MWP

Bat Survey and Assessment Report

Ballinla Wind Farm

Ballinla Wind Farm Ltd.

October 2024

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Project No.	Doc. No.	Rev.	Date	Prepared By	Checked By	Approved By	Status
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1. Summary

- A suite of bat surveys were conducted at the site of a Proposed Wind Farm Development at Ballinla, County Offaly.
- Surveys comprised of passive automated bat (PAB) surveys, a day-time bat walkover survey (DBW), and night-time bat walkover surveys (NBW).
- The passive automated bat surveys were carried out during the summer and autumn of 2023 and also during the spring, summer, and autumn of 2024. They were designed to passively sample and record bat activity at initially 12 pre-selected sampling points (SP) and were carried out on 10 consecutive nights during each season. As the project progressed and design changes were made, due to a reduction in the amount of proposed turbines sampling points reduced to 11, 10 and finally 8 pre-selected sampling points.
- The following species were recorded within the proposed wind farm area during the PAB surveys:
    - Soprano pipistrelle (*Pipistrellus pygmaeus*) (46.91%)
    - Common pipistrelle (*Pipistrellus pipistrellus*) (34.53%)
    - Leisler's bat (*Nyctalus leisleri*) (14.82%)
    - Unidentified bats: (1.35%)
    - Species from the genus *Myotis* (1.25%)
    - Brown long-eared bat (*Plecotus auritus*) (1.08%) and
    - Nathusius' pipistrelle (*Pipistrellus nathusii*) (0.06%)
- The highest level of activity was recorded at SP2, where a total of 25,456. bat passes were recorded during the survey 2023 and 2024 periods.
- The highest level of seasonal activity was recorded in summer 2024 and the total number of 28,384 bat passes recorded which comprises 29.65% of the total of bat passes recorded across 2023 and 2024. The number of bat passes recorded in summer and autumn of 2023 comprised of 24.17% and 12.80% respectively of the total recorded across 2023 and 2024. Spring and autumn of 2024 comprised of 18.88% and 14.49% respectively across both survey seasons.
- Data gathered from the NBW surveys indicated low levels of activity by a low number of individual bat species along the Leitrim stream found in the south of the Proposed Development.
- The levels of activity recorded during 2023 and 2024 survey periods are low and reflective of the normal patterns that relate to the site. It is concluded that the Proposed Development does not pose a significant risk to bat species.
- With a lack of suitable roosting features found across the site for all buildings and trees, the site is considered to be of 'negligible' potential for roosting bats.
- Recommendations for minimising impacts to foraging bats are detailed in section 8. This includes for buffers around turbines, a sensitive lighting plan and a stringent post construction monitoring programme.

Residual effects on bats have been assessed as not significant provided recommendations in Section 8, are employed.

2. Introduction

Malachy Walsh and Partners, Engineering and Environmental Consultants (MWP), was commissioned by Ballinla Wind Farm Limited the 'Applicant', to undertake bat surveys at the location of a Proposed 7 Turbine Wind Farm Development at a location in east County Offaly, located approximately 4km west of the Edenderry town boundary and 24km east of Tullamore. The surveys were conducted to inform the preparation of an Environmental Impact Assessment Report (EIAR) which will be submitted in support of a planning application to An Bord Pleanála (ABP) for consent to construct the wind turbines, and associated infrastructure and ancillary facilities on the 42 ha site.

See **Figure 1** for the location of the proposed development site. See **Figure 2**, below for Proposed Development site boundary.

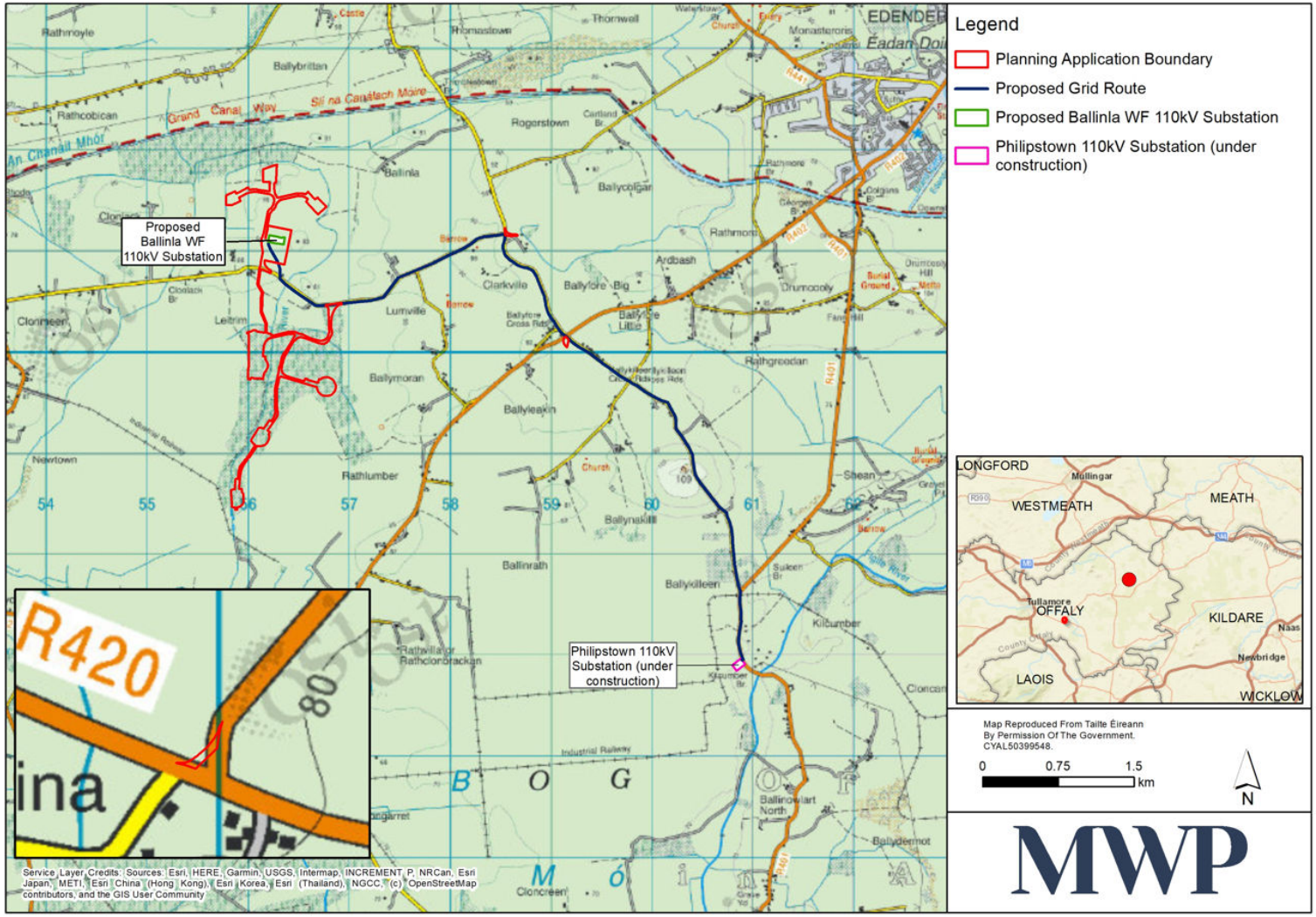

Figure 1: Proposed Development site boundary in wider geographical context.

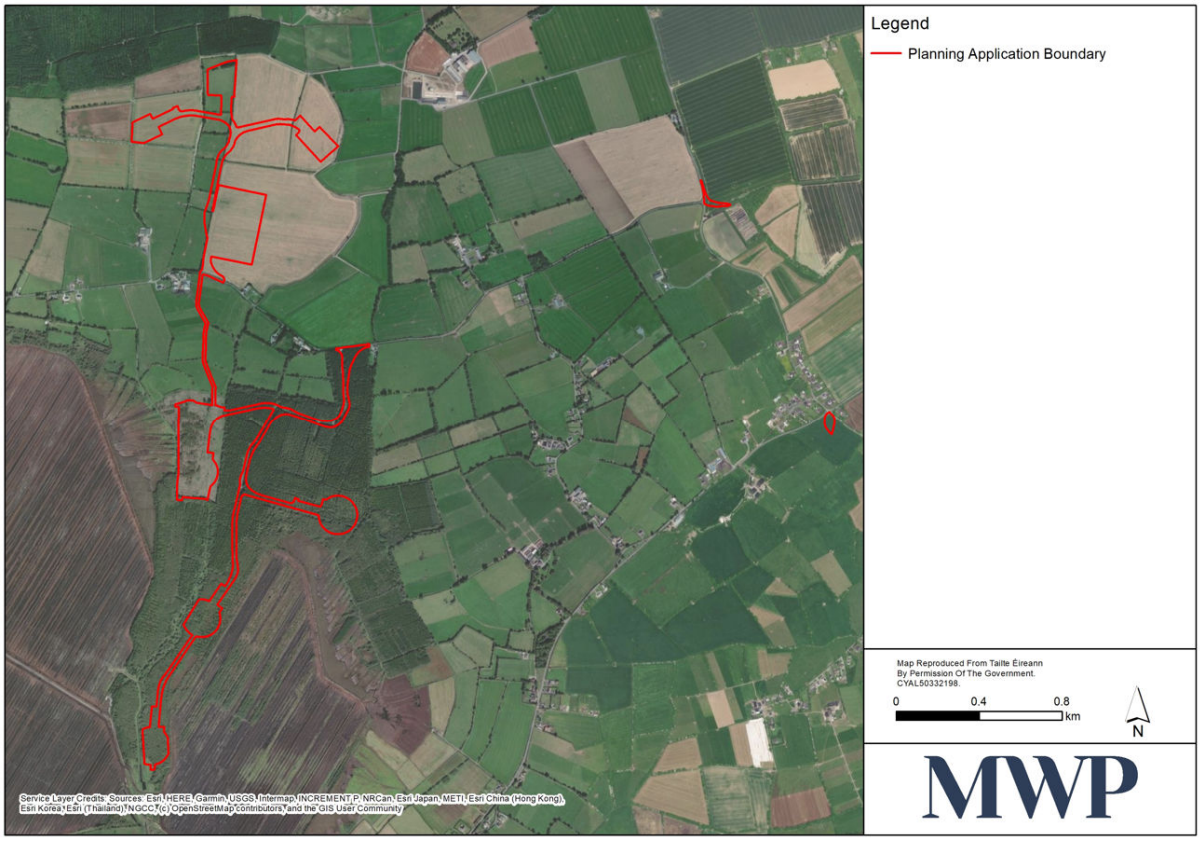

Figure 2: Proposed Development site boundary.

2.1 Purpose of the Surveys and Report

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.
- To identify any foraging/commuting habitat features 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.
- 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. The results of the surveys, outlined in this report, form the basis for the assessment of the potential impacts of the Proposed Development on bats (see **Section 8**).

Further details on the field survey design are provided in **Section 5.** The field survey results are presented in **Section 6**.

2.2 Statement of Competency

This report was authored by Rob Beer (BSC, MRSB). 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 has also recently acquired a NPWS bat survey license (DER/BAT 2024-112). 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. Rob also undertook the bat sonogram analysis and compiled and tabulated data from the static surveys and NBW's undertaken.

Field work was conducted by Rob, Orla van der Noll (MSc., BSc.), Jennifer Snook (BSc, DipHe), and Petr Dobes.

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 assisted with bat surveys and with collation and tabulation of data from static surveys.

Jennifer is an Ecologist at MWP and has been working in the ecology sector in Ireland since 2022 where she has completed numerous ecological surveys and reports for a range of projects across different industries. Jennifer is particularly competent in bird, mammal and habitat survey methodology with over two years of experience in these areas. In 2023, Jennifer qualified with a Bachelor of Science (Honours) in Wildlife Biology from Munster Technological University, Tralee, Co. Kerry, and has a DipHe in Business Management. Jennifer is registered with the Chartered Institute of Ecology and Environmental Management (CIEEM) and has many licenses, qualifications and memberships for various wildlife groups and organisations in Ireland.

Petr is an Ecologist at MWP and is a graduate of Kerry College's Ecology programme, has been a valuable member of MWP's Ecology team since May 2023. As a qualifying member of the Chartered Institute of Ecology and Environmental Management (CIEEM), he exhibits a deep commitment to environmental stewardship. Passionate about nature, Petr actively participates in Citizen Science projects, contributing to the monitoring of local wildlife and flora. He is a dedicated birdwatcher, conducting annual bird population surveys for both Birdwatch Ireland and the Irish Raptor Study Group. He has been formally trained in aquatic macroinvertebrates identification (Freshwater Biological Association), Biological Water quality Assessment by the Q-value method (Pascal Sweeney), surveying for white-clawed crayfish and Stage 1 & 2 freshwater pearl mussel surveying (Pascal Sweeney).

This report was reviewed 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 Appropriate Assessment (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 bat surveys (DER/BAT 2024-51).

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, impact assessment and mitigation design with regard to bats.

- '*Bat surveys for Professional Ecologists: Good Practice Guidelines (4th edition)*'. Bat Conservation Trust, London. (Collins, 2023).
- '*Bats and artificial lighting at night. Guidance Note 08/23*'. Bat Conservation Trust. (BCT, 2023)
- '*Bat mitigation guidelines for Ireland v2'*. Irish Wildlife Manuals, No. 134. National Parks and Wildlife Service. (Marnell, *et al*., 2022).
- '*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)
- 'Bats and onshore wind turbines – survey, assessment and mitigation'. NatureScot. (NS, 2021)

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 species accounts please refer to Appendix 1.

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:

- 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).

[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

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 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		

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

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

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 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 of 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

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

4. Brief Description of the Site and Works

The Proposed Development site is located in a rural area of east Co. Offaly. The site is approximately 4km west of the Edenderry town boundary and 24km east of Tullamore.

Lands within the site predominantly consist in the north of intensely managed agricultural land, with areas of conifer plantation found in the south of the site. Coillte-owned forestry plantations make up a considerable portion of the south part of the site. Access to the north and south of the wind farm area will be via an access track connected to the L5010 Road (Local Road).

Lands surrounding the site are predominantly in agricultural use, interspersed with conifer plantations, cut over bog and residential dwellings. The EirGrid 110kV ESBN Cushaling Substation adjacent to Edenderry Power Plant is located approximately 6km southeast of the Proposed Development. It is proposed that electrical energy generated by the Proposed Wind Farm will be exported to this substation via an underground grid connection (subject to a separate planning application). There are areas of ecological importance present in the wider landscape, including Grand Canal pNHA, located directly north of the site.

It is being proposed by the Applicant to develop a wind farm (namely Ballinla Wind Farm) comprising seven (7) No. wind turbines. In addition to the turbines, the Proposed Development includes for turbine foundations, hardstanding areas, new access tracks and upgrading of existing access tracks, a substation including control buildings and associated grid connection (subject to a separate planning application, but assessed within the EIAR), electrical and grid services equipment, underground electrical and communications cabling, drainage, sediment controls, temporary site compound, tree felling, turbine delivery route works and associated works.

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:

- OSI Aerial photography and 1:50,000 mapping.
- NPWS website, map-viewer and datasets available on-line.
- Bat Conservation Ireland (BCIreland) publications, and website.
- The 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.
- Other information sources and reports footnoted in the report.

5.1.1 Database Searches

NPWS Database and NBDC Database

The on-line dataset record distribution for known lesser horseshoe bat roosts retained by NPWS was checked for records of lesser horseshoe bat roosts in the area[10]. In addition, the NBDC on-line database for all Irish bat species was checked for records within a 10 km radius of the site.

Bat Habitat Suitability Index

The desk study included a preliminary assessment of the availability of landscape features of importance to bats within the study area or within the geographical area extending away from it, based on the NBDC online mapping tool which includes a Bat Habitat Suitability Index (BHSI) layer[11]. 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 individual species, while 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.

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.

[10]https://www.npws.ie/maps-and-data/habitat-and-species-data
[11] https://maps.biodiversityireland.ie/Map

5.2 Site Risk Assessment

5.2.1 Initial Site Risk Assessment

In order to characterise potential risks that may exist at the site NatureScot (2021) recommends that an Initial Site Risk Assessment (ISRA) of site-based risk factors be carried out. This ISRA, which comprises an evaluation of the site's risk level, is based on a consideration of the habitat and development-related features of the proposed wind farm area only.

Table 5: Initial Site Risk Assessment

Project Risk Rating			
Project Size	Small	Medium	Large
Habitat Risk Rating	**Initial Site Risk Assessment[12]**		
Low	1	2	3
Moderate	2	3	4
High	3	4	5
Habitat Risk Level			
Habitat Risk	**Description**		
Low	• Small number of potential roost features, of low quality. YES • Low-quality foraging habitat that could be used by small numbers of foraging bats. YES • Isolated site not connected to the wider landscape by prominent linear features. YES		
Moderate	• Buildings, trees, or other structures with moderate-high potential as roost sites on or near the site. NO • Habitat could be used extensively by foraging bats. NO • Site is connected to the wider landscape by linear features such as scrub, tree lines, and streams. NO		
High	• Numerous suitable buildings, trees (particularly mature ancient woodland), or other structures with moderate-high potential as roost sites on or near the site, and/or confirmed roosts present close to or on the site. NO • Extensive and diverse habitat mosaic of high quality for foraging bats. NO • Site is connected to the wider landscape by a network of strong linear features such as rivers, blocks of woodland, and mature hedgerows. NO • At/near edge of range and/or on an important flyway. NO • Close to key roost and/or swarming site. NO		
Project Size Risk Level			
Project Size	**Description**		
Small	• Small scale development (≤10 turbines). YES • No other wind energy developments within 10 km. YES • Comprising turbines <50 m in height. NO		
Medium	• Larger developments (between 10 and 40 turbines). NO • May have some other wind developments within 5 km. NO • Comprising turbines 50-100 m in height. NO		
Large	• Largest developments (>40 turbines) with other wind energy developments within 5 km. NO • Comprising turbines >100 m in height). YES		

[12]Initial site risk assessment Key: (1-2) - low/lowest site risk; (3) - medium site risk; (4-5) - high/highest site risk.

5.2.2 Overall Site Risk Assessment

An overall assessment of risk can then be made by considering the initial site assessment result in relation to the bat activity level found on site and taking into account the relative vulnerability of each species of bat present, at the population level.

The output from the initial site risk assessment is used in the matrix found in **Table 6** to derive an overall risk assessment based on the activity level of high collision risk species.

This table is intended to identify those sites which are of greatest concern in terms of potential collision risk. This risk assessment is then performed for all high collision risk species recorded on site, which are common pipistrelle, soprano pipistrelle and Leisler's bat. The subsequent outputs are then taken into account in the context of any potential impacts at the population level for each of the three species accessed as having high population vulnerability (**Table 7**). It should be noted that these risk assessments are to be used as a guide and are indicative only and are not a rigid classification of a site's overall risk.

Table 6: Overall Site Risk Assessment[13]

Bat activity level	Nil (0)	Low (1)	Low-Moderate (2)	Moderate (3)	Moderate-High (4)	High (5)
Site Risk Level from table 5						
Lowest (1)	0 Low	1 Low	2 Low	3 Low	4 Low	5 Medium
Low (2)	0 Low	2 Low	4 Low	6 Medium	8 Medium	10 Medium
Med (3)	0 Low	3 Low	6 Medium	9 Medium	12 Medium	15 High
High (4)	0 Low	4 Low	8 Medium	12 Medium	15 High	18 High
Highest (5)	0 Low	5 Medium	10 Medium	15 High	20 High	25 High

Using the risk criteria outlined in **Tables 5 and 6,** in combination with all bat data gathered from static detectors and Nighttime bat activity walks, the proposed wind farm site is evaluated as a **'Low'** risk site. The same result is derived when accessing all the high collision risk species that were recorded on site. Hourly pass data coupled with all the data gathered from NBWs indicated low activity levels of all species found on site.

