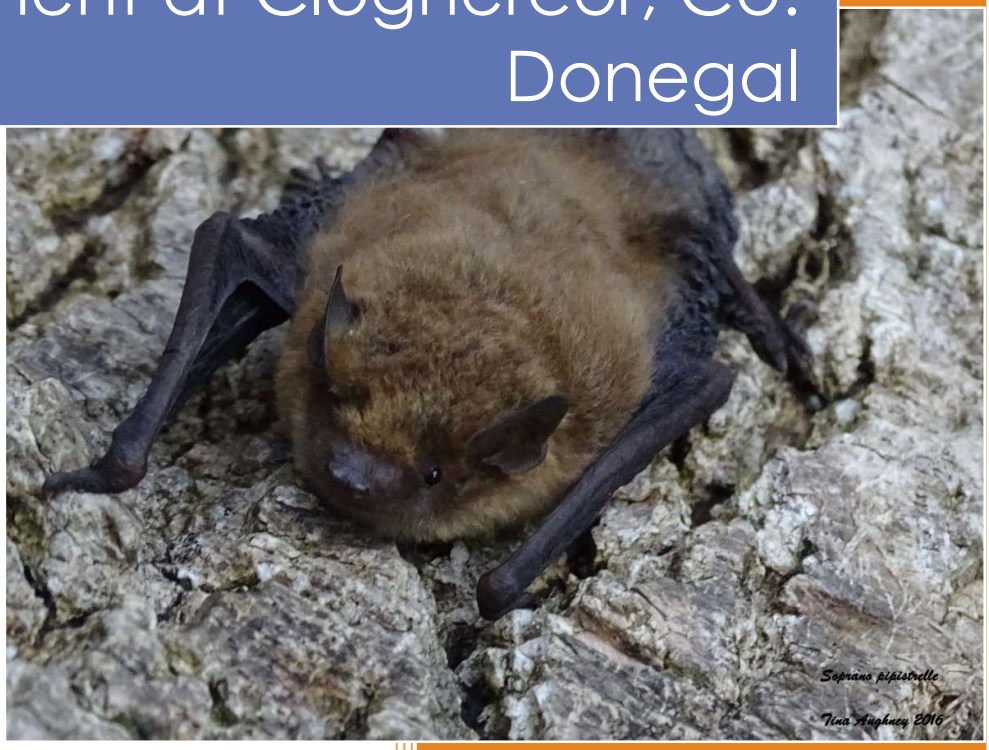
Appendix 6-4 – Bat Assessment Report

2022

Bat Assessment: proposed wind farm development at Cloghercor, Co. Donegal



Dr Tina Aughney

Bat Eco Services

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NPWS licence C17/2023 (Licence to handle bats, expires 23rd January 2026);
NPWS licence 27/2023 (Licence to photograph/film bats, expires 31st December 2024) ;
NPWS licence DER/BAT 2022-36 (Survey licence, expires 24th March 2025).

Statement of Authority: Dr Aughney has worked as a Bat Specialist since 2000 and has undertaken extensive survey work for all Irish bat species including large scale development projects, road schemes, residential developments, wind farm developments and smaller projects in relation to building renovation or habitat enhancement. She is a monitoring co-ordinator and trainer for Bat Conservation Ireland. She is a co-author of the 2014 publication *Irish Bats in the 21st Century.* This book received the 2015 CIEEM award for Information Sharing. Dr Aughney is a contributing author for the Atlas of Mammals in Ireland 2010-2015.

All analysis and reporting is completed by Dr Tina Aughney. Data collected and surveying is completed with the assistance of a trained field assistant.

Mr. Shaun Boyle (Field Assistant) NPWS licence DER/BAT 2022-37 (Survey licence, expires 24th March 2025).

Client: TOBIN on behalf of Orsted/FEI

Project Name & Location: Cloghercor, Co. Donegal.

Report Revision History

Date of Issue	Draft Number	Issued To (process of issuing)
30th October 2022	Draft 1	TOBIN (by email)
29th November 2022	Draft 2	TOBIN (by email)
2nd December 2022	Draft 3	TOBIN (by email)
19th December 2022	Draft 4	TOBIN (by email)
2nd February 2023	Draft 5	TOBIN (by email)
10th February 2023	Final	TOBIN (by email)

Purpose

This document has been prepared as a Report for TOBIN. Only the most up to-date report should be consulted. All previous drafts/reports are deemed redundant in relation to the named site.

Bat Eco Service accepts no responsibility or liability for any use that is made of this document other than by the client for the purposes for which it was originally commissioned and prepared.

Carbon Footprint Policy

It is the policy of Bat Eco Services to provide documentation digitally in order to reduce carbon footprint. Printing of reports etc. is avoided, where possible.

Bat Record Submission Policy

It is the policy of Bat Eco Services to submit all bat records to Bat Conservation Ireland database one year post-surveying. This is to ensure that a high level bat database is available for future desktop reviews. This action will be automatically undertaken unless otherwise requested, where there is genuine justification.

Executive Summary

Project Name & Location: Cloghercor, Co. Donegal.

Proposed work: Wind farm development.

Bat Survey Results - Summary

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

Bat Survey Duties Completed (Indicated by red shading)

Tree PBR Survey	◯	Daytime Building Inspection	◯
Static Detector Survey	◯	Daytime Bridge Inspection	○
Dusk Bat Survey	◯	Dawn Bat Survey	◯
Walking Transect	◯	Driving Transect	◯
Trapping / Mist Netting	○	IR Camcorder filming	◯
Endoscope Inspection	◯	Other	◯
		Thermal imagery scope	

Citation: Bat Eco Services (2022) Bat assessment of proposed wind farm development at Cloghercor, Co. Donegal. Unpublished report prepared for TOBIN.

Contents

1. Introduction

Bat Eco Services was commissioned by TOBIN to undertake a bat survey of Cloghercor, Co. Donegal. Bat surveys were completed in 2020, 2021 and 2022 and this comprised of static surveillance, dusk and dawn surveys and walking/driving transects.

1.1 Relevant Legislation & Bat Species Status in Ireland

The principal statutory provisions for the protection of animal species are under the Wildlife Act 1976 (as amended) and the European Communities (Birds and Natural Habitats) Regulations 2011, as amended. The Habitats Directive (Council Directive 92/43/EEC) are the legislative instruments which are transposed into Irish law, *inter alia,* by the European Communities (Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011) ('the 2011' Regulations), as amended.

All Irish bat species are protected under the Wildlife Act (1976) and Wildlife Amendment Acts (2000 and 2010). Also, the EC Directive on The Conservation of Natural habitats and of Wild Fauna and Flora (Habitats Directive 1992), seeks to protect rare species, including bats, and their habitats and requires that appropriate monitoring of populations be undertaken. All Irish bats are listed in Annex IV of the Habitats Directive and the lesser horseshoe bat *Rhinolophus hipposideros* is further listed under Annex II. Across Europe, they 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, enacted 1983) was instigated to protect migrant species across all European boundaries. The Irish government has ratified both these conventions.

There are eleven recorded bat species in Ireland, nine of which are considered resident on the island. Eight resident bat species and one of the vagrant bat species are vesper bats and all vespertilionid bats have a tragus (cartilaginous structure inside the pinna of the ear). Vesper bats are distributed throughout the island. Nathusius' pipistrelle *Pipistrellus nathusii* is a recent addition while the Brandt's bat has only been recorded once to-date (Only record confirmed by DNA testing, all other records has not been genetically confirmed). The ninth resident species is the lesser horseshoe bat *Rhinolophus hipposideros*, which belongs to the Rhinolophidea and has a complex nose leaf structure on the face, distinguishing it from the vesper bats.

Please see Appendix 8.1 for more details.

1.2 Site Location

The proposed development site is located within a peatland and forested landscape, between Doochary, Lettermacaward and Glenties, in Co. Donegal. The site of the proposed wind farm is located approximately 22km north of Donegal town, and approximately 23km southwest of Letterkenny, within townlands of Cloghercor, Cloghercullion, Derryloaghan, Cleengort, Derk More and Derk Beg Co. Donegal.

The main part of the proposed development site, which extends to approximately 1,972.7 hectares (ha), of which approximately 1,062.6 ha is owned by Coillte and the remaining area is third party property.

The elevation of the wind farm site ranges from sea level along the Gweebarra Estuary to the north rising to over 360m above ordnance datum (AOD) in the east of the site. The Clochar an Chuilinn flows through the site as well as several small watercourses and all flow into the Gweebarra /Owenwee [Doochary] river adjacent to the wind farm site. Two lakes, the Aneane More and Aneane Beg are within the site boundary.

1.3 Proposed Project

The turbine details are:

- Erection of 19 no. wind turbines with an overall blade tip height of between 185-200m, a rotor diameter of between 149-164m, a hub height of between 112-125m, and all associated foundations and hard-standing areas in respect of each turbine.

Figure 1: Layout of proposed turbines.

2. Methodology

2.1 Desktop Review

2.1.1 Bat Conservation Ireland Database

Bat Conservation Ireland acts as the central depository for bat records for the Republic of Ireland. Its' bat database is comprised of >60,000 bat records. A 1km and 10km radius search was requested for the Irish Grid Reference B8566903242 in 2021.

2.1.2 Bat Conservation Landscape Favourability

Bat Conservation Ireland produced a landscape conservation guide for Irish bat species using their database of species records collated during the 2000 - 2009 survey seasons. An analysis of the habitat and landscape associations of all bat species deemed resident in Ireland was undertaken and reported in Lundy *et al*., 2011. The geographical area suitable for individual species was used to identify the core favourable areas of each species. This was produced as a GIS layer for local authorities and planners in order to provide a guide to the consideration of bat conservation. The island is divided into 5km squares and the landscape favourability of each 5km square for each species of bat was modelled. A caveat is attached to the model and it is that the model is based on records held on the BCIreland database, while core areas have been identified, areas outside the core area should not be discounted as unimportant as bats are a landscape species and can travel many kilometres between roosts and foraging areas nightly and seasonally. This model was used as part of the desktop study for this report.

2.2 Daytime Inspections

2.2.1 Building & Structure Inspection

One set of ruins located within the proposed development area was inspected during the daytime on seven survey dates (prior to dusk emergence surveys – see Table 9 for more details) for evidence of bat usage. Evidence of bat usage is in the form of actual bats (visible or audible), bat droppings, urine staining, grease marks (oily secretions from glands present on stonework) and claw marks. In addition, the presence of bat fly pupae (bat parasite) also indicated that bat usage of a crevice, for example, has occurred in the past. Inspections are undertaken visually with the aid of a strong torch beam (LED Lenser P14.2) and endoscope (General DC5660A Wet / Dry Scope). These structures were also assessed to determine their suitability as a bat roost and described using the parameters Negligible, Low, Medium or High suitability according to Collins (2016). Please see Appendix 2 for more information (Table B). Daytime inspections was completed on numerous dates in 2020, 2021 and 2022 (Please see results section for more details).

2.2.2 Tree Potential Bat Roost (PBRs) Inspection

Deciduous trees located adjacent to the stone ruins within the survey area were inspected (17/10/2020 and 11/1/2021) to determine if they provide a roosting space for bats using the Bat Tree Habitat Key (BTHK, 2018) and the classification system adapted from Collins (2016). The Potential Roost Features (PRFs) listed in BTHK (2018) were used to determine the PBR value of trees. Evidence of bat usage is in the form of actual bats (visible or audible), bat droppings, urine staining, grease marks (oily secretions from glands present) and claw marks. In addition, the presence of bat fly pupae (bat parasite) also indicated that bat usage of a crevice, for example, has occurred in the past. A Phase 1 inspection was undertaken visually with the aid of a strong torch beam (LED Lenser P14.2) during the daytime searching for PRFs, if visible. Please see Appendix 8.2 for more information (Table C).

2.3 Bat Detector Surveys

2.3.1 Dusk & Dawn Bat Surveys

Dusk Emergence Surveys were completed from 10 minutes before sunset to at least 110 minutes post sunset and the surveyors position themselves adjacent to the building / structure to be surveyed to determine if bats are roosting within, location of roost(s), number of bats, bat species etc. Dusk surveys were completed on 22/4/2020, 28/7/2020, 29/7/2020, 3/8/2020, 18/8/2020, 28/8/2020, 31/8/2020, 1/9/2020, 17/10/2020, 11/1/2021, 5/7/2021, 6/7/2021 and 15/6/2022. A dawn survey was completed from 110 minutes before sunrise to 10 minutes after sunrise on 1/9/2020 (This was deemed sufficient time period as there was no bat activity for the last 20 minutes of surveying and weather conditions were deteriorating). The surveys were completed, where possible, during mild and dry weather conditions with air temperature 8^{o}C or greater. All bat encounters were noted during surveys.

The following equipment was used:

- Surveyor 1 (Principal surveyor): Anabat Walkabout Full Spectrum Bat Detector and Petersson D200 Heterodyne Bat Detector.
- Surveyor 2: Bat Logger M2 Full Spectrum Bat Detector and Petersson D200 Heterodyne Bat Detector.
- Surveyor 3: Anabat Scout Full Spectrum Bat Detector and Petersson D200 Heterodyne Bat Detector.

2.3.1.1 Filming

A Guide TrackIR Pro25 thermal imagery scope filming was also deployed during dusk emergence surveys to capture potential emerging bats from potential roosting sites within the ruins located within the proposed development area. This was completed from 10 minutes before sunset till at least 120 minutes after sunset and 110 minutes before sunrise to 10 minutes after sunrise during surveys of the ruins located within the proposed development area. Captured film was watched post-survey and any emerging bats were noted.

Bat detectors were attached to the filming units to aid species identified: Anabat Scout Full Spectrum Bat Detector and Pettersson D200 Heterodyne Bat Detector.

2.3.2 Walking & Driving Transects

Walking transects were completed post Dusk Emergence Surveys and involved the surveyor(s) walking the survey area, noting the time, location and bat species encountered. Mapping of bat encounters was undertaken using QGIS and an excel file produced for mapping purposes (ITM Irish grid reference co-ordinates). Validation of bat records was completed by the principal bat surveyor prior to mapping.

Driving transects were undertaken for large survey areas. Bat Logger M2 Spectrum Bat Detector was used for this survey type and was located outside on the passenger side of the vehicle. The vehicle was driven at 24 km/hr following Bat Conservation Ireland's car-based bat monitoring methodology (Aughney *et al.,* 2018). The time, location (grid reference) and bat species encountered were recorded. These recordings were mapped using QGIS and an excel file produced for mapping purposes (ITM Irish grid reference co-ordinates). Validation of bat records was completed by the principal bat surveyor prior to mapping.

Walking and Driving transects were undertaken to gather information on local bat populations within and adjacent to the proposed development area. Walking (Surveyor 1) and Driving (Surveyor 2 & 3) transects were undertaken on the following dates:

- 22/4/2020 driving transect at dusk (along local roads encompassing the survey area);
- 22/4/2020 walking transect at dusk (internal roads of survey area);
- 23/4/2020 driving transect at dusk (from Doochary village to Gweebara Bridge);
- 23/4/2020 walking transect at dusk (from main barrier access to survey area along local road to Doochary village);
- 3/5/2020 driving transect at dusk ((from main barrier access to survey area along local roads to Gweebara bridge);
- 23/7/2020 driving transect at dusk (along local roads encompassing the survey area);
- 23/7/2020 walking transect at dusk (along local road of northern boundary of survey area);
- 25/7/2020 walking transect at dawn (Doochary village);
- 28/7/2020 walking transect at dawn ((internal roads of survey area);
- 29/7/2020 walking transect at dawn (along river);
- 18/8/2020 driving transect at dusk (along local roads encompassing the survey area);
- 18/8/2020 walking transect at dawn ((internal roads of survey area);
- 1/9/2020 walking transect at dawn (from main barrier access to survey area along local road to Doochary village);
- 1/9/2020 walking transect at dawn (from graveyard along local road to Doochary village);
- 1/9/2020 walking transect at dusk (along Coillte tracks);
- 17/10/2020 driving transect at dusk (from main barrier access to survey area along local road to Glenties Road);
- 17/10/2020 walking transect at dusk (internal roads of survey area);
- 5/7/2021 walking transect at dusk (internal roads of survey area);
- 6/7/2021 walking transect at dusk (along Coillte tracks);
- 11/9/2021 walking transect at dusk (along Coillte tracks);
- 12/5/2022 walking transect at dusk (internal roads of survey area);
- 15/6/2022 walking transect at dusk (internal roads of survey area).

