adam is competent in the use of mobile bat detectors, the identification of species from call and visual assessment of bat flight paths to aid the identification of species in the field. Furthermore, he is proficient in the identification of potential bat roosting sites and the correct identification of physical field signs indicating the presence of bats at roost sites (scratching, staining, droppings etc.).

Mr Daniel Lawlor (Surveyor 3)

Daniel is an apprentice ecologist with 5 years' experience in undertaking ecological surveys. Due to his interest in field ecology, he trained in bat survey techniques with Dr Declan Lawlor, (beginning in 2016), and has carried out more than 120 bat surveys in rural, urban, and suburban contexts for training purposes between 2016 and 2023. Daniel is competent in the use of mobile bat detectors, the identification of species from call and visual assessment of bat flight paths to aid the identification of species in the field. Furthermore, he is proficient in the identification of potential bat roosting sites and the correct identification of physical field signs indicating the presence of bats at roost sites (scratching, staining, droppings etc.).

All surveys were undertaken by Dr. Declan Lawlor (Surveyor 1), with the assistance of Mr Adam Lawlor (Surveyor 2) and Mr Daniel Lawlor (Surveyor 3). All survey work was carried out in accordance with current best practice guidelines (BCT, 2016), and following the Chartered Institute of Ecology and Environmental Management's code of professional conduct when undertaking ecological work. All post-survey analysis of recordings was undertaken by Dr Declan Lawlor.

1.3 Site Description

The site is located within Leixlip (Map 1 and 2) and comprises built structures associated with a former telecommunications office (Buildings 1, 2 and 3), along with boundary walls and a large area of rank grasses and weeds to the rear of the site (see figs. 1 – 11). Land-use in the surrounding area include urban housing and roads, parkland, and woodland. In terms of environmental designations within proximity to the site, Rye Water Valley/Cartron Special Area of Conservation (SAC) is located within 2km from the site (Map 3).

1.4 Brief and Objectives

To carry out dusk emergence activity surveys of the site and to inform the client of any ecological implications associated with the current proposals.

The main objectives of the surveys are:

- To collect robust data following good practice guidelines to allow an assessment of the potential impacts of the proposed development on local bat populations.
- To provide baseline information on bat activity at the application site.
- To provide clear information to enable the planning authority to reach a decision on the planning application.
- To assist the client in meeting their statutory obligations.
- To facilitate the conservation of bat populations.

1.5 Bats and Protection

All bat species and their roosting sites are strictly protected under both national and international law. The purpose of this legislation is to maintain and restore bat populations within their natural range. Where human activities have the potential to compromise bat populations, measures are required to be put in place to avoid impacts or compensate and mitigate for those impacts.

The key legislation which provides protection to bats are:

- Wildlife Act (1976) and subsequent amendments which makes it unlawful to intentionally disturb, injure or kill a bat or disturb its resting place without a licence to derogate from Regulation 23 of the Habitats Regulations 1997, issued by NPWS.
- The EU Habitats Directive (which has been transposed into Irish law with the European Communities (Birds and Natural Habitats) Regulations 2011) which seeks to protect rare species, including bats, and their habitats and requires that appropriate monitoring of populations be undertaken. All Irish bat species are listed in Annex IV, while Annex II provides additional protection for the Lesser Horseshoe Bat.

2.0 METHODOLOGY

2.1 Desk Study

A desk study was conducted to identify existing ecological data relating to recorded bat activity from the area. Species records within the National Biodiversity Data Centre (NBDC) database were searched and wildlife corridors considered where the site connects into the surrounding area.

2.2 Phase 1 Assessment (Bat Roost Potential)

A site walkover survey assessing for Bat Roost Potential (BRP) was completed on the 30th of June 2023 in dry, bright, and mild weather conditions. The buildings were visually inspected externally for gaps in the roof features which would allow access to bats and wall structures were checked externally for gaps which would allow access to bats or signs of bats including droppings, insect feeding remains and staining, all undertaken in accordance with current survey guidance (Bat Conservation Trust, 2016).

2.3 Phase 2 Assessment (Bat Activity Survey)

On the 30th of June 2023, and the 14th of July 2023, two dusk emergence bat activity surveys were completed in line with current guidelines (Bat Conservation Trust, 2016). The surveys started at least 15 minutes before sunset and continued until around 1.5 hours after sunset. Three surveyors were present during each of the building. All surveyors were positioned at vantage points within the site (Maps 4 and 5) to provide adequate visual coverage. Equipment used included Echo Meter Touch2 (Pro Version) (Wildlife Acoustics). Sounds were analysed on Kaleidoscope Software.

2.3.1 Hand-held bat detectors

The Echo Meter Touch2 (Pro Version) combines a special microphone with sophisticated circuitry and software to transform ultrasonic bats calls into audio that the user can hear. Echo Meter Touch displays the bat calls on an interactive, scientific-level spectrogram. The user can pause the audio, zoom in on each recording, and listen to it in more detail using one of three professional level listening modes: Real-Time Expansion, heterodyne, and post-recording time expansion. All recordings contain species ID and GPS coordinates.

Kaleidoscope software allows for the post-survey analysis of recordings, including measuring the start and end of each echolocation frequency, measuring inter-pulse interval, and measuring the peak frequency (Wildlife Acoustics, 2018).

Details on the environmental conditions were taken at the time of survey. Declan Lawlor (MCIEEM) (Surveyor 1) was present at all surveys with two other bat surveyors. Surveyor locations are shown in Map 4 and Map 5.

2.3.2 Infrared Imaging Cameras

In May 2022 the Bat Conservation Trust released an interim guidance note on the use of vision aids for bat emergence surveys and further comment on dawn surveys. They stipulated that the use of night vision aids (NVAs) will shift to being a standard protocol rather than as an optional or complimentary method for both building and tree emergence surveys. Willow Environmental has adopted the protocol during the 2022 survey season.

Three Nightfox Whisker Digital night vision devices were also deployed during the dusk surveys. They consist of a special camera sensor, an infrared (IR) LED and a viewing screen. It has a wide field of view of 57 degrees and an optical zoom of between 1x and 10x and captures photos and video. The devices were mounted on a tripod and used alongside the hand-held bat detectors. This allows the surveyor to periodically view the camera screen whilst observing the building or tree. Post-survey analysis of the video footage is undertaken on a computer.

2.3.3 Static Bat Recorder

A Wildlife Acoustics Song Meter SM4BAT FS/ZC automatic detector/recorder fitted with SMM- U2 Ultrasonic Microphones was deployed near Building No.1 during the dusk survey of 14th July until dawn on 15th July 2023. The SM4BAT detector records to full-spectrum (8 – 125 kHz) *.wav or zero crossing files which are stored internally for download and analysis. The recorder was deployed to gather information on bat activity over a whole night and to provide an insight into the level of bat commuting/foraging at the site, and if such activity occurs at specific periods during the night.

All recordings were analysed using Kaleidoscope Pro (Wildlife Acoustics) and subject to expert review and verification by the author. To avoid under-reporting the spectrograph generated each time the SM4 was triggered, all those automatically classified as 'noise', were also examined to confirm, or correct automatic identification.

2.4 Survey Limitations

The surveys were undertaken during the optimal survey period of April to September, with both undertaken during the peak maternity period of June - August 2023.

Weather conditions on the dates of surveys were considered favourable for monitoring bat activity. No other limitations were noted.

3.0 RESULTS AND DISCUSSION

3.1 Desk Study

Due to the small scale and extent of the proposal and the degree of separation from areas of conservation importance, it is highly unlikely that the development will impact directly upon statutory nature conservation sites.

A search of the National Biodiversity Network (NBN) database indicated that five of the nine known bat species on the island of Ireland have been recorded within a 10km radius of the Site. These are:

- Natterer's Bat *Myotis nattereri*
- Soprano pipistrelle *Pipistrellus pipistrellus*
- Common pipistrelle *Pipistrellus pipistrellus*
- Brown Long-eared Bat *Plecotus auratus*
- Daubenton's Bat *Myotis daubentonii*

However, because there has been no recorded presence of other bat species within the locality, it does not follow that other bat species are not present.

Furthermore, based on landscape habitat suitability for all bat species, based on the research outcomes from Lundy *et al* (2011), the site would appear to be in the moderate/high index end of habitat suitability (39.78) when considering all Irish bat species (see Table 1 and Map 5). The index ranges from 0 to 100, the higher the index value, the higher the habitat suitability for all bat species and for individual bat species. The highest individual species score for the site is *Nyctalus leisleri* at 56, *Pipistrellus pipistrellus* at 58, and *Plecotus auratus* at 54. Although the results of this research are at a broad scale, squares highlighted as less favourable, may still have local areas of abundance.

3.2 Phase 1 Assessment (Bat Roost Potential)

The site is located at the edge of an urban settlement with housing, parkland, woodland, watercourses, and grassland within 1 km of the site. There are also mature trees along the western site boundary, and an area of woodland beyond the northern boundary. Such features often provide good foraging and commuting corridors for bat species. The location of buildings within the site are shown on Map 3. The external inspection of the buildings involved looking for signs of bat roosting activity such as droppings, urine staining on walls, and the remains of insect wings from feeding. No such evidence was found on inspection.