Table 7: Level of potential vulnerability of populations of British bat species (Adapted from Wray et al., 2010)

	Low collision risk	**Medium collision risk**	**High collision risk**
Common species	Brown long-eared **Low vulnerability**	n/a	Common pipistrelle Soprano pipistrelle **Medium vulnerability**
Rarer species	Daubenton's Natterer's Whiskered Lesser horseshoe **Low vulnerability**	n/a	Nathusius' pipistrelle Leisler's **High vulnerability**

[13] Overall site risk assessment Key: Low = 0-4, Medium = 5-12, High = 15-25

5.3 Bat Foraging and Commuting Habitat Suitability Survey

As part of the initial site walkover, any linear habitat features, such as hedgerows and treelines, 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 (2023).

5.4 Preliminary Roost Assessment

Preliminary survey of buildings, structures and or trees found on site was undertaken to identify any actual or potential bat roosts which could be either directly or indirectly impacted by the proposal. The Preliminary Roost Assessment (PRA) was conducted on the 23rd of April 2024 by an experienced MWP bat surveyor (Irish bat license number: DER/BAT 2024-112; Natural England bat survey licence number 2022-10295-CL18-BAT). The survey involved an inspection of any buildings, structures and or trees found within the red line boundary, to identify features that could support roosting bats, and/or identify any evidence of bat activity. Survey effort and timings were in line with those recommended in Collins (2023).

During the PRA survey, any buildings, structures and or trees were inspected 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.

Buildings and or structures were evaluated in terms of structural integrity, degree of dampness, degree of shelter/protection, etc and potential as bat roosting habitat. This involved the surveyor visually inspecting both the interior using torches and the exterior from ground level using torches and binoculars. Trees were assessed in accordance with current bat survey guidance (Collins, 2023) and involved surveyors visually inspecting the exterior surface of the trees from ground level using torches and binoculars, as well as the areas of ground in the immediate vicinity.

On completion of the PRA, any building/structure/tree was categorised as having either 'negligible', 'low', 'moderate' or 'high' suitability for roosting bats, as per Collins (2023). The results of the PRAs determined whether additional survey effort was required.

5.5 Nighttime Bat Walkover Survey (NBW)

Nighttime bat walkover surveys were undertaken within the south of site in close proximity to the Leitrim stream to observe bat behaviour at this key area of site. This area, through initial data gathering, indicated a high amount of bat activity and was also located in an area of land that offered a limited buffer area for any vegetation clearance as part of potential mitigation. Nighttime bat walkover surveys were used to supplement data captured with static detectors and enable a more in-depth analysis of bat activity.

Nighttime bat walkover surveys were conducted in 2024 on the 23rd of April and 14th of May (spring season), 16th of June and 8th of August (summer season), and the 3rd of September and 12th of September (autumn season).

The NBW surveys involved surveyors walking along a predetermined transect route with stopping points at regular intervals, whilst observing and recording any bat activity observed with the use of hand-held recording units. Due to low levels of activity the transect was extended in the autumn surveys to gather more data. Data was gathered on species type, the number of bats, flight direction, flight type, and perceived behavioural responses to existing habitat features such as waterways and or tree lines.

Surveyors used bat detection equipment to record any bats occurring and were equipped with Wildlife Acoustics – Echo Meter Touch 2 software on Samsung tablets, Batlogger M2 handheld detectors as well as Night Fox night vision googles to assist in counting any individual bats observed.

As per Collins (2023) surveys commenced at 20 minutes before sunset and continued until approximately 1.5-2 hours after sunset.

5.6 Passive Automated Bat Surveys (PABS)

Ground-level static surveys were undertaken within the proposed wind farm site over the course of the 2023 and 2024 bat survey seasons. The automated activity surveys were carried out in compliance with NS (2021) which stipulates that pre-application surveys should take place over a full season of bat activity.

The preliminary assessment desk-top study was supplemented by a ground-truthing daytime survey carried out when the units were deployed at the site. An assessment of the potential value to foraging bats of the existing habitats and features was made. Particular attention was paid to the presence of linear features within the site that connected the site to the surrounding area. The habitat mix present within the proposed wind farm area's agricultural surroundings, the presence of linear landscape features, and the types of land use were noted.

The purpose of this daytime survey was to ensure that, as far as was possible within the strictures of NS (2021), that the locations of the bio-acoustic units would intersect with a habitat mix that was representative of the proposed wind farm area and would, therefore, accurately sample the activity of any bat populations present. When determining which landscape features were of importance cognisance was taken, during both the desk-study and ground-truthing assessments, of the criteria listed in **Table 3**, of NRA (2006a and 2006b), Collins (2023), and of the UK Department of Transport's Interim Advice Note 116/08[14].

Three key criteria from NS (2021) informed the PABS survey design. These are as follows:

1. Minimum survey effort for ground-based surveys:
   The minimum level of pre-application survey required using static detectors is 10 nights in each of: spring (April-May), summer (June-mid-August) and autumn (mid-August-October).

2. Number of detectors required:
   Detectors should be placed at all known turbine locations at wind farms containing less than ten proposed turbines. Where developments have more than ten turbines, detectors should be placed within the developable area at ten potential turbine locations plus a third of additional potential turbine sites.

3. Location of detector units:
   *At sites where the proposed turbine locations are known, **static detectors should be placed [....] at or close to these points.** [Emphasis added]. The selection of locations at which to place detectors should be based on professional judgement, but at large sites, it is recommended that beyond the initial ten detectors placed at proposed turbine sites (if known), the remainder should be distributed based on the availability of different habitats and topographical features on the site.*

In compliance with NS (2021), ground-level static surveys, designed to passively sample and record bat activity at the site, were conducted. Due to unforeseen circumstances a full survey period could not be completed within the calendar year of 2023, with data only collected from the summer and autumn seasons. In 2024 data was collected during the spring, summer and autumn seasons. Initially 13 automatic detectors were deployed at pre-selected sampling locations (SPs), based off early development plans, to capture data on the extent of bat activity at the site and its spatial and temporal distribution. As time passed and the project progressed, changes to the

[14] Nature Conservation Advance in Relation to Bats' (Available at http://www.dft.gov.uk/ha/standards/ians/pdfs/ian116.pdf)

development design were made and the number of turbines first planned were reduced and therefore static detector locations were also reduced to reflect this. Static detectors were always placed in locations that the turbines were planned for and in places that aimed to capture as much habitat representation across the site as possible. Static detectors 3, 4, 5 and 6 were found to be within areas of intensely managed land, which were representative of the majority of land found within this northern portion of site. In addition, a new static detector location to the west of the northern section of site, in line with an updated layout, was chosen to gather additional bat data to further support the stratified sampling method employed.

The static bioacoustic recorders were deployed during the following survey dates:

- Summer 02/08/2023 to 11/08/2023.
- Autumn 19/09/2023 to 28/09/2023.
- Spring 26/04/2024 to 05/05/2024.
- Summer 27/07/2024 to 05/08/2024.
- Autumn 03/09/2024 to 12/09/2024.

The survey sampling points (SP) (locations where the bioacoustic units were deployed) are illustrated in Figure 3.

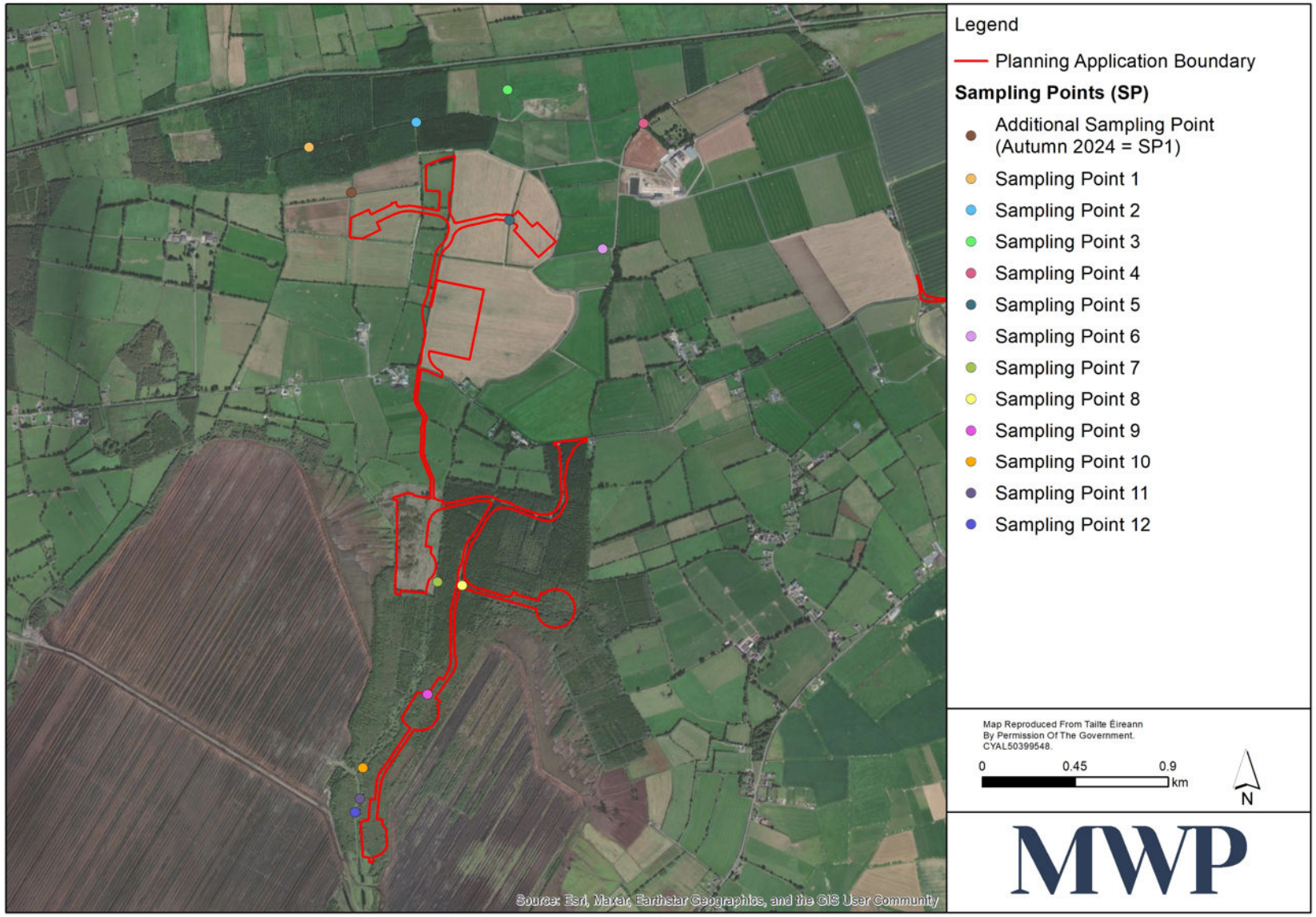

Figure 3: Sampling points (SP) location map

Song Meter Full Spectrum bioacoustic recording units were deployed within the Proposed Wind Farm area for 10 nights during each season. 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 were programmed to begin recording half an hour before sunset each evening and to continue until half an hour after dawn the next morning. Before deployment, the latitude, longitude, and time zone for each survey location was inputted to each unit and each then automatically determined the times of dawn and dusk, thereby, reducing the likelihood of operator error. Calls emitted by bats that passed within the detecting range of the units, during the period of activation, were recorded and their calls were stored for later analysis. Each unit has an omnidirectional microphone that detects bat ultrasonic calls and each unit records and stores data on internal SD cards.

Because of the habitat mix within the proposed wind farm site boundary, and because the collection of a representative sample was more likely if the sampling points were located along the network of field boundaries rather than in the open agricultural grassland habitats, four of the bioacoustic units were located on field boundaries. This was done in the expectation that, should bats be present, detectable levels of activity were reasonably foreseeable at the selected locations, particularly because bats are known to exhibit a high level of site loyalty and will frequently return to the same foraging sites night after night (Entwhistle et al., 2001). This characteristic of the sampling locations also increased the probability that any species with a habitual presence in the survey area would, at some point, be encountered at the locations.

5.7 Sonogram Analysis of data recorded during PABs

Post PAB surveys, the sound files were downloaded from the SD cards and converted using proprietary software[15] 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 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 6.5 and in Appendix 2 under the column heading 'NoID'.

[15] Kaleidoscope Pro Analysis Software.

5.8 Limitations

5.8.1 Survey Limitations

Daytime Bat Walkover Survey

This type of survey provides a snapshot of the proposed development site at the time of the survey(s) only. Bats are a highly mobile species, and they can and do turn-up from time to time unexpectedly. All care has been taken to ensure the results and recommendations are suitable within the context of the proposed development and survey data.

Nighttime Bat Walkover Surveys

This type of survey provides a snapshot in time only and ecologists can only be in one location at any given time and therefore activity in another part of the site could be missed. In order to limit this, several 'loops' of the walking route were conducted across the two-hour survey period. The use of night vision aids also ensured that there was more reliability in data gathering as opposed to the use of the human eye only in poor light.

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. Furthermore, technical issues with detectors at sampling point 6 (SP6) in the summer of 2023 and at sampling point 1 (SP1) in spring 2024 meant that no data was recorded here, however this was not considered a limitation to the study as enough data was gathered at other sampling points across the two years of survey in habitat that was representative of where these sampling points were located.

6. Results

6.1 Desk Study

6.1.1 NPWS Database & NBDC database

Following review of data from NPWS's database for records of lesser horseshoe bat (LHB) roosts in the area,[16] there are no known LHB roosts within 10 km of the development site with the closest found over 100 km to the west. In addition, the NBDC on-line database for all Irish bat species was checked for records within a 10km radius of the site, the following table provides a summary of these results.

Table 8: Summary of bat data for all Irish bat species within a 10km radius of the site.

Species	Number of Records	Year (most recent)	Location (closest)	Record type
Brown long-eared bat	5	2009	2 km northeast	In flight
Common pipistrelle	15	2019	1.5 km northeast	In flight
Daubenton's bat	10	2018	1 km north	In flight
Leisler's bat	5	2019	1.5 km northeast	In flight
Natterer's bat	1	2009	1.5 km northeast	In flight
Soprano pipistrelle	14	2019	1.5 km northeast	In flight

6.1.2 Bat Habitat Suitability Index (BHSI)

A review of the NBDC's Bat Habitat Suitability Index available on-line determined that the for the area encompassed within the Proposed Development site, and also including the lands extending away from the proposed development site, the BHSI rating is split between the northern section of the site and the southern section of the site. For the northern part of the site the BHSI has been assigned for 'all bats' is 29.11 out of 100, and for the southern part 23.78 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 48, with a minimum rating of 0 (see **Table 9** below).

On the basis of the BHSI ratings assigned for all bats and for individual species, the Proposed Development site and surrounding land is considered to be of relatively low overall value for bats. The marginally higher rating in the northern part of the site could be attributed to the mix of hedgerows, woodland and agricultural land use within the site and the Grand Canal found north of the site boundary and there being more low-quality bat habitat in the form of plantation woodland found to the south.

Table 9: 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	-	**North – 29.11** **South – 23.78**
Brown long-eared bat	*Plecotus auritus*	North - 35 South - 29
Common pipistrelle	*Pipistrellus pipistrellus*	North - 48 South - 40

[16]https://www.npws.ie/maps-and-data/habitat-and-species-data

Common name	Scientific name	BHSI Rating
Daubenton's bat	*Myotis daubentonii*	North - 35 South - 31
Leisler's bat	*Nyctalus leisleri*	North - 45 South - 36
Lesser Horseshoe bat	*Rhinolophus hipposideros*	North - 0 South - 0
Nathusius's pipistrelle	*Pipistrellus nathusii*	North - 5 South - 2
Natterer's bat	*Myotis nattereri*	North - 34 South - 25
Soprano pipistrelle	*Pipistrellus pygmaeus*	North - 44 South - 38
Whiskered bat	*Myotis mystacinus*	North - 16 South - 13

6.2 Bat Foraging and Commuting Habitat Suitability Survey

The site overall is dominated mostly by a mix of agricultural land with boundary hedgerows and trees lines and coniferous woodland, with all the agricultural land found in the northern portion of the site. The southern section of the site is mostly dominated by coniferous woodland with some scrubby areas and the Leitrim stream. The Grand Canal is found approximately 500m north of the Proposed Development and this feature coupled, with the boundary hedgerows and tree lines, provide high commuting and foraging potential with links to the wider landscape. The coniferous plantation woodland that dominates the south provides very little in the way of suitable commuting and foraging potential. The woodlands are dense with scarce ground flora and thus supports very little in terms of bat's insect prey. These woodlands are also prone to periodical felling, and it is only within areas of scrub regrowth that provide more insect activity, where there is more, albeit limited, foraging potential. There is also the Leitrim stream in the south of the Proposed Development with low commuting and foraging potential.

6.3 Preliminary Roost Assessment

Buildings found on site consisted of agricultural farm buildings such as metal built barns, storage sheds and cattle sheds. A single brick building was also present on site (farm shop). These buildings were well maintained with no apparent gaps or crevice's present. The metal-built buildings, many of which had open access, did not provide suitable features in which roosting bats could utilize. The single brick building on site had tight fitting concrete roof tile with no gaps or missing tiles enabling access. In addition to the buildings on site all trees were subjected to ground level assessments for roosting bats and no potential roosting features were observed. With a lack of suitable roosting features found across all buildings and trees, the site overall was considered to be of 'negligible' value for roosting bats.

6.4 Nighttime Bat Walkover Survey (NBW)

Data collected from the initial static detectors deployed in the summer and autumn of 2023 indicated a high level of bat activity was recorded at detectors placed along the Leitrim stream. Also, high level of bat activity was recorded at detectors placed in close proximity to the Grand Canal north of the northern boundary of the site. Due to design changes and a greater area of land availability for potential mitigation to the north of site, further NBW surveys were not considered here. It should also be noted that desk study results, a preliminary walkover

and knowledge of bat ecology indicated that the canal itself would provide high potential for commuting and foraging bats and it was expected that higher levels of activity would be found here.

However, as initial survey data suggested that the Leitrim stream found in the south of site was being used by a high number of bats, NBW surveys were undertaken across the full survey season to supplement this data and enable in depth analysis of bat activity. The NBW surveys allowed for a visual assessment of bat activity to understand the amount of bats that were using the stream it's surrounds and how they were using the landscape in this area of site.

A total of six nighttime bat walkovers were conducted in 2024 along a predetermined transect route (**Figure 4**), as discussed in **Section 5.5** above. These surveys met the minimum survey requirements in line with Colins (2023). The results are summarised in **Table** 10**, Table 11 and Table 12** below.