The following equipment was used:

- Surveyor 1 (Principal surveyor): Anabat Walkabout Full Spectrum Bat Detector and Petersson D200 Heterodyne Bat Detector.
- Surveyor 2: Bat Logger M2 Full Spectrum Bat Detector and Petersson D200 Heterodyne Bat Detector.
- Surveyor 3: Anabat Scout Full Spectrum Bat Detector and Petersson D200 Heterodyne Bat Detector.

2.3.3 Passive Static Bat Detector Survey

A Passive Static Bat Surveys was the principal survey to document the bat usage of the proposed development site. This involved leaving a static bat detector unit (with ultrasonic microphone) in a specific location (erected on a 2m pole) and set to record from 30 minutes before sunset to 30 minutes after sunrise (i.e. a bat detector is left in the field, there is no observer present and bats which pass near enough to the monitoring unit are recorded and their calls are stored for analysis post surveying). The bat detector was effectively used as a bat activity data logger.

All audio recordings collected were analysed using Wildlife Acoustics Kaleidoscope Pro. The Auto-Id function was used for all sound files and manual verification was used to check 20% of positively

identified audio files ensure the auto-id function was accurate. This is particularly important for less common bat species and cryptic bat species such as *Myotis* species. In addition, "Noise" and "Unidentified" sound files were also manually checked. Each sequence of bat pulses was noted as a bat pass to indicate level of bat activity for each species recorded. This data was prepared for EcoBat Tool analysis.

Audio files were a maximum of 15 seconds long and each audio file was taken as a bat pass (registration) for each bat species recorded within the audio file. Each bat pass does not equate to the number of individuals of bats flying in vicinity of the recording device but is representative of bat activity levels.

Static Surveillance was undertaken in 2020, 2021 and 2022. The location of static units was determined by the proposed location of turbines. However, the location of turbines changed a number of times over the duration of the survey and therefore static unit locations changed from season to season to compensate for this. The following static unit models were deployed during this static bat detector surveys.

Table 1a: Static Bat Detectors deployed during Static Bat Detector Surveys.

Static Unit Code	Bat Detector Type	Recording Function	Microphone
SM4 Units 1 - 8	Wildlife Acoustics SongMeter 4 Bat FS	Passive Full Spectrum	SMM-U2, 4m cable
SM Mini Bat Units 1-12	Wildlife Acoustics SongMeter Mini Bat	Passive Full Spectrum	SMM-U2
SM3 & SM2 (2020 only)	Wildlife Acoustics SongMeter 4 Bat FS	Passive Full Spectrum	SMM-U2, 4m cable

Note: ultrasonic microphone were annually checked to ensure that their sensitivity was accurate for static surveillance.

2.4 Analysis

Summary statistics of data collated from static surveillance, walking and driven transects and dusk and dawn surveys were completed. All data collected was collated into excel files for each bat species in order to produce distribution maps.

In addition, the nightly number of bat passes recorded per species on the statics units were analysed using the website based tool Ecobat (http://www.ecobat.org.uk/).

2.4.1 Ecobat Tool

This Ecobat tool was designed by the University of Exeter, UK and is hosted by the Mammal Society, UK. The following is taken from the "About " section of the website:

Using bat passes to assess the relative importance of a site for policymakers therefore requires practitioners to account for how these multiple factors may have influenced the number of bat passes recorded at a site. Although professional opinion is valuable, it can often be based on intuition, is context dependent and can vary considerably between practitioners (Hulme, 2014).

It is therefore likely that an assessment of the ecological value of a site (and the impacts of any proposed action) will vary between practitioners based upon their own level of experience and knowledge of the region and/or species.

Ecobat compares surveys submitted by the user with a national reference dataset and objectively quantifies bat activity levels. It offers a web-based interface for depositing data rapidly and securely, automatically generating a numerical indicator of the relative importance of a night's worth of activity, by contrasting with a comparable reference range. The output can be used by ecologists to accurately quantify what bat activity means for use during ecological impact assessments.

Ecobat uses percentiles to provide a numerical representation of activity levels relative to the surrounding landscape for each night of surveying. Percentiles can then be assigned to activity categories (low, moderate, high) to provide a quantifiable measure of bat activity. Percentiles provide a numerical indicator of the relative importance of a nights' worth of bat activity by comparing it with a national database. For example, activity data in the 80th percentile would indicate that the recorded data were in the top 20% of activity for the reference range".

Table 1b: Percentile score and categorised level of bat activity.

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

2.4.2 Bat Habitats & Bat Activity Analysis

All static recording locations sampled are also classed according to their favourability as a bat habitat within 200m radius of the static location. Four classifications are used:

- Open – for example, open peat bog. Typically, there is little tall vegetation in this category which is generally required for bat species to forage and commute along (exception to this is Leisler's bats). This category would be considered to have a low potential for the majority of bat species.
- Edge – for example, hedgerows, treelines and woodland edge. Bat species such as *Pipistrellus* species have a preference to fly along linear habitat features. This category would be considered to have a high potential for the majority of bat species.
- Closed – for example woodland. Bat species such a brown long-eared bats have a preference to foraging within woodland habitats. This category would be considered to have a high potential for the majority of bat species.
- Water – while an open habitat, due to the insect resource associated with water, these habitat types are often favoured by foraging bats, especially Daubenton's bat.

Roche *et al.* (2014) and Lundy *et al.* (2011) reported on the habitats consider favourable for each Irish bat species. Using the habitat maps (QGIS map layers) produced by Tobin examined to aid analysis for this report. Habitats deemed by the author, under guidance of Roche *et al.* (2014) and Lundy *et al.* (2011), as "Bat Habitat" are as follows:

- Mixed broad leaved woodland
- Water bodies

- Linear habitat
- Bog Woodland
- Mosaic
- Scrub
- Conifer plantation

As a consequence, the “Habitat” shapefile provided by Tobin was used to represent “Bat Habitats” for analysis.

Additional QGIS layers were created to aid analysis for this report. Each bat encounter was mapped and bat encounters within 1km of the proposed turbine locations was extracted to represent the bat encounters of the principal proposed development area. As bats echolocation calls can be detected some distance from where the actual bat is flying, a 50m fly zone was created around each bat encounter to represent the general area that individual bat recorded could be located at that point in time. This was named the ***“Buffered Bat Encounters”*** and represents the potential distance that bat echolocation calls can be detected by an ultrasonic microphone (i.e. bat detector zone).

To further facilitate analysis, all turbine locations were buffered to 200m. This layer was named “Buffered Turbine Locations” and represents the potential area/zone directly around the turbine locations that may impact on local bat populations.

2.4.3 Internal Wind Farm Access Tracks

To facilitate the construction of the proposed wind turbine, an internal wind farm access tracks are required. This may result in the removal of habitats and the potential impact of this is investigated using the ***“Habitat”*** layer, **“*Buffered bat Encounters*”** layer and the **“*Buffered Turbine Locations*”** layer produced.

2.4.4 Core Sustenance Areas

Bat Conservation Trust (BCT) defines Core Sustenance Zones (CSZs) for different bat species and this is based on an extensive literature review (www.bats.org.uk). A CSZ refers to the area surrounding a communal bat roost within which habitat availability and quality will have a significant influence on the resilience and conservation status of the colony using the roost. With reference to development, the CSZ could be used to indicate:

- The area surrounding a communal roost within which development work may impact the commuting and foraging habitat of bats using that roost.
- The area within which it may be necessary to ensure no net reduction in the quality and availability of foraging habitat for the colony.

3. Bat Survey Results

The results of the different types of surveys are presented below and summarised at the end of the section. It is important that the whole section is read in order to gain a full impression of the potential bat value of the survey area.

3.1 Daytime Inspections

3.1.1 Building & Structure Inspection

There is one set of buildings located within the proposed development area (Figure 3a). This is comprised of two stone ruins located adjacent to the weather mast. These structures are surrounded by mature trees which provide shelter and therefore increases the roosting potential of the structures. Daytime inspections were undertaken of the buildings prior to each dusk survey completed (See Table 9 for survey dates) but no bats were recorded roosting in the structure during any of the inspections.

Table 2: Buildings / Structures inspection results.

Building Code	Description	Grid Reference (ITM)	Roost Type / Suitability	Bat Species
Building 1	Natural stone walls, corrugated roof sheeting on sections of building	585623, 903253	Medium	No bats recorded

3.1.2 Tree Potential Bat Roost (PBRs) Inspection

As stated above, there is an area of mature trees surrounding stone ruins within the proposed development area (Figure 2a). All of the trees within this located were inspected on two survey dates (17/10/2020 and 11/1/2021) for features such as tree holes, spilt limbs etc. that can provided roosting features for bats. The majority of trees in this area have a Potential Bat Roost or PBR value for local bat populations.

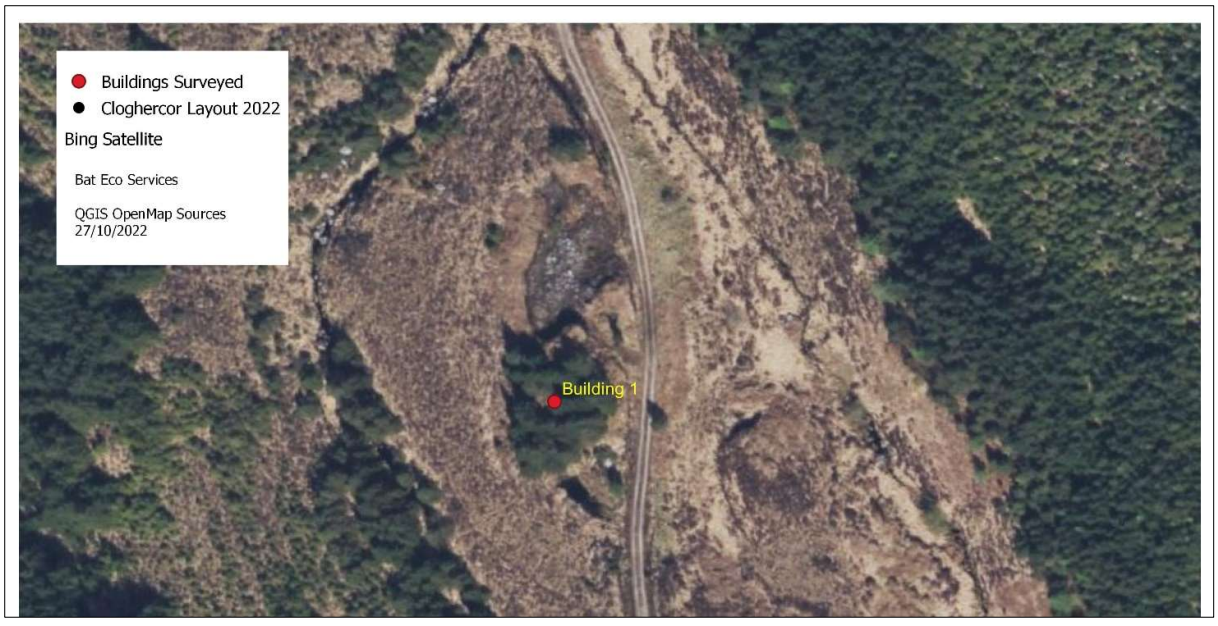

Figure 2: Location of Building 1 and surrounding mature trees.

3.2 Bat Detector Surveys

3.2.1 Dusk & Dawn Bat Surveys

The following table summarises the results of the bat detector surveys completed on various dates in 2020, 2021 and 2022. The majority of building surveys were undertaken in 2020 with seasonal surveys completed for the stone ruins within the proposed development area (i.e. Building 1). The survey dates and type of survey undertaken for the buildings are provided in the table below. Where permission was granted, buildings located outside the principal proposed development area were surveyed in 2020. No bat roosts were recorded.

Table 3: Buildings / Structures night-time survey results.

Building Code	Dates & Survey details	Survey Results
Old Ruins within survey area Building 1	22/4/2020 Dusk Survey (14oC, patchy cloud cover, calm, dry). 28/7/2020 Dusk Survey (15oC, patchy cloud cover, calm, dry). 18/8/2020 Dusk Survey (14oC, patchy cloud cover, light wind, dry). 17/10/2020 Dusk Survey (8oC, full cloud cover, calm, dry) 11/1/2021 Dusk Survey (8oC, full cloud cover, light wind, dry) 5/7/2021 Dusk Survey (14oC, full cloud cover, light breeze, dry) 15/6/2022 Dusk Survey (Summer)	No emerging bats detected during any of the surveys undertaken. Prior to each dusk survey, an endoscope inspection was undertaken of the ruins and no bats were recorded roosting in stone crevices. Foraging & commuting: soprano pipistrelle and *Myotis* spp. occasionally.
Stone ruins along local road Building 2	29/7/2020 Dawn Survey (11oC, full cloud cover, dry, calm) and static surveillance in vicinity of the ruins (1 night)	No bats detected returning to roost during survey undertaken. Static Surveillance : Soprano pipistrelle (17 passes) Common pipistrelle (12 passes) & Myotis species (1 pass).
Cottage + Shed (natural stone buildings, roof intact) Building 3	28/8/2020 Dusk Survey (14oC, full cloud cover, dry, calm)	No emerging bats detected during survey undertaken. Soprano pipistrelles recorded commuting and foraging briefly at 22;12 hrs and 22:57hrs.
Building (single storey, intact roof) along local road (within conifer plantation) Building 4	3/8/2020 Dusk Survey (weather conditions: 12oC, full cloud cover, dry, calm)	No emerging bats detected during survey undertaken. No bats detected during survey

Derelict building adjacent to road (natural stone, no roof) Building 5	3/8/2020 Dusk Survey (weather conditions: 12oC, full cloud cover, dry, calm)	No emerging bats detected during survey undertaken. Common pipistrelle detected at 22:54hrs, Soprano pipistrelle detected at 22:57hrs commuting by.
Stone Building (derelict, no roof) along Coillte tracks Building 6	3/8/2020 Dusk Survey (weather conditions: 12oC, full cloud cover, dry, calm) plus static surveillance (i.e. static unit located within the structure for one night of surveillance)	No emerging bats detected during survey undertaken. No bats detected on static unit.
Private Dwelling (occupied) Building 8	31/8/2020 (14oC, weather conditions: full cloud cover, dry, light breeze)	No bats detected emerging from building. Leisler's bat, Soprano pipistrelle and common pipistrelles (individual bats) recorded commuting and occasionally foraging along treelines.
Graveyard	1/9/2020 Dawn Survey	The principal function of this survey was to document Leisler's bat commuting routes across the river. The graveyard is located at a suitable high vantage point. No commuting bats recorded.
Private Dwelling (occupied) Building 7	1/9/2020 Dusk Survey (14oC, weather conditions: full cloud cover, dry, light breeze)	No bats detected emerging from building. Soprano pipistrelle commuting to survey area from 20:35 hrs (x2 individuals). Single common pipistrelle recorded briefly at 20:58hrs.
Private dwelling (unoccupied, cottage, roof intact) Building 9	1/9/2020 Dusk Survey (13.5oC, full cloud cover, breezy, dry)	No bats detected returning to building.
Buildings (x2, natural stone, intact roof) along local road (within conifer plantation) Building 10	3/8/2020 Dusk Survey (weather conditions: 12oC, full cloud cover, dry, calm)	No emerging bats detected during survey undertaken. No bats detected during survey
Private dwelling (unoccupied, cottage, slate roof intact) located in Coillte area Building 11	6/7/2021 Dusk Survey (weather conditions: 14oC, full cloud cover, dry, calm)	No emerging bats detected during survey undertaken. No bats detected during survey