Building No.1

The largest building situated next to the main road (Mill Lane) at the southern boundary of the site (see figs 1 – 6). It is a vacant two storey structure of block construction and dash render. Its former use was offices. The roof slates appeared intact, along with lead flashing. The wooden fascia displayed signs of rot with several gaps apparent at gable ends. Such gaps provide potential roosting features for bats. There was substantial ivy growth at the rear of the building which can obscure potential entry points. No signs of bat usage were noted externally, with the building having **moderate** bat roosting potential. Two follow-up surveys are recommended.

Building No. 2

A small structure to the rear of the main building and constructed with blocks and concrete and dash render (see figs. 7 and 8). The structure has a flat roof. There was some ivy growth on the structure with some evidence of wood rot on a section of fascia. This structure was assessed as having **low** bat roosting potential. One dusk emergence survey is recommended.

Building No. 3

A small structure near the telecommunications tower, along the western site boundary and constructed with blocks (see fig. 10). The structure has a flat roof. There were no gaps or cracks evident in the structure. This structure was assessed as having **negligible** bat roosting potential. No follow-up surveys are deemed necessary.

Sycamore Tree

A single sycamore tree is located along the south-eastern site boundary (see fig. 9). It is a maturing tree with ivy growth along its trunk and branches. Single bats could potentially utilise ivy for roosting. The tree was graded as offering **low** bat roosting potential. No follow-up surveys are required.

The buildings and trees within the site were assessed in accordance with BCT Guidelines (2016) for assessing the potential suitability of proposed development sites for bats (Table 2). A summary of habitat suitability for the building and tree is shown in Table 3. Table 4 shows an assessment of habitat suitability for the surrounding countryside, with the woodland beyond the northern boundary shown in figure 11.

3.3 Phase 2 Assessment (Bat Activity Surveys)

3.3.1 Date of Survey: 30th June 2023 (Dusk Survey 1)

Sunset was at 21:56 on the date of the first dusk survey. Surveyor records and analysis confirm that there were three bat species recorded over the site on the 30th of June 2023 (first dusk survey): *Pipistrellus pygmaeus* (Soprano Pipistrelle), *Pipistrellus pipistrellus* (Common Pipistrelle), and *Nyctalus leisleri* (Leisler's Bat). There was a total of 139 recordings during the survey between all three surveyors, although many of these were from the same individual bat during lengthy periods of foraging activity.

The first recording was around 4 minutes before sunset (21:52) from a commuting *Nyctalus leisleri* bat, observed flying overhead from the north. Leisler's Bats often emerge early from roosts (up to 20 minutes after sunset) and can be observed often high in the sky (up to 70m) (Russ, 2012). There was an initial period of foraging activity from this species earlier in the survey for approximately 25 minutes (between 21:52 and 22:15), with intermittent recordings during the remainder of the survey period. A total of 69 recordings were of this species, with several associated observations.

The second species recorded was *Pipistrellus pipistrellus*. This species generally emerges from roosts between 20 and 30 minutes after sunset and catches its prey by aerial hawking behaviour. With fast and agile flight, it generally hunts lower to the ground (3-10m), characterised by rapid direction changes (Russ, 2012). The first recording for this species

during the survey was at 22:05, with 21 recordings up until the last recording at 23:07. There were several observations and recordings of this species, but especially in relation to foraging over trees along the western boundary of the site and commuting over the site from north to south.

The third species recorded was *Pipistrellus pygmaeus*. Similar in behavioural characteristics to *P. pipistrellus*, there were a total of 49 recordings of this species during the survey period. The first recording was at 22:14, with intermittent activity up until 23:24. Observations included foraging activity across boundary vegetation and commuting.

Observed dusk survey flight paths from bat species is presented in Map 7. Sample recordings are presented in figures 16 - 18. The peak frequency of *Nyctalus leisleri* is between 24.2 – 30.7 kHz, with *Pipistrellus pygmaeus* being between 49.6 – 69.3 kHz, and *Pipistrellus pipistrellus* between 41.6 -50.6 kHz. No bats were observed emerging from the existing buildings during the dusk survey. A summary of the survey is presented in Table 5 (PIPPYG = *Pipistrellus pygmaeus*, PIPPIP = *Pipistrellus pipistrellus*, MYODAU = *Myotis daubentonii*, NYCLEI = *Nyctalus leisleri*), with a graph showing the recorded activity by species (fig. 12).

3.3.2 Date of Survey: 14th July 2023 (Dusk Survey 2)

Sunset was at 21:46 on the date of the second dusk survey. There was a total of 120 recordings from all three surveyors during the survey period. This was slightly down on the previous month and the first survey. Surveyor records and analysis from all surveyors confirm that there were four bat species recorded over the site on the 14th of July 2023. *P. pygmaeus*, (Soprano pipistrelle), *P. pipistrellus* (Common pipistrelle), *Nyctalus leisleri*, and *Myotis daubentonii* were all recorded during this survey period.

The earliest recording was at 21:48 from *Nyctalus leisleri* which was observed commuting across the site from the north (Surveyor 3). There was a total of 52 recordings from this species, with some associated observations high overhead. Activity was prolonged up until the last recording at 22:48.

There were 12 recordings of *P. pipistrellus*, and 54 of *P. pygmaeus*. The first recording of the pipistrelle species was at 22:14, some 28 minutes after sunset from *P. pygmaeus*. The first recording of *P. pipistrellus* was soon after, at 22:16. Many observations with these species were also from the north, with periods of foraging along boundary trees observed.

The fourth species recorded during the second survey was from a *Myotis* species, most likely *Myotis daubentonii*. It was recorded twice, at 22:09 and at 22:37 and there was no associated observation. Also known as the water bat, it is usually seen skimming the surface of lakes, rivers, and reservoirs, flying fast, low and using its large back feet as a gaff to flick mayflies and other insects to its mouth. They live in bridges, holes in trees or old stone buildings near to water, they prefer a cooler roost site than Pipistrelles (Northumberland Bats, 2019).

Observed dusk survey flight paths from bat species is presented in Map 8. Sample recordings are presented in figures 16-19. The peak frequency of *Nyctalus leisleri* is between 24.2 – 30.7 kHz, with *Pipistrellus pygmaeus* being between 49.6 – 69.3 kHz, *Pipistrellus pipistrellus* between 41.6 -50.6 kHz., and *Myotis daubentonii* between 39.5 – 56.7 kHz. No bats were observed emerging from existing buildings during the dusk survey. A summary of the survey

is presented in Table 6 (PIPPYG = *Pipistrellus pygmaeus*, PIPPIP = *Pipistrellus pipistrellus*, MYODAU = *Myotis daubentonii*, NYCLEI = *Nyctalus leisleri*), with a graph showing the recorded activity by species (fig. 13).

3.3.3 Infrared Imaging – Post Survey Analysis

All video footage from the infrared imaging cameras was analysed on a computer following the survey. There was no evidence of bats emerging from the buildings. An example of images from the video footage is shown in figures 20 and 21.

3.3.4 Static Recorder – Post Survey Analysis

The SM4BAT FS automatic bat detector was installed from the evening of 14th July until the morning of 15th June 2023. The equipment was set to record all discrete ultrasonic events detected (low filter set at 16 kHz, high filter set above 125 kHz) from 30 mins before sunset until 30 mins after sunset.

A total of 84 discrete ultrasonic events were recorded. Following analysis (automatic software identification and surveyor verification) 52 were confirmed as echolocation calls emitted by one or more bats, with the remaining 22 confirmed as ‘noise’.

The following three species (and numbers of registrations) were recorded at the site:

1. Leisler’s Bat *Nyctalus leisleri* (n = 2)
2. Common pipistrelle *Pipistrellus pipistrellus* (n = 13)
3. Soprano pipistrelle *Pipistrellus pygmaeus* (n = 37)

Table 7 shows the species count during overnight survey. It must be noted that, due to the way the SM4 operates, a single bat pass will often generate two or more registrations. Most of the calls recorded were at low intensity indicating, for the species detected those bats remained at some distance from the detector. Figure 14 shows a graph indicating bat activity by species. When the bat activity is displayed per hour (see fig. 15), it is evident that bat activity tails off after the first hour of foraging and commuting activity. There is a slight rise in the sixth and seventh hour of the recordings, likely representing commuting activity of bat species returning to nearby roosts as dawn approaches. Overall, the data for this one night suggests a low level of bat activity over the site.

4.0 CONCLUSIONS AND RECOMMENDATIONS

The dusk emergence bat surveys have demonstrated bat activity from four bat species on the survey dates, with no evidence of bat roosting activity within the vacant buildings. Both surveys were undertaken in peak season (June – August), representing the peak period of bat activity.

The site and proximity also contribute to bat foraging and commuting habitat locally for at least four bat species. Most commuting bat activity recorded during the survey was across the site from north to south. Trees and hedgerows in proximity to the site contribute to foraging activity for bats, particularly *Pipistrellus pipistrellus* and *Pipistrellus pygmaeus*. These areas will need to be protected post-construction from any excessive proposed external lighting, which has been shown to have a significant negative impact on bats causing them to avoid well-lit areas. If possible, a planting scheme containing additional trees and hedging should be incorporated into the design and located around the building, as well as retaining as many existing trees and hedgerow as possible. This habitat enhancement feature will encourage insects, birds, and bats.