Table 10. Summary of Nighttime Bat Walkover survey results (spring 2024)

Date & time	Weather at Start	Weather at End	Results
Date: 23rd April 2024 **Start time:** 20:41 **End time:** 22:41 **Sunset:** 21:01	**Temp:** 14.2°C **Humidity:** 50% **Moon phase:** Waning Cresent **Wind:** Light breeze **Cloud:** 0% cloud cover **Precipitation:** Dry	**Temp:** 10.6 °C **Humidity:** 59% **Wind:** Light breeze **Cloud:** 0% cloud cover **Precipitation:** Dry	No bats were observed from stopping points 1 to 3. A single Leisler's (L) pass was recorded at 21:25 at stopping point 4 (SP4). Another L pass was heard again at SP4 at 21:30. Two common pipistrelle (CP) passes were heard at 21:27 and 21:30 at SP4. Soprano pipistrelle (SP) passes were heard at 21:32, 21:33, 21:34, 21:36 and 21:37 between stopping points 4 and 5. A single CP pass was heard at 21:38 at SP5 and a single L pass was heard at 21:40 at SP5. SP passes were seen and heard at 21:40, 21:43 and 21:34. During these passes two individual SP were seen commuting south. SP and CP were heard at 21:47 and 21:49 between stopping points 5 and 6. CP passes were heard at 21:50, 21:51, and 21:52 at SP6 and heard again at 21:52 between stopping points 6 and 7. SP passes were heard at 21:56 and 21:57 between stopping points 6 and 7. A single CP call was heard at 21:58 at SP7. L passes were heard at 21:59, 22:00 and 22:01 at SP7. A single *Myotis*.spp (MYO) call was heard at 22:04 at SP7.
Date 14th May 2024 **Start time:** 21:02 **End time:** 23:02 **Sunset:** 21:17	**Temp:** 13.9 °C **Humidity:** 83% **Moon phase:** Waxing Cresent **Wind:** Light breeze **Cloud:**70% cloud cover **Precipitation**: Dry	**Temp:** 13.3°C **Humidity:** 75% **Wind:** Light breeze **Cloud:** 90% cloud cover **Precipitation:** Dry	No bats were observed from stopping points 1 to 4. A single L pass was recorded at 22:05 at SP5 and a single CP pass was recorded at 22:07. CP passes were heard at 22:14 and 22:16 at SP6. A single CP call was heard between stopping points 6 and 7. CP was heard again at SP7 at 22:22, 22:24, and 22:26. SP passes were heard at 22:22 and 22:27 also at SP7. A single CP pass was recorded at 22:29 between stopping points 7 and 8. Single SP and CP passes were heard at SP8 at 20:30 and 20:33 respectively. A single CP pass was heard at 20:36 between stopping points 8 and 9 and two SP passes were heard at 22:36 and 22:37 also between stopping points 8 and 9. A single MYO pass was recorded at 22:38 also between stopping points 8 and 9. A single L pass was heard at 22:39 at SP9. A single CP pass was heard at 22:39 at SP9. SP passes were heard at 22:42 and 22:44 at SP9. Single SP and CP passes were heard at 22:45 between stopping points 9 and 10. No further bat passes were recorded at SP10.

Date & time	Weather at Start	Weather at End	Results
Summary 23/04/2024 – Minimal activity across the survey period with common pipistrelle, soprano pipistrelle, *Myotis*.spp and Leisler's all recorded. Where soprano pipistrelle was seen and heard, they were seen commuting along the Leitrim stream heading southward. No bats were recorded at the first 3 stopping points and no further calls were heard after stopping point 7. 14/05/2024 – Minimal activity across the survey period with common pipistrelle, soprano pipistrelle, Leisler's, and a single *Myotis*.spp call all recorded. All bats were heard and not seen across the survey.			

Table 11: Summary of Nighttime Bat Walkover survey results (summer 2024)

Date & time	Weather at Start	Weather at End	Results
Date: 16th June 2024 Start time: 21:26 End time: 23:26 Sunset: 21:46	Temp: 19 °C Humidity: 57% Moon phase: Waxing gibbous Wind: Light breeze Cloud: 10% cloud cover Precipitation: Dry	Temp: 16.9 °C Humidity: 69% Wind: Light breeze Cloud: 50% cloud cover Precipitation: Dry	No bats were observed from stopping points 1 to 3. A single L pass was heard at 22:38 at SP4. Two SP calls were recorded at 22:39 and 22:40 at SP4. A single SP call was heard at 22:45 at SP5. A single SP call was heard between stopping points 6 and 7. CP calls were heard at 22:52 and 22:55 at SP7 and then again at 22:56 between stopping points 7 and 8. SP was recorded at 22:58, 22:59 and 23:00 at SP8. SP was then heard again at 23:02 and 23:03 between stopping points 8 and 9. A single MYO pass was heard at 23:08 at SP9. SP passes were heard at 23:05, 23:07 and 23:08 at SP9. SP was then heard again between stopping points 9 and 10 at 23:11. Two CP calls were heard at 23:14 and 23:15 at SP10. A single SP call was heard at 23:17 at SP10.
Date: 8th August 2024 Start time: 20:51 End time: 22:51 Sunset:21:11	Temp: 17.4 °C Humidity: 69% Moon phase: Waxing crescent Wind: Moderate breeze Cloud: 100% cloud cover Precipitation: Drizzle	Temp: 15.6°C Humidity: 68% Wind: Strong breeze Cloud: 100% cloud cover Precipitation: Dry	No bats were observed from stopping points 1 to 2. L was seen and not heard at 21:36 at SP3. L was then heard again at the same stopping point at 21:44. SP was seen feeding along the Leitrim stream at 21:42 at SP3. SP was seen overhead feeding along the Leitrim stream at 21:50, 21:51, 21:53 and 21:54 at SP4. During these passes only one individual bat was observed and was suspected that each pass was the same individual. A single L was heard and not seen at 22:00 at SP5. A single SP was seen feeding overhead at 22:01 at SP5. A single L pass was heard and not seen at SP6 at 22:21. CP was heard and not seen at 22:21, 22:23 and 21:27 at SP6. L was heard at 22:28 and 22:29 and CP was recorded at 22:31 between stopping points 6 and 7. SP was heard only at 22:32 and 22:33 at SP7. A single L call was heard at 22:33 at SP7. SP was heard feeding at 22:35 between stopping points 7 and 8. SP was recorded at 22:42 and heard feeding at 22:43 between stopping points 8 and 9. CP was heard feeding at 22:47 at SP9. CP was then heard again at 22:55 and 22:56 at SP10.

Date & time	Weather at Start	Weather at End	Results
Summary 16/06/2024 – Low amount of activity across the survey period with no bats seen, just heard echolocating. Species heard included common pipistrelle, soprano pipistrelle, and single calls for both *Myotis*.spp and Leisler's. 08/08/2024 – More general activity was recorded than previous surveys but still found to be at a low level. Species recorded were common pipistrelle, soprano pipistrelle and Leisler's. Feeding was visually observed along the Leitrim stream and overhead on two separate occasions by soprano pipistrelle (21:42 and 22:01). Feeding buzzes were recorded on five occasions but no bats were seen... No bats were recorded between stopping points 1 to 2 and none were recorded at stopping point 8.			

Table 12: Summary of Nighttime Bat Walkover survey results (autumn 2024)

Date & time	Weather at Start	Weather at End	Results
Date: 3rd Sept 2024 Start time: 19:53 End time: 21:53 Sunset: 20:13	Temp: 15.3 °C Humidity: 61% Moon phase: Waxing Cresent Wind: None Cloud: 90% cloud cover Precipitation: Dry	Temp: 12.2 °C Humidity: 67% Wind: Light breeze Cloud: 100% cloud cover Precipitation: Dry	No bats were observed from stopping points 1 to 3. SP was seen overhead commuting from a southerly direction and then headed west at 20:43 at SP4. SP was then seen feeding overhead along the Leitrim stream at 20:48 and 20:49 between stopping points 4 and 5. It is suspected that this was the same individual. SP was heard and not seen at 20:50 at SP5. SP was then heard again feeding at 20:56 at the same stop point. CP was heard feeding at 20:54 and then a call was also heard at 20:59 at SP5. A very distant SP call was heard at 21:03 at SP6. A single SP call was heard at 21:20 at SP8. CP was heard at 21:33, feeding, between stopping points 8 and 9 and then a call was heard at 21:36 between stopping points 8 and 9. SP calls were heard at 21:33, 21:34, and 21:35 between stopping points 8 and 9. A single SP feeding buzz was heard at 21:37 at SP9. CP was heard at 21:44 and 21:45 with SP also heard at 21:45, all between stopping points 9 and 10. Two SP calls were heard at 21:50 and 21:51 at SP10.
Date: 12th Sept 2024 Start time: 19:31 End time: 21:31 Sunset: 19:51	Temp: 13 °C Humidity: 69% Moon phase: Full moon Wind: Light breeze Cloud: 70% cloud cover Precipitation: Dry	Temp: 10.8°C Humidity: 88% Wind: Light breeze Cloud: 100% cloud cover Precipitation: Dry	No bats were observed from stopping points 1 to 5. A single SP call was recorded at 20:49 at SP5. A single SP call was heard at 20:55 and a single CP call was heard at 20:56 both at SP6. A single CP call was heard at 20:59 between stopping points 6 and 7. CP calls were heard at 21:03 and 21:04 at SP7. A single SP call was heard at 21:17 between stopping points 8 and 9. A single SP call was heard at 21:26 at SP9. Summary 03/09/2024 – Low amount of activity across the survey period with only common and soprano pipistrelle being recorded. Soprano pipistrelle was observed visually overhead on three separate occasions (20:43, 20:48 and 20:49). Feeding buzzes were also recorded and bat passes recorded but individual not seen on three occasions No bats were recorded between stopping points 1 to 3 and none were recorded at stopping point 7.

Date & time	Weather at Start	Weather at End	Results
12/09/2024 – Very little activity across the survey period with only common and soprano pipistrelle being recorded. No bats were seen and were only heard. No bats were recorded between stopping points 1 to 4 and none were recorded at stopping points 8 and 10.			

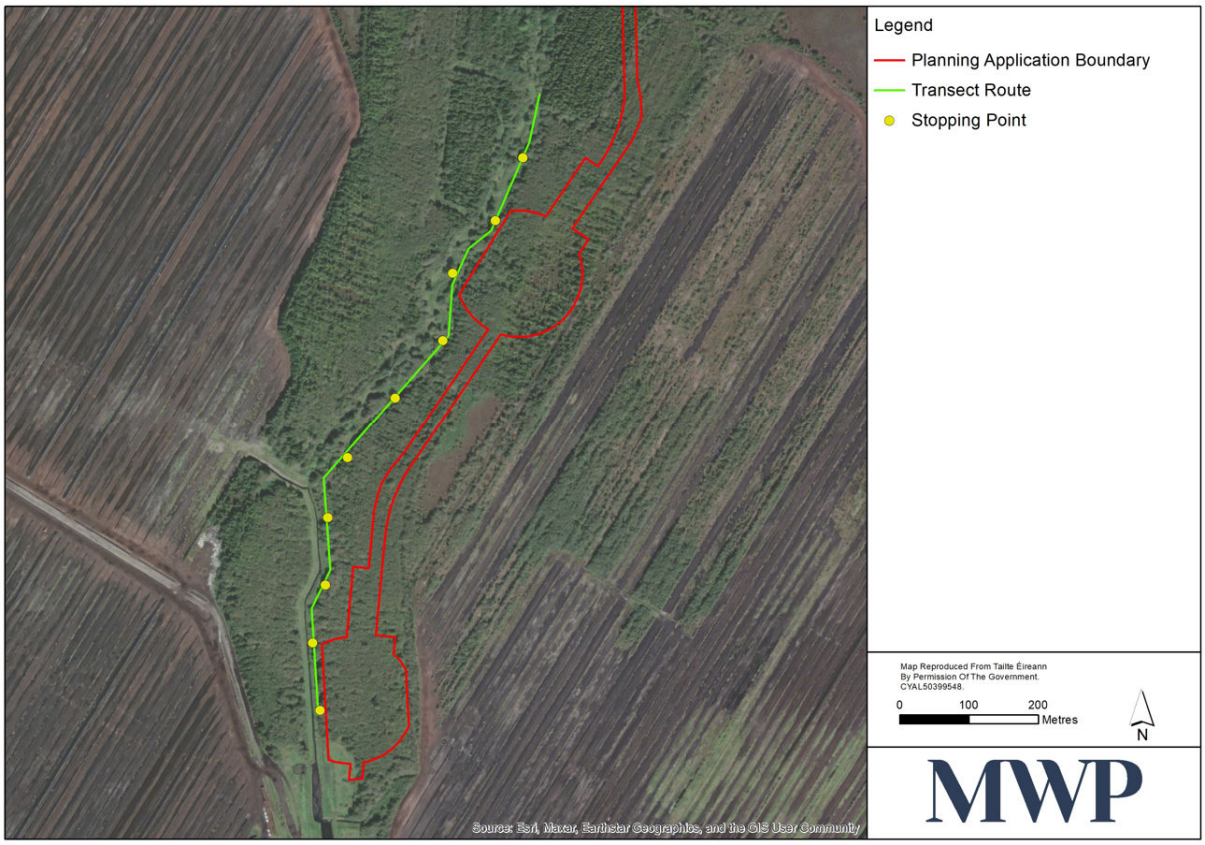

Figure 4: Map showing transect route and stopping points.

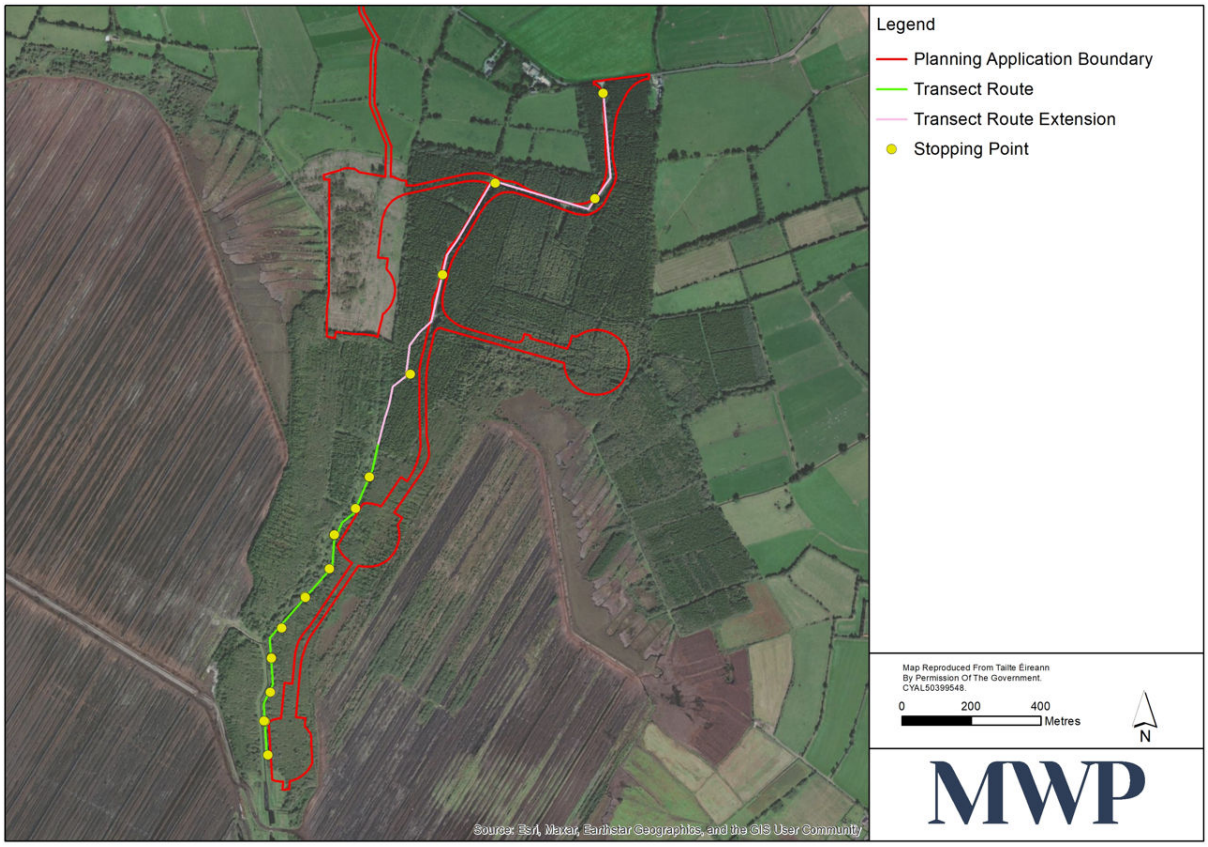

Figure 5: Extended transect route in autumn 2024 survey.

6.5 Passive Automated Bat Surveys (PABS)

Because an individual bat can be the source of more than one, or even many, calls, the numbers of calls recorded by the bio-acoustic units are not a direct measure of the numbers of any bat species. Bats will frequently fly over and back along short sections of habitat, if prey is readily available. Also while foraging they use linear features to navigate through the landscape, to and from roosts, and within foraging sites. Therefore, the number of calls recorded is likely to be greater than the number of bats that generated them.

As outlined in Section 5.6 above, static units were deployed in Summer and Autumn 2023 and in Spring, Summer and Autumn 2024 for 10 consecutive nights of optimum weather within each season. A total of 95,733 bat passes were recorded over the 2023 and 2024 deployment period (a total 50 nights of deployment).

Overall, Soprano pipistrelle had the highest number of passes recorded (46.91%) at the proposed development site across 2023 and 2024 survey periods.

All species recorded, with their combined total percentage passes, are as follows:

- Soprano pipistrelle (46.91%)
- Common pipistrelle (34.53%)
- Leisler's bat (14.82%)
- Species from the genus *Myotis* (1.25%)
- Brown long-eared bat (1.08%) and
- Nathusius' pipistrelle (0.06%)

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 (1.35%)

Soprano pipistrelle was the most frequently recorded species, and the total number of bat passes attributed to this species (44,908 passes) comprised 46.91% of the total, with the next most frequently recorded species comprising common pipistrelle with 33,055 passes (34.53% of the total).

Leisler's bat was the third highest in terms of passes over the survey period with 14,187 passes (14.82%), with species from the genus Myotis found to have 1,200 passes (1.25% of the total) and the brown long-eared bat found to have 1,031 passes over the survey period (1.08%). The Nathusius' pipistrelle equated to 0.06% (61 passes).

The species recorded are listed in Table 13 below, with the percentage of the total number of bat passes/calls per species and the BHSI rating for each species outlined.

Table 13: Percentage of total bat calls recorded, categorised by species and with corresponding BHSI Ratings for the site.

Species	% of total of all bat calls recorded (2023 & 2024)	BHSI Rating (out of 100)
Soprano pipistrelle	46.91	North - 44 South - 38
Common pipistrelle	34.53	North - 48 South - 40
Leisler's bat	14.82	North - 45 South - 36
Myotis specie	1.25	North - 28 South – 23[17]
Brown long-eared bat	1.08	North - 35 South - 29
Nathusius' pipistrelle	0.06	North - 5 South - 2

The BHSI ratings are considered to be mostly in-line with the level of activity recorded on-site. The BHSI rating for brown long-eared (BLE) appears to be higher than the levels of activity recorded on-site for BLE. As discussed in Section 5.1.1, 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 BLE such as sheltered habitats like valleys, parks and gardens and open deciduous and coniferous woodlands are not found to be present on site. Any woodland found on site is of the incredibly dense plantation type not associated with bat species. It may be that the significant habitats mentioned are more

[17] Mean average score taken across the three myotis species found in Ireland

available in the wider landscape but not at the proposed development site. The relative abundance and distribution of the species recorded is likely primarily influenced by the types of factors which are discussed in Sections 3.3 and 3.4 above. Therefore, any discordances noted are not considered to have any implications for the interpretation of the survey data.

The following sub-sections provide further detail on the PABS results from both the 2023 survey periods of Summer and Autumn along with the 2024 survey periods of Spring, Summer and Autumn. The nightly and hourly averages of the bat passes recorded for each species at each sampling point, including also bat passes to which a species or genus could not be attributed, are tabulated in Appendix 2. The results are discussed in Section 7.

6.5.1 2023 Survey Season Results

6.5.1.1.1 *Summer 2023 - Overview of levels of bat activity recorded*

Bat species recorded at all sampling points across the summer survey period, with their combined total percentage passes, are as follows:

- Soprano pipistrelle (56.32% = 13,035 passes)
- Common pipistrelle (35.05% = 8,111 passes)
- Leisler's bat (3.19% = 739 passes)
- Species from the genus *Myotis* (1.58% = 365 passes) and
- Brown long-eared bat = 116 passes = 0.5%)

In addition to the above, calls recorded which could not be attributed to a species and/or genus during the summer 2023 PAB surveys are as follows:

- Unidentified (3.36% = 778 passes)

6.5.1.1.1.1 Bat passes recorded at individual sampling points

The total numbers of bat passes recorded at each sampling point during the summer 2023 survey period is shown below in Table 14. These are broken down by species or genus, and the calls for which a species or genus could not be attributed (NoID). 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.