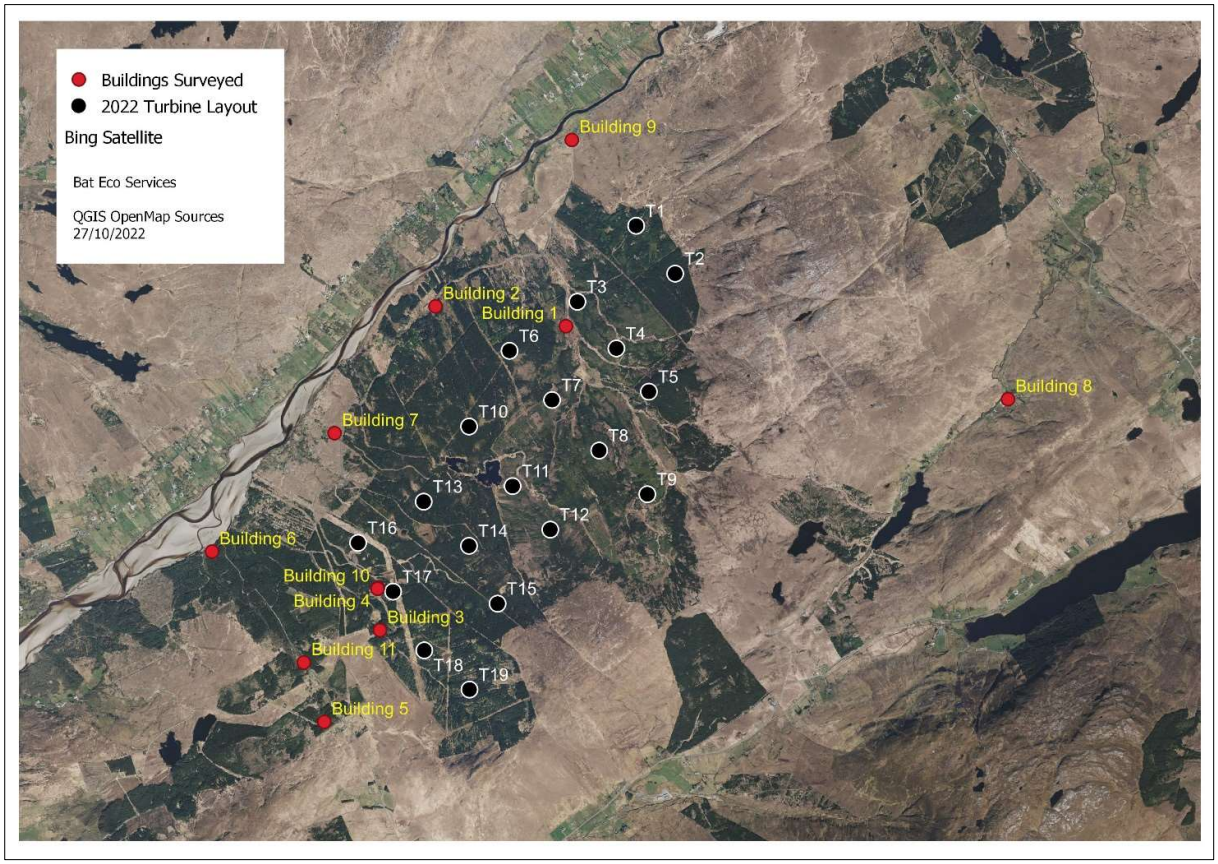

Figure 3: Location of 11 buildings surveyed during night-time surveys (Please note – two buildings are located adjacent to each other i.e. Red Circles overlap).

3.2.2 Walking & Driving Transects

The bat encounters recorded for these surveys are reported as part of overall summary maps for each of the bat species. The following bat species were recorded during transects: soprano pipistrelle, common pipistrelle, Leisler's bat, Natterer's bat, Daubenton's bat and brown long-eared bat. This information provides distribution results for the bat species recorded.

3.2.3 Passive Static Bat Detector Survey

The following tables summarises the results recorded on the static units deployed over seven surveillance periods (a total of 102 static unit points). The information collated by the static surveillance is analysed using the EcoBat Tool and therefore will be discussed in greater detail under that section of the report. Figures are provided to show the location of each of the static unit in relation to the proposed turbine locations. The location of static units was determined by the proposed location of turbines. However, the location of turbines changed a number of times over the duration of the survey and therefore static unit locations changed from season to season to compensate for this. The current turbine layout determined the Summer 2022 surveillance deployment. All static units were deployed for a minimum of 10 days and therefore meet the level of surveillance recommended by guidance documents.

Table 4a: Results of Static Bat Detectors deployed during Summer 2020.

Static Code	Grid Reference (ITM)	Closest Turbine No.	Survey Period	Bat Species
Summer 1	583935, 901596	T18	18/8/2020 to 31/8/2020	CP, Leis, Daub, Whis, Myotis, BLE
Summer 2	584482, 901176	T16	18/8/2020 to 31/8/2020	CP, SP, Leis, Natt, BLE
Summer 3	584464, 900815	T19	18/8/2020 to 31/8/2020	Daub, Whis, Natt, Myotis, BLE
Summer 4	586482, 901672	T10	18/8/2020 to 31/8/2020	No bats recorded
Summer 5	586453, 901881	T9	18/8/2020 to 31/8/2020	SP, Daub, BLE
Summer 6	585368, 902136	T13	18/8/2020 to 31/8/2020	Leis
Summer 7	585879, 902748	T7 & T8	18/8/2020 to 31/8/2020	SP, CP
Summer 8	586756, 902444	T5	18/8/2020 to 31/8/2020	CP, Leis, BLE
Summer 9	586106, 903153	T4	18/8/2020 to 31/8/2020	CP, Leis, BLE
Summer 10	585706, 903697	T3	18/8/2020 to 31/8/2020	Natt, BLE
Summer 11	583048, 900886	>500m	18/8/2020 to 31/8/2020	CP, SP, Leis, Myotis, BLE
Summer 12	583578, 899932	>500m	18/8/2020 to 31/8/2020	CP, SP, Daub, Natt, Myotis, BLE
Summer 13	582373, 901207	>500m	18/8/2020 to 31/8/2020	CP, SP, Daub, Natt, Whis, Myotis, BLE
Summer 14	585901, 902803	T7 & T8	18/8/2020 to 31/8/2020	Leis

NOTE: CP = common pipistrelle, SP = soprano pipistrelle, Leis = Leisler's bat, BLE = brown long-eared bat, Natt = Natterer's bat, Whis = Whiskered bat, Daub = Daubenton's bat, Myotis = Myotis species.

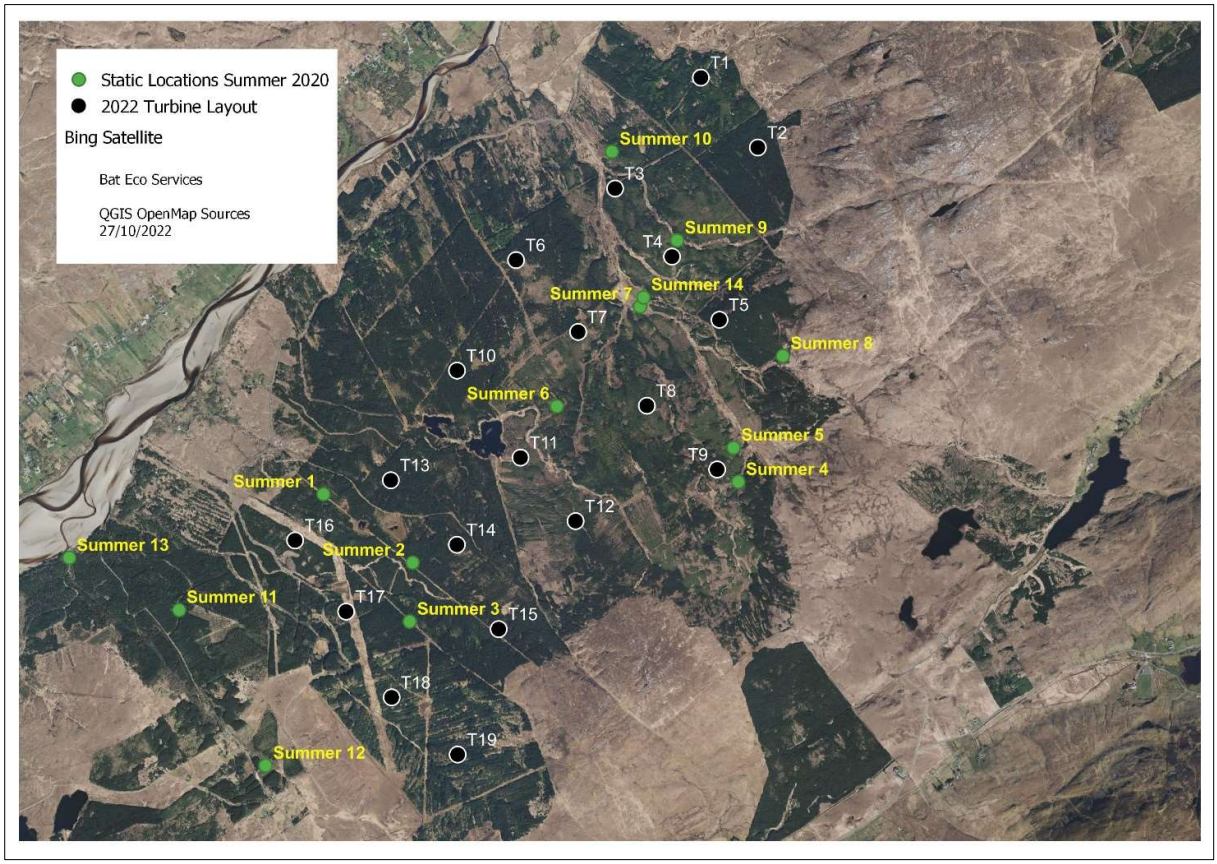

Figure 4a: Location of static units deployed during Summer 2020 static surveillance.

Table 4b: Results of Static Bat Detectors deployed during Autumn 2020.

Static Code	Grid Reference (ITM)	Closest Turbine No.	Survey Period	Bat Species
Autumn 1	583938, 901599	T18	18/8/2020 to 31/8/2020	CP, SP, Leis, Natt, Myotis, BLE
Autumn 2	584482, 901173	T16 & T19	18/8/2020 to 31/8/2020	CP, SP, Leis, Natt, BLE
Autumn 3	585135, 900620	T17	18/8/2020 to 31/8/2020	CP, SP, Whis, BLE
Autumn 4	586482, 901673	T10	18/8/2020 to 31/8/2020	No bats recorded
Autumn 5	586452, 901877	T9	18/8/2020 to 31/8/2020	CP, Leis, Daub, Myotis, BLE
Autumn 6	585366, 902135	T13	18/8/2020 to 31/8/2020	CP, Leis, Daub, BLE
Autumn 7	585871, 902746	T7 & T8	18/8/2020 to 31/8/2020	SP, CP, Daub, Whis, Natt, Myotis, BLE
Autumn 8	586761, 902444	T5	18/8/2020 to 31/8/2020	SP, CP, Leis, Daub, Natt, Myotis, BLE

Autumn 9	586105, 903166	T4	18/8/2020 to 31/8/2020	SP, CP, Leis, Daub, BLE
Autumn 10	585706, 903712	T3	18/8/2020 to 31/8/2020	SP, CP, Leis, Natt, Myotis, BLE
Autumn 11	582378, 901207	>500m	18/8/2020 to 31/8/2020	SP, CP, NP, Leis, Daub, Natt, Whis, Myotis, BLE
Autumn 12	582983, 900726	>500m	18/8/2020 to 31/8/2020	SP, CP, Leis, Daub, Myotis, BLE
Autumn 13	583578, 899913	>500m	18/8/2020 to 31/8/2020	SP, CP, NP, Leis, Daub, Natt, Myotis, BLE
Autumn 14	581775, 898877	>500m	18/8/2020 to 31/8/2020	SP, CP, NP, Leis, Daub, Natt, Myotis, BLE
Autumn 15	585901, 902803	T7 & T8	18/8/2020 to 31/8/2020	CP, Leis, BLE

NOTE: CP = common pipistrelle, SP = soprano pipistrelle, Leis = Leisler's bat, BLE = brown long-eared bat, Natt = Natterer's bat, Whis = Whiskered bat, Daub = Daubenton's bat, Myotis = Myotis species.

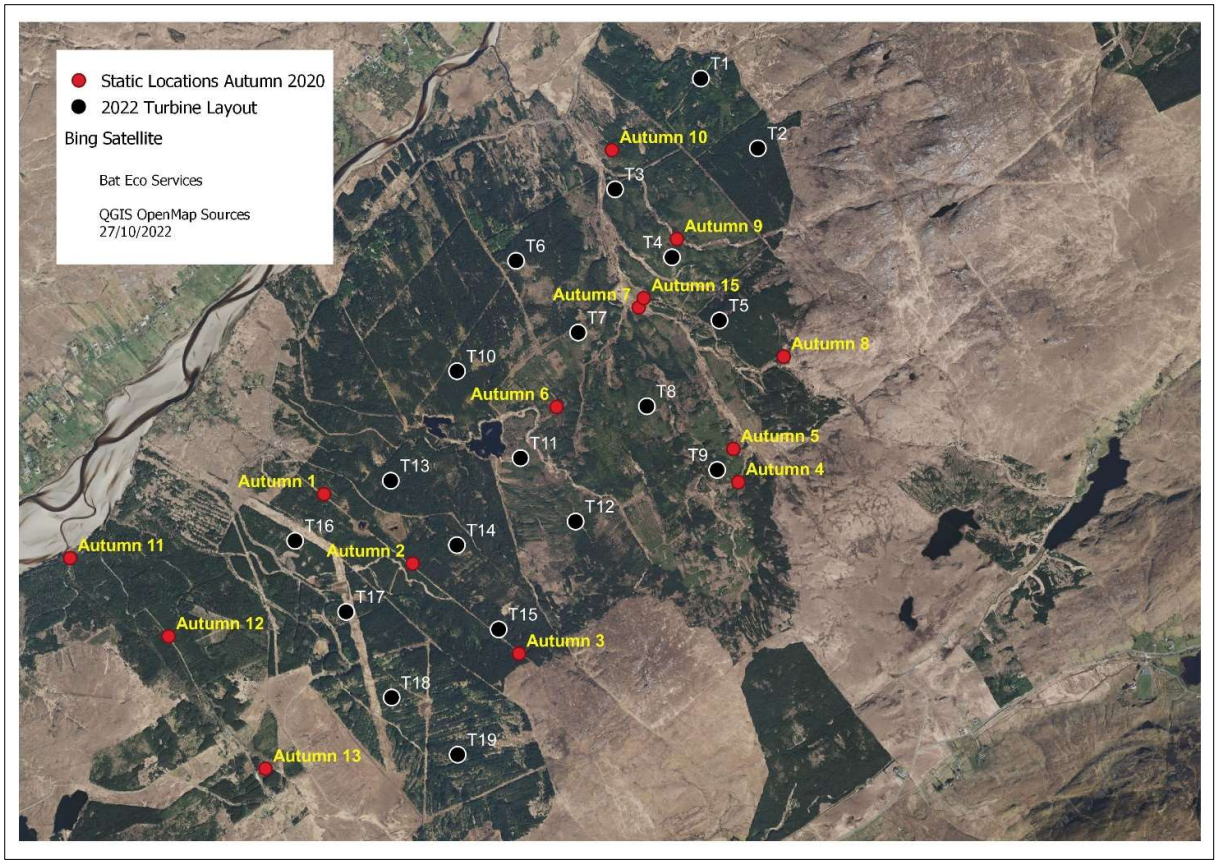

Figure 4b: Location of static units deployed during Autumn 2020 static surveillance.

Table 4c: Results of Static Bat Detectors deployed during Spring 2021.

Static Code	Grid Reference (ITM)	Closest Turbine No.	Survey Period	Bat Species
Spring 1	583826, 901389	T8	22/4/2021 to 3/5/2021	CP, SP
Spring 2	584495, 901192	T16	22/4/2021 to 3/5/2021	CP
Spring 3	586614, 904318	>500m	22/4/2021 to 3/5/2021	CP
Spring 4	586768, 903889	T2	22/4/2021 to 3/5/2021	SP, CP, Leis, Daub, Whis, BLE
Spring 5	586145, 904359	T1	22/4/2021 to 3/5/2021	SP, CP, Leis, Daub, Whis, BLE
Spring 6	584704, 900960	T16	22/4/2021 to 3/5/2021	SP, CP, Leis, Daub, Myotis, BLE
Spring 7	584083, 901108	T19	22/4/2021 to 3/5/2021	SP, CP, Leis, Daub, Natt, BLE
Spring 8	585578, 903795	T3	22/4/2021 to 3/5/2021	SP, CP, Leis, Myotis, BLE
Spring 9	586406, 902833	T4	22/4/2021 to 3/5/2021	SP, CP, Myotis
Spring 10	586302, 902338	T8	22/4/2021 to 3/5/2021	CP
Spring 11	586241, 902477	T8	22/4/2021 to 3/5/2021	SP, CP, Leis, Daub, Natt, Whis, Myotis, BLE
Spring 12	584950, 902051	T12	22/4/2021 to 3/5/2021	SP, CP, Leis, Daub, Whis, Myotis
Spring 13	585525, 902053	T13	22/4/2021 to 3/5/2021	SP, Myotis
Spring 14	585872, 902778	>500m	22/4/2021 to 3/5/2021	SP, CP, Leis, Natt, Whis, Myotis, BLE
Spring 15	585539, 902324	>500m	22/4/2021 to 3/5/2021	CP, SP

NOTE: CP = common pipistrelle, SP = soprano pipistrelle, Leis = Leisler's bat, BLE = brown long-eared bat, Natt = Natterer's bat, Whis = Whiskered bat, Daub = Daubenton's bat, Myotis = Myotis species.