Whilst the surveys did not reveal the presence of any bat roosts within existing built structures, and whilst the woodland beyond the northern boundary and boundary trees will not be impacted by the proposed development, there will be a loss of an area of grassland and associated foraging opportunity for the local bat population. Ideally, any loss of foraging habitat should be compensated.

The main aim of mitigation and/or compensation is to allow for the Continued Ecological Functionality (CEF) of breeding sites and resting places so that the conservation status of bats is maintained or enhanced both during and after development (BCT, 2017). This means ensuring that the site continues to maintain and provide the same elements needed by the bat(s) to rest or to breed successfully in that site. For example, area, temperature, humidity, access etc. Maintaining CEF is therefore the guiding principle for all mitigation and compensation activities and will be strongly adhered to in this application.

Recommendations:

Compensatory features could include features on different aspects of new buildings within the site along with the following:

- Although no bats were recorded during the 2023 surveys, they may utilise the buildings in the intervening period before demolition. Care is advised and it is recommended to remove tiles by hand over a period of 48 hours. If any bats are encountered within the building, works must cease and advice sought from NPWS.
- Excessive external lighting should be avoided and must be pointed downwards to where it is needed if being used. Given the proximity of woodland and trees along the northern and western site boundaries in particular, artificial lighting should be directed away from these habitat features.
- Create a planting scheme around the site to encourage insects and bats. This could include flowering shrubs and flowerbeds.

- During the construction works, temporary bat boxes can be erected on suitable buildings or structures within proximity to the site.
- The sycamore tree with low bat roosting potential should be retained if possible.

Some possible measures are outlined below.

Schwegler 2F Bat Boxes (temporary, during construction)

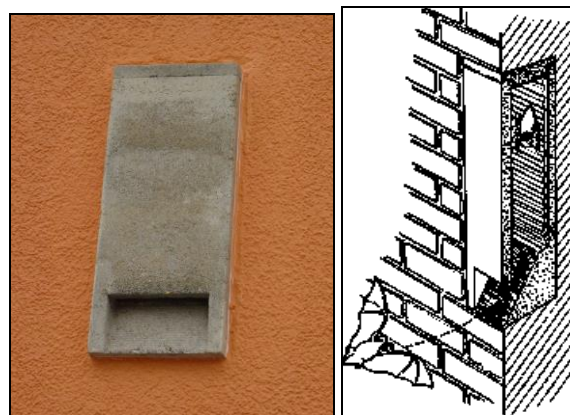
Bat boxes can be useful in certain situations to provide artificial roosting features for bats.



Example of temporary bat boxes for trees and/or buildings

Schwegler 1FR Bat Tubes (within new structure)

Bat tubes can be installed into the fabric of the building (see below) and allow for a permanent bat roost within structures. Bat tubes are often desirable for developers as they sit flush with or beneath the rendered surface of the wall so only the entrance hole is visible. Another advantage is that they can be painted with air permeable paint to match the colour of the building. Bat tubes also provide good roosting conditions for bats as they hold a high thermal mass due to being located within the wall of the building. Alternatively, surface mounted bat boxes can be installed.



Example of bat tubes (Source: Acerecology.co.uk).



Figure 1:Front view of Building No. 1



Figure 2: East-facing gable wall (Building No. 1)



Figure 3: West-facing gable wall (Building No. 1)



Figure 4: Rear view of Building No. 1.



Figure 5: Rear view of Building No. 1



Figure 6: Internal view of Building No. 1



Figure 7: View of Building No. 2



Figure 8: Side View of Building No. 2



Figure 9: Sycamore tree with low bat roosting potential.



Figure 10: Side view of Building No. 3.



Figure 11: Woodland in proximity to the site.

Bat Suitability Index (39.78)	
<i>Species</i>	<i>Index</i>
<i>Pipistrellus pygmaeus</i>	49
<i>Plecotus auritus</i>	54
<i>Pipistrellus pipistrellus</i>	58
<i>Rhinolophus hipposideros</i>	0
<i>Nyctalus leisleri</i>	56
<i>Myotis mystacinus</i>	31
<i>Myotis daubentonii</i>	46
<i>Pipistrellus nathusii</i>	16
<i>Myotis nattereri</i>	48

Table 1: Bat Suitability Index (Source: NBDC)

Suitability	Description	
	Roosting habitats	Commuting and foraging habitats
Negligible	Negligible habitat features on site likely to be used by roosting bats.	Negligible habitat features on site likely to be used by commuting or foraging bats.
Low	A structure with one or more potential roost sites that could be used by individual bats opportunistically. However, these potential roost sites do not provide enough space, shelter, protection, appropriate conditions and/or suitable surrounding habitat to be used on a regular basis by larger numbers of bats (ie. unlikely to be suitable for maternity or hibernation).	Habitat that could be used by small numbers of commuting bats such as a gappy hedgerow or unvegetated stream, but isolated, i.e., not very well connected to the surrounding landscape by other habitat.
	A tree of sufficient size and age to contain PRFs but with none seen from the ground or features seen with only very limited roosting potential.	Suitable, but isolated habitat that could be used by small numbers of foraging bats such as a lone tree (not in a parkland situation) or patch of scrub.
Moderate	A structure or tree with one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions, and surrounding habitat but unlikely to support a roost of high conservation status (with respect to roost type only – this assessment is made irrespective of species conservation status, which is established after presence is confirmed).	Continuous habitat connected to the wider landscape that could be used by bats for foraging such as trees, scrub, grassland, or water.
High	A structure or tree with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions, and surrounding habitat.	Continuous, high-quality habitat that is well connected to the wider landscape that is likely to be used regularly by commuting bats such as river valleys, streams, hedgerows, lines of trees and woodland edge.
		High-quality habitat that is well-connected to the wider landscape that is likely to be used regularly by foraging bats such as broadleaved woodland, tree-lined watercourses, and grazed parkland.
		Site is close to and connected to known roosts.

Table 2: Guidelines for assessing the potential suitability of proposed development site for bats.

(From BCT Guidelines, 2016)

Building	Building Category	Notes
1	Moderate	<p><i>Vacant office building</i></p> <p><i>Walls and roof intact</i></p> <p><i>Rotten sections of fascia and soffit at gable ends</i></p> <p><i>No evidence of roosting bats in structure.</i></p>
2	Low	<p><i>Outbuilding</i></p> <p><i>Block wall structure</i></p> <p><i>Flat roof and rotten wooden fascia</i></p> <p><i>No evidence of roosting bats in structure.</i></p>
3	Negligible	<p><i>Outbuilding</i></p> <p><i>Block wall structure</i></p> <p><i>No evidence of roosting bats in structure.</i></p>
4	Low	<p><i>Single sycamore tree within the site.</i></p> <p><i>Some ivy covering along trunk and branches.</i></p>

Table 3: Suitability rating for buildings and trees within the development site.

Habitat Category	Notes
Moderate	<p><i>Continuous habitat connected to the wider landscape that could be used by bats for foraging such as trees, scrub, grassland, or water.</i></p> <p><i>Woodland, and grasslands in proximity to site. Habitat connectivity provided by hedgerows.</i></p>

Table 4: Habitat suitability rating for foraging and commuting.

Table 5: Bat Activity Recordings – Dusk Survey 1

Bat Activity Survey Recordings				
Site:	Mill Lane, Leixlip, Co. Kildare			
Date:	30th June 2023			
Surveyors:	DL, AL, DL,			
Weather:	Dry and clear			
Temperature:	18°C			
Wind speed:	light breeze			
Sunset:	21:56			
Survey Start:	21:35			
Survey End:	23:25			
Reference	Surveyor	Time	Species	Duration
1	1	21:52	NYCLEI	4.8
2	1	21:53	NYCLEI	5.4
3	1	21:58	NYCLEI	15.0
4	1	21:59	NYCLEI	15.0
5	1	22:00	NYCLEI	10.5
6	2	22:02	NYCLEI	15.0
7	1	22:02	NYCLEI	10.5
8	3	22:02	NYCLEI	15.0
9	2	22:03	NYCLEI	14.8
10	3	22:03	NYCLEI	10.2
11	1	22:05	PIPPIP	4.8
12	1	22:06	NYCLEI	13.9
13	1	22:12	PIPPIP	6.5
14	2	22:14	PIPPYG	8.0
15	3	22:15	NYCLEI	3.5
16	2	22:15	NYCLEI	10.3
17	3	22:15	NYCLEI	5.5
18	2	22:15	NYCLEI	13.2
19	3	22:15	NYCLEI	11.1
20	2	22:16	PIPPIP	8.5
21	3	22:16	PIPPIP	5.6
22	1	22:16	PIPPIP	5.2
23	2	22:16	PIPPYG	13.9
24	1	22:17	PIPPIP	15.0
25	1	22:18	PIPPIP	15.0
26	1	22:18	PIPPYG	7.9
27	1	22:19	PIPPYG	5.4
28	2	22:19	NYCLEI	13.9
29	3	22:19	NYCLEI	15.0
30	1	22:19	PIPPIP	9.3
31	1	22:20	NYCLEI	5.5