Soprano 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 SP8, where a total of 3,251 passes were recorded. High numbers of soprano pipistrelle were also recorded at SP2 during the same period where a total of 3,086 passes were recorded. Overall, the highest level of activity generally was recorded at SP2 (27.48% of all calls recorded), followed by SP8 (22.45%); the lowest level was recorded at SP9 (1.3%). 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 14: Number of bat passes of each species recorded at each sampling point during the summer 2023 survey

Sampling point	*Myotis* spp.	Leisler's bat	Nathusius' pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID	Total	%
2	57	61	0	2,914	3,086	38	0	203	6,359	27.48
8	196	52	0	1,564	3,251	4	0	128	5,195	22.45
12	51	64	0	1,064	2,530	5	0	66	3,780	16.33
11	23	50	0	441	2,237	3	0	91	2,845	12.29
7	27	72	0	412	634	6	0	37	1,188	5.13
5	1	94	0	739	330	9	0	4	1,177	5.09
1	6	48	0	520	121	15	0	48	758	3.28
4	1	128	0	258	298	33	0	14	732	3.16
10	3	46	0	28	381	0	0	11	469	2.03
3	0	87	0	100	121	3	0	29	340	1.47
9	0	37	0	71	46	0	0	147	301	1.3
6	0	0	0	0	0	0	0	0	0	0
Total	**365**	**739**	**0**	**8,111**	**13,035**	**116**	**0**	**778**	**23,144**	
%	**1.58**	**3.19**	**0**	**35.05**	**56.32**	**0.50**	**0**	**3.36**		

6.5.1.1.1.2 Nightly and Hourly averages of bat passes

To determine the level of bat activity it is important to look at both 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 sampling point, both the average nightly and average hourly rates recorded are used in conjunction with one another to indicate the overall level of species activity at each SP location.

6.5.1.1.1.3 Nightly averages of bat passes recorded at individual sampling points

On the basis of the nightly average calls, for both soprano and common pipistrelle an overall activity rating of 'High' was assigned for sampling points 2, 8, and 12. For both of these species a 'Medium' activity rating was assigned for sampling points 3 and 4.

An overall activity rating of 'High' was assigned to common pipistrelle only for sampling point 5 and soprano pipistrelle only for sampling points 7 and 11. For common pipistrelle a 'Medium' activity rating was given to sampling points 7 and 11. For soprano pipistrelle a 'Medium' activity rating was given to sampling points 1, 5, and 10.

A 'Medium' activity rating was assigned to Leisler's bat at sampling point 4 and was also assigned for *Myotis*.spp at sampling point 8.

For all other species recorded, the activity rating was assigned 'Low' for all of the other SP locations during the survey period (see **Table 15** below, species have been ranked highest to lowest in terms of overall number of nightly passes recorded in summer 2023).

The average nightly rates of calls for each species are tabulated in **Appendix 2.**

Table 15: Overview of nightly individual species activity recorded in summer 2023 with overall species activity rating assigned

Species	No. of SP locations with calls recorded	SP with highest total calls	SP with highest nightly total calls	Overall activity rating assigned / SP
Soprano pipistrelle	11/12	SP8	SP8	SP's 2, 7, 8 11, 12 = **High** SP's 1, 3, 4, 5, 10 = **Medium** SP's 6, 9 = **Low**
Common pipistrelle	11/12	SP2	SP2	SP's 2, 5, 8 12 = **High** SP's 3, 4, 7, 11 = **Medium** SP's 1, 6, 9, 10 = **Low**
Leisler's	11/12	SP4	SP4	SP4 = **Medium** Remaining SP's = **Low**
Myotis spp.	9/12	SP8	SP8	SP8 = **Medium** Remaining SP's = **Low**
Brown long-eared	9/12	SP2	SP8	All SP's = **Low**

6.5.1.1.1.4 Hourly averages of bat passes recorded at individual sampling points

Based on the hourly average calls for both soprano and common pipistrelle an overall activity rating of 'Medium' was assigned for sampling points 2, 8 and 12. An overall activity rating of 'Medium' was assigned to soprano pipistrelle only sampling point 11.

For all other species recorded, the activity rating was assigned 'Low' for all other SP locations during the survey period (see **Table 16** below, species have been ranked highest to lowest in terms of overall number of hourly passes recorded in summer 2023).

The average hourly rates of calls for each species are tabulated in **Appendix 2.**

Table 16: Overview of hourly individual species activity recorded in summer 2023 with overall species activity rating assigned

Species	SP with highest hourly total calls	Overall activity rating assigned / SP
Soprano pipistrelle	SP8	SP's 2, 8, 12 = **Medium** SP's 1, 3, 4, 5, 6, 7, 9, 10, 11 = **Low**
Common pipistrelle	SP2	SP's 2, 8, 11, 12 = **Medium** SP's 1, 3, 4, 5, 6, 7, 9, 10 = **Low**
Leisler's	SP4	All SP's = **Low**
Myotis spp.	SP8	All SP's = **Low**

Brown long-eared	SP8	All SP's = **Low**

6.5.1.1.2 *Autumn 2023 - Overview of levels of bat activity recorded*

Bat species recorded at all sampling points across the autumn survey period, with their combined total percentage passes, are as follows:

- Soprano pipistrelle (66.31% = 8,218 passes)
- Common pipistrelle (26.18% = 3,209passes)
- Species from the genus *Myotis* (2.48% = 304 passes)
- Leisler's bat (1.29% = 158 passes) and
- Brown long-eared bat = 0.33% = 41 passes)

In addition to the above, calls recorded which could not be attributed to a species and/or genus during the autumn 2023 PAB surveys are as follows:

- Unidentified (3.41% = 418 passes)

6.5.1.1.2.1 Bat passes recorded at individual sampling points

The total numbers of bat passes recorded at each sampling point during the autumn 2023 survey period are shown below in **Table 17.** These are broken down by species or genus, and 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.

Soprano pipistrelle was again 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, where a total of 3,496 passes were recorded. High numbers of soprano pipistrelle were also recorded at SP8 during the same period where a total of 3,254 passes were recorded. The highest level of activity generally was recorded at SP2 (35.82% of all calls recorded), followed by SP8 (34.42%); the lowest level was recorded at SP10 (0.05%). 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: Number of bat passes of each species recorded at each sampling point during the autumn 2023 survey

Sampling point	*Myotis* spp.	Leisler's bat	Nathusius' pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID	Total	%
2	30	12	0	787	3,496	9	0	57	4391	35.82

Sampling point	*Myotis* spp.	Leisler's bat	Nathusius' pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID	Total	%
8	159	15	0	763	3,254	1	0	27	4,219	34.42
6	9	42	0	841	217	12	0	223	1,344	10.96
3	5	8	0	263	472	1	0	7	756	6.17
4	6	26	0	261	284	8	0	23	608	4.96
9	63	5	0	203	46	0	0	39	356	2.90
11	7	3	0	30	227	0	0	6	273	2.23
7	17	22	0	16	54	1	0	10	120	0.98
1	4	3	0	28	44	3	0	23	105	0.86
5	4	21	0	17	33	2	0	3	80	0.65
10	0	1	0	0	1	4	0	0	6	0.05
TOTAL	**304**	**158**	**0**	**3,209**	**8,128**	**41**	**0**	**418**	**12,258**	
%	**2.48**	**1.29**	**0**	**26.18**	**66.31**	**0.33**	**0**	**3.41**		

6.5.1.1.2.2 Nightly averages of bat passes recorded at individual sampling points

On the basis of the nightly average calls, for both soprano and common pipistrelle an overall activity rating of 'High' was assigned for sampling points 2 and 8. For both of these species a 'Medium' activity rating was assigned for sampling points 3 and 4.

An overall activity rating of 'High' was assigned to common pipistrelle for sampling point 6 and a 'Medium' activity rating was given to sampling point 9. For soprano pipistrelle a 'Medium' activity rating was given to sampling points 6 and 11.

A 'Medium' activity rating was assigned to *Myotis* spp. at sampling point 8.

For other species recorded, the activity rating was assigned 'Low' for all of the other SP locations during the survey period (see Table 18 below, species have been ranked highest to lowest in terms of overall number of nightly passes recorded in autumn 2023).

The average nightly rates of calls for each species are tabulated in Appendix 2

Table 18: Overview of nightly individual species activity recorded in autumn 2023 with overall species activity rating assigned

Species	No. of SP locations calls recorded	SP with highest total calls	SP with highest nightly total calls	Overall activity rating assigned / SP
Soprano pipistrelle	11/11	SP2	SP2	SP's 2, 8 = **High** SP's 4, 6, 11 = **Medium** SP's1, 3, 5, 7, 9, 10 = **Low**
Common pipistrelle	10/11	SP6	SP6	SP's 2, 6, 8 = **High** SP's 3, 4, 9 = **Medium** SP's 1, 5, 7, 10, 11 = **Low**
Leisler's	11/11	SP6	SP6	All SP's = **Low**
Myotis spp.	9/11	SP8	SP8	SP8 = **Medium** Remaining SP's = **Low**
Brown long-eared	10/11	SP6	SP6	All SP's = **Low**

6.5.1.1.2.3 Hourly averages of bat passes recorded at individual sampling points

Based on the hourly average calls for both soprano and common pipistrelle an overall activity rating of 'Medium' was assigned for sampling points 2, 8 and 12. An overall activity rating of 'Medium' was assigned to soprano pipistrelle only sampling point 11.

For all other species recorded, the activity rating was assigned 'Low' for all other SP locations during the survey period (see **Table 16** below, species have been ranked highest to lowest in terms of overall number of hourly passes recorded in autumn 2023).

The average hourly rates of calls for each species are tabulated in **Appendix 2.**

Table 19: Overview of hourly individual species activity recorded in autumn 2023 with overall species activity rating assigned

Species	SP with highest hourly total calls	Overall activity rating assigned / SP
Soprano pipistrelle	SP8	SP's 2, 8 = **Medium** SP's 1, 3, 4, 5, 6, 7, 9, 10, 11 = **Low**
Common pipistrelle	SP2	All SP's = **Low**
Leisler's	SP4	All SP's = **Low**
Myotis spp.	SP8	All SP's = **Low**
Brown long-eared	SP8	All SP's = **Low**

6.5.1.1.3 *Overview of 2023 Survey Period*

The seasonal and annual totals of all bat passes that were recorded during the 2023 survey period are provided in **Table 20**, below. Cells highlighted yellow indicate the largest number of bat passes recorded at a sampling point

each season; the cell highlighted green is the largest seasonal total; the cell highlighted orange indicates the largest number of bat passes recorded at a sampling point over the survey period.

The highest level of seasonal activity was recorded in summer and the total number of bat passes recorded, 23,144, comprises 65.37% of the total of bat passes recorded. The number of bat passes recorded in autumn, 34.63% of the total were recorded. The highest level of activity was recorded at SP2 where 10,750 bat passes were recorded during the 2023 period of activity.

Table 20: Seasonal and annual totals for 2023 by sampling point

SP	1	2	3	4	5	6	7	8	9	10	11	12	Total	%
Summer	758	6,359	340	732	1,177		1,188	5,195	301	469	2,845	3,780	23,144	65.37
Autumn	105	4,391	756	608	80	1,344	120	4,219	356	6	273		12,258	34.63
Total	863	10,750	1,096	1,340	1,257	1,344	1,308	9,414	657	475	3,118	3,780	35,402	
%	2.44	30.37	3.1	3.79	3.55	3.8	3.69	26.59	1.86	1.34	8.81	10.68		

6.5.2 2024 Survey Season Results

6.5.2.1.1 *Spring 2024 - Overview of levels of bat activity recorded*

Bat species recorded at all sampling points across the spring survey period, with their combined total percentage passes, are as follows:

- Soprano pipistrelle (38.59% = 6,976 passes)
- Leisler's bat (37.58% = 6,784 passes)
- Common pipistrelle (21.50% = 3,887 passes)
- Species from the genus *Myotis* (1.52% = 275 passes)
- Brown long-eared bat (0.49% = 89 passes) and
- Nathusius' pipistrelle (0.22% = 40)

In addition to the above, calls recorded which could not be attributed to a species and/or genus during the spring 2024 PAB surveys are as follows:

- Unidentified (0.10% = 18 passes)

6.5.2.1.1.1 Bat passes recorded at individual sampling points

The total numbers of bat passes recorded at each sampling point during the spring 2024 survey period are shown below in Table 21. These are broken down by species or genus, and 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.

Soprano 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, where a total of 2,944 passes were recorded. The highest level of activity generally was recorded also at SP2 (30.74% of all calls recorded), followed by SP8 (14.87%); the lowest level was recorded at SP5 (1.71%). 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 21: Number of bat passes of each species recorded at each sampling point during the spring 2024 survey

Sampling point	*Myotis* spp.	Leisler's bat	Nathusius' pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser Horseshoe	NoID	Total	%
2	131	1359	6	1107	2944	7	0	4	5558	30.74
8	28	1329	0	203	1115	10	0	3	2688	14.87
11	11	1002	5	225	493	0	0	0	1736	9.60
7	35	942	0	299	445	3	0	1	1725	9.54
3	2	372	2	713	626	1	0	0	1716	9.49
4	11	382	10	799	419	54	0	8	1683	9.31
10	46	535	12	248	578	2	0	0	1421	7.86
6	2	572	3	168	125	11	0	2	883	4.88
9	9	267	2	42	39	1	0	0	360	1.99
5	0	34	0	83	192	0	0	0	309	1.71
1	0	0	0	0	0	0	0	0	0	0.00
Total	**275**	**6,794**	**40**	**3,887**	**6,976**	**89**	**0**	**18**	**18,079**	
%	**1.52**	**37.58**	**0.22**	**21.50**	**38.59**	**0.49**	**0.00**	**0.10**		

6.5.2.1.1.2 Nightly averages of bat passes recorded at individual sampling points

On the basis of the nightly average calls, for soprano pipistrelle, common pipistrelle and Leisler's an overall activity rating of 'High' was assigned for sampling point 2. An overall activity rating of 'High' was assigned to common pipistrelle for sampling points 3 and 4. An overall activity rating of 'High' was assigned to soprano pipistrelle for sampling points 3, 7, 8, 10, and 11. An overall activity rating of 'High' was assigned to Leisler's for sampling points 6, 7, 8, 10 and 11.

For both soprano and common pipistrelle an overall activity rating of 'Medium' was found at sampling point 6. For soprano pipistrelle only, a 'Medium' activity rating was given to sampling points 4 and 5. For common pipistrelle only, a 'Medium' activity rating was given to sampling points 7, 8, 10 and 11.

A 'Medium' activity rating was given for Leisler's at sampling points 3, 4 and 9 and a 'Medium' activity rating was also assigned to Myotis.spp at sampling point 2.

For all other species recorded, the activity rating was assigned 'Low' for all of the other SP locations during the survey period (see Table 22 below, species have been ranked highest to lowest in terms of overall number of nightly passes recorded in spring 2024).

The average nightly rates of calls for each species are tabulated in Appendix 2.

Table 22: Overview of nightly individual species activity recorded in spring 2024 with overall species activity rating assigned

Species	No. of SP locations calls recorded	SP with highest total calls	SP with highest nightly total calls	Overall activity rating assigned / SP
Soprano pipistrelle	10/11	SP2	SP2	SP's 2, 3, 7, 8, 10, 11 = **High** SP's 4, 5, 6, = **Medium** SP's 3, 9 = **Low**
Leisler's	10/11	SP2	SP2	SP's 2, 6, 7, 8, 10, 11 = **High** SP's 3, 4, 9 = **Medium** SP's = 5 **Low**
Common pipistrelle	10/11	SP2	SP2	SP's 2, 3, 4, = **High** SP's 6, 7, 8, 10, 11 = **Medium** SP's 5, 9 = **Low**
Myotis.spp	9/11	SP2	SP2	SP 2 = **Medium** Remaining SP's = **Low**
Brown Long-eared	8/11	SP4	SP4	All SP's = **Low**
Nathusius' pipistrelle	7/11	SP10	SP10	All SP's = **Low**

6.5.2.1.1.3 Hourly averages of bat passes recorded at individual sampling points

Based on the hourly average calls for soprano pipistrelle, common pipistrelle and Leisler's an overall activity rating of 'Medium' was assigned for sampling point 2. An overall activity rating of 'Medium' was assigned to both soprano pipistrelle and Leisler's for sampling point 8. An overall activity rating of 'Medium' was also assigned to Leisler's for sampling point 11.

For all other species recorded, the activity rating was assigned 'Low' for all other SP locations during the survey period (see **Table 23** below, species have been ranked highest to lowest in terms of overall number of hourly passes recorded in spring 2024).

The average hourly rates of calls for each species are tabulated in **Appendix 2.**

Table 23: Overview of hourly individual species activity recorded in spring 2024 with overall species activity rating assigned

Species	SP with highest hourly total calls	Overall activity rating assigned / SP
Soprano pipistrelle	SP2	SP's 2, 8 = **Medium** SP's 3, 4, 5, 6, 7, 9, 10, 11 = **Low**
Leisler's	SP4	SP's 2, 8, 11 = **Medium** SP's 3, 4, 5, 6, 7, 9, 10 = **Low**
Common pipistrelle	SP2	SP 2 = **Medium** SP's 1, 3, 4, 5, 6, 7, 8, 9, 10, 11 = **Low**
Myotis.spp	SP8	All SP's = **Low**
Brown long-eared	SP8	All SP's = **Low**
Nathusius' pipistrelle	SP10	All SP's = **Low**

6.5.2.1.2 *Summer 2024 - Overview of levels of bat activity recorded*

Bat species recorded at all sampling points across the summer survey period, with their combined total percentage passes, are as follows:

- Common pipistrelle (44.62% = 12,666 passes)
- Soprano pipistrelle (38.80% = 11,013 passes)
- Leisler's bat (14.77% = 4,192 passes)
- Brown long-eared bat (1.07% = 303 passes)
- Species from the genus *Myotis* (0.54% = 153 passes)
- Nathusius' pipistrelle (0.02% = 6 passes)

In addition to the above, calls recorded which could not be attributed to a species and/or genus during the summer 2024 PAB surveys are as follows:

- Unidentified (0.18% = 51 passes)

6.5.2.1.2.1 Bat passes recorded at individual sampling points

The total numbers of bat passes recorded at each sampling point during the summer 2024 survey period are shown below in Table 24. These are broken down by species or genus, and 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, where a total of 3,908 passes were recorded. The highest level of activity generally was recorded also at SP2 (24.42% of all calls recorded), followed by SP4 (19.10%); the lowest level was recorded at SP9 (0.25%). 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 24: Number of bat passes of each species recorded at each sampling point during the summer 2024 survey

Sampling point	*Myotis* spp.	Leisler's bat	Nathusius' pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser Horseshoe	NoID	Total	%
2	19	86	1	3908	2902	16	0	0	6932	24.42
4	13	1764	2	2445	1087	109	0	1	5421	19.10
1	14	108	1	2584	826	27	0	0	3560	12.54

Sampling point	*Myotis* spp.	Leisler's bat	Nathusius' pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser Horseshoe	NoID	Total	%
3	22	901	0	1388	1048	88	0	0	3447	12.14
7	30	58	0	517	2606	4	0	1	3216	11.33
5	2	708	1	636	678	19	0	48	2092	7.37
10	32	191	0	447	992	12	0	0	1674	5.90
6	2	294	0	653	394	18	0	0	1361	4.79
8	19	46	0	70	463	10	0	1	609	2.15
9	0	36	1	18	17	0	0	0	72	0.25
Total	**153**	**4,192**	**6**	**12,666**	**11,013**	**303**	**0**	**51**	**28,384**	
%	**0.54**	**14.77**	**0.02**	**44.62**	**38.80**	**1.07**	**0.00**	**0.18**		

6.5.2.1.2.2 Nightly averages of bat passes recorded at individual sampling points

On the basis of the nightly average calls, for soprano pipistrelle, common pipistrelle and Leisler's an overall activity rating of 'High' was assigned for sampling points 3, 4, and 5. For both soprano and common pipistrelle an overall activity rating of 'High' was found at sampling points 1, 2, and 7.