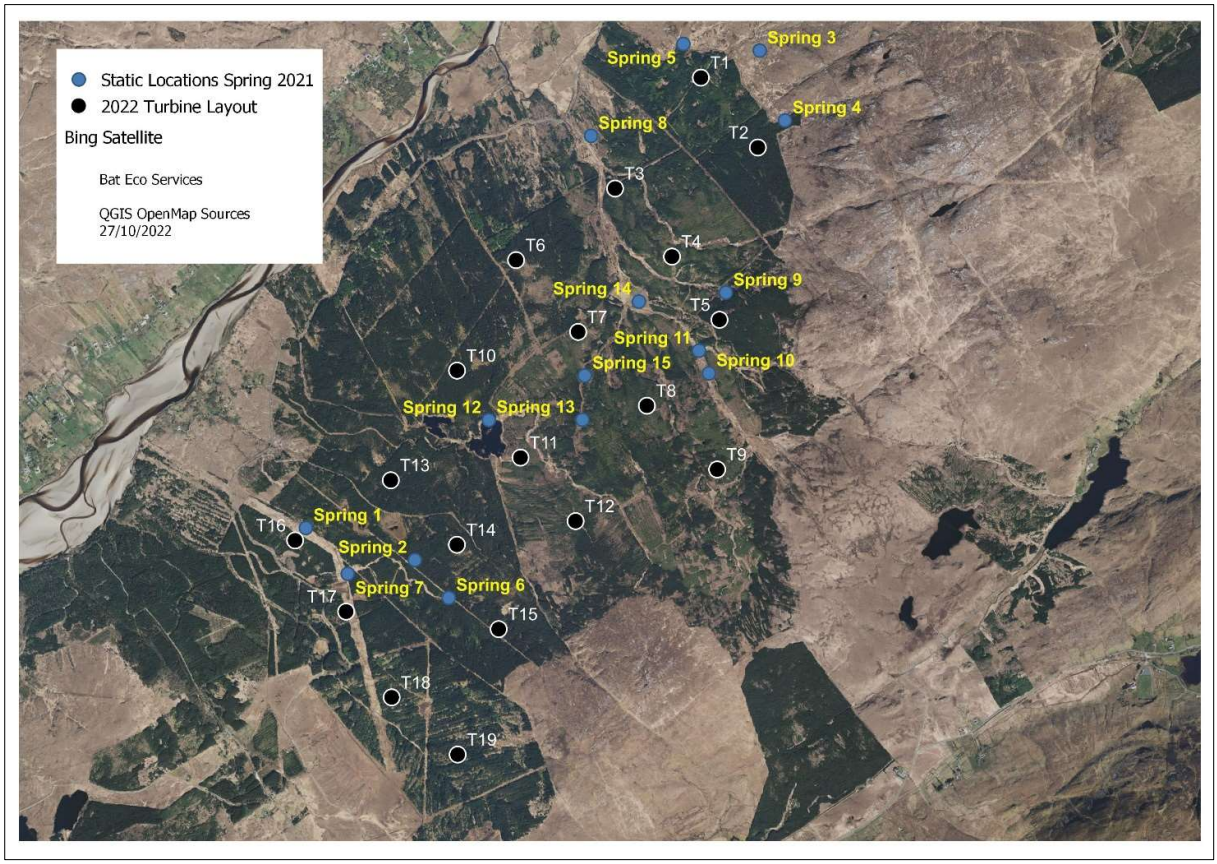

Figure 4c: Location of static units deployed during Spring 2021 static surveillance.

Table 4d: Results of Static Bat Detectors deployed during Summer 2021.

Static Code	Grid Reference (ITM)	Closest Turbine No.	Survey Period	Bat Species
Summer 15	581865, 899126	>500m	5/7/2021 to 19/7/2021	SP, CP, NP, Leis, Daub, Whis, Natt, Myotis
Summer 16	582467, 899336	>500m	5/7/2021 to 19/7/2021	No bats recorded
Summer 17	582419, 900967	>500m	5/7/2021 to 19/7/2021	SP, CP, Leis, Daub, Myotis, BLE
Summer 18	581775, 900407	>500m	5/7/2021 to 19/7/2021	SP, CP, Leis, Daub, Natt, Myotis, BLE
Summer 19	583065, 901116	>500m	5/7/2021 to 19/7/2021	SP, CP, Leis, Daub, Whis, Natt, Myotis, BLE
Summer 20	584767, 899684	T21	5/7/2021 to 19/7/2021	SP, CP, Leis, Daub, Myotis, BLE
Summer 21	584923, 900828	T17	5/7/2021 to 19/7/2021	SP, CP, Leis, Daub, Natt, BLE

Summer 22	585985, 903327	T3	5/7/2021 to 19/7/2021	SP, CP, Leis, BLE
Summer 23	586626, 903174	T4	5/7/2021 to 19/7/2021	SP, CP, NP
Summer 24	585633, 903531	T3	5/7/2021 to 19/7/2021	SP, CP, Myotis
Summer 25	585682, 902798	T7	5/7/2021 to 19/7/2021	SP, CP, Leis, BLE
Summer 26	585220, 901979	T13	5/7/2021 to 19/7/2021	Leis, CP
Summer 27	584278, 902348	T11	5/7/2021 to 19/7/2021	SP, CP, Leis, Daub, Natt, Myotis
Summer 28	584736, 902460	T12	5/7/2021 to 19/7/2021	SP, CP, Leis, Myotis
Summer 29	585567, 901345	T14	5/7/2021 to 19/7/2021	SP, CP, Leis, BLE

NOTE: CP = common pipistrelle, SP = soprano pipistrelle, Leis = Leisler's bat, BLE = brown long-eared bat, Natt = Natterer's bat, Whis = Whiskered bat, Daub = Daubenton's bat, Myotis = Myotis species.

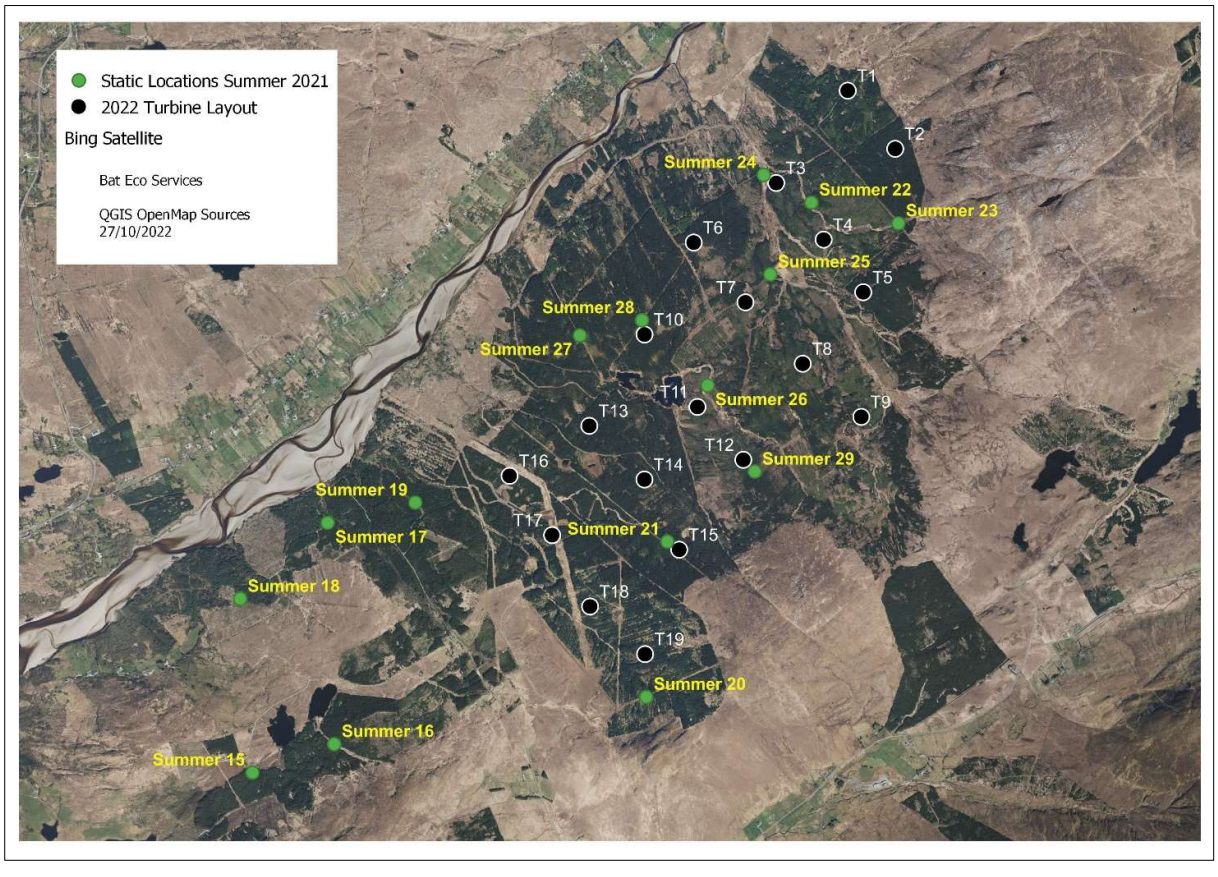

Figure 4d: Location of static units deployed during Summer 2021 static surveillance.

Table 4e: Results of Static Bat Detectors deployed during Autumn 2021.

Static Code	Grid Reference (ITM)	Closest Turbine No.	Survey Period	Bat Species
Autumn 16	582418, 900962	>500m	30/8/2021 to 12/9/2021	SP, CP
Autumn 17	583064, 901112	>500m	30/8/2021 to 12/9/2021	SP, CP, Leis, Daub, Whis, Natt, My
Autumn 18	582459, 899339	>500m	30/8/2021 to 12/9/2021	SP, CP, Natt, BLE
Autumn 19	584919, 900330	T17	30/8/2021 to 12/9/2021	SP, CP, NP, Leis, Natt, My, BLE
Autumn 20	585558, 901353	T14	30/8/2021 to 12/9/2021	SP, CP, Leis, Daub, Natt, Myotis, BLE
Autumn 21	585285, 901832	T3	30/8/2021 to 12/9/2021	SP, CP, Leis, Daub, Natt, Myotis, BLE
Autumn 22	585629, 903535	T3	30/8/2021 to 12/9/2021	SP, CP, Leis, Daub, Natt, Myotis
Autumn 23	586623, 903173	T4	30/8/2021 to 12/9/2021	SP, CP, Daub, Whis, Myotis, BLE
Autumn 24	584735, 902457	T12	30/8/2021 to 12/9/2021	SP,CP, Leis, Daub, Natt, BLE
Autumn 25	581774, 900411	>500m	30/8/2021 to 12/9/2021	SP, CP, NP, Leis, Whis, Daub, Natt, Myotis, BLE
Autumn 26	581867, 899124	>500m	30/8/2021 to 12/9/2021	SP, CP, NP, Leis, Whis, Natt, Myotis, BLE
Autumn 27	584764, 899682	T21	30/8/2021 to 12/9/2021	SP, CP, Leis, Whis, Natt, Myotis, BLE
Autumn 28	585683, 902804	T17	30/8/2021 to 12/9/2021	SP, CP, Myotis
Autumn 29	585985, 903336	T3	30/8/2021 to 12/9/2021	SP, CP, Leis, Whis, Natt, Myotis, BLE
Autumn 30	584270, 902353	T11	30/8/2021 to 12/9/2021	SP, CP, Leis, Whis, Natt, Myotis, BLE

NOTE: CP = common pipistrelle, SP = soprano pipistrelle, Leis = Leisler's bat, BLE = brown long-eared bat, Natt = Natterer's bat, Whis = Whiskered bat, Daub = Daubenton's bat, Myotis = Myotis species.

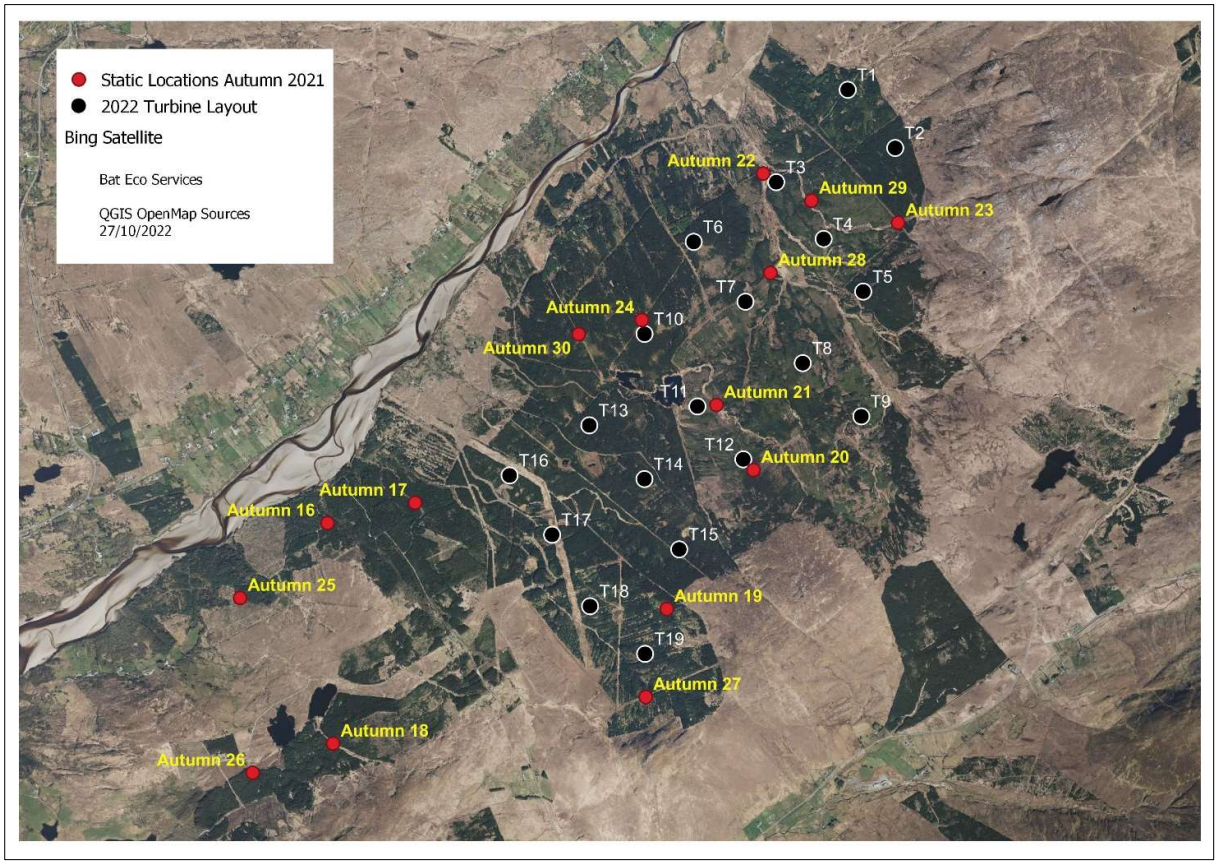

Figure 4e: Location of static units deployed during Autumn 2021 static surveillance.

Table 4f: Results of Static Bat Detectors deployed during Spring 2022.