32	2	22:20	NYCLEI	15.0
33	3	22:20	NYCLEI	15.0
34	2	22:20	NYCLEI	9.2
35	1	22:20	PIPPYG	5.4
36	3	22:20	PIPPYG	8.8
37	2	22:20	PIPPYG	7.4
38	2	22:21	PIPPYG	11.7
39	3	22:21	PIPPYG	7.6
40	3	22:22	PIPPYG	4.9
41	1	22:23	PIPIPI	4.7
42	1	22:23	PIPPYG	5.5
43	1	22:25	PIPIPI	8.2
44	3	22:26	PIPIPI	5.9
45	2	22:26	PIPIPI	6.3
46	1	22:26	NYCLEI	7.8
47	3	22:26	PIPPYG	5.2
48	3	22:27	PIPPYG	5.5
49	2	22:27	NYCLEI	11.1
50	3	22:27	NYCLEI	7.6
51	1	22:28	PIPIPI	6.8
52	1	22:29	NYCLEI	9.1
53	3	22:29	PIPPYG	6.2
54	1	22:29	NYCLEI	8.2
55	1	22:29	NYCLEI	15.0
56	1	22:29	NYCLEI	10.8
57	2	22:30	PIPPYG	11.8
58	1	22:30	NYCLEI	7.7
59	1	22:30	NYCLEI	4.7
60	1	22:31	NYCLEI	5.1
61	1	22:31	NYCLEI	15.0
62	1	22:32	PIPIPI	6.4
63	3	22:32	PIPPYG	5.7
64	3	22:32	PIPPYG	5.7
65	2	22:33	PIPPYG	7.0
66	1	22:33	NYCLEI	15.0
67	1	22:33	NYCLEI	6.8
68	1	22:33	NYCLEI	15.0
69	2	22:33	NYCLEI	15.0
70	3	22:33	NYCLEI	5.1
71	3	22:33	PIPPYG	7.4
72	1	22:34	NYCLEI	5.4
73	3	22:34	PIPPYG	5.6
74	1	22:34	PIPPYG	9.5
75	3	22:34	PIPPYG	4.0

76	1	22:34	NYCLEI	12.7
77	3	22:34	PIPPYG	3.8
78	3	22:35	PIPPYG	4.2
79	2	22:35	PIPPYG	8.7
80	2	22:35	PIPPIP	15.0
81	3	22:35	PIPPYG	10.5
82	2	22:35	PIPPYG	14.7
83	3	22:35	NYCLEI	15.0
84	2	22:35	NYCLEI	15.0
85	1	22:35	PIPPYG	12.7
86	3	22:36	PIPPYG	4.3
87	1	22:36	NYCLEI	6.2
88	3	22:36	PIPPYG	3.9
89	3	22:36	PIPPYG	6.0
90	3	22:36	PIPPYG	4.6
91	3	22:36	PIPPYG	6.1
92	3	22:36	PIPPYG	10.8
93	1	22:36	NYCLEI	5.6
94	1	22:37	NYCLEI	4.5
95	1	22:37	NYCLEI	7.4
96	1	22:37	NYCLEI	4.3
97	3	22:37	PIPPYG	4.8
98	2	22:38	PIPPYG	10.3
99	1	22:38	NYCLEI	7.8
100	1	22:38	NYCLEI	5.0
101	1	22:39	PIPPIP	6.7
102	2	22:39	PIPPYG	8.0
103	1	22:39	NYCLEI	5.4
104	3	22:39	PIPPYG	5.1
105	2	22:40	NYCLEI	15.0
106	3	22:40	NYCLEI	15.0
107	2	22:40	NYCLEI	11.5
108	1	22:40	NYCLEI	10.7
109	3	22:40	NYCLEI	4.4
110	1	22:40	NYCLEI	6.9
111	1	22:41	NYCLEI	4.7
112	2	22:41	PIPPYG	9.3
113	3	22:41	PIPPYG	5.3
114	1	22:41	NYCLEI	8.2
115	2	22:42	NYCLEI	13.3
116	3	22:42	NYCLEI	14.4
117	1	22:43	NYCLEI	6.5
118	1	22:43	PIPPIP	15.0
119	2	22:44	NYCLEI	15.0

120	2	22:45	PIPPYG	12.8
121	3	22:45	PIPPYG	4.9
122	1	22:45	PIPPYG	13.6
123	1	22:45	NYCLEI	6.3
124	3	22:45	NYCLEI	10.1
125	2	22:45	NYCLEI	10.1
126	1	22:46	NYCLEI	5.8
127	3	22:46	PIPPYG	7.7
128	1	22:47	PIPPIP	6.5
129	3	22:48	PIPPIP	8.4
130	2	22:48	NYCLEI	9.4
131	3	22:48	NYCLEI	8.4
132	3	22:59	PIPPYG	6.6
133	2	22:49	PIPPYG	8.2
134	1	23:02	PIPPIP	4.4
135	3	23:07	PIPPIP	7.3
136	3	23:09	NYCLEI	4.7
137	2	23:16	PIPPYG	8.8
138	3	23:21	PIPPYG	7.1
139	2	23:24	PIPPYG	10.0

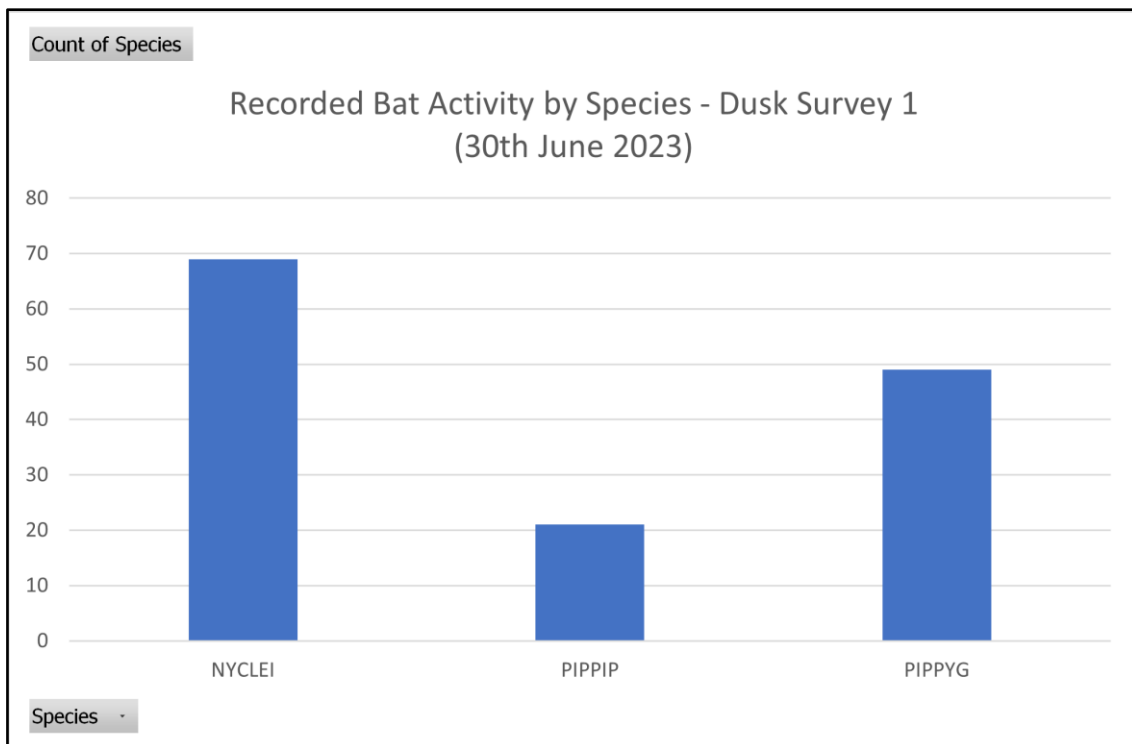


Figure 12: Recordings per Species (Dusk Survey 1)

Table 6: Bat Activity Recordings – Dusk Survey 2

Bat Activity Survey Recordings				
Site:	Mill Lane, Leixlip, Co.Kildare			
Date:	14th July 2023			
Surveyors:	DL, AL, DL,			
Weather:	Overcast			
Temperature:	17°C			
Wind speed:	strong breeze			
Sunset:	21:46			
Survey Start:	21:30			
Survey End:	23:15			
Reference	Surveyor	Time	Species	Duration
1	3	21:48	NYCLEI	4.6
2	1	22:02	NYCLEI	12.1
3	1	22:02	NYCLEI	15.0
4	3	22:02	NYCLEI	15.0
5	2	22:02	NYCLEI	15.0
6	1	22:03	NYCLEI	15.0
7	3	22:03	NYCLEI	11.8
8	2	22:03	NYCLEI	14.8
9	3	22:09	NYCLEI	5.9
10	3	22:09	MYODAU	3.2
11	2	22:14	PIPPYG	8.0
12	1	22:15	NYCLEI	15.0
13	2	22:15	NYCLEI	10.3
14	2	22:15	NYCLEI	13.2
15	3	22:15	NYCLEI	11.8
16	1	22:15	NYCLEI	11.0
17	1	22:16	PIPPIP	8.2
18	2	22:16	PIPPIP	8.5
19	3	22:16	PIPPIP	5.9
20	2	22:16	PIPPYG	13.9
21	2	22:19	NYCLEI	13.9
22	1	22:19	NYCLEI	15.0
23	3	22:19	NYCLEI	15.0
24	2	22:20	NYCLEI	15.0
25	1	22:20	NYCLEI	15.0
26	3	22:20	NYCLEI	15.0
27	2	22:20	NYCLEI	9.2
28	1	22:20	PIPPYG	12.6
29	3	22:20	PIPPYG	6.8
30	2	22:20	PIPPYG	7.4
31	2	22:21	PIPPYG	11.7