An overall activity rating of 'High' was assigned to common pipistrelle for sampling point 6. An overall activity rating of 'High' was assigned to soprano pipistrelle for sampling point 10.

An overall activity rating of 'Medium' was assigned to Leisler's for sampling points 1, 6, and 10. For common pipistrelle a 'Medium' activity rating was given to sampling point 10. For soprano pipistrelle a 'Medium' activity rating was given to sampling points 6 and 8.

An overall activity rating of 'Medium' was assigned to brown long-eared for sampling point 4.

For all other species recorded, the activity rating was assigned 'Low' for all of the other SP locations during the survey period (see Table 25 below, species have been ranked highest to lowest in terms of overall number of nightly passes recorded in summer 2024).

The average nightly rates of calls for each species are tabulated in Appendix 2

Table 25: Overview of nightly individual species activity recorded in summer 2024 with overall species activity rating assigned

Species	No. of SP locations calls recorded	SP with highest total calls	SP with highest nightly total calls	Overall activity rating assigned / SP
Soprano pipistrelle	10/10	SP2	SP2	SP's 1, 2, 3, 4, 5, 7, 10 = **High** SP's 6, 8 = **Medium** SP = 9 **Low**
Common pipistrelle	10/10	SP2	SP2	SP's, 1, 2, 3, 4, 5, 6, 7 = **High** SP 10 = **Medium** SP's 8, 9 = **Low**
Leisler's	10/10	SP4	SP4	SP's 3, 4, 5 = **High** SP's 1, 6, 10 = **Medium** SP's 2, 7, 8, 9 = **Low**
Brown Long-eared	9/10	SP4	SP4	SP 4 = **Medium** Remaining SP's = **Low**
Myotis.spp	9/10	SP7	SP10	All SP's = **Low**
Nathusius' pipistrelle	5/10	SP4	SP4	All SP's = **Low**

6.5.2.1.2.3 Hourly averages of bat passes recorded at individual sampling points

Based on the hourly average calls for soprano pipistrelle, common pipistrelle and Leisler's an overall activity rating of 'Medium' was assigned for sampling point 4. An overall activity rating of 'Medium' was assigned to both common and soprano pipistrelle for sampling points 2, 3, and 4. An overall activity rating of 'Medium' was also assigned to soprano pipistrelle for sampling point 7 and for common pipistrelle at sampling point 1.

For all other species recorded, the activity rating was assigned 'Low' for all other SP locations during the survey period (see **Table 26** below, species have been ranked highest to lowest in terms of overall number of hourly passes recorded in summer 2024).

The average hourly rates of calls for each species are tabulated in **Appendix 2.**

Table 26: Overview of hourly individual species activity recorded in summer 2024 with overall species activity rating assigned

Species	SP with highest hourly total calls	Overall activity rating assigned / SP
Soprano pipistrelle	SP2	SP's 2, 3, 4, 7 = **Medium** Remaining SP's = **Low**
Common pipistrelle	SP2	SP's 1, 2, 3, 4 = **Medium** Remaining SP's = **Low**
Leisler's	SP4	SP 4 = **Medium** Remaining SP's = **Low**
Brown long-eared	SP8	All SP's = **Low**
Myotis.spp	SP8	All SP's = **Low**

Nathusius' pipistrelle	SP10	All SP's = **Low**

6.5.2.1.3 *Autumn 2024 - Overview of levels of bat activity recorded*

Bat species recorded at all sampling points across the autumn survey period, with their combined total percentage passes, are as follows:

- Soprano pipistrelle) (41.51% = 5,756 passes)
- Common pipistrelle (37.37% = 5,182 passes)
- Leisler's bat (16.61% = 2,304 passes)
- Brown long-eared bat (3.48% = 482 passes)
- Species from the genus *Myotis* (0.74% = 103 passes) and
- Nathusius' pipistrelle (0.11% = 15 passes)

In addition to the above, calls recorded which could not be attributed to a species and/or genus during the autumn 2024 PAB surveys are as follows:

- Unidentified (0.19% = 26 passes)

6.5.2.1.3.1 Bat passes recorded at individual sampling points

The total numbers of bat passes recorded at each sampling point during the autumn 2024 survey period are shown below in Table 27. These are broken down by species or genus, and 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.

Soprano 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 SP3, where a total of 2,293 passes were recorded. The highest level of activity generally was recorded also at SP3 (30.27% of all calls recorded), followed by SP8 (21.76%); the lowest level was recorded at SP7 (0.63%). 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: Number of bat passes of each species recorded at each sampling point during the autumn 2024 survey

Sampling point	*Myotis* spp.	Leisler's bat	Nathusius' pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID	Total	%
3	5	343	0	1,543	2,293	14	0	0	4,198	30.27
8	20	56	1	2,073	858	10	0	0	3,018	21.76

2	34	555	1	780	659	166	0	21	2,216	15.98
4	1	876	1	138	261	32	0	2	1,311	9.45
5	27	135	12	293	658	56	0	2	1,183	8.53
6	16	149	0	131	569	187	0	1	1,053	7.59
1	0	112	0	223	454	13	0	0	802	5.78
7	0	78	0	1	4	4	0	0	87	0.63
Total	**103**	**2,304**	**15**	**5,182**	**5,756**	**482**	**0**	**26**	**13,868**	
%	**0.74**	**16.61**	**0.11**	**37.37**	**41.51**	**3.48**	**0.00**	**0.19**		

6.5.2.1.3.2 Nightly averages of bat passes recorded at individual sampling points

On the basis of the nightly average calls, for soprano pipistrelle, common pipistrelle and Leisler's an overall activity rating of 'High' was assigned for sampling point 2. For both soprano and common pipistrelle an overall activity rating of 'High' was found at sampling points 3 and 8.

An overall activity rating of 'High' was assigned to soprano pipistrelle for sampling points 5 and 6. An overall activity rating of 'High' was assigned to Leisler's for sampling point 4.

An overall activity rating of 'Medium' was assigned to soprano pipistrelle, common pipistrelle and Leisler's for sampling point 1. For common pipistrelle a 'Medium' activity rating was given to sampling points 1, 4, 5 and 6. For soprano pipistrelle a 'Medium' activity rating was given to sampling points 1 and 4. An overall activity rating of 'Medium' was assigned to brown long eared for sampling points 2 and 6.

For all other species recorded, the activity rating was assigned 'Low' for all of the other SP locations during the survey period (see Table 28 below, species have been ranked highest to lowest in terms of overall number of nightly passes recorded in autumn 2024).

The average nightly rates of calls for each species are tabulated in Appendix 2

Table 28: Overview of nightly individual species activity recorded in summer 2024 with overall species activity rating assigned

Species	No. of SP locations calls recorded	SP with highest total calls	SP with highest nightly total calls	Overall activity rating assigned / SP
Soprano pipistrelle	8/8	SP3	SP3	SP's 2, 3, 5, 6, 8 = High SP's1, 4 = Medium SP7 = Low

Common pipistrelle	8/8	SP8	SP8	SP's 2, 3, 8 = **High** SP's 1, 4, 5, 6 = **Medium** SP 7 = **Low**
Leisler's	8/8	SP4	SP4	SP's 2, 4 = **High** SP's 1, 3, 5 = **Medium** SP's 6, 7, 8 = **Low**
Brown Long-eared	8/8	SP6	SP6	SP's2, 6 = **Medium** Remaining SP's = **Low**
Myotis.spp	6/8	SP2	SP2	All SP's = **Low**
Nathusius' pipistrelle	4/8	SP5	SP5	All SP's = **Low**

6.5.2.1.3.3 Hourly averages of bat passes recorded at individual sampling points

Based on the hourly average calls for soprano pipistrelle and common pipistrelle an overall activity rating of 'Medium' was assigned for sampling point 3. An overall activity rating of 'Medium' was assigned to common pipistrelle only, for sampling point 8.

For all other species recorded, the activity rating was assigned 'Low' for all other SP locations during the survey period (see **Table 29** below, species have been ranked highest to lowest in terms of overall number of hourly passes recorded in autumn 2024).

The average hourly rates of calls for each species are tabulated in **Appendix 2.**

Table 29: Overview of hourly individual species activity recorded in autumn 2024 with overall species activity rating assigned

Species	SP with highest hourly total calls	Overall activity rating assigned / SP
Soprano pipistrelle	SP3	SP 3 = **Medium** Remaining SP's = **Low**
Common pipistrelle	SP8	SP's 3, 8 = **Medium** Remaining SP's = **Low**
Leisler's	SP4	All SP's = **Low**
Brown Long-eared	SP6	All SP's = **Low**
Myotis.spp	SP2	All SP's = **Low**
Nathusius' pipistrelle	SP5	All SP's = **Low**

6.5.2.1.4 *Overview of 2024 Survey Period*

The seasonal and annual totals of all bat passes that were recorded during the 2024 survey period are provided in **Table 30**, below. Cells highlighted yellow indicate the largest number of bat passes recorded at a sampling point

each season; the cell highlighted green is the largest seasonal total; the cell highlighted orange indicates the largest number of bat passes recorded at a sampling point over the survey period.

The highest level of seasonal activity was recorded in summer and the total number of bat passes recorded, 28,384, comprises 47.05% of the total of bat passes recorded. The number of bat passes recorded in spring comprises 29.97% and, in autumn, 22.99% of the total were recorded. The highest level of activity was recorded at SP2 where 14,706 bat passes were recorded during the full annual period of activity.

Table 30: Seasonal and annual totals for 2024 by sampling point

SP	1	2	3	4	5	6	7	8	9	10	11	Total	%
Spring	0	5,558	1,716	1,683	309	883	1,725	2,688	360	1,421	1,736	18,079	29.97
Summer	3,560	6,932	3,447	5,421	2,092	1,361	3,216	609	72	1,674		28,384	47.05
Autumn	802	2,216	4,198	1,311	1,183	1,053	87	3,018				13,868	22.99
Total	4,362	14,706	9,361	8,415	3,584	3,297	5,028	6,315	432	3,095	1,736	60,331	
%	7.23	24.38	15.52	13.95	5.94	5.46	8.33	10.47	0.72	5.13	2.88		

7. Discussion

7.1 Value of the Site for Foraging and Commuting Bats

The Proposed Development site is dominated mostly by a mix of agricultural land (mostly bordered with hedgerows and treelines) and coniferous woodland, furthermore the site is adjacent to the Grand Canal which is found approximately 500m north of the Proposed Development. This canal, coupled with the agricultural hedgerows and treelines, provide high potential for foraging and commuting bats. The coniferous plantation woodland that dominates the south provides very little in the way of suitable commuting and foraging potential and is also subject to periodic felling. The Leitrim stream in the southern section of the Proposed Development was deemed to have low commuting and foraging potential for bats.

Results from the NBW surveys and PAB data indicate that the majority of all bat activity found across the site is within the northern section. Initial project designs included more turbines located closer to the Grand Canal. As such sampling points 1, 2, 3 and 4 were chosen to provide a representative sample of bat activity at or close to these initial proposed turbine locations. Data gathered from these sampling points generally were all found to have the highest levels of bat activity, with sampling point 2 recording the highest level of activity for any sampling point across both the 2023 and 2024 survey periods. Due to a number of factors across multiple disciplines, including the high levels of bat activity found in this area and its close distance to the important commuting and foraging feature of the canal, it was recommended to reduce the number of turbines and move the turbines further from the Grand Canal, to ensure this feature and its surrounding area remained protected from any potential impacts caused by the proposed turbines.

Also, within the northern portion of the site there are a number of hedgerows and tree lines marking out agricultural field boundaries, with high commuting potential for bats. Size, quality and structure of said hedgerows varies across the site as does their connectivity to one another. The aforementioned features, qualities and data gathered show that the northern section of site is of more value to foraging and commuting bats than the south.

The BHSI was split across site between the northern section and southern section, with the area to the north scoring higher. This score is influenced by habitat features such as the Grand Canal and hedgerows in the area that provide valuable commuting and foraging resources for local bats. In addition, the majority of the closest bat

records in the area were located along a stretch of the Grand Canal to the northeast from the site. As designs changed, a number of turbines were dropped from the project and turbines were located further away from the Grand Canal. It can be seen from the ratings listed in Table 9 in Section 6.1.2, not only is the overall BHSI rating for all bat species (29.11 for the north and 23.78 for the south) very low, but the highest rating value for any individual species is also no higher than 48 and only two other species have ratings above 40. Less activity was recorded in the south generally, with some initial high levels of activity found close to the Leitrim stream. As such, NBW surveys were conducted along the Leitrim stream to the south, to gather more information on the numbers of bats and how they are using the landscape to support the initial data collected from the static detectors. Data gathered highlighted the stream is used at a low activity level, by low numbers of individual bats for foraging and commuting purposes. The NBW transect route was extended to cover a greater area of the southern section of site. Overall, this area of the site had very little activity recorded during the NBW surveys with most activity found along the stream already mentioned and within areas of successional scrub, where tree felling has occurred. This southern area of the site is mostly dominated by conifer plantation woodland, which is not conducive bat habitat, and the areas of dense coniferous woodland were found to have very little activity recorded during NBW and PAB surveys.

With regard to species composition: common and soprano pipistrelle bats constitute the most frequently recorded species, and the combined totals of their bat passes comprise 81.44% of the total of all passes recorded over the 2023 and 2024 survey periods. Leisler's bats comprise 14.82%; unidentified bats 1.35%; species from the genus *Myotis* comprise 1.25%; brown long-eared bat, 1.08% and, Nathusius pipistrelle comprise 0.06%. All species recorded on site are considered to have a Favourable Conservation status.

Nightly and Hourly Bat Passes

The nightly and hourly averages of the bat passes recorded at each sampling point during each season, of each species, and bat passes to which a species or genus could not be attributed, are listed in Appendix 2. As mentioned in Section 6.5 an individual bat can be the source of more than one, or even many, calls recorded by the static detectors and that the number of calls recorded is likely to be greater than the number of bats that generated them.

High nightly bat passes were recorded for common and soprano pipistrelle in summer 2023 at sampling points, 2, 5, 7, 8, 11 and 12. When looking at hourly passes for the same species in the same survey period, moderate passes per hour for the same species were recorded at sampling points 2, 8, 11 (soprano pipistrelle only) and 12. Only once were passes in excess of 30 an hour and this was for soprano pipistrelle at sampling point 2, the remainder are less than 20 passes per hour. For all other species recorded in the summer 2023 survey season passes per hour never rose above 2.

During the autumn 2023 survey season high nightly bat passes were recorded for common and soprano pipistrelle at sampling points 2 and 8 with high nightly passes also recorded for common pipistrelle only at sampling point 6. However, the majority of hourly passes in the autumn survey period were found to be less than 9 per hour for all species except soprano pipistrelle. Soprano pipistrelle passes only exceeded 30 passes twice at sampling point 2 and 8 with 34 and 32 passes an hour recorded respectively.

Nightly bat passes recorded in the spring of 2024 highlighted high nightly passes for common and soprano pipistrelle as well as Leisler's bat on occasion at 8 of the 11 sampling points however, when looking at hourly passes for the same species in the same time period the vast majority of hourly passes for all species at all sampling points were found to be less than 10 an hour. The only time 20 passes an hour was exceeded was at sampling point 2 for soprano pipistrelle. A similar data set was recorded in the summer season of 2024 with high nightly passes for common and soprano pipistrelle recorded as well as Leisler's bat on occasion at 8 of the 11 sampling points. When looking at the hourly passes for the summer 2024 survey season again the vast majority of hourly passes for all species at all sampling points were less than 10. In the northern part of the site the hourly passes

for common and soprano pipistrelle only exceeded 25 an hour once at sampling point 2, and only exceeded 25 an hour in the south once at sampling point 7 for soprano pipistrelle. Nightly bat passes recorded in the autumn of 2024 indicated high numbers of passes for soprano pipistrelle at 5 of the 11 sampling points, 3 for common pipistrelle and 2 for Leisler's bat. Hourly passes recorded for the same period showed moderate level of passes for common and soprano pipistrelle at sampling points 2 and 8 and never rose above 23 an hour, the remainder of hourly passes for all species at all sampling points never exceeded 9 an hour. Overall hourly passes across the site over the whole combined 2023 and 2024 survey period were at low levels, supporting the analysis that highlights how poor the site is generally for foraging and commuting bats.

Overall, it is considered that the site consists of low value foraging and commuting habitat for bats in the southern section and low to moderate value foraging and commuting habitat in the north section of the proposed development site. It is considered that it is highly unlikely that Proposed Wind Farm area is within the core foraging ranges of any bat species, as individual species forage over relatively limited ranges that do not exceed kilometres in the single-digit range. The levels of activity recorded during 2023 and 2024 survey periods are low and reflective of the normal patterns that pertain to the site. It is therefore concluded that the Proposed Development does not pose a significant risk to bat species.

7.2 Value of the Site for Roosting bats

The preliminary survey of the buildings and trees found within the red line boundary and immediate surrounds was undertaken to identify any actual or potential bat roosts which could be either directly or indirectly be impacted by proposed works. No confirmed roosts, bats, or evidence of bats was found during the survey. Buildings found on site consisted of agricultural farm buildings which included metal-built barns, storage sheds and cattle sheds and a brick-built farm shop. These buildings were well maintained with no apparent gaps or crevice's present, nor were there any other potential roosting features (PRFs) found. All trees found on site were also subjected to ground level assessments for roosting bats and no potential roosting features were found. Additionally, data from the desk study shows that there are no known roosts within close proximity to the proposed wind farm location. With a lack of suitable roosting features found across the site for all buildings and trees, the site is considered to be of 'negligible' potential for roosting bats.

8. Recommendations

For low-risk sites, such as the Proposed Development, NS (2021) recommends a buffer distance of 50 m between a turbine blade tip and the nearest key habitat feature such as woodlands, tree lines or wetlands for example. This buffer distance is recommended as a basic standard mitigation measure for all bat species occurring at proposed wind farm sites, and should be applied universally, regardless of whether any further additional mitigation measures such as curtailment is also recommended. This minimum buffer distance should be applied to reduce the potential effect on foraging and commuting resources in the locality of proposed turbine locations. The guidance also states that an exception may be applied where there are large areas of linear hedgerows and treelines that are regarded as spatially important in a landscape. Where avoidance is not possible (in the first instance when following the mitigation hierarchy) then a habitat assessment should be conducted to establish if removal of a given habitat feature within the buffer zone area is necessary. If it is established that a given habitat feature should be retained within the buffer zone, then further survey effort would be needed to understand whether a given habitat feature can be retained or if further mitigation is required.

When applying the aforementioned guidance to the Ballinla Wind Farm site, the basic standard mitigation measure buffer zone around turbines 1 to 5 can be employed. For turbines 6 and 7 an exception to the standard

basic standard mitigation measure is deemed necessary. The Leitrim stream in the southern section and its bordering tree lines, was deemed to be specific habitat feature that should be retained. Through the assessment of this habitat feature and data gathered on the bat species that are using it, a modified buffer around turbines 6 and 7 is recommended to ensure there is no net change in this area. The Leitrim stream and bordering treeline was found to be used at a low activity level and by low numbers of individual species across the survey periods. If the basic standard mitigation buffer area were to be applied to turbines 6 and 7 this would create an opening within the current treeline along the Leitrim stream corridor and could potentially encourage the low number of bat species currently using the Leitrim stream to then forage within this newly created open habitat and therefore be at a higher risk of impact from the turbines.