Static Code	Grid Reference (ITM)	Closest Turbine No.	Survey Period	Bat Species
Spring 16	585937, 902471	T8	25/4/2022 to 12/5/2022	No bats recorded
Spring 17	584964, 899787	T21	25/4/2022 to 12/5/2022	SP, CP, Leis, Natt, Myotis, BLE
Spring 18	586713, 902636	T5	25/4/2022 to 12/5/2022	No bats recorded
Spring 19	585509, 902816	T7	25/4/2022 to 12/5/2022	SP, NP, Leis, Daub, BLE
Spring 20	584986, 902215	T12	25/4/2022 to 12/5/2022	SP
Spring 21	585026, 903221	T6	25/4/2022 to 12/5/2022	SP, CP, Leis, Daub, BLE
Spring 22	584344, 902335	T11	25/4/2022 to 12/5/2022	SP, Leis

Spring 23	586261, 904179	T1	25/4/2022 to 12/5/2022	SP, CP, Leis, Daub, Whis, Natt, Myotis, BLE
Spring 24	586860, 903836	T2	25/4/2022 to 12/5/2022	SP, CP, Leis, BLE
Spring 25	584399, 901577	T15	25/4/2022 to 12/5/2022	SP, CP, Leis, Daub, Whis, Natt, Myotis, BLE
Spring 26	584865, 901272	T16	25/4/2022 to 12/5/2022	SP
Spring 27	583688, 901400	T18	25/4/2022 to 12/5/2022	SP, CP, Leis, Daub, Natt, BLE
Spring 28	584113, 900811	T19	25/4/2022 to 12/5/2022	SP, CP, Leis, Daub, Natt, Myotis, BLE
Spring 29	584403, 900266	T20	25/4/2022 to 12/5/2022	SP, CP, Leis, BLE

NOTE: CP = common pipistrelle, SP = soprano pipistrelle, Leis = Leisler's bat, BLE = brown long-eared bat, Natt = Natterer's bat, Whis = Whiskered bat, Daub = Daubenton's bat, Myotis = Myotis species.

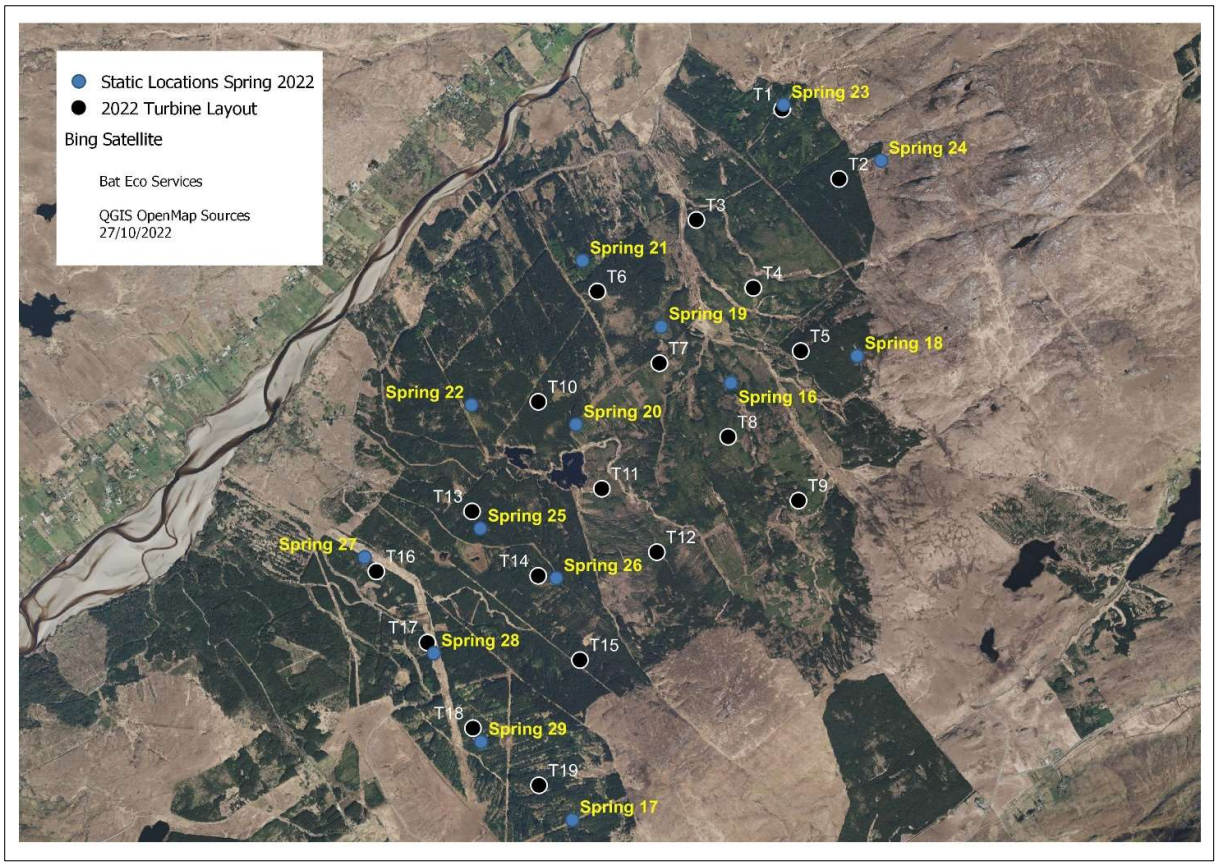

Figure 4f: Location of static units deployed during Spring 2022 static surveillance.

Table 4g: Results of Static Bat Detectors deployed during Summer 2022.

Static Code	Grid Reference (ITM)	Closest Turbine No.	Survey Period	Bat Species
Summer 30	585011,903013	T6	15/6/2022 to 27/6/2022	No bats recorded
Summer 31	585127,901854	T12	15/6/2022 to 27/6/2022	SP, CP, Leis, Daub
Summer 32	585523,902644	T7	15/6/2022 to 27/6/2022	CP, Leis, BLE
Summer 33	586262, 904180	T1	15/6/2022 to 27/6/2022	SP, CP, Leis, Daub, Natt, BLE
Summer 34	585969,902280	T8	15/6/2022 to 27/6/2022	CP, Myotis
Summer 35	586729,903801	T2	15/6/2022 to 27/6/2022	CP, Leis, Daub, Whis, Natt, Myotis, BLE
Summer 36	586456,901666	T9	15/6/2022 to 27/6/2022	CP, SP, Leis, Daub, Natt, Myotis
Summer 37	586017, 903083	T4	15/6/2022 to 27/6/2022	SP, CP, Leis, Daub
Summer 38	585615,901445	T14	15/6/2022 to 27/6/2022	SP, CP, Leis, Daub
Summer 39	586319,902616	T10	15/6/2022 to 27/6/2022	CP, Leis, BLE
Summer 40	584147, 900837	T19	15/6/2022 to 27/6/2022	SP, CP, Leis, Daub, BLE
Summer 41	584415, 901594	T15	15/6/2022 to 27/6/2022	SP, CP, Daub
Summer 42	584995,900734	T17	15/6/2022 to 27/6/2022	SP, CP, Leis, BLE
Summer 43	583779,901346	T18	15/6/2022 to 27/6/2022	SP, CP, Leis, Daub, Natt, Myotis, BLE

NOTE: CP = common pipistrelle, SP = soprano pipistrelle, Leis = Leisler's bat, BLE = brown long-eared bat, Natt = Natterer's bat, Whis = Whiskered bat, Daub = Daubenton's bat, Myotis = Myotis species.

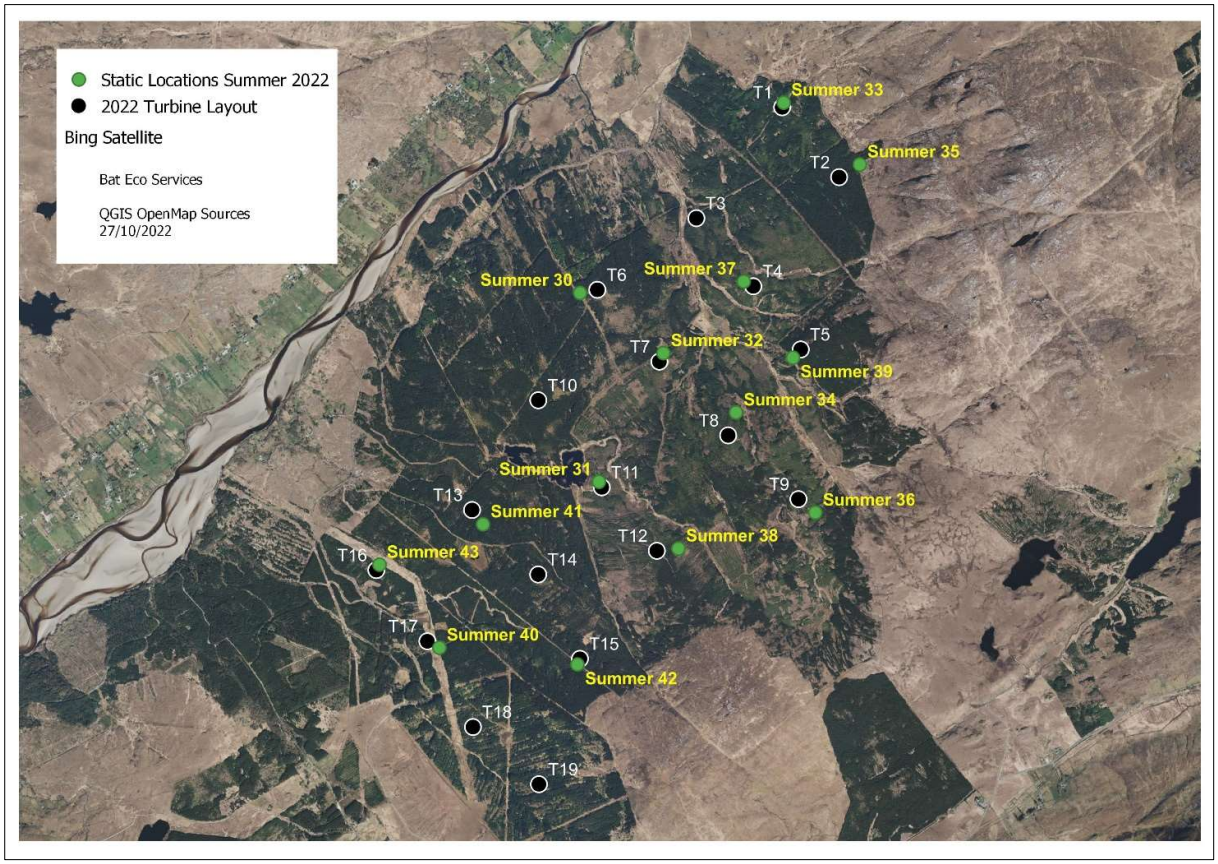

Figure 4g: Location of static units deployed during Summer 2022 static surveillance.

A total of seven static surveillance periods was undertaken during 2020, 2021 and 2022 surveys. This was a total of 10,909 hours of surveillance. In order to provide an overall visual in relation to the total level of bat activity recorded at the static units the following graphs were prepared. The bat species were divided into two groups:

- Common bat species: common pipistrelle, soprano pipistrelle and Leisler's bat;
- Less Common bat species: all remaining Irish bat species.

NOTE: The behaviour of bats during commuting and foraging greatly influences the level of bat passes recorded on static units. The number of bat passes do not equate to the number of bats flying past the static unit. Pipistrellus species tend to foraging as they commute and therefore are regularly observed flying up and down a treeline or hedgerow before moving on in the landscape. Leisler's bats fly high in the sky and therefore can be observed flying fast through the landscape, occasionally foraging over treetops as they commute. As a consequence, Pipistrellus species bat activity tends to result in a higher number of bat passes recorded on static units compared to Leisler's bats. In relation to other bat species recorded, as they tend to be less common in the landscape compared to common pipistrelles, soprano pipistrelles and Leisler's bats, their recorded presence is notable. Exceptions to this would include Daubenton's bats on a waterway or a static located adjacent to a known bat roost.

The total number of soprano pipistrelles bat passes recorded was 14,949 (= 1.37 bat passes/hr) during the entire static surveillance (10,909 hours) while common pipistrelles (10,759 bat passes = 1 bat pass/hr) and Leisler's bats (1358 bat passes = 0.1 bat passes/hr) were the second and third most frequently recorded bat species, respectively. In relation to distribution across the static unit locations, common pipistrelle was the most frequently recorded bat species (i.e. 87 of the 102

locations = 85%) . All other bat species were recorded at a lower level of bat passes and less frequently across static surveillance locations.

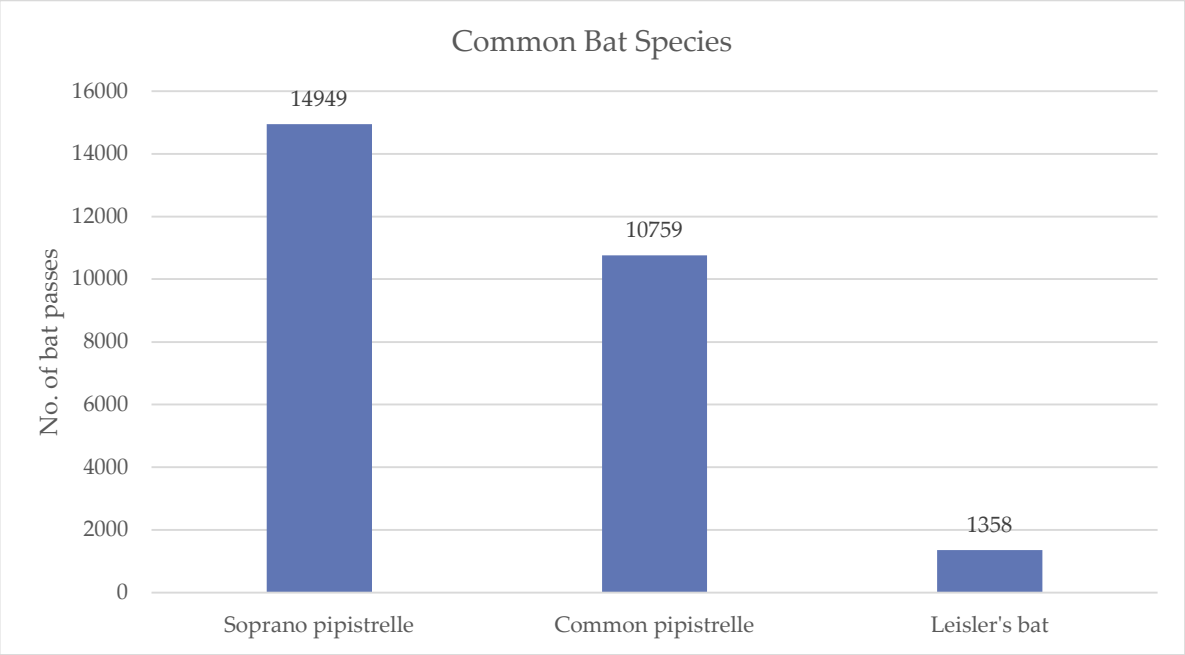

Figure 4h: Total number of bat passes recorded for Common Bat Species in Ireland.

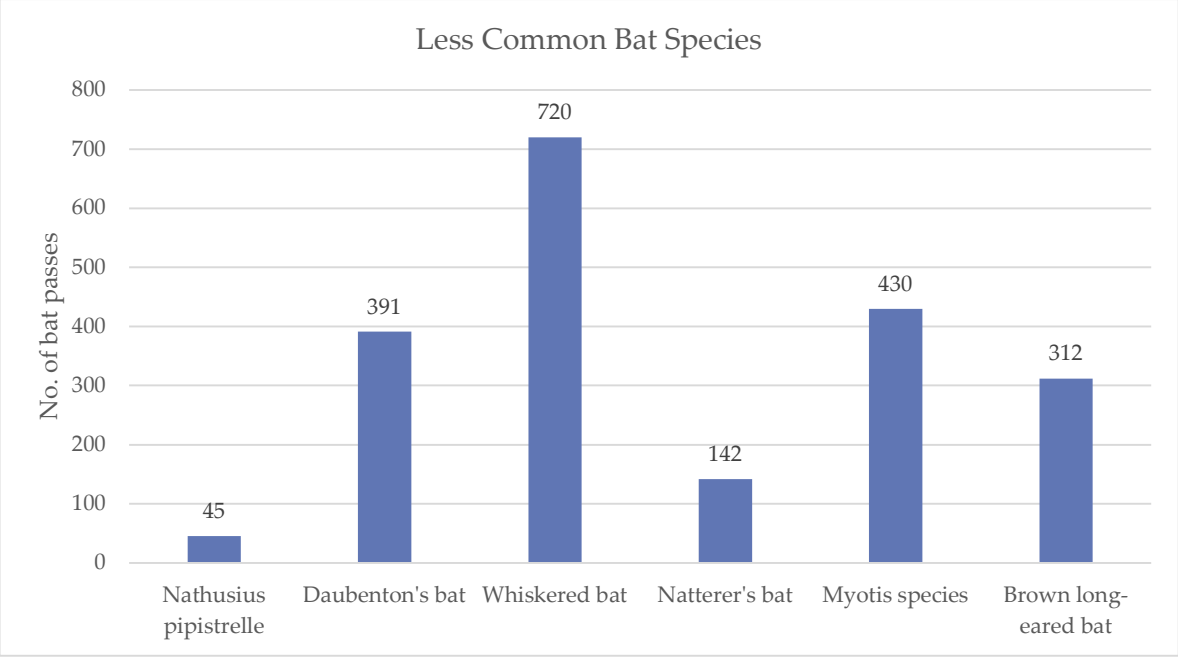

Figure 4i: Total number of bat passes recorded for Less Common Bat Species in Ireland.