32	1	22:22	PIPPYG	5.1
33	3	22:22	PIPPYG	5.6
34	1	22:26	PIPPIP	9.4
35	2	22:26	PIPPIP	6.3
36	3	22:26	PIPPIP	4.5
37	1	22:26	NYCLEI	9.6
38	3	22:26	NYCLEI	8.0
39	1	22:26	PIPPYG	14.6
40	3	22:26	PIPPYG	12.1
41	2	22:27	NYCLEI	11.1
42	3	22:27	NYCLEI	9.7
43	1	22:27	NYCLEI	7.9
44	1	22:29	PIPPYG	7.5
45	3	22:29	PIPPYG	9.0
46	2	22:30	PIPPYG	11.8
47	1	22:30	PIPPYG	6.2
48	3	22:30	PIPPYG	6.5
49	3	22:31	PIP NAT	3.3
50	1	22:32	PIPPYG	9.1
51	3	22:32	PIPPYG	3.7
52	3	22:32	PIPPYG	4.2
53	1	22:32	PIPPYG	12.2
54	2	22:33	PIPPYG	7.0
55	2	22:33	NYCLEI	15.0
56	1	22:33	NYCLEI	10.8
57	3	22:33	NYCLEI	9.3
58	1	22:33	PIPPYG	6.7
59	1	22:34	PIPPYG	9.7
60	1	22:34	NYCLEI	6.5
61	1	22:35	PIPPYG	9.8
62	2	22:35	PIPPYG	8.7
63	2	22:35	PIPPIP	15.0
64	1	22:35	PIPPYG	15.0
65	3	22:35	PIPPYG	7.8
66	2	22:35	PIPPYG	14.7
67	1	22:35	PIPPYG	4.3
68	3	22:35	PIPPYG	4.9
69	1	22:35	NYCLEI	15.0
70	2	22:35	NYCLEI	15.0
71	3	22:35	NYCLEI	15.0
72	3	22:36	NYCLEI	5.9
73	1	22:36	PIPPYG	3.8
74	1	22:36	NYCLEI	5.1
75	3	22:36	NYCLEI	8.5

76	1	22:36	PIPPYG	8.4
77	1	22:36	PIPPYG	12.4
78	1	22:37	PIPPYG	8.6
79	3	22:37	PIPPYG	6.6
80	1	22:37	MYODAU	4.5
81	2	22:38	PIPPYG	10.3
82	2	22:39	PIPPYG	8.0
83	3	22:39	PIPPYG	6.2
84	1	22:39	PIPPYG	15.0
85	2	22:40	NYCLEI	15.0
86	3	22:40	NYCLEI	4.8
87	1	22:40	NYCLEI	15.0
88	2	22:40	NYCLEI	11.5
89	1	22:40	NYCLEI	8.3
90	1	22:41	PIPPYG	13.6
91	2	22:41	PIPPYG	9.3
92	3	22:41	PIPPYG	4.1
93	2	22:42	NYCLEI	13.3
94	1	22:42	NYCLEI	13.8
95	3	22:42	NYCLEI	10.9
96	2	22:44	NYCLEI	15.0
97	2	22:45	PIPPYG	12.8
98	1	22:45	PIPPYG	8.5
99	3	22:45	NYCLEI	12.8
100	1	22:45	NYCLEI	10.3
101	2	22:45	NYCLEI	10.1
102	1	22:46	PIPPYG	8.7
103	3	22:46	PIPPYG	6.3
104	3	22:48	PIPPIP	7.3
105	1	22:48	PIPPIP	6.6
106	1	22:48	NYCLEI	9.4
107	1	22:48	NYCLEI	8.2
108	2	22:48	NYCLEI	9.4
109	1	22:48	NYCLEI	7.1
110	1	22:49	PIPPYG	7.9
111	2	22:49	PIPPYG	8.2
112	1	22:49	PIPPIP	9.0
113	3	22:50	PIPPIP	7.3
114	2	22:53	PIPPYG	8.8
115	1	22:53	PIPPYG	9.4
116	3	22:53	PIPPYG	4.0
117	1	22:56	PIPPYG	6.9
118	3	22:56	PIPPYG	6.9
119	2	22:57	PIPPYG	10.0

120	3	22:59	PIPPYG	6.9
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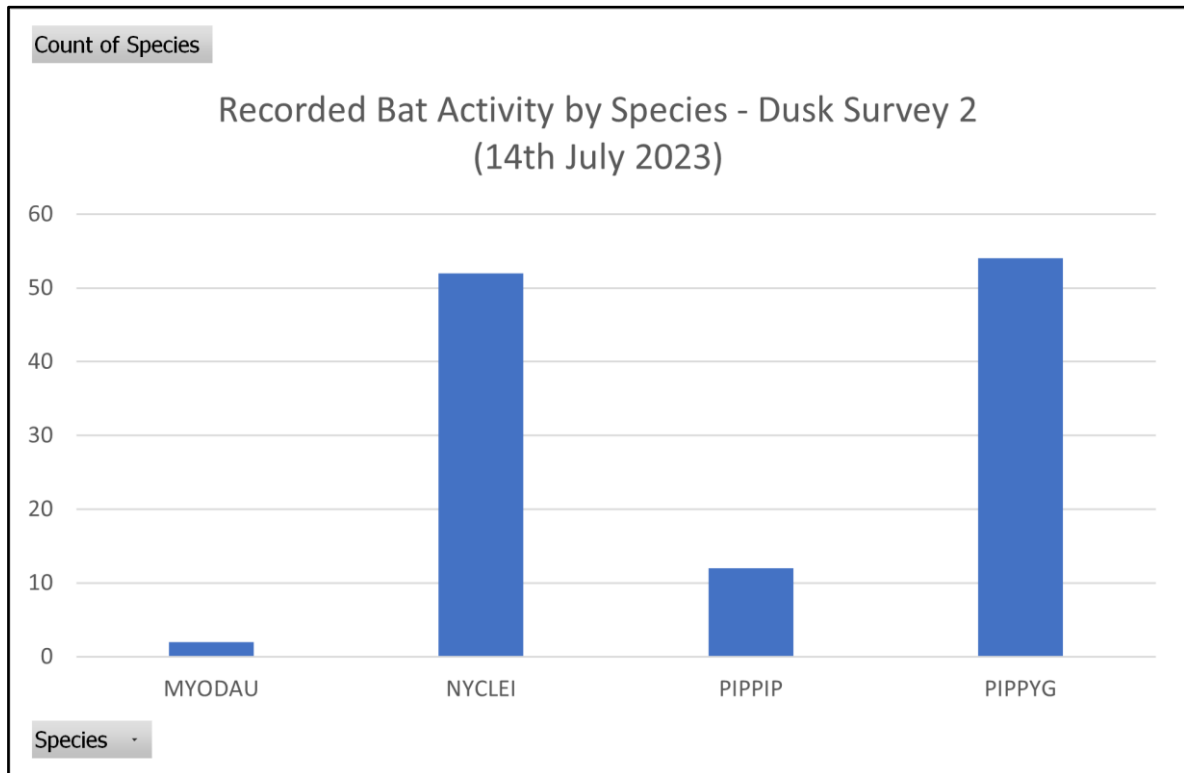


Figure 13: Recordings per Species (Dusk Survey 2)

Table 7: Bat Activity Recordings – Static Recorder Deployment

Bat Activity Survey Recordings					
Site:	Mill Lane, Leixlip, Co. Kildare				
Date:	14th - 15th July 2023				
Surveyors:	Static Recorder				
Reference	Date	Time	Species	Duration	Hour
1	14/07/2023	22:05	PIPPIP	5.124	1
2	14/07/2023	22:21	PIPPYG	3.662	1
3	14/07/2023	22:24	PIPPIP	4.38	1
4	14/07/2023	22:26	PIPPYG	3.904	1
5	14/07/2023	22:26	PIPPYG	3.636	1
6	14/07/2023	22:28	PIPPYG	5.99	1
7	14/07/2023	22:29	PIPPYG	3.654	1
8	14/07/2023	22:33	PIPPYG	3.54	1
9	14/07/2023	22:34	PIPPYG	4.084	1
10	14/07/2023	22:36	PIPPYG	6.074	1
11	14/07/2023	22:37	PIPPYG	3.836	1
12	14/07/2023	22:38	PIPPYG	3.496	1
13	14/07/2023	22:39	PIPPYG	3.264	1
14	14/07/2023	22:40	PIPPYG	3.792	1
15	14/07/2023	22:42	NYCLEI	6.886	1
16	14/07/2023	22:44	PIPPYG	3.478	1
17	14/07/2023	22:45	PIPPYG	4.032	1
18	14/07/2023	22:47	PIPPIP	3.764	1
19	14/07/2023	22:49	PIPPIP	4.518	1
20	14/07/2023	22:53	PIPPYG	3.87	1
21	14/07/2023	23:13	PIPPIP	4.684	2
22	14/07/2023	23:16	PIPPIP	4.238	2
23	14/07/2023	23:44	PIPPYG	3.384	2
24	15/07/2023	00:16	PIPPYG	3.368	3
25	15/07/2023	00:31	PIPPYG	6.048	3
26	15/07/2023	00:34	PIPPYG	5.206	3
27	15/07/2023	00:38	PIPPIP	7.258	3
28	15/07/2023	00:45	PIPPYG	3.468	3
29	15/07/2023	01:14	PIPPYG	4.146	4
30	15/07/2023	01:16	PIPPIP	5.032	4
31	15/07/2023	01:43	PIPPYG	4.302	4
32	15/07/2023	01:52	PIPPYG	3.348	4
33	15/07/2023	02:12	PIPPIP	5.06	5
34	15/07/2023	02:18	PIPPYG	3.424	5
35	15/07/2023	02:21	PIPPIP	4.362	5
36	15/07/2023	02:40	PIPPYG	4.034	5
37	15/07/2023	02:51	PIPPYG	4.264	5