To calculate the clear-fell distance, the formula below is used to calculate (B), the distance between the edge of the woodland and the centre of the tower:

$$B = \sqrt{(50 + bl)^2 - (hh - fh)^2}$$

Where bl = blade length, hh = hub height, fh = feature height (all in metres). Based on this formula and provisional proposed turbine dimensions, a felling distance of 77 m around turbine 1; 89 m around turbine 2; 77 m around turbine 3; 84 m around turbine 4; and 83 m around turbine 5, would be required to comply with NS guidelines for minimising impacts to foraging bats (see **Figure 6**). These figures are based on a provisional turbine blade length of 79.35 m, a hub height of 104 m and a range in closest feature heights to each turbine location (this was based off visual assessments made in the field). As mentioned, a modified buffer will be required around turbines T6 and T7, at a measurement of 87 m, to ensure the Leitrim Stream and bordering tree line, found in the south of the Proposed Development, is retained (see **Figure 7** and **Figure 8**).

It should also be noted that the clearance of vegetation within a buffer zone to reduce risk to bat populations, can have the potential to create an ecological rich foraging area for bats in the immediate time post-clear felling and the extent of this increased activity depends on the size of the area cleared and the bat species in question. Therefore, it is recommended that a minimum of 6–12 months should lapse after clear felling before the installation of turbines, and that all vegetation should be cleared from these buffer zones. It should also be noted that any existing hedgerow found within these buffer areas will be intensively managed to ensure the height is kept as low as possible (1 m to 1.5 m) whilst still retaining their function as field boundaries for livestock.

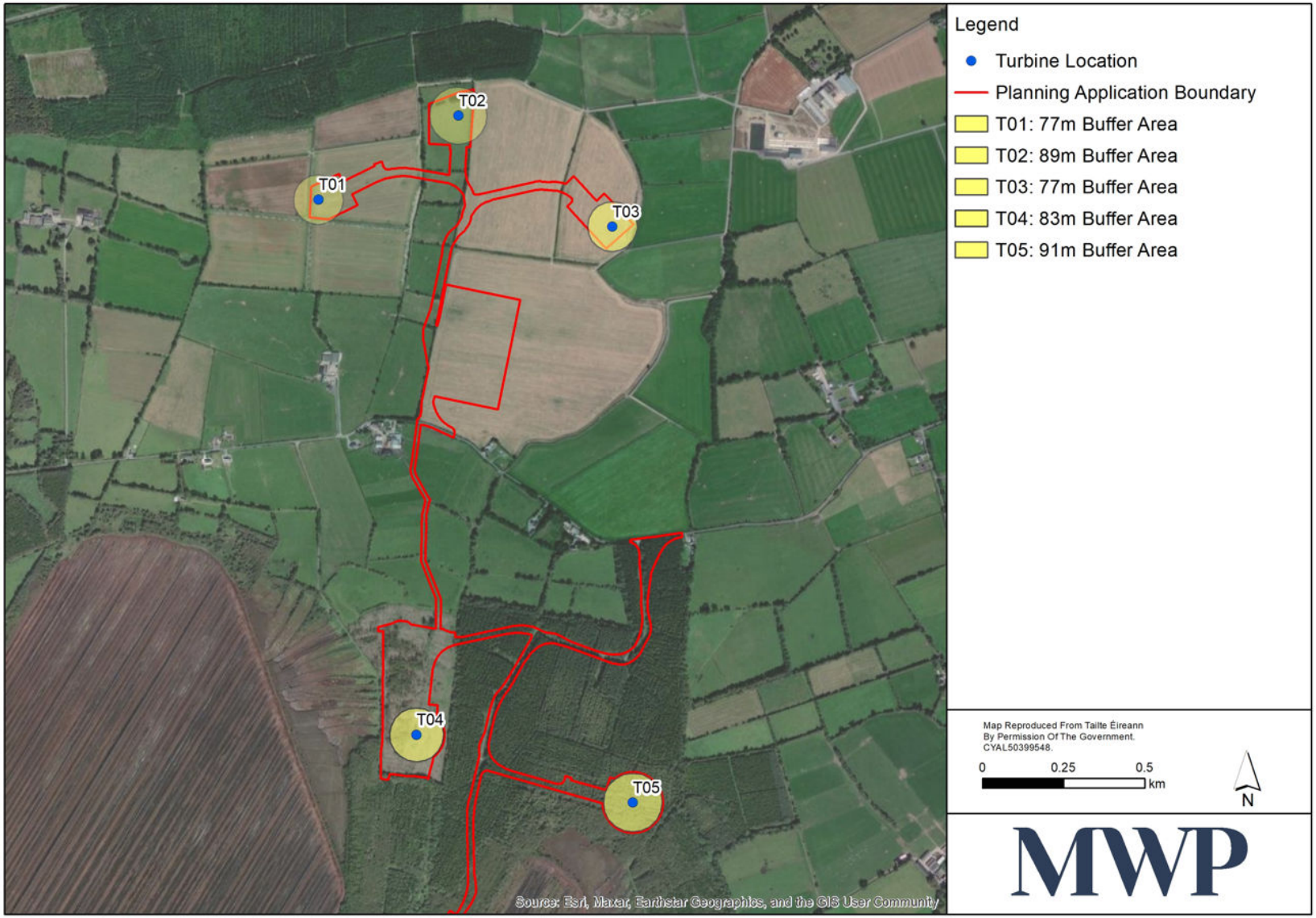

Figure 6: Turbine T1 to T5 buffer zones

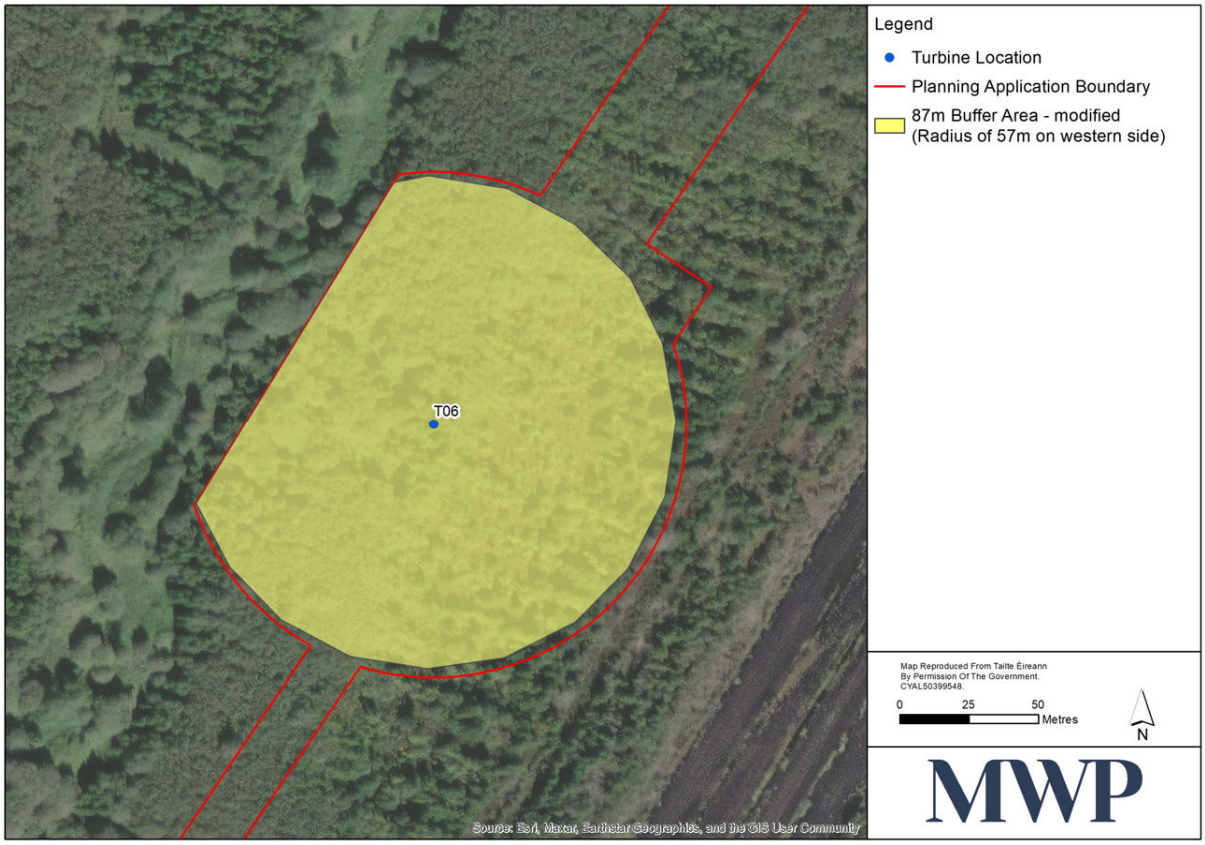

Figure 7: Turbine T6 buffer zone

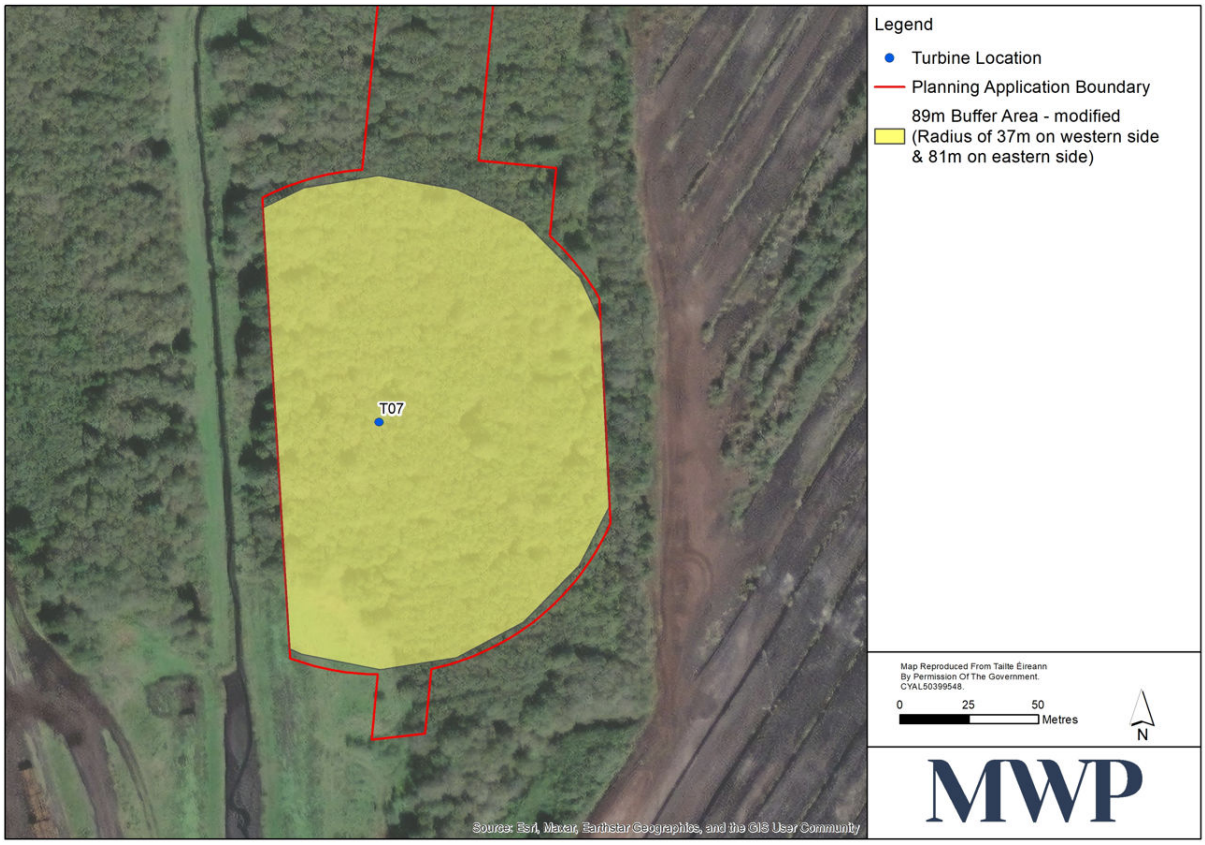

Figure 8: Turbine T7 buffer zone

Any proposed lighting shall adhere to the following guidelines, taken from the Bat Conservation Trust 2023 'Guidance Note 08/23', to ensure that any unnecessary light spill from the proposed development and its potential impacts to any roosting, foraging and commuting bats are minimized.

- LED luminaires to be used due to the fact that they are highly directional, and have a sharp cut-off, lower intensity, good colour rendition and dimming capability.
- All luminaires should lack UV elements to reduce impact. Metal halide, compact fluorescent sources should not be used.
- A warm white light source (<2700 Kelvins) is to be adopted to reduce the blue light component).
- Light sources should feature peak wavelengths higher than 550nm to avoid the component of light most disturbing to bats.
- Internal luminaires can be recessed (as opposed to using a pendant fitting) where they are installed in proximity to windows to reduce glare and light spill.
- Waymarking inground markers (low output with cowls or similar to minimise upward light spill) to delineate path edges.
- Column heights will be carefully considered to minimise light spill and glare visibility. This should be balanced with the potential for increased numbers of columns and upward light reflectance as with bollards. The shortest column height allowed will be used where possible.
- Only luminaires with a negligible or zero upward light ratio and with good optical control will be used.

- Luminaires should always be mounted horizontally with no light output above 90° and/or no upward tilt.
- Where appropriate, external security lighting should be set on motion sensors and set to as short a possible a timer as the risk assessment will allow. For most general residential purposes, a 1- or 2-minute timer is likely to be appropriate.
- Use of a Central Management System (CMS) with additional web-enabled devices to light on demand.
- Use of motion sensors for local authority street lighting may not be feasible unless the authority has the potential for smart metering through a CMS.
- The use of bollard or low-level downward-directional luminaires is strongly discouraged. This is due to a considerable range of issues, such as unacceptable glare, poor illumination efficiency, unacceptable upward light output and increased upward light scatter from surfaces. Therefore, they should only be considered in specific cases where these issues can be resolved.
- Only if all other options have been explored, accessories such as baffles, hoods or louvres can be used to reduce light spill and direct it only to where it is needed. However, due to the lensing and fine cut-off control of the beam inherent in modern LED luminaires, the mitigating effect of cowls and baffles is often far less than anticipated and so should not be relied upon solely.

A stringent post-construction monitoring programme shall be performed to assess any changes in bat activity patterns and help inform any potential mitigation in the form of turbine curtailment. Monitoring will be completed annually for three years after construction. During this time period casualty searches and acoustic monitoring will take place alongside one another.

Acoustic surveys can be used to continue to assess bat activity and behaviour following construction of turbines to assess any significant decrease or indeed increases in bat activity. Passive Automated Bat surveys (PAB) shall be conducted each year for three years over 10 nights in spring (April-May), 10 nights in summer (June-mid-August) and 10 nights in autumn (mid-August-October). The same methods shall be applied that are described in section 5.6 of this report. The PAB surveys can be accompanied with nighttime bat activity walkover surveys with the use of thermal imaging cameras as necessary to provide more detailed information on bat activity in the vicinity of turbines.

Systematic searches for bat casualties on the ground below wind turbines are currently the only effective means of monitoring bat fatalities. Searches should be undertaken as early as possible in the morning during high-risk periods. Data from the pre-application activity surveys show that the highest level of activity was recorded in the summer, as such it is concluded that this period is deemed to be of the highest risk for bats currently using the site.

Suitably trained dogs with handlers are significantly more efficient and faster than humans in locating carcasses and should preferably be used to achieve more robust results. The number of turbines surveyed should be proportional to the size of the site. As the site is deemed to be large (greater than 5 turbines) turbines can be selected at random, except where there is evidence to suggest an elevated risk at a particular turbine location (at present there is no evidence to suggest this is the case).

A limitation to conducting carcass searching is lack of access to the land beneath the turbine. As such it is essential that access is secured through liaising with the turbine operator and that land-use is conducive to performing a search. Systematic searches will be conducted within a 100m x 100m grid centred on the turbine, they will be conducted in at least two search periods, which is typically in the summer and autumn periods. Data must be obtained from the turbine operators on whether or not the target turbine(s) were operational on the night prior to the search, with the surveying procedure adjusted as necessary if the turbines were either non-operational or were not rotating because of a lack of wind.

Once all surveys have been conducted across the bat active seasonal period (spring, summer and autumn) data shall be complied into an annual bat monitoring report, outlining the findings and their implications for the wind farm operation, including any additional mitigation measures that may be required.

9. Conclusion

Residual effects on bats have been assessed as not significant provided best practice methodologies and guidance, as outlined above in Section 8, are employed.

Provided that the proposed project is constructed and operated in accordance with the design, and any proposed lighting is in line with the Bat Conservation Trust 2023 'Guidance Note 08/23' are adhered to, significant effects on bat species are not anticipated at any geographical scale.

Current proposals in line with the aforementioned will ensure that no significant residual ecological effects, either alone or cumulatively with other plans or projects, will arise on bats from the project.

Table 31: Summary of all recommended mitigation measures

Summary of Mitigation Measures
Standard buffer zones for turbines 1 to 5
Modified buffer zones for turbines 6 & 7
Any proposed lighting follows the Bat Conservation Trust 2023 'Guidance Note 08/23'
Post construction monitoring - Passive Automated Bat surveys (PABs) shall be conducted each year for three years over 10 nights in spring (April-May), 10 nights in summer (June-mid-August) and 10 nights in autumn (mid-August-October).
Post construction monitoring - Nighttime bat activity walkover surveys to accompany the PABs
Post construction monitoring - Casualty searches (to be conducted in at least two search periods, which is typically in the summer and autumn periods).

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Appendix 1
Irish bat species profiles

All are bats species found in Ireland 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; 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.

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)[18], 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)[19] and usually fly approximately 5 to 10 meters from the ground (Russ, 1999)[20]. The common pipistrelle's distribution is widespread and is found throughout the island of Ireland (NBDC, 2024)[21]. 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. The common pipistrelle's conservation status is currently found to be favourable and improving (NPWS, 2019)[22].

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

The soprano pipistrelle is also one of Irelands 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)[23]. 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)[24]. A post-calcarial lobe is present on the tail

[18] 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.

[19] 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

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[21] 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.

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

[23]

[24] 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

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)[25]. Soprano pipistrelles also emerge around 20 minutes after sunset and too are 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 pipistrelle's preferring lakes, rivers and riparian habitats (Vaughan et al., 1997)[26]. Soprano pipistrelles have overlap with the common pipistrelle in regards to roosting preferences. Soprano pipistrelles are also known to be crevice dwellers 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)[27]. Winter roosting preferences are also the same as common pipistrelle with roosting in trees and buildings and rarely underground. The soprano pipistrelle's conservation status is currently found to be favourable and improving (NPWS 2019).

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 be easily be confused with the other two resident species of pipistrelle (NBDC, 2024)[28]. Since its discovery in Ireland (circa 1996-1997), roosts of this species have 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)[29] 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)[30]. Nathusius pipistrelles are also associated with wetlands, rivers and waterbodies (BCT, 2024)[31] 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). The Nathusius pipistrelle's conservation status is currently unknown (NPWS 2019).

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

The brown long eared bat (BLE) is medium sized bat and has distinctive long ears which can be up to three quarters of the size of its total head and body length (2.5cm) (CI, 2024)[32]. 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)[33]. 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)[34]. The BLE's distribution is widespread and can be found

[25] 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.

[26] 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.

[27] 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

[28] 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.

[29] 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.

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

[31] 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.

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

[33] 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

[34] 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

throughout the island of Ireland (NBDC, 2024)[35]. BLE prefer sheltered habitats such as valleys, parks and gardens and are also known to forage open deciduous and coniferous woodland and orchards (BCT, 2024). As mentioned, 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 also make use of trees and bat boxes (BCI, 2024)[36]. 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). The brown long eared bat's conservation status is currently found to be favourable and improving (NPWS 2019).