3.2.4 Bat Survey Results - Summary

The following figures illustrate the location of bat encounters recorded during all of the bat surveys completed. A total of eight bat species were recorded within the proposed development site. While a large array of night-time surveys were undertaken, an overall low level of bat activity was recorded during dusk and dawn surveys and walking/driving transects. For less common bat species, the bat encounters recorded were primarily on static units as these were left in the "field" for a minimum of 10 days and therefore provide a greater opportunity to record bat species.

3.2.4.1 Soprano pipistrelle

A total of 426 geo-reference bat encounters were recorded for this species of bat during the array of bat surveys completed. As shown on Figure 5a, this bat species was recorded throughout the survey area. It was also recorded on 77 of the 102 static unit locations. As this species was recorded on a walking and driving transects covering a greater area than the proposed development area, a map to the scale of 1:50,000 was produced.

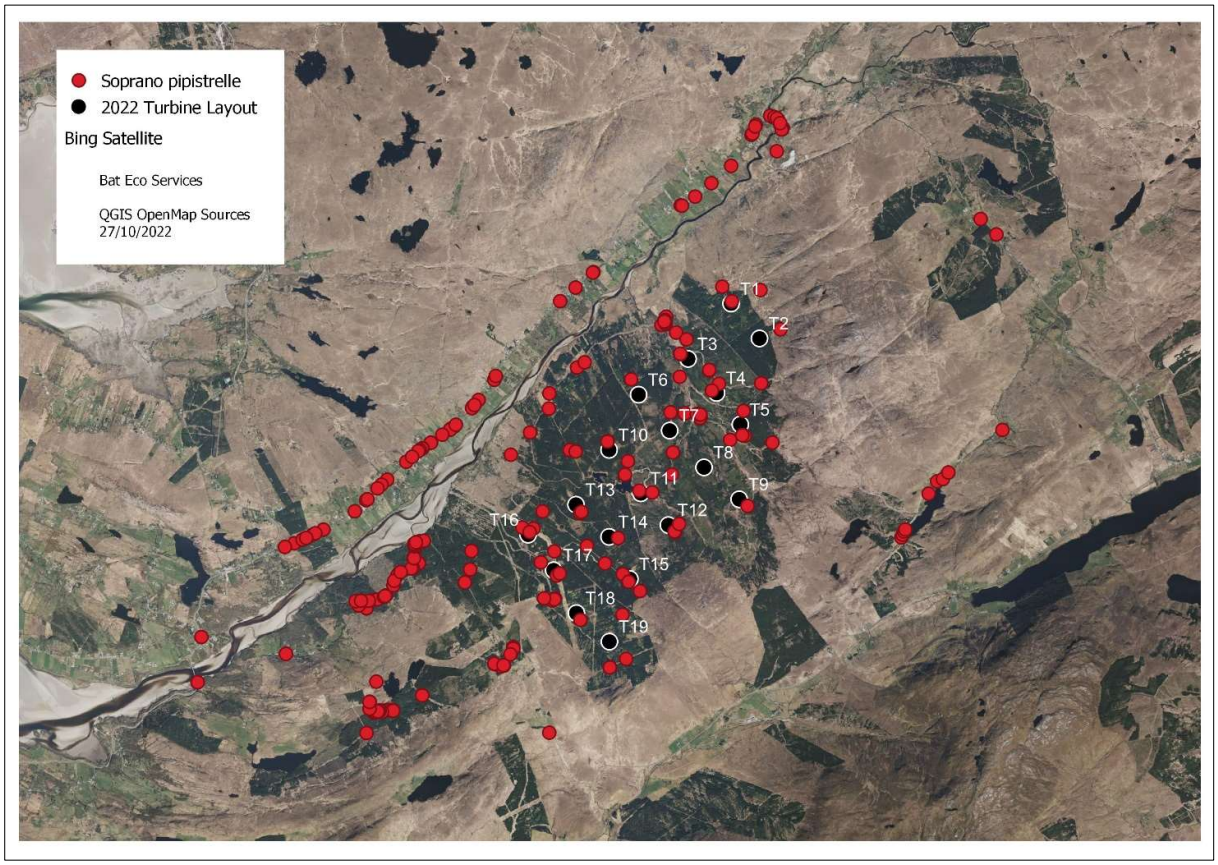

Figure 5a: Location of soprano pipistrelle bat encounters within the proposed development area and at a wider survey area.

3.2.4.2 Common pipistrelle

A total of 393 geo-reference bat encounters were recorded for this species of bat during the array of bat surveys completed. As shown on Figure 5b, this bat species was recorded throughout the survey area. It was also recorded on 87 of the 102 static unit locations. No bat roosts were recorded within the survey area for this bat species. As this species was recorded on a walking and driving transects covering a greater area than the proposed development area, a map to the scale of 1:50,000 was produced.

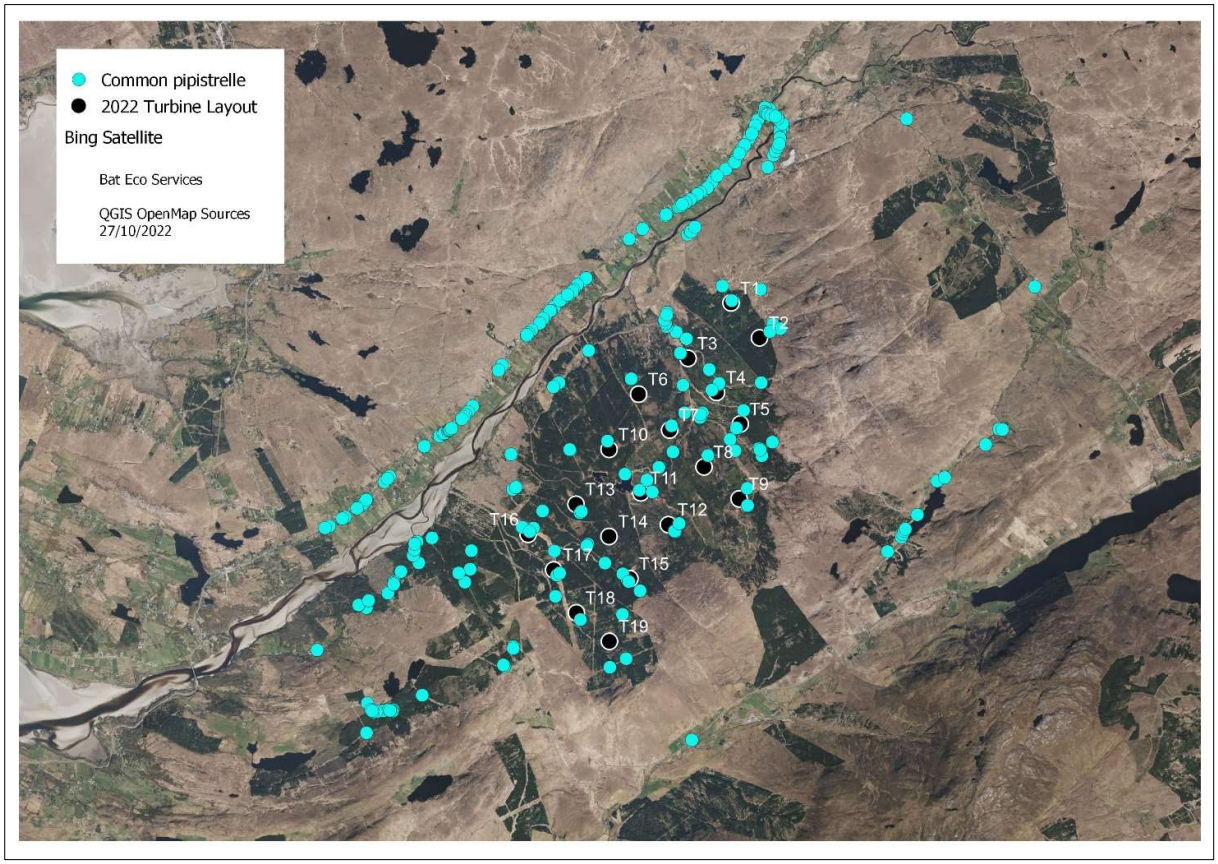

Figure 5b: Location of common pipistrelle bat encounters within the proposed development area and at a wider survey area.

3.2.4.3 Leisler's bat

A total of 104 geo-reference bat encounters were recorded for this species of bat during the array of bat surveys completed. As shown on Figure 5c, this bat species was recorded throughout the survey area. It was also recorded on 71 of the 102 static unit locations. No bat roosts were recorded within the survey area for this bat species. As this species was recorded on a walking and driving transects covering a greater area than the proposed development area, a map to the scale of 1:50,000 was produced.

3.2.4.4 Daubenton's bat

A total of 53 geo-reference bat encounters were recorded for this species of bat during the array of bat surveys completed. As shown on Figure 5d, this bat species was recorded throughout the survey area. It was also recorded on 51 of the 102 static unit locations. No bat roosts were recorded within the survey area for this bat species. As this species was recorded on a walking and driving transects covering a greater area than the proposed development area, a map to the scale of 1:50,000 was produced.

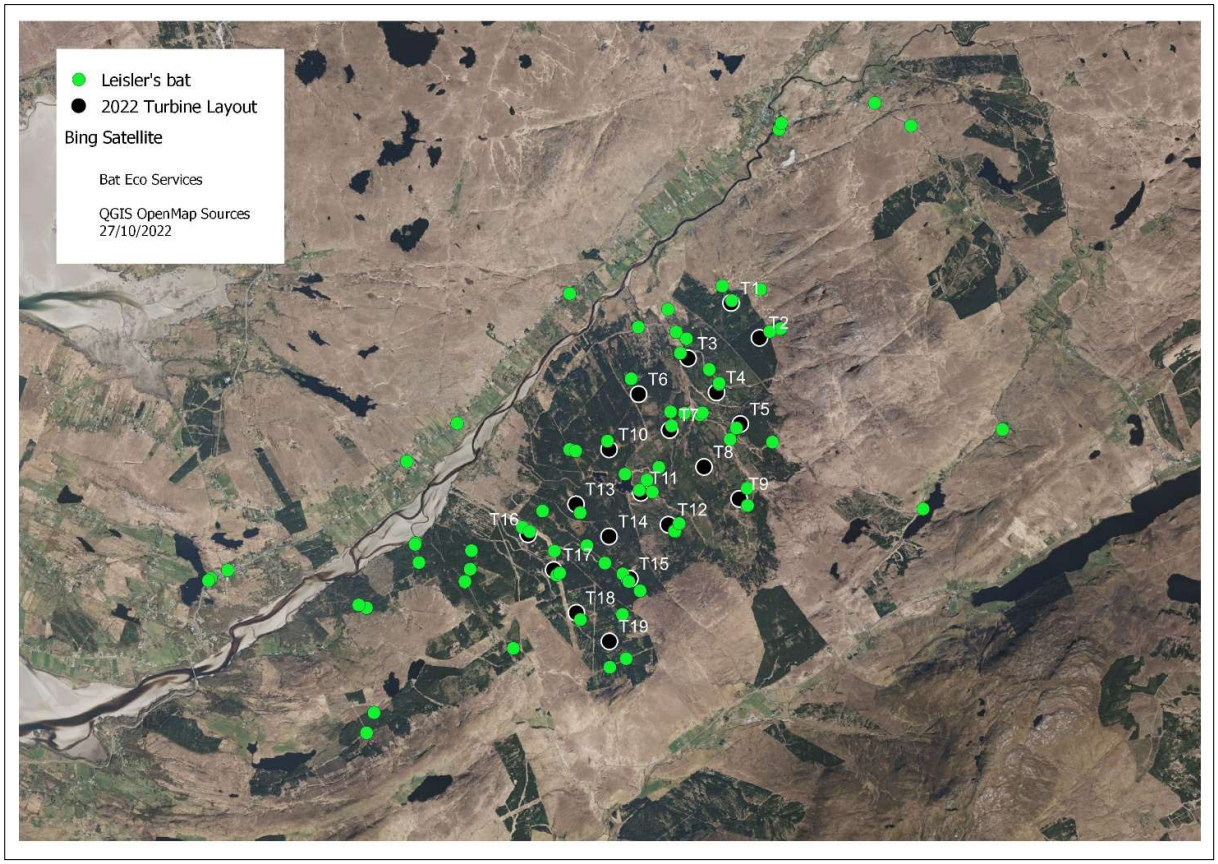

Figure 5c: Location of Leisler's bat encounters within the proposed development area and at a wider survey area.

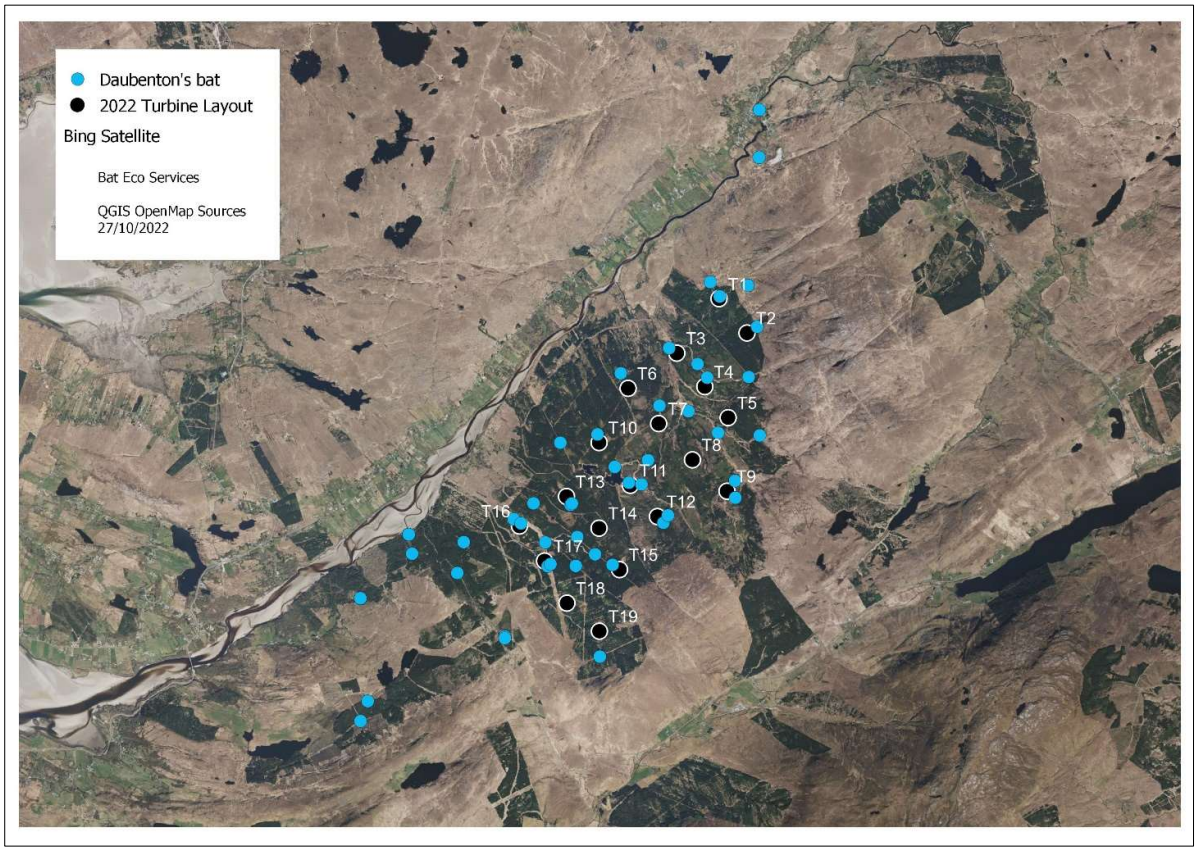

Figure 5d: Location of Daubenton's bat encounters within the proposed development area and at a wider survey area.