38	15/07/2023	03:05	PIPPYG	4.77	6
39	15/07/2023	03:13	PIPPYG	5.372	6
40	15/07/2023	03:22	NYCLEI	3.482	6
41	15/07/2023	03:32	PIPPYG	3.506	6
42	15/07/2023	03:47	PIPPYG	4.204	6
43	15/07/2023	03:48	PIPPIP	4.256	6
44	15/07/2023	03:50	PIPPYG	3.662	6
45	15/07/2023	03:54	PIPPYG	3.694	6
46	15/07/2023	04:09	PIPPYG	3.378	7
47	15/07/2023	04:13	PIPPIP	4.052	7
48	15/07/2023	04:14	PIPPIP	3.48	7
49	15/07/2023	04:21	PIPPYG	5.056	7
50	15/07/2023	04:29	PIPPYG	3.39	7
51	15/07/2023	04:35	PIPPYG	3.782	7
52	15/07/2023	04:39	PIPPYG	3.62	7

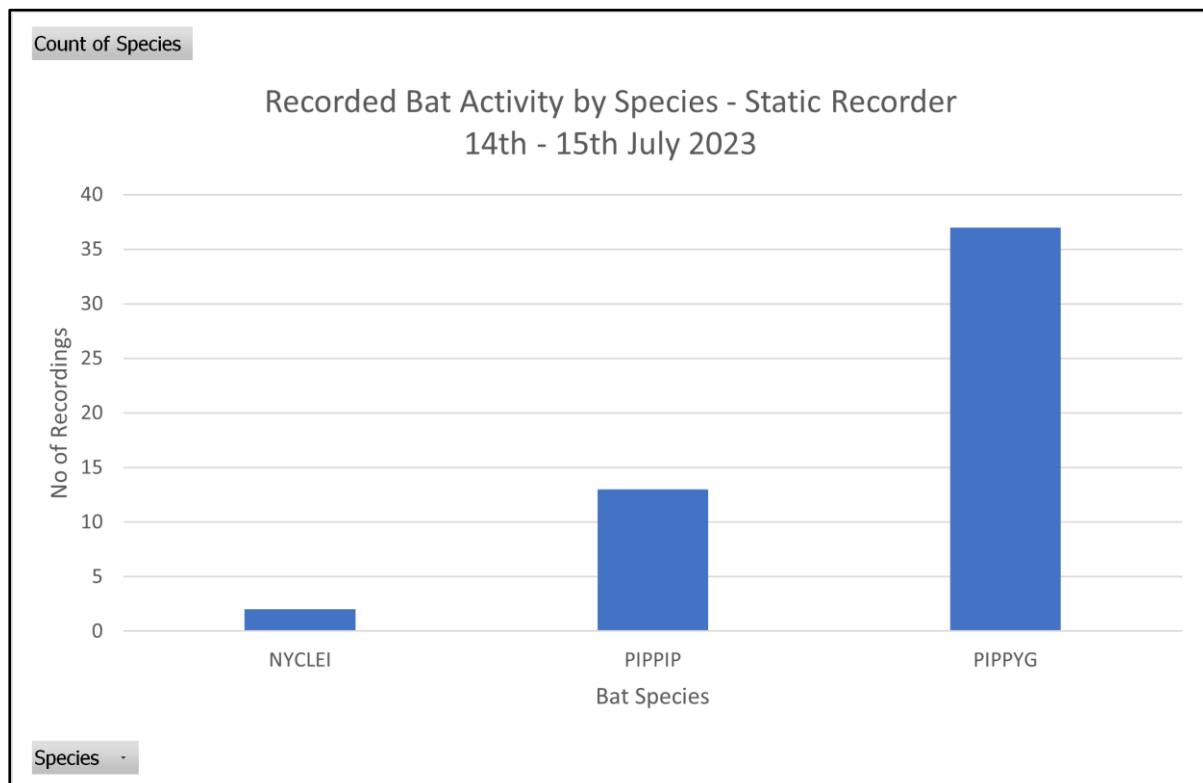


Figure 14: Recordings per Species (Static Recorder Deployment)

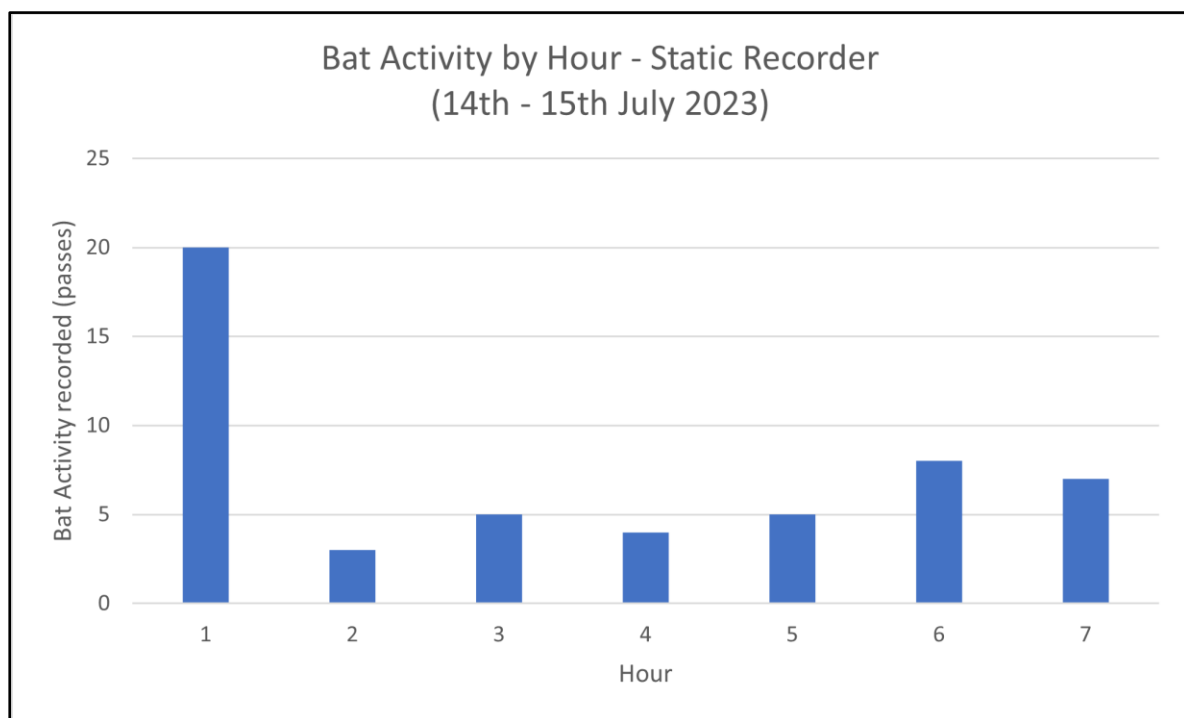
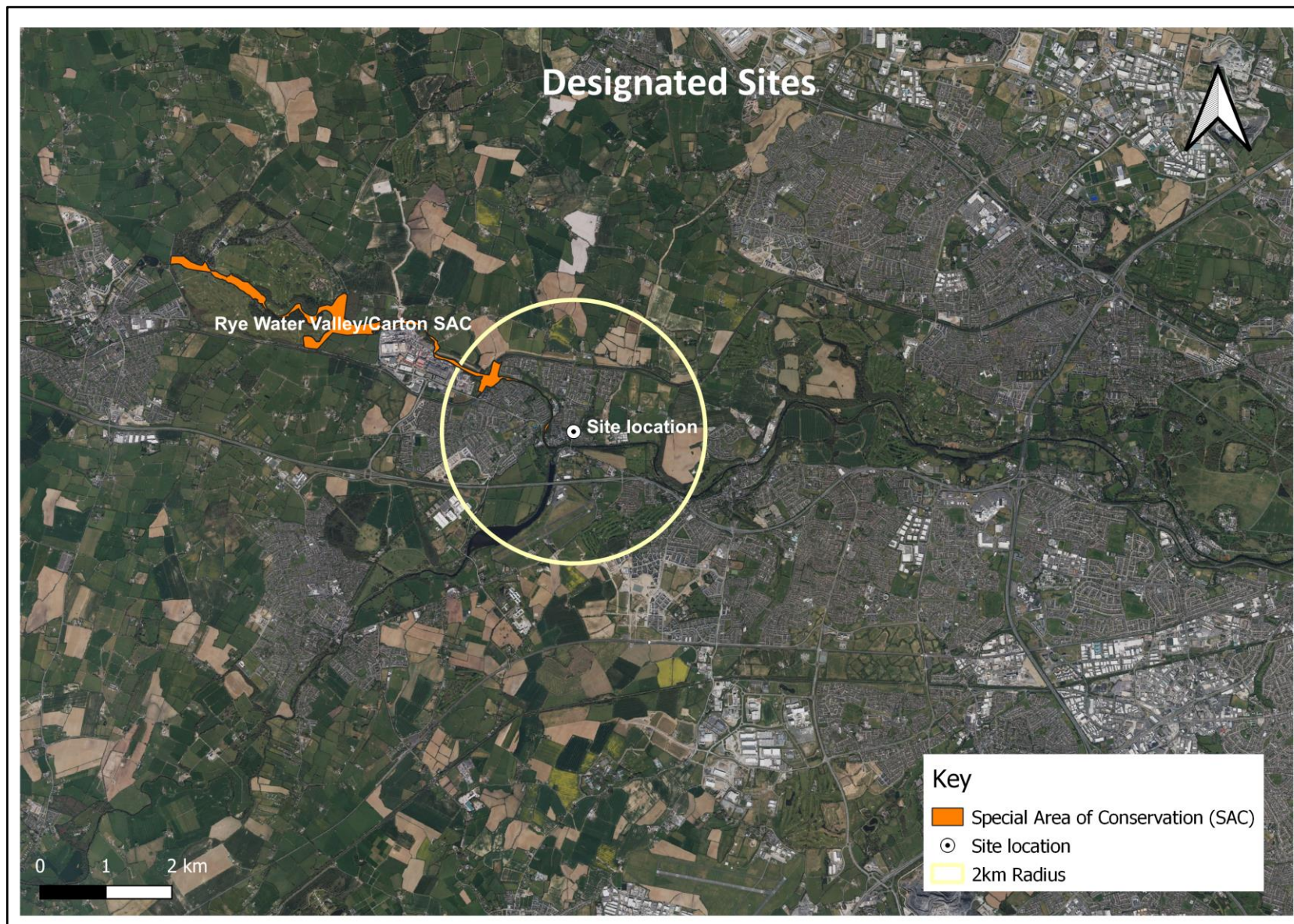