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

Daubenton's bat is medium sized bat and is widely known as the water bat due to its strong association with water bodes and rivers (PTES, 2024)[37]. These bats are low and fast flying, and typically skim the waters surface to catch their prey and are known to use their ventral fur to collect water to drink (UOB, 2024)[38]. Emergence times of this species of bats ranges and there are even difference between times in males and females (Andrews Ecology, 2017)[39] 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). Daubenton's bat distribution is widespread and can be found throughout the island of Ireland (NBDC, 2024)[40]. Although this species is heavily associated with water ways 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)[41]. 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). Daubenton's bat conservation status is currently found to be favourable and improving (NPWS 2019).

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)[42]. 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)[43]. Although rarer in Britian and the rest of Europe Leisler's are widely distributed across Ireland (BCI, 2024)[44]. 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)[45]. 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)[46]. Often associated with woodlands they can be found to roost within tree holes and deep cavities and

[35] 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

[36] 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.

[37] 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

[38] 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

[39] 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.

[40] 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

[41] 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

[42] 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.

[43] 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.

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

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

[46] 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.

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 crevice's in buildings (BCT, 2024)[47]. Leisler's bat conservation status is currently found to be favourable and improving (NPWS 2019).

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)[48]. 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)[49] and is distinguished from the greater horseshoe by size, as the lesser horseshoe is smaller and has a smaller forearm length (UOB, 2024)[50]. 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)[51] . 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). The lesser horseshoe bat's conservation status is currently found to be Inadequate and declining (NPWS 2019).

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)[52]. Its broad wings allow for agile, low and slow flight (UOB, 2024)[53] 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)[54]. Natterer's tend to be late emerger with an average emergence time of 75 minutes after sunset (Duvergé, P. L, et al., 2000)[55]. 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 south west 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)[56]. 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)[57]. 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

[47] 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.
[48] Conserve Ireland (CI), 2024, *Lesser Horseshoe bat profile*, available at https://www.conserveireland.com/mammals/lesser_horseshoe_bat.php accessed March 2024
[49] 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
[50] 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.
[51] Bat Conservation Ireland (BCI), 2024, *Lesser Horseshoe Bat*, available at https://www.batconservationireland.org/irish-bats/species/lesser-horseshoe-bat accessed March 2024.
[52] 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.
[53] 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.
[54] Bat Conservation Ireland (BCI), 2024, *Natterer's bat* https://www.batconservationireland.org/irish-bats/species/natterers-bat accessed March 2024.
[55] Duvergé, P. L., Jones, G., Rydell, J., & Ransome, R. D. (2000). *Functional Significance of Emergence Timing in Bats*. Ecography, *23*(1), 32–40.
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[57] 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.

to forage in urban areas, parkland, and over agricultural land (CI, 2024)[58]. 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 know to share their roosting spaces with other species of bat such as the brown long eared and Daubenton's (NBDC, 2024). Natterer's bat conservation status is currently found to be favourable and stable (NPWS 2019).

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's, although widespread across Britian and the rest of Europe (BCT,2024)[59]. 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)[60]. The whiskered bat is a medium to fast, agile flyer and usually flies approximately 20m above ground level (UOB, 2024)[61]. 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).[62] 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)[63] The whiskered bat conservation status is currently found to be favourable and stable (NPWS 2019).

[58] Conserve Ireland (CI), 2024, *Natterer's bat profile*, available at https://www.conserveireland.com/mammals/natterers_bat.php accessed March 2024.
[59] 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.
[60] Jones, G., & Rydell, J. (1994). *Foraging strategy and predation risk as factors influencing emergence time in echolocating bats*, 346(1318), The Royal Society
[61] 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.
[62] Bat Conservation Ireland (BCI), 2024, *Whiskered bat,* available at https://www.batconservationireland.org/irish-bats/species/whiskered-bat accessed March 2024.
[63] Conserve Ireland (CI), 2024, *Whiskered bat profile*, available at https://www.conserveireland.com/mammals/whiskered_bat.php accessed March 2024.

Appendix 2
Data Tables

Bat passes of each species recorded at each sampling point

Table 32: Number of bat passes of each species recorded at each sampling point during summer 2023 surveys

SP	*Myotis* spp.	Leisler's bat	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	NoID	Total	%
1	6	48	520	121	15	48	758	3.28
2	57	61	2,914	3,086	38	203	6,359	27.48
3	0	87	100	121	3	29	340	1.47
4	1	128	258	298	33	14	732	3.16
5	1	94	739	330	9	4	1,177	5.09
7	27	72	412	634	6	37	1,188	5.13
8	196	52	1,564	3,251	4	128	5,195	22.45
9	0	37	71	46	0	147	301	1.3
10	3	46	28	381	0	11	469	2.03
11	23	50	441	2,237	3	91	2,845	12.29
12	51	64	1,064	2,530	5	66	3,780	16.333
TOTAL	**365**	**739**	**8,111**	**13,035**	**116**	**778**	**23,144**	
%	**1.58**	**3.19**	**35.05**	**56.32**	**0.5**	**3.36**		

Table 33: Number of bat passes of each species recorded at each sampling point during autumn 2023 surveys

SP	*Myotis* spp.	Leisler's bat	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	NoID	Total	%
1	4	3	28	44	3	23	105	0.86
2	30	12	787	3,496	9	57	4,391	35.82
3	5	8	263	472	1	7	756	6.17
4	6	26	261	284	8	23	608	4.96
5	4	21	17	33	2	3	80	0.65
6	9	42	841	217	12	223	1,344	10.96
7	17	22	16	54	1	10	120	0.98
8	159	15	763	3,254	1	27	4,219	34.42
9	63	5	203	46	0	39	356	2.9
10	0	1	0	1	4	0	6	0.05
11	7	3	30	227	0	6	273	2.23
TOTAL	**304**	**158**	**3,209**	**8,128**	**41**	**418**	**12,258**	
%	**2.48**	**1.29**	**26.18**	**66.31**	**0.33**	**3.41**		

Table 34: Number of bat passes of each species recorded at each sampling point during spring 2024surveys

SP	*Myotis* .spp	Leisler's bat	Nat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID	Total	%
1	0	0	0	0	0	0	0	0	0	0.00
2	131	1,359	6	1,107	2,944	7	0	4	5,558	30.74
3	2	372	2	713	626	1	0	0	1,716	9.49
4	11	382	10	799	419	54	0	8	1,683	9.31
5	0	34	0	83	192	0	0	0	309	1.71
6	2	572	3	168	125	11	0	2	883	4.88
7	35	942	0	299	445	3	0	1	1,725	9.54
8	28	1,329	0	203	1,115	10	0	3	2,688	14.87
9	9	267	2	42	39	1	0	0	360	1.99
10	46	535	12	248	578	2	0	0	1,421	7.86
11	11	1,002	5	225	493	0	0	0	1,736	9.60
TOTAL	**275**	**6,794**	**40**	**3,887**	**6,976**	**89**	**0**	**18**	**18,079**	
%	**1.52**	**37.58**	**0.22**	**21.50**	**38.59**	**0.49**	**0.00**	**0.10**		

Table 35: Number of bat passes of each species recorded at each sampling point during summer 2024 surveys

SP	*Myotis*.spp	Leisler's bat	Nat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID	Total	%
1	14	108	1	2,584	826	27	0	0	3,560	12.54
2	19	86	1	3,908	2,902	16	0	0	6,932	24.42
3	22	901	0	1,388	1,048	88	0	0	3,447	12.14
4	13	1,764	2	2,445	1,087	109	0	1	5,421	19.10
5	2	708	1	636	678	19	0	48	2,092	7.37
6	2	294	0	653	394	18	0	0	1,361	4.79
7	30	58	0	517	2,606	4	0	1	3,216	11.33
8	19	46	0	70	463	10	0	1	609	2.15
9	0	36	1	18	17	0	0	0	72	0.25
10	32	191	0	447	992	12	0	0	1,674	5.90
TOTAL	**153**	**4,192**	**6**	**12,666**	**11,013**	**303**	**0**	**51**	**28,384**	
%	**0.54**	**14.77**	**0.02**	**44.62**	**38.80**	**1.07**	**0.00**	**0.18**		

Table 36: Number of bat passes of each species recorded at each sampling point during autumn 2024 surveys

SP	*Myotis*.spp	Leisler's bat	Nat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID	Total	%
1	0	112	0	223	454	13	0	0	802	5.78
2	34	555	1	780	659	166	0	21	2,216	15.98
3	5	343	0	1543	2,293	14	0	0	4,198	30.27
4	1	876	1	138	261	32	0	2	1,311	9.45
5	27	135	12	293	658	56	0	2	1,183	8.53
6	16	149	0	131	569	187	0	1	1,053	7.59

SP	*Myotis*.spp	Leisler's bat	Nat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID	Total	%
7	0	78	0	1	4	4	0	0	87	0.63
8	20	56	1	2073	858	10	0	0	3,018	21.76
TOTAL	103	2,304	15	5,182	5,756	482	0	26	13,868	
%	0.74	16.61	0.11	37.37	41.51	3.48	0.00	0.19		

Nightly/hourly average passes per species

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

Nightly average passes

Table 37: Nightly average passes per species across the summer 2023 survey period at sampling point 1

SP1

	Myotis. spp	Leisler's bat	Nat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	6	48	0	520	121	15	0	48
Average over 10 nights	0.6	4.8	0	52	12.1	1.5	0	4.8

Table 38: Nightly average passes per species across the summer 2023 survey period at sampling point 2

SP2

	Myotis.spp	Leisler's bat	Nat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	57	61	0	2,914	3,086	38	0	203
Average over 10 nights	5.7	6.1	0	291.4	308.6	3.8	0	20.3

Table 39: Nightly average passes per species across the summer 2023 survey period at sampling point 3

SP3

	Myotis.spp	Leisler's bat	Nat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	0	87	0	100	121	3	0	29
Average over 10 nights	0	8.7	0	10	12.1	0.3	0	2.9

Table 40: Nightly average passes per species across the summer 2023 survey period at sampling point 4

SP4

	Myotis.spp	Leisler's bat	Nat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	1	128	0	258	298	33	0	14
Average over 10 nights	0.1	12.8	0	25.8	29.8	3.3	0	1.4

Table 41: Nightly average passes per species across the summer 2023 survey period at sampling point 5

SP5

	Myotis.spp	Leisler's bat	Nat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	1	94	0	739	330	9	0	4
Average over 10 nights	0.1	9.4	0	73.9	33	0.9	0	0.4

Table 42: Nightly average passes per species across the summer 2023 survey period at sampling point 6

SP6

	Myotis.spp	Leisler's bat	Nat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	0	0	0	0	0	0	0	0
Average over 10 nights	0	0	0	0	0	0	0	0

Table 43: Nightly average passes per species across the summer 2023 survey period at sampling point 7

SP7

	Myotis.spp	Leisler's bat	Nat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	27	72	0	412	634	6	0	37
Average over 10 nights	2.7	7.2	0	41.2	63.4	0.6	0	3.7

Table 44: Nightly average passes per species across the summer 2023 survey period at sampling point 8

SP8

	Myotis.spp	Leisler's bat	Nat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	196	52	0	1,564	3,251	4	0	128
Average over 10 nights	19.6	5.2	0	156.4	325.1	0.4	0	12.8

Table 45: Nightly average passes per species across the summer 2023 survey period at sampling point 9

SP9

	Myotis.spp	Leisler's bat	PIPNAT	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	0	37	0	71	46	0	0	147
Average over 10 nights	0	3.7	0	7.1	4.6	0	0	14.7

Table 46: Nightly average passes per species across the summer 2023 survey period at sampling point 10

SP10

	Myotis.spp	Leisler's bat	PIPNAT	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	3	46	0	28	381	0	0	11
Average over 10 nights	0.3	4.6	0	2.8	38.1	0	0	1.1

Table 47: Nightly average passes per species across the summer 2023 survey period at sampling point 11

SP11

	Myotis.spp	Leisler's bat	Nat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	23	50	0	441	2,237	3	0	91
Average over 10 nights	2.3	5	0	44.1	223.7	0.3	0	9.1

Table 48: Nightly average passes per species across the summer 2023 survey period at sampling point 12

SP12

	Myotis.spp	Leisler's bat	Nat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	51	64	0	1,064	2,530	5	0	66
Average over 10 nights	5.1	6.4	0	106.4	253	0.5	0	6.6

Table 49: Nightly average passes per species across the autumn 2023 survey period at sampling point 1

SP1

	Myotis.spp	Leisler's bat	Nat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	4	3	0	28	44	3	0	23
Average over 10 nights	0.4	0.3	0	2.8	4.4	0.3	0	2.3

Table 50: Nightly average passes per species across the autumn 2023 survey period at sampling point 2

SP2

	Myotis.spp	Leisler's bat	Nat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	30	12	0	787	3,496	9	0	57
Average over 10 nights	3	1.2	0	78.7	349.6	0.9	0	5.7

Table 51: Nightly average passes per species across the autumn 2023 survey period at sampling point 3

SP3

	Myotis.spp	Leisler's bat	Nat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	5	8	0	263	472	1	0	7
Average over 10 nights	0.5	0.8	0	26.3	47.2	0.1	0	0.7

Table 52: Nightly average passes per species across the autumn 2023 survey period at sampling point 4

SP4

	Myotis.spp	Leisler's bat	Nat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	6	26	0	261	284	8	0	23
Average over 10 nights	0.6	2.6	0	26.1	28.4	0.8	0	2.3

Table 53: Nightly average passes per species across the autumn 2023 survey period at sampling point 5

SP5

	Myotis.spp	Leisler's bat	PIPNAT	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	4	21	0	17	33	2	0	3
Average over 10 nights	0.4	2.1	0	1.7	3.3	0.2	0	0.3

Table 54: Nightly average passes per species across the autumn 2023 survey period at sampling point 6

SP6

	Myotis.spp	Leisler's bat	Nat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	9	42	0	841	217	12	0	223
Average over 10 nights	0.9	4.2	0	84.1	21.7	1.2	0	22.3

Table 55: Nightly average passes per species across the autumn 2023 survey period at sampling point 7

SP7

	Myotis.spp	Leisler's bat	PIPNAT	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	17	22	0	16	54	1	0	10
Average over 10 nights	1.7	2.2	0	1.6	5.4	0.1	0	1

Table 56: Nightly average passes per species across the autumn 2023 survey period at sampling point 8

SP8

	Myotis.spp	Leisler's bat	Nat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	159	15	0	763	3,254	1	0	27
Average over 10 nights	15.9	1.5	0	76.3	325.4	0.1	0	2.7

Table 57: Nightly average passes per species across the autumn 2023 survey period at sampling point 9

SP9

	Myotis.spp	Leisler's bat	Nat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	63	5	0	203	46	0	0	39
Average over 10 nights	6.3	0.5	0	20.3	4.6	0	0	3.9

Table 58: Nightly average passes per species across the autumn 2023 survey period at sampling point 10

SP10

	Myotis.spp	Leisler's bat	Nat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	0	1	0	0	1	4	0	0
Average over 10 nights	0	0.1	0	0	0.1	0.4	0	0

Table 59: Nightly average passes per species across the autumn 2023 survey period at sampling point 11

SP11

	Myotis.spp	Leisler's bat	Nat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	7	3	0	30	227	0	0	6
Average over 10 nights	0.7	0.3	0	3	22.7	0	0	0.6

Table 60: Nightly average passes per species across the spring 2024 survey period at sampling point 1

SP1

	Myotis.spp	Leisler's bat	Nat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	0	0	0	0	0	0	0	0
Average over 10 nights	0	0	0	0	0	0	0	0

Table 61: Nightly average passes per species across the spring 2024 survey period at sampling point 2

SP2

	Myotis.spp	Leisler's bat	Nat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	131	1,359	6	1,107	2,944	7	0	4
Average over 10 nights	13.1	135.9	0.6	110.7	294.4	0.7	0	0.4

Table 62: Nightly average passes per species across the spring 2024 survey period at sampling point 3

SP3

	Myotis.spp	Leisler's bat	PIPNAT	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	2	372	2	713	626	1	0	0
Average over 10 nights	0.2	37.2	0.2	71.3	62.6	0.1	0	0

Table 63: Nightly average passes per species across the spring 2024 survey period at sampling point 4

SP4

	Myotis.spp	Leisler's bat	Nat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	11	382	10	799	419	54	0	8
Average over 10 nights	1.1	38.2	1	79.9	41.9	5.4	0	0.8

Table 64: Nightly average passes per species across the spring 2024 survey period at sampling point 5

SP5

	Myotis.spp	Leisler's bat	Nat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	0	34	0	83	192	0	0	0
Average over 10 nights	0	3.4	0	8.3	19.2	0	0	0

Table 65: Nightly average passes per species across the spring 2024 survey period at sampling point 6

SP6

	Myotis.spp	Leisler's bat	Nat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	2	572	3	168	125	11	0	2
Average over 10 nights	0.2	57.2	0.3	16.8	12.5	1.1	0	0.2

Table 66: Nightly average passes per species across the spring 2024 survey period at sampling point 7

SP7

	Myotis.spp	Leisler's bat	Nat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	35	942	0	299	445	3	0	1
Average over 10 nights	3.5	94.2	0	29.9	44.5	0.3	0	0.1

Table 67: Nightly average passes per species across the spring 2024 survey period at sampling point 8

SP8

	Myotis.spp	Leisler's bat	Nat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	28	1,329	0	203	1,115	10	0	3
Average over 10 nights	2.8	132.9	0	20.3	111.5	1	0	0.3

Table 68: Nightly average passes per species across the spring 2024 survey period at sampling point 9

SP9

	Myotis.spp	Leisler's bat	Nat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	9	267	2	42	39	1	0	0
Average over 10 nights	0.9	26.7	0.2	4.2	3.9	0.1	0	0

Table 69: Nightly average passes per species across the spring 2024 survey period at sampling point 10

SP10

	Myotis.spp	Leisler's bat	Nat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID

	46	535	12	248	578	2	0	0
Average over 10 nights	4.6	53.5	1.2	24.8	57.8	0.2	0	0

Table 70: Nightly average passes per species across the spring 2024 survey period at sampling point 11

SP11

	Myotis.spp	Leisler's bat	Nat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	11	1,002	5	225	493	0	0	0
Average over 10 nights	1.1	100.2	0.5	22.5	49.3	0	0	0

Table 71: Nightly average passes per species across the summer 2024 survey period at sampling point 1

SP1

	Myotis.spp	Leisler's bat	Nat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	14	108	1	2,584	826	27	0	0
Average over 10 nights	1.4	10.8	0.1	258.4	82.6	2.7	0	0

Table 72: Nightly average passes per species across the summer 2024 survey period at sampling point 2

SP2

	Myotis.spp	Leisler's bat	Nat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	19	86	1	3,908	2,902	16	0	0
Average over 10 nights	1.9	8.6	0.1	390.8	290.2	1.6	0	0

Table 73: Nightly average passes per species across the summer 2024 survey period at sampling point 3

SP3

	Myotis.spp	Leisler's bat	Nat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	22	901	0	1,388	1,048	88	0	0
Average over 10 nights	2.2	90.1	0	138.8	104.8	8.8	0	0

Table 74: Nightly average passes per species across the summer 2024 survey period at sampling point 4

SP4

	Myotis.spp	Leisler's bat	Nat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	13	1,764	2	2,445	1,087	109	0	1

Average over 10 nights	1.3	176.4	0.2	244.5	108.7	10.9	0	0.1

Table 75: Nightly average passes per species across the summer 2024 survey period at sampling point 5

SP5

	Myotis.spp	Leisler's bat	Nat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	2	708	1	636	678	19	0	48
Average over 10 nights	0.2	70.8	0.1	63.6	67.8	1.9	0	4.8