3.2.4.5 Nathusius' pipistrelle

Eleven geo-reference bat encounters were recorded for this species of bat during the array of bat surveys completed. It was only recorded on the static units and of these locations, it was recorded on 11 of the 102 static unit locations. The level of encounter rate was low.

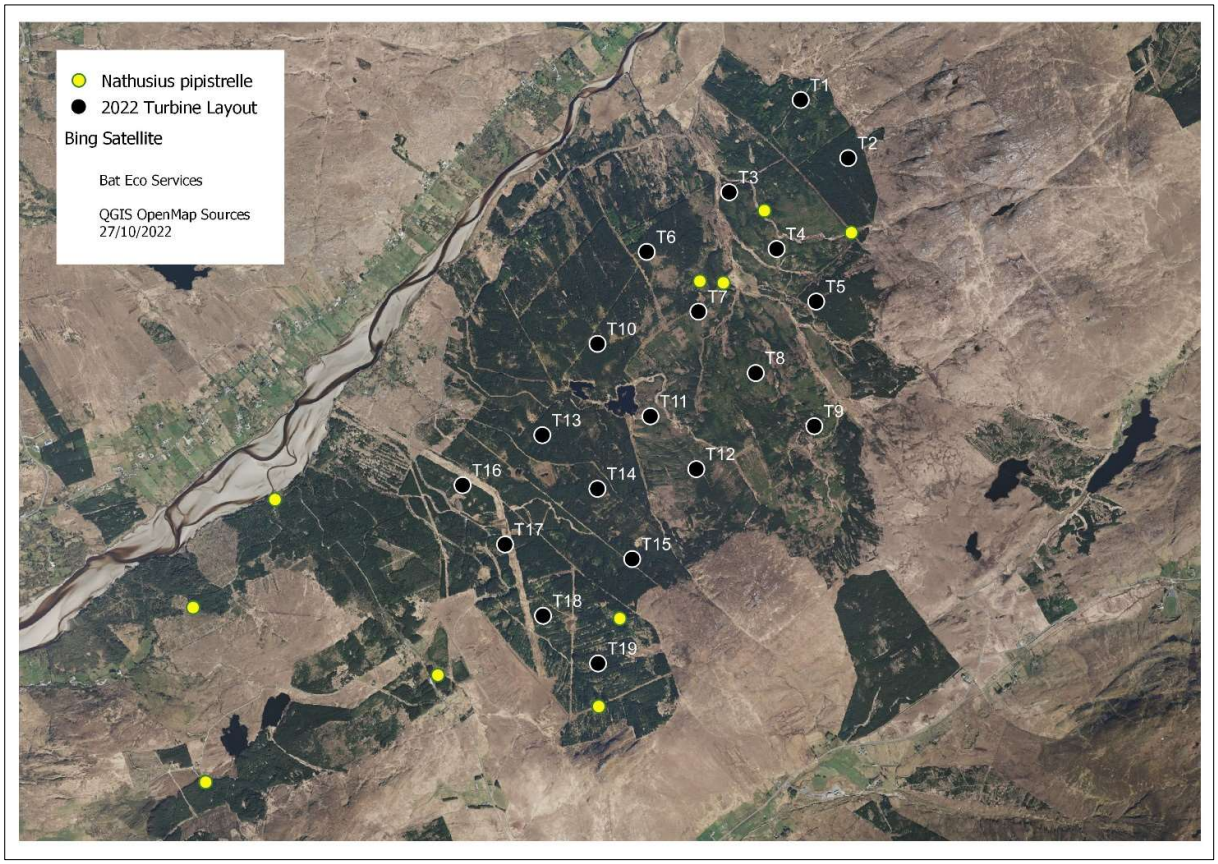

Figure 5e: Location of Nathusius' pipistrelle bat encounters within the proposed development area.

3.2.4.6 Natterer's bat

A total of 48 geo-reference bat encounters were recorded for this species of bat during the array of bat surveys completed. As shown on Figure 5f, this bat species was recorded throughout the survey area but primarily as a result of the extensive static surveillance. It was recorded on 40 of the 102 static unit locations. *Myotis* species bat encounters are also mapped here as this group could be either three *Myotis* species resident in Ireland (i.e. Daubenton's bat, Natterer's bat and whiskered bat).

3.2.4.7 Whiskered bat

A total of 23 geo-reference bat encounters were recorded for this species which are shown on Figure 5g. It was only recorded on static units and it was recorded on 23 of the 102 static unit locations. *Myotis* species bat encounters are also mapped here as this group could be either three *Myotis* species resident in Ireland (i.e. Daubenton's bat, Natterer's bat and whiskered bat).

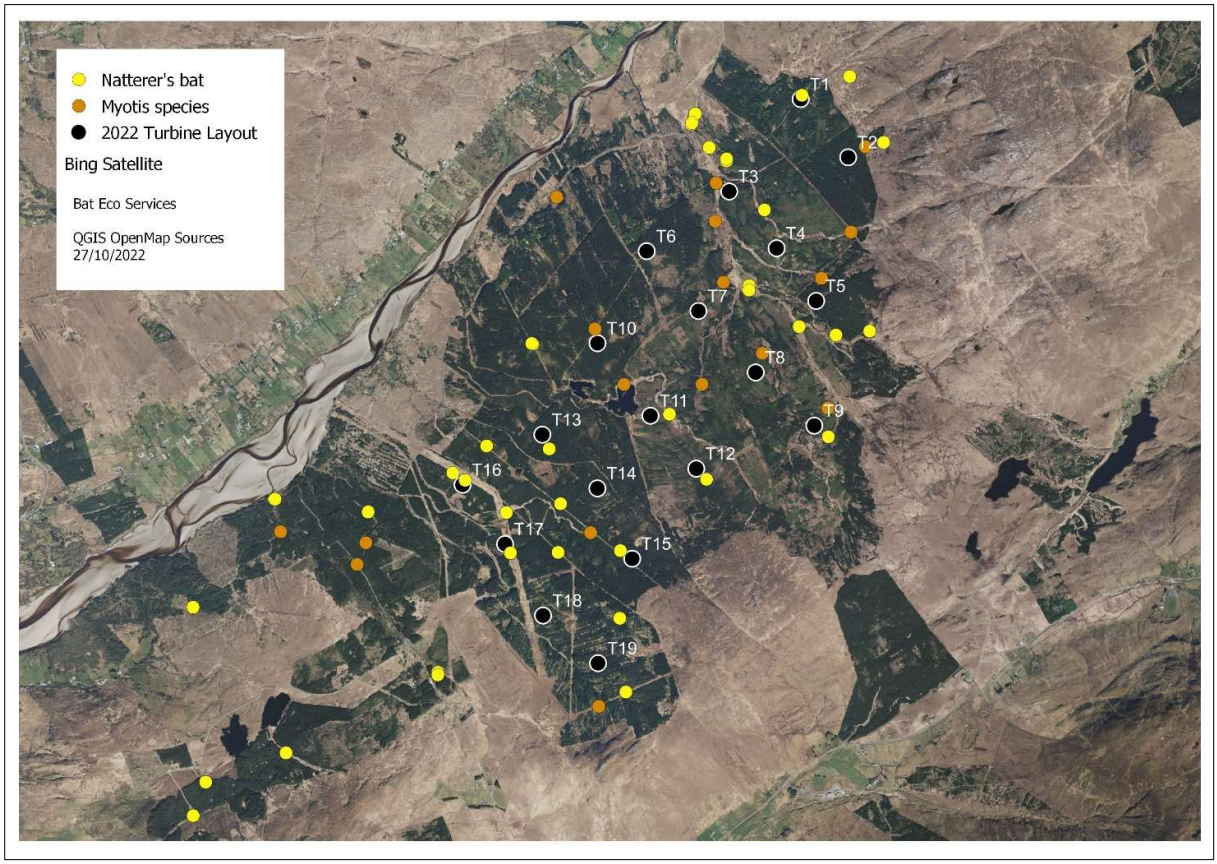

Figure 5f: Location of Natterer's bat encounters within the proposed development area.

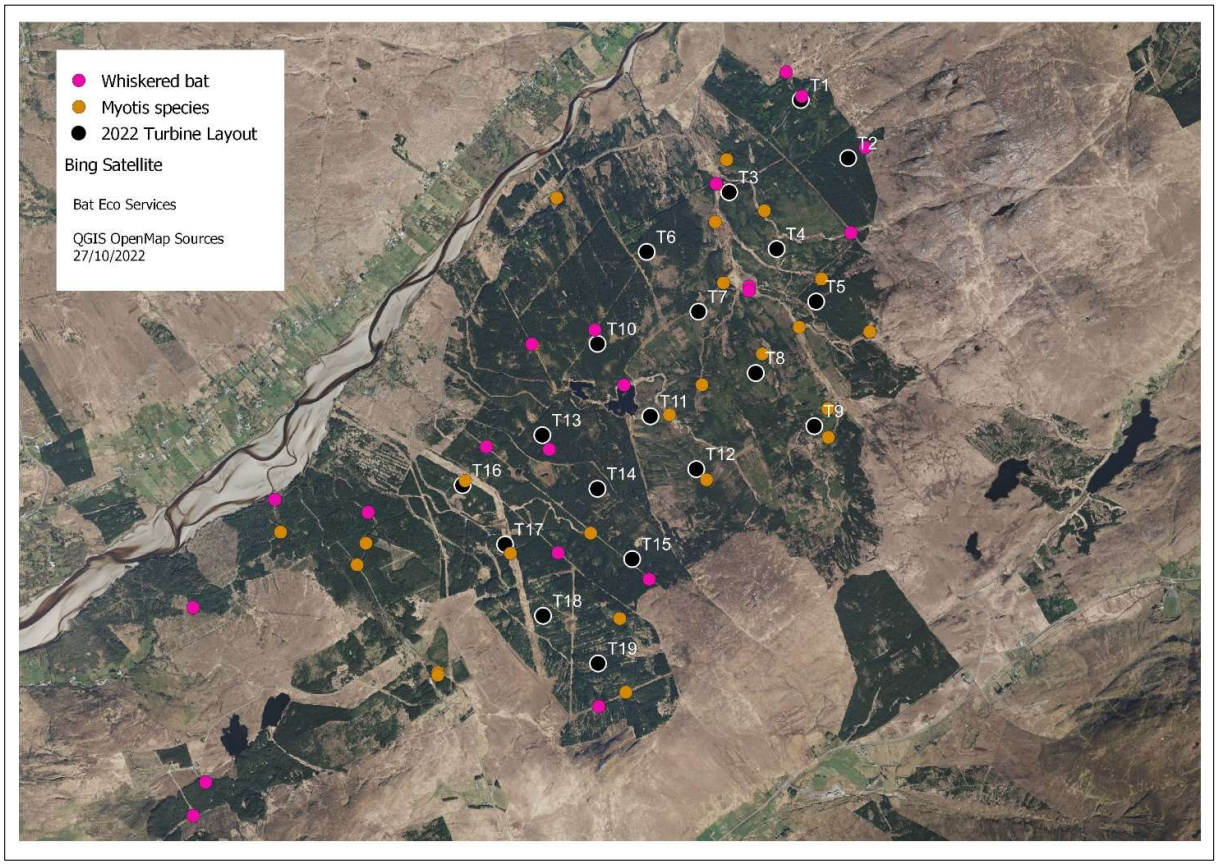

Figure 5g: Location of Whiskered bat encounters within the proposed development area.

3.2.4.8 Brown long-eared bat

A total of 73 geo-reference bat encounters were recorded for this species of bat during the array of bat surveys completed. As shown on Figure 5h, this bat species was recorded throughout the survey area. It was recorded on 69 of the 102 static unit locations.

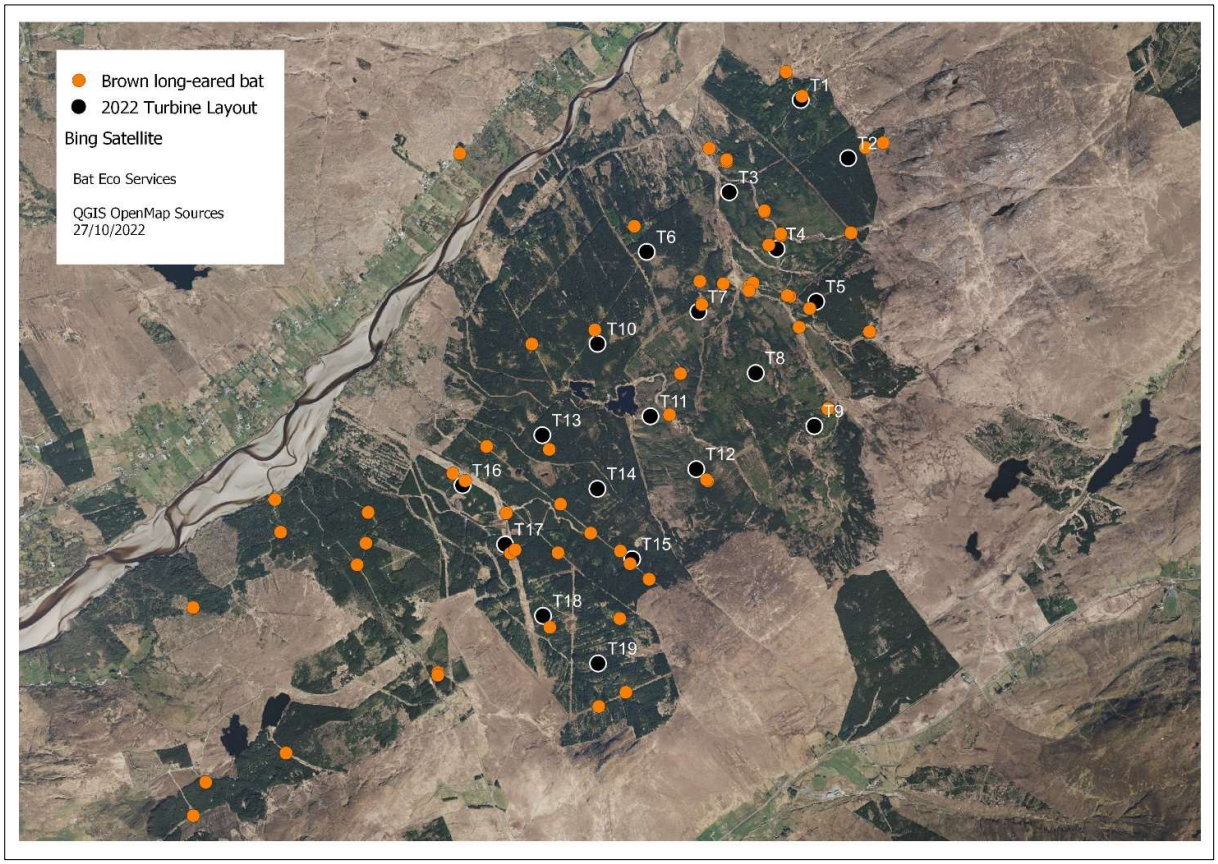

Figure 5h: Location of Brown long-eared bat encounters within the proposed development area.

3.3 EcoBat Tool Results

All of the static surveillance results were entered into the "Per Night" forms and submitted for analysis using the EcoBat tool. These forms were collated for the seven seasonal surveillance periods – Spring (2021 and 2022), Summer (2020, 2021 and 2022) and Autumn (2020 and 2021).

The reference range datasets were stratified to include:

- Only records from within 30 days of the survey date.
- Only records from within 100km^2 of the survey location.
- Records using any make of bat detector.

The Ecobat tool provides are series of summary tables to enable analysis of the bat activity level at each static location. These are presented below and categorisation of activity level is based on the following table (presented earlier in the report):

Table 5: Percentile score and categorised level of bat activity.