Figure 15: Bat Activity by Hour – Static Recorder Deployment



Map 1: Locational Context



Map 2: Designated Sites



Map 3: Aerial View of Site and Surrounding Area

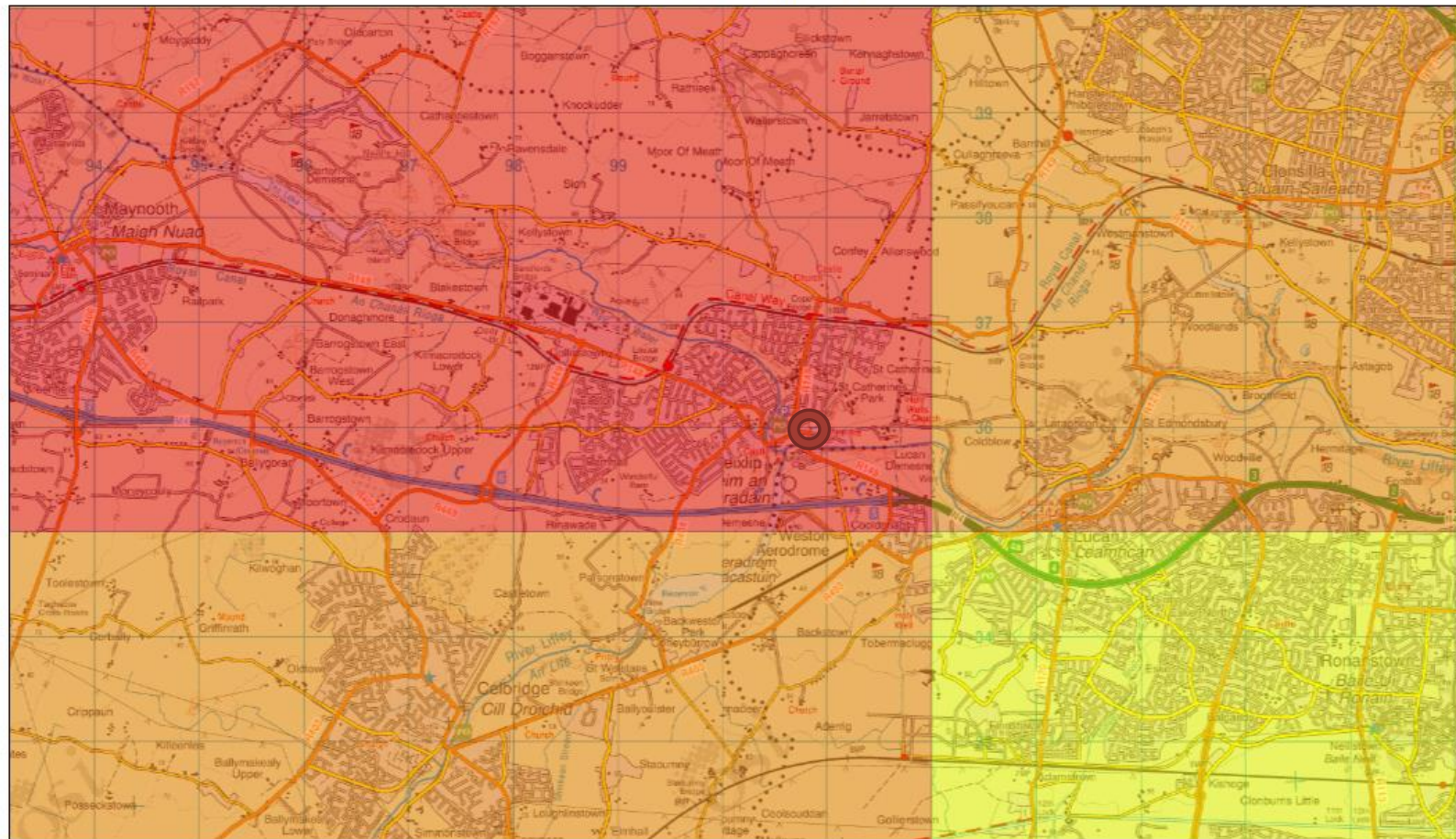


Map 4: Surveyor Locations – 1st Survey



Map 5: Surveyor Locations – 2nd Survey

Bat Landscapes



July 6, 2023

All bats

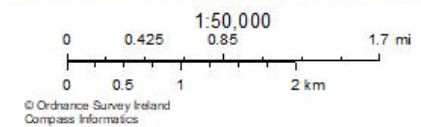
0.000000 - 13.000000

13.000001 - 21.333300

21.333301 - 28.111099

28.111100 - 36.444401

36.444402 - 58.555599



Map 6: Bat Landscapes (Source: NBDC)