Table 76: Nightly average passes per species across the summer 2024 survey period at sampling point 6

SP6

	Myotis.spp	Leisler's bat	Nat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	2	294	0	653	394	18	0	0
Average over 10 nights	0.2	29.4	0	65.3	39.4	1.8	0	0

Table 77: Nightly average passes per species across the summer 2024 survey period at sampling point 7

SP7

	Myotis.spp	Leisler's bat	Nat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	30	58	0	517	2,606	4	0	1
Average over 10 nights	3	5.8	0	51.7	260.6	0.4	0	0.1

Table 78: Nightly average passes per species across the summer 2024 survey period at sampling point 8

SP8

	Myotis.spp	Leisler's bat	Nat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	19	46	0	70	463	10	0	1
Average over 10 nights	1.9	4.6	0	7	46.3	1	0	0.1

Table 79: Nightly average passes per species across the summer 2024 survey period at sampling point 9

SP9

	Myotis.spp	Leisler's bat	Nat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	0	36	1	18	17	0	0	0

Average over 10 nights	0	3.6	0.1	1.8	1.7	0	0	0

Table 80: Nightly average passes per species across the summer 2024 survey period at sampling point 10

SP10

	Myotis.spp	Leisler's bat	Nat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	32	191	0	447	992	12	0	0
Average over 10 nights	3.2	19.1	0	44.7	99.2	1.2	0	0

Table 81: Nightly average passes per species across the autumn 2024 survey period at sampling point 1

SP1

	Myotis.spp	Leisler's bat	Nat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	0	112	0	223	454	13	0	0
Average over 10 nights	0	11.2	0	22.3	45.4	1.3	0	0

Table 82: Nightly average passes per species across the autumn 2024 survey period at sampling point 2

SP2

	Myotis.spp	Leisler's bat	Nat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	34	555	1	780	659	166	0	21
Average over 10 nights	3.4	55.5	0.1	78	65.9	16.6	0	2.1

Table 83: Nightly average passes per species across the autumn 2024 survey period at sampling point 3

SP3

	Myotis.spp	Leisler's bat	PIPNATNat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	5	343	0	1,543	2,293	14	0	0
Average over 10 nights	0.5	34.3	0	154.3	229.3	1.4	0	0

Table 84: Nightly average passes per species across the autumn 2024 survey period at sampling point 4

SP4

	Myotis.spp	Leisler's bat	PIPNATNat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	1	876	1	138	261	32	0	2

Average over 10 nights	0.1	87.6	0.1	13.8	26.1	3.2	0	0.2

Table 85: Nightly average passes per species across the autumn 2024 survey period at sampling point 5

SP5

	Myotis.spp	Leisler's bat	PIPNATNat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	27	135	12	293	658	56	0	2
Average over 10 nights	2.7	13.5	1.2	29.3	65.8	5.6	0	0.2

Table 86: Nightly average passes per species across the autumn 2024 survey period at sampling point 6

SP6

	Myotis.spp	Leisler's bat	PIPNATNat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	16	149	0	131	569	187	0	1
Average over 10 nights	1.6	14.9	0	13.1	56.9	18.7	0	0.1

Table 87: Nightly average passes per species across the autumn 2024 survey period at sampling point 7

SP7

	Myotis.spp	Leisler's bat	Nat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	0	78	0	1	4	4	0	0
Average over 10 nights	0	7.8	0	0.1	0.4	0.4	0	0

Table 88: Nightly average passes per species across the autumn 2024 survey period at sampling point 8

SP8

	Myotis.spp	Leisler's bat	PIPNATNat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	20	56	1	2073	858	10	0	0
Average over 10 nights	2	5.6	0.1	207.3	85.8	1	0	0

Hourly average passes per species

Table 89: Hourly average passes per species across the summer 2023 survey period at sampling point 1

SP1

	Myotis.spp	Leisler's bat	PIPNATNat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	0.6	4.8	0	52	12.1	1.5	0	4.8
Average over 10 nights	0.06	0.48	0	5.2	1.21	0.15	0	0.48

Table 90: Hourly average passes per species across the summer 2023 survey period at sampling point 2

SP2

	Myotis.spp	Leisler's bat	PIPNATNat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	5.7	6.1	0	291	309	3.8	0	20.3
Average over 10 nights	0.57	0.61	0	29.14	30.86	0.38	0	2.03

Table 91: Hourly average passes per species across the summer 2023 survey period at sampling point 3

SP3

	Myotis.spp	Leisler's bat	PIPNATNat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	0	8.7	0	10	12.1	0.3	0	2.9
Average over 10 nights	0	0.87	0	1	1.21	0.03	0	0.29

Table 92: Hourly average passes per species across the summer 2023 survey period at sampling point 4

SP4

	Myotis.spp	Leisler's bat	PIPNATNat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	0.1	12.8	0	25.8	29.8	3.3	0	1.4
Average over 10 nights	0.01	1.28	0	2.58	2.98	0.33	0	0.14

Table 93: Hourly average passes per species across the summer 2023 survey period at sampling point 5

SP5

	Myotis.spp	Leisler's bat	PIPNATNat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	0.1	9.4	0	73.9	33	0.9	0	0.4

Average over 10 nights	0.01	0.94	0	7.39	3.3	0.09	0	0.04

Table 94: Hourly average passes per species across the summer 2023 survey period at sampling point 6

SP6

	Myotis.spp	Leisler's bat	PIPNATNat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	0	0	0	0	0	0	0	0
Average over 10 nights	0	0	0	0	0	0	0	0

Table 95: Hourly average passes per species across the summer 2023 survey period at sampling point 7

SP7

	Myotis.spp	Leisler's bat	PIPNATNat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	2.7	7.2	0	41.2	63.4	0.6	0	3.7
Average over 10 nights	0.27	0.72	0	4.12	6.34	0.06	0	0.37

Table 96: Hourly average passes per species across the summer 2023 survey period at sampling point 8

SP8

	Myotis.spp	Leisler's bat	PIPNATNat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	19.6	5.2	0	156	325	0.4	0	12.8
Average over 10 nights	1.96	0.52	0	15.64	32.51	0.04	0	1.28

Table 97: Hourly average passes per species across the summer 2023 survey period at sampling point 9

SP9

	Myotis.spp	Leisler's bat	PIPNATNat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	0	3.7	0	7.1	4.6	0	0	14.7
Average over 10 nights	0	0.37	0	0.71	0.46	0	0	1.47

Table 98: Hourly average passes per species across the summer 2023 survey period at sampling point 10

SP10

	Myotis.spp	Leisler's bat	PIPNATNat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	0.3	4.6	0	2.8	38.1	0	0	1.1

Average over 10 nights	0.03	0.46	0	0.28	3.81	0	0	0.11

Table 99: Hourly average passes per species across the summer 2023 survey period at sampling point 11

SP11

	Myotis.spp	Leisler's bat	PIPNATNat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	2.3	5	0	44.1	224	0.3	0	9.1
Average over 10 nights	0.23	0.5	0	4.41	22.37	0.03	0	0.91

Table 100: Hourly average passes per species across the summer 2023 survey period at sampling point 12

SP12

	Myotis.spp	Leisler's bat	PIPNATNat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	5.1	6.4	0	106	253	0.5	0	6.6
Average over 10 nights	0.51	0.64	0	10.64	25.3	0.05	0	0.66

Table 101: Hourly average passes per species across the autumn 2023 survey period at sampling point 1

SP1

	Myotis.spp	Leisler's bat	PIPNATNat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	0.4	0.3	0	2.8	4.4	0.3	0	2.3
Average over 10 nights	0.04	0.03	0	0.28	0.44	0.03	0	0.23

Table 102: Hourly average passes per species across the autumn 2023 survey period at sampling point 2

SP2

	Myotis.spp	Leisler's bat	PIPNATNat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	3	1.2	0	79	350	0.9	0	5.7
Average over 10 nights	0.3	0.12	0	7.87	34.96	0.09	0	0.57

Table 103: Hourly average passes per species across the autumn 2023 survey period at sampling point 3

SP3

	Myotis.spp	Leisler's bat	PIPNATNat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	0.5	0.8	0	26.3	47.2	0.1	0	7

Average over 10 nights	0.05	0.08	0	2.63	4.72	0.01	0	0.7

Table 104: Hourly average passes per species across the autumn 2023 survey period at sampling point 4

SP4

	Myotis.spp	Leisler's bat	PIPNATNat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	0.6	2.6	0	26.1	28.4	0.8	0	2.3
Average over 10 nights	0.06	0.26	0	2.61	2.84	0.08	0	0.23

Table 105: Hourly average passes per species across the autumn 2023 survey period at sampling point 5

SP5

	Myotis.spp	Leisler's bat	PIPNATNat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	0.4	2.1	0	1.7	3.3	0.2	0	0.3
Average over 10 nights	0.04	0.21	0	0.17	0.33	0.02	0	0.03

Table 106: Hourly average passes per species across the autumn 2023 survey period at sampling point 6

SP6

	Myotis.spp	Leisler's bat	PIPNATNat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	0.9	4.2	0	84.1	21.7	1.2	0	22.3
Average over 10 nights	0.09	0.42	0	8.41	2.17	0.12	0	2.23

Table 107: Hourly average passes per species across the autumn 2023 survey period at sampling point 7

SP7

	Myotis.spp	Leisler's bat	PIPNATNat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	1.7	2.2	0	1.6	5.4	0.1	0	1
Average over 10 nights	0.17	0.22	0	0.16	0.54	0.01	0	0.1

Table 108: Hourly average passes per species across the autumn 2023 survey period at sampling point 8

SP8

	Myotis.spp	Leisler's bat	PIPNATNat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	15.9	1.5	0	76	325	0.1	0	2.7

Average over 10 nights	1.59	0.15	0	7.63	32.54	0.01	0	0.27

Table 109: Hourly average passes per species across the autumn 2023 survey period at sampling point 9

SP9

	Myotis.spp	Leisler's bat	PIPNATNat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	6.3	0.5	0	20.3	4.6	0	0	3.9
Average over 10 nights	0.63	0.05	0	2.03	0.46	0	0	0.39

Table 110: Hourly average passes per species across the autumn 2023 survey period at sampling point 10

SP10

	Myotis.spp	Leisler's bat	PIPNATNat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	0	0.1	0	0	0.1	0.4	0	0
Average over 10 nights	0	0.01	0	0	0.01	0.04	0	0

Table 111: Hourly average passes per species across the autumn 2023 survey period at sampling point 11

SP11

	Myotis.spp	Leisler's bat	PIPNATNat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	0.7	0.3	0	3	23	0	0	0.6
Average over 10 nights	0.07	0.03	0	0.3	2.27	0	0	0.06

Table 112: Hourly average passes per species across the spring 2024 survey period at sampling point 1

SP1

	Myotis.spp	Leisler's bat	PIPNATNat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	0	0	0	0	0	0	0	0
Average over 10 nights	0	0	0	0	0	0	0	0

Table 113: Hourly average passes per species across the spring 2024 survey period at sampling point 2

SP2

	Myotis.spp	Leisler's bat	PIPNATNat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	13.1	135.9	0.6	110.7	294.4	0.7	0	0.4

Average over 10 nights	1.31	13.59	0.06	11.07	29.44	0.07	0	0.04

Table 114: Hourly average passes per species across the spring 2024 survey period at sampling point 3

SP3

	Myotis.spp	Leisler's bat	PIPNATNat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	0.2	37.2	0.2	71.3	62.6	0.1	0	0
Average over 10 nights	0.02	3.72	0.02	7.13	6.26	0.01	0	0

Table 115: Hourly average passes per species across the spring 2024 survey period at sampling point 4

SP4

	Myotis.spp	Leisler's bat	PIPNATNat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	1.1	38.2	1	79.9	41.9	5.4	0	0.8
Average over 10 nights	0.11	3.82	0.1	7.99	4.19	0.54	0	0.08

Table 116: Hourly average passes per species across the spring 2024 survey period at sampling point 5

SP5

	Myotis.spp	Leisler's bat	PIPNATNat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	0	3.4	0	8.3	19.2	0	0	0
Average over 10 nights	0	0.34	0	0.83	1.92	0	0	0

Table 117: Hourly average passes per species across the spring 2024 survey period at sampling point 6

SP6

	Myotis.spp	Leisler's bat	Nat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	0.2	57.2	0.3	16.8	12.5	1.1	0	0.2
Average over 10 nights	0.02	5.72	0.03	1.68	1.25	0.11	0	0.02

Table 118: Hourly average passes per species across the spring 2024 survey period at sampling point 7

SP7

	Myotis.spp	Leisler's bat	PIPNAT PIPNATNat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	3.5	94.2	0	29.9	34.5	0.3	0	0.1

Average over 10 nights	0.35	9.42	0	2.99	3.45	0.03	0	0.01

Table 119: Hourly average passes per species across the spring 2024 survey period at sampling point 8

SP8

	Myotis.spp	Leisler's bat	PIPNAT PIPNATNat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	2.8	132.9	0	20.3	111.5	1	0	0.3
Average over 10 nights	0.28	13.29	0	2.03	11.15	0.1	0	0.03

Table 120: Hourly average passes per species across the spring 2024 survey period at sampling point 9

SP9

	Myotis.spp	Leisler's bat	PIPNAT PIPNATNat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	0.9	26.7	0.2	4.2	3.9	0.1	0	0
Average over 10 nights	0.09	2.67	0.02	0.42	0.39	0.01	0	0

Table 121: Hourly average passes per species across the spring 2024 survey period at sampling point 10

SP10

	Myotis.spp	Leisler's bat	PIPNAT PIPNATNat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	4.6	53.5	1.2	24.8	57.8	0.2	0	0
Average over 10 nights	0.46	5.35	0.12	2.48	5.78	0.02	0	0

Table 122: Hourly average passes per species across the spring 2024 survey period at sampling point 11

SP11

	Myotis.spp	Leisler's bat	PIPNAT PIPNATNat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	1.1	100.2	0.5	22.5	49.3	0	0	0
Average over 10 nights	0.11	10.02	0.05	2.25	4.93	0	0	0

Table 123: Hourly average passes per species across the summer 2024 survey period at sampling point 1

SP1

	Myotis.spp	Leisler's bat	PIPNAT PIPNATNat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	1.4	10.8	0.1	258.4	82.6	2.7	0	0

Average over 10 nights	0.14	1.08	0.01	25.84	8.26	0.27	0	0

Table 124: Hourly average passes per species across the summer 2024 survey period at sampling point 2

SP2

	Myotis.spp	Leisler's bat	PIPNAT PIPNATNat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	1.9	8.6	0.1	390.8	290.2	1.6	0	0
Average over 10 nights	0.19	0.86	0.01	39.08	29.02	0.16	0	0

Table 125: Hourly average passes per species across the summer 2024 survey period at sampling point 3

SP3

	Myotis.spp	Leisler's bat	PIPNAT PIPNATNat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	2.2	90.1	0	138.8	104.8	8.8	0	0
Average over 10 nights	0.22	9.01	0	13.88	10.48	0.88	0	0

Table 126: Hourly average passes per species across the summer 2024 survey period at sampling point 4

SP4

	Myotis.spp	Leisler's bat	PIPNAT PIPNATNat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	1.3	176.4	0.2	244.5	108.7	10.9	0	0.1
Average over 10 nights	0.13	17.64	0.02	24.45	10.87	1.09	0	0.01

Table 127: Hourly average passes per species across the summer 2024 survey period at sampling point 5

SP5

	Myotis.spp	Leisler's bat	PIPNAT PIPNATNat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	0.2	70.8	0.1	63.6	67.8	1.9	0	4.8
Average over 10 nights	0.02	7.08	0.01	6.36	6.78	0.19	0	0.48

Table 128: Hourly average passes per species across the summer 2024 survey period at sampling point 6

SP6

	Myotis.spp	Leisler's bat	PIPNAT PIPNATNat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	0.2	29.4	0	65.3	39.4	1.8	0	0

Average over 10 nights	0.02	2.94	0	6.53	3.94	0.18	0	0

Table 129: Hourly average passes per species across the summer 2024 survey period at sampling point 7

SP7

	Myotis.spp	Leisler's bat	PIPNAT PIPNATNat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	3	5.8	0	51.7	260.6	0.4	0	0.1
Average over 10 nights	0.3	0.58	0	5.17	26.06	0.04	0	0.01

Table 130: Hourly average passes per species across the summer 2024 survey period at sampling point 8

SP8

	Myotis.spp	Leisler's bat	PIPNAT PIPNATNat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	1.9	4.6	0	7	46.3	1	0	0.1
Average over 10 nights	0.19	0.46	0	0.7	4.63	0.1	0	0.01

Table 131: Hourly average passes per species across the summer 2024 survey period at sampling point 9

SP9

	Myotis.spp	Leisler's bat	PIPNAT PIPNATNat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	0	3.6	0.1	1.8	1.7	0	0	0
Average over 10 nights	0	0.36	0.01	0.18	0.17	0	0	0

Table 132: Hourly average passes per species across the summer 2024 survey period at sampling point 10

SP10

	Myotis.spp	Leisler's bat	PIPNAT PIPNATNat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	3.2	19.1	0	44.7	99.2	1.2	0	0
Average over 10 nights	0.32	1.91	0	4.47	9.92	0.12	0	0

Table 133: Hourly average passes per species across the autumn 2024 survey period at sampling point 1

SP1

	Myotis.spp	Leisler's bat	PIPNAT PIPNATNat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	0	11.2	0	22.3	45.4	1.3	0	0

Average over 10 nights	0	1.12	0	2.23	4.54	0.13	0	0

Table 134: Hourly average passes per species across the autumn 2024 survey period at sampling point 2

SP2

	Myotis.spp	Leisler's bat	PIPNAT PIPNATNat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	3.4	55.5	0.1	78	65.9	16.6	0	2.1
Average over 10 nights	0.34	5.55	0.01	7.8	6.59	1.66	0	0.21

Table 135: Hourly average passes per species across the autumn 2024 survey period at sampling point 3

SP3

	Myotis.spp	Leisler's bat	PIPNAT PIPNATNat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	0.5	34.3	0	154.3	229.3	1.4	0	0
Average over 10 nights	0.05	3.43	0	15.43	22.93	0.14	0	0

Table 136: Hourly average passes per species across the autumn 2024 survey period at sampling point 4

SP4

	Myotis.spp	Leisler's bat	PIPNAT PIPNATNat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	0.1	87.6	0.1	13.8	26.1	3.2	0	0.2
Average over 10 nights	0.01	8.76	0.01	1.38	2.61	0.32	0	0.02

Table 137: Hourly average passes per species across the autumn 2024 survey period at sampling point 5

SP5

	Myotis.spp	Leisler's bat	PIPNAT PIPNATNat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	2.7	13.5	1.2	29.3	65.8	5.6	0	0.2
Average over 10 nights	0.27	1.35	0.12	2.93	6.58	0.56	0	0.02

Table 138: Hourly average passes per species across the autumn 2024 survey period at sampling point 6

SP6

	Myotis.spp	Leisler's bat	PIPNAT PIPNATNat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	1.6	14.9	0	13.1	56.9	18.7	0	0.1

Average over 10 nights	0.16	1.49	0	1.31	5.69	1.87	0	0.01

Table 139: Hourly average passes per species across the autumn 2024 survey period at sampling point 7

SP7

	Myotis.spp	Leisler's bat	PIPNAT PIPNATNat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	0	7.8	0	0.1	0.4	0.4	0	0
Average over 10 nights	0	0.78	0	0.01	0.04	0.04	0	0

Table 140: Hourly average passes per species across the autumn 2024 survey period at sampling point 8

SP8

	Myotis.spp	Leisler's bat	PIPNAT PIPNATNat pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared bat	Lesser horseshoe	NoID
	2	5.6	0.1	207.3	85.8	1	0	0
Average over 10 nights	0.2	0.56	0.01	20.73	8.58	0.1	0	0