Map 7: Dusk Survey 1 – Observed Flight Paths



Map 8: Dusk Survey 2 – Observed Flight Paths

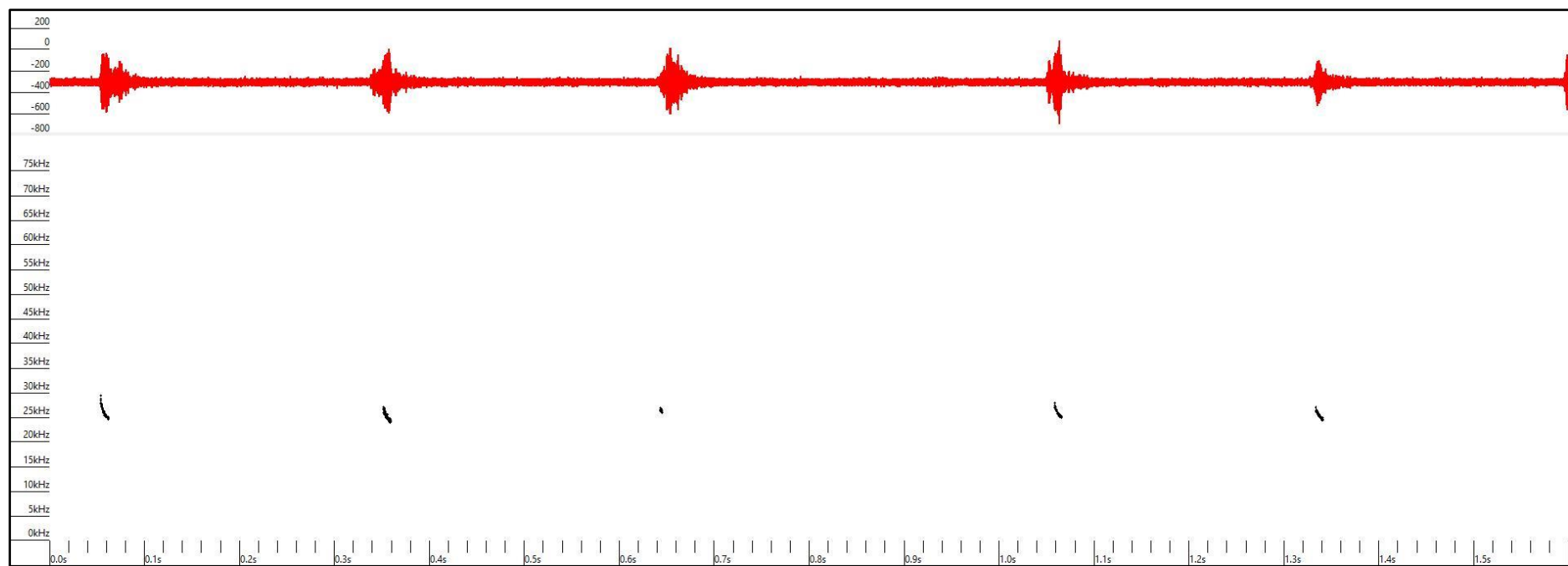


Figure 16: Example of recording from Nyctalus leisleri

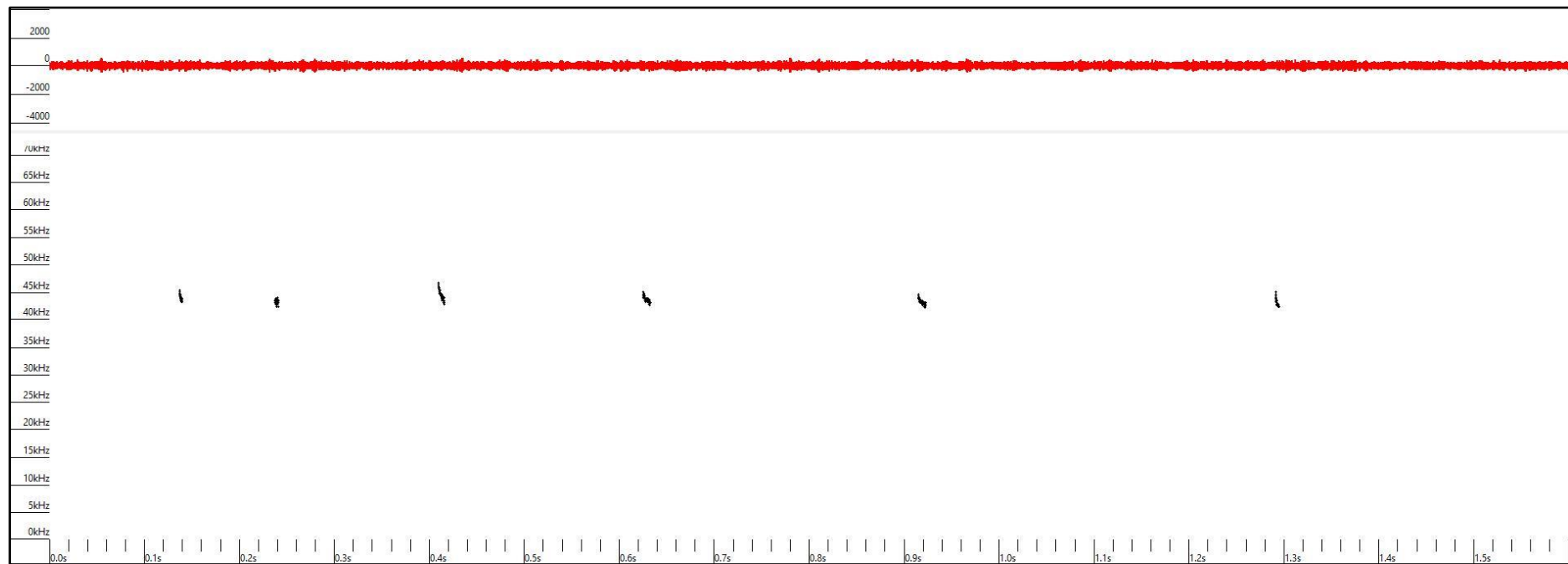


Figure 17: Example of recording from *P. pipistrellus*

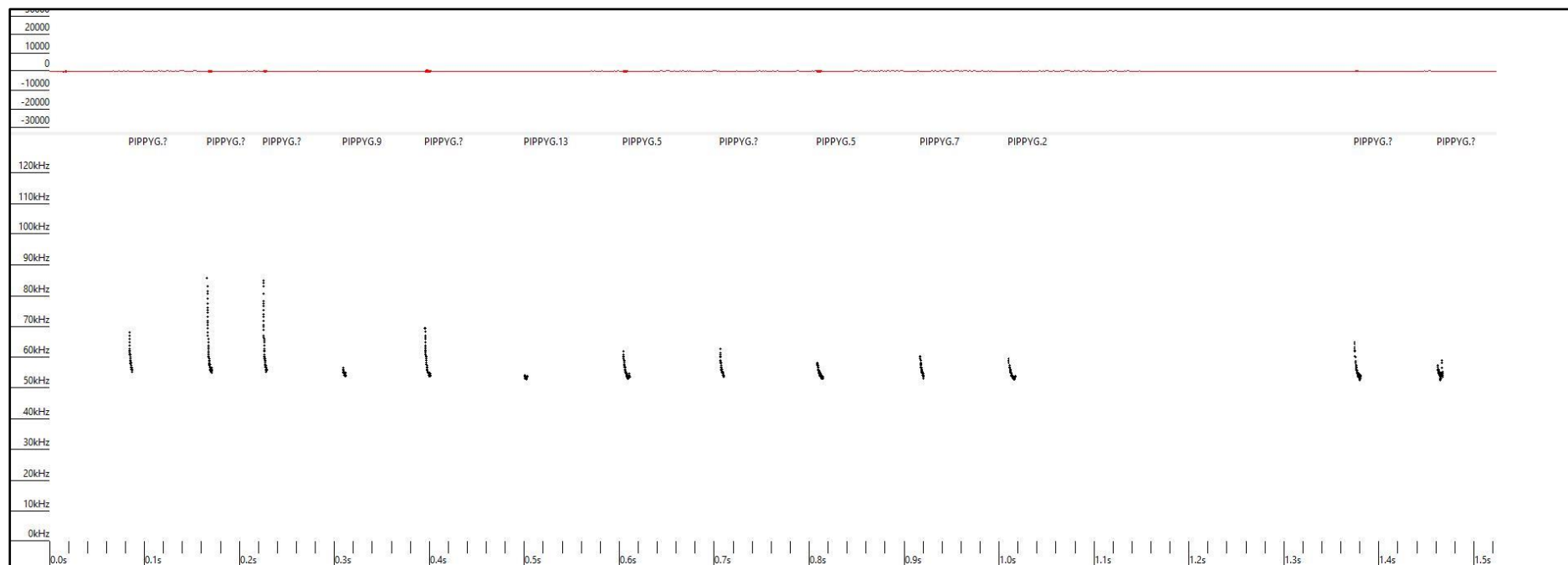


Figure 18: Example of recording from *P. pygmaeus*

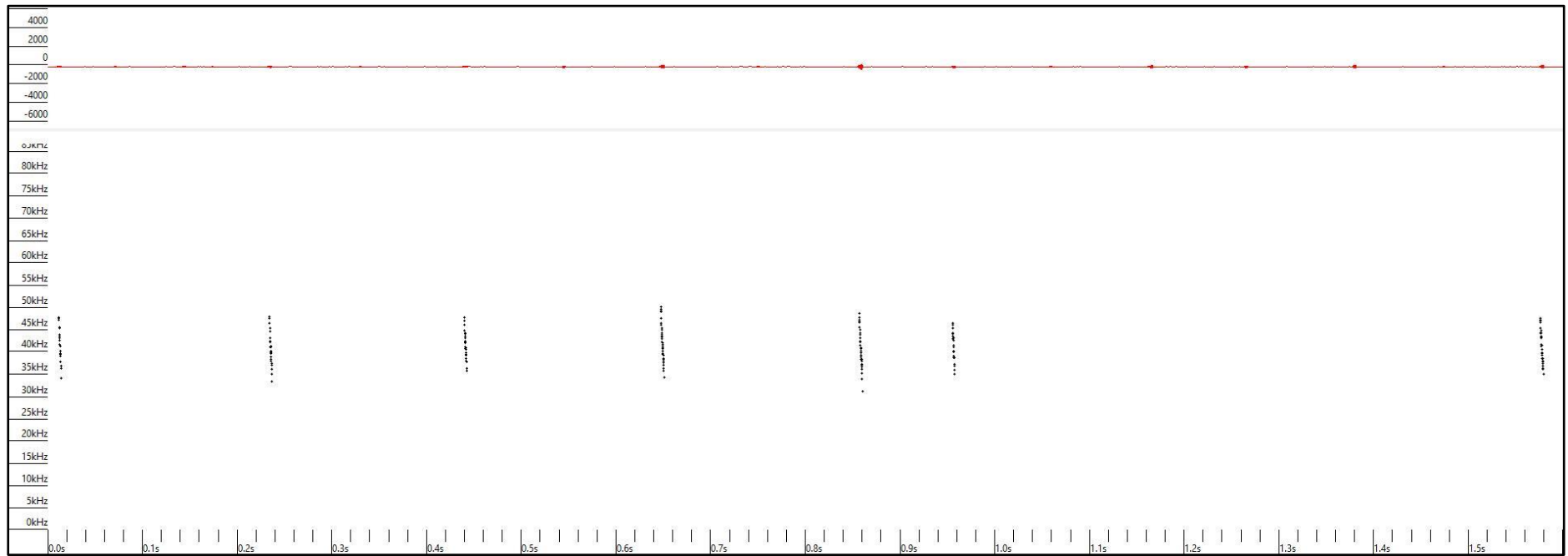


Figure 19: Example of recording from a *Myotis* species.



Figure 20: Example infrared image of Building No.1.



Figure 21: Example infrared image of Building No. 2.

5.0 REFERENCES

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