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

Additional figures are presented in the appendices which provide information on the spread of nightly activity according to the five percentile ranges in Table 5 above. Additional figures are also presented in the Appendices.

3.3.1 Summer Surveillance 2020

Bat surveys were conducted at Summer 12, Summer 13, Summer 1, Summer 11, Summer 3, Summer 5, Summer 2, Summer 10, Summer 8, Summer 9, Summer 6, Summer 7, for 12 nights between 2020-07-23 and 2020-08-03, using Wildlife Acoustics static bat detectors. The maximum of passes recorded in a single night was 93 passes, and 8 species were recorded.

From the table below, Summer 13 had a High "Bat Activity Category" for soprano pipistrelle (Highlighted in Yellow). This bat species is considered to be "High Risk" bat species in relation to wind turbines. Summer 13 was located on a tree adjacent to the river shore and along Coillte track and therefore a highly suitable area of foraging and commuting bats. However it is located 1.3km from the nearest proposed turbine (T18).

Table 6a: Summary table showing the number of nights recorded bat activity fell into each activity band for each bat species.

Location	Species/Species Group	Nights of High Activity	Nights of Moderate/ High Activity	Nights of Moderate Activity	Nights of Low/ Moderate Activity	Nights of Low Activity	Median Percentile	Bat Activity Category
Summer 1	*Myotis*	0	0	0	1	0	26	L to M
Summer 1	*Myotis daubentonii*	0	0	0	0	1	5	Low
Summer 1	*Myotis mystacinus*	0	0	0	0	1	5	Low
Summer 1	*Nyctalus leisleri*	0	0	0	0	1	5	Low

Summer 1	*Pipistrellus pipistrellus*	0	0	0	0	3	5	Low
Summer 1	*Plecotus auritus*	0	0	0	0	1	5	Low
Summer 10	*Myotis nattereri*	0	0	0	0	1	5	Low
Summer 10	*Plecotus auritus*	0	0	0	0	4	5	Low
Summer 11	*Myotis*	0	0	0	0	1	5	Low
Summer 11	*Nyctalus leisleri*	0	0	0	0	1	5	Low
Summer 11	*Pipistrellus pipistrellus*	0	0	0	0	1	5	Low
Summer 11	*Pipistrellus pygmaeus*	0	0	0	0	3	5	Low
Summer 11	*Plecotus auritus*	0	0	0	1	0	26	L to M
Summer 12	*Myotis*	0	0	2	3	2	26	L to M
Summer 12	*Myotis daubentonii*	0	0	0	0	1	5	Low
Summer 12	*Myotis nattereri*	0	0	0	0	1	5	Low
Summer 12	*Pipistrellus pipistrellus*	0	1	0	1	4	5	Low
Summer 12	*Pipistrellus pygmaeus*	0	0	0	1	4	5	Low
Summer 13	*Myotis*	0	0	3	2	0	46	Mod
Summer 13	*Myotis daubentonii*	0	0	0	2	0	32	L to M
Summer 13	*Myotis mystacinus*	0	0	0	0	1	5	Low
Summer 13	*Myotis nattereri*	0	0	0	1	3	5	Low
Summer 13	*Pipistrellus pipistrellus*	0	3	2	3	1	51	Mod
Summer 13	*Pipistrellus pygmaeus*	5	4	0	1	0	81	High
Summer 13	*Plecotus auritus*	0	0	0	0	1	5	Low
Summer 2	*Myotis daubentonii*	0	0	0	0	1	5	Low
Summer 2	*Nyctalus leisleri*	0	0	0	0	1	5	Low
Summer 2	*Pipistrellus pipistrellus*	0	0	0	0	2	5	Low
Summer 2	*Pipistrellus pygmaeus*	0	0	0	0	1	5	Low
Summer 2	*Plecotus auritus*	0	0	0	1	1	16	Low
Summer 3	*Myotis*	0	0	1	0	0	46	Mod
Summer 3	*Myotis daubentonii*	0	0	0	1	2	5	Low
Summer 3	*Myotis mystacinus*	0	0	0	0	1	5	Low
Summer 3	*Myotis nattereri*	0	0	0	0	2	5	Low
Summer 3	*Plecotus auritus*	0	0	0	0	2	5	Low
Summer 5	*Myotis daubentonii*	0	0	0	0	1	5	Low
Summer 5	*Pipistrellus pygmaeus*	0	0	0	0	2	5	Low
Summer 5	*Plecotus auritus*	0	0	0	0	2	5	Low
Summer 6	*Nyctalus leisleri*	0	0	0	0	1	5	Low
Summer 7	*Pipistrellus pipistrellus*	0	0	0	0	2	5	Low
Summer 7	*Pipistrellus pygmaeus*	0	0	2	2	4	16	Low
Summer 8	*Nyctalus leisleri*	0	0	0	1	1	16	Low
Summer 8	*Pipistrellus pipistrellus*	0	0	0	7	2	26	L to M
Summer 8	*Plecotus auritus*	0	0	0	0	1	5	Low
Summer 9	*Nyctalus leisleri*	0	0	0	0	1	5	Low
Summer 9	*Pipistrellus pipistrellus*	0	0	0	0	1	5	Low
Summer 9	*Plecotus auritus*	0	0	0	0	1	5	Low

Differences in activity between static detector locations split by species and location is presented in the figure below. The centre line indicates the median activity level whereas the box represents the interquartile range (therefore the spread of the middle 50% of nights of activity). The plots indicate

that, in general, the level of bat activity varied greatly from static location and that there was not a consistent level of bat species activity from night to night.

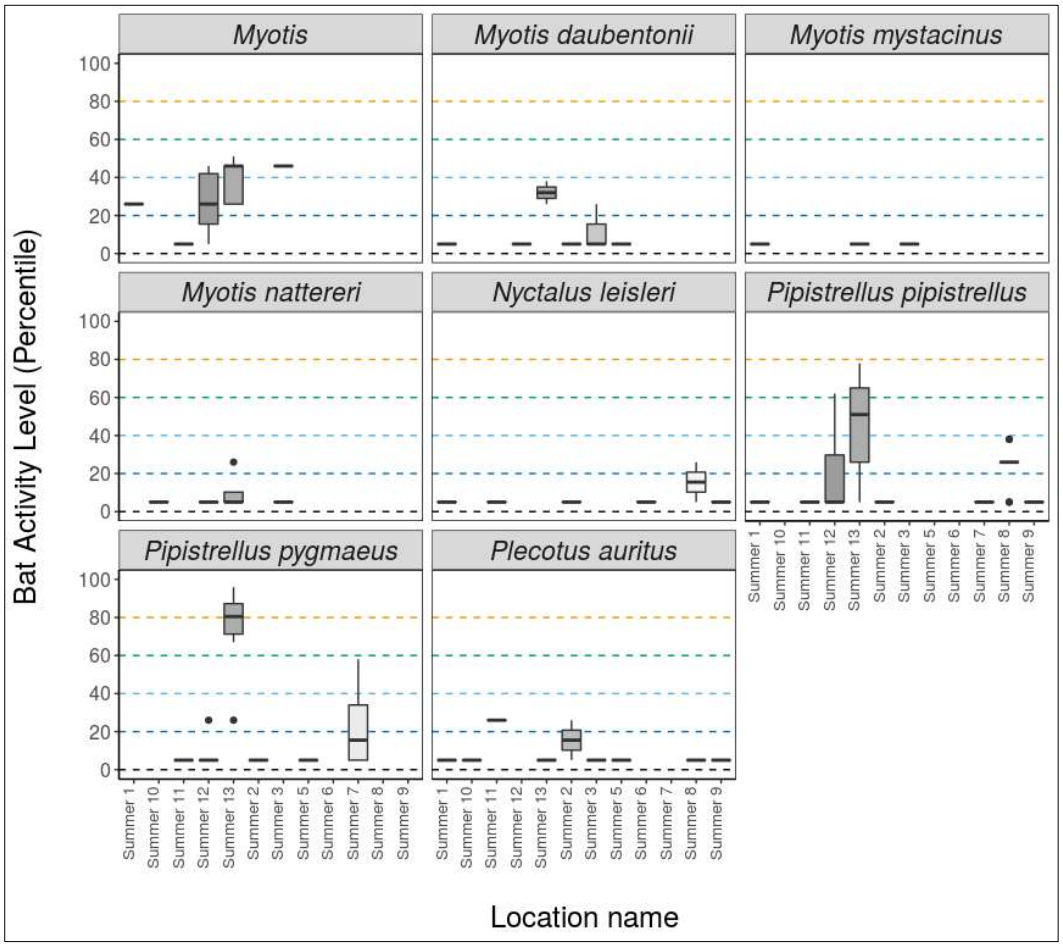

Figure 6a. Differences in activity between static detector locations, split by species and location. The centre line indicates the median activity level whereas the box represents the interquartile range (the spread of the middle 50% of nights of activity).

3.3.2 Autumn Surveillance 2020

Bat surveys were conducted at Autumn 14, Autumn 1, Autumn 11, Autumn 7, Autumn 13, Autumn 10, Autumn 8, Autumn 5, Autumn 9, Autumn 3, Autumn 2, Autumn 15, Autumn 6, for 14 nights between 2020-08-18 and 2020-08-31, using Wildlife Acoustics static bat detectors. The maximum of passes recorded in a single night was 646 passes and 8 species were recorded.

From the table below, Autumn 8 and Autumn 11 had a High “Bat Activity Category” for common pipistrelle while Autumn 7 and Autumn 11 had a High “Bat Activity Category” for soprano pipistrelle (Highlighted in Yellow). Both of these bat species are considered to be “High Risk” bat species in relation to wind turbines. Autumn 7 was located on a tree adjacent to the stone ruins and grove of mature Sycamore trees with numerous suitable features for roosting. This area is 374m from T7 and 315m from T8. Autumn 8 was located on a tree on the edge of a conifer plantation and firebreak track and the nearest turbine is T5 (200m distance). Autumn 11 was located on a tree adjacent to the river shore and along Coillte track and therefore a highly suitable area of foraging and commuting bats. However it is located 1.3km from the nearest proposed turbine (T18).

From the table below, Autumn 14 had a Moderate to High "Bat Activity Category" for soprano pipistrelle (Highlighted in Orange).

Table 6b: Summary table showing the number of nights recorded bat activity fell into each activity band for each bat species.

Location	Species/Species Group	Nights of High Activity	Nights of Moderate/ High Activity	Nights of Moderate Activity	Nights of Low/ Moderate Activity	Nights of Low Activity	Median Percentile	Bat Activity Category
Autumn 1	*Myotis*	0	0	0	0	1	6	Low
Autumn 1	*Myotis nattereri*	0	0	0	0	1	6	Low
Autumn 1	*Nyctalus leisleri*	0	0	2	1	0	56	Mod
Autumn 1	*Pipistrellus pipistrellus*	0	0	1	1	3	6	Low
Autumn 1	*Pipistrellus pygmaeus*	0	0	1	0	0	42	Mod
Autumn 1	*Plecotus auritus*	0	0	0	0	1	6	Low
Autumn 10	*Myotis*	0	0	0	0	3	6	Low
Autumn 10	*Myotis nattereri*	0	0	0	0	2	6	Low
Autumn 10	*Nyctalus leisleri*	0	0	1	1	3	6	Low
Autumn 10	*Pipistrellus pipistrellus*	0	0	1	1	2	18	L to M
Autumn 10	*Pipistrellus pygmaeus*	0	1	0	1	3	6	Low
Autumn 10	*Plecotus auritus*	0	0	1	1	1	29	L to M
Autumn 11	*Myotis*	0	0	3	3	0	36	L to M
Autumn 11	*Myotis daubentonii*	0	0	0	1	3	6	Low
Autumn 11	*Myotis mystacinus*	0	0	0	0	2	6	Low
Autumn 11	*Myotis nattereri*	0	0	0	1	4	6	Low
Autumn 11	*Nyctalus leisleri*	0	0	0	2	3	6	Low
Autumn 11	*Pipistrellus pipistrellus*	11	1	1	0	0	93	High
Autumn 11	*Pipistrellus pygmaeus*	14	0	0	0	0	98	High
Autumn 11	*Plecotus auritus*	0	0	0	0	4	6	Low
Autumn 13	*Myotis*	0	0	2	1	0	42	Mod
Autumn 13	*Myotis daubentonii*	0	0	0	1	1	18	L to M
Autumn 13	*Myotis nattereri*	0	0	1	0	2	6	Low
Autumn 13	*Nyctalus leisleri*	0	1	2	0	4	6	Low
Autumn 13	*Pipistrellus pipistrellus*	0	0	0	4	1	29	L to M
Autumn 13	*Pipistrellus pygmaeus*	1	2	1	2	5	29	L to M
Autumn 13	*Plecotus auritus*	0	0	1	0	6	6	Low
Autumn 14	*Myotis*	0	2	5	2	2	42	Mod
Autumn 14	*Myotis daubentonii*	0	0	1	1	2	18	Low
Autumn 14	*Myotis mystacinus*	0	0	0	0	2	6	Low
Autumn 14	*Myotis nattereri*	0	0	1	1	3	6	Low
Autumn 14	*Nyctalus leisleri*	0	0	1	0	4	6	Low
Autumn 14	*Pipistrellus pipistrellus*	2	3	6	0	2	56	Mod
Autumn 14	*Pipistrellus pygmaeus*	2	9	2	0	0	69	M to H
Autumn 14	*Plecotus auritus*	0	0	1	1	1	29	L to M
Autumn 15	*Nyctalus leisleri*	0	0	0	1	1	18	Low
Autumn 15	*Pipistrellus pipistrellus*	0	0	0	0	2	6	Low
Autumn 2	*Myotis nattereri*	0	0	0	0	2	6	Low
Autumn 2	*Nyctalus leisleri*	0	0	1	2	2	29	L to M
Autumn 2	*Pipistrellus pipistrellus*	0	0	0	0	1	6	Low

Autumn 2	*Pipistrellus pygmaeus*	0	0	0	1	0	29	L to M
Autumn 2	*Plecotus auritus*	0	0	0	1	1	18	Low
Autumn 3	*Myotis mystacinus*	0	0	0	0	1	6	Low
Autumn 3	*Nyctalus leisleri*	0	0	0	0	1	6	Low
Autumn 3	*Pipistrellus pipistrellus*	0	0	0	0	1	6	Low
Autumn 3	*Pipistrellus pygmaeus*	0	0	1	0	1	24	L to M
Autumn 3	*Plecotus auritus*	0	0	0	0	1	6	Low
Autumn 5	*Myotis*	0	0	0	0	1	6	Low
Autumn 5	*Myotis daubentonii*	0	0	0	0	1	6	Low
Autumn 5	*Nyctalus leisleri*	0	0	0	0	2	6	Low
Autumn 5	*Pipistrellus pipistrellus*	0	0	1	0	4	6	Low
Autumn 5	*Plecotus auritus*	0	0	0	0	3	6	Low
Autumn 6	*Nyctalus leisleri*	0	0	1	1	5	6	Low
Autumn 6	*Pipistrellus pipistrellus*	0	0	0	0	3	6	Low
Autumn 6	*Plecotus auritus*	0	0	0	0	2	6	Low
Autumn 7	*Myotis*	0	0	0	1	2	6	Low
Autumn 7	*Myotis daubentonii*	0	0	0	0	1	6	Low
Autumn 7	*Myotis mystacinus*	0	0	0	0	1	6	Low
Autumn 7	*Myotis nattereri*	0	0	0	1	0	29	L to M
Autumn 7	*Pipistrellus pipistrellus*	2	0	1	1	6	6	Low
Autumn 7	*Pipistrellus pygmaeus*	11	2	0	0	0	92	High
Autumn 7	*Plecotus auritus*	0	0	0	0	2	6	Low
Autumn 8	*Myotis*	0	0	0	1	0	29	L to M
Autumn 8	*Myotis daubentonii*	0	0	0	0	2	6	Low
Autumn 8	*Myotis nattereri*	0	0	0	0	1	6	Low
Autumn 8	*Nyctalus leisleri*	0	1	3	0	1	42	Mod
Autumn 8	*Pipistrellus pipistrellus*	8	0	2	3	0	81	High
Autumn 8	*Pipistrellus pygmaeus*	1	0	0	4	4	29	L to M
Autumn 8	*Plecotus auritus*	0	0	1	3	0	29	L to M
Autumn 9	*Myotis daubentonii*	0	0	0	0	2	6	Low
Autumn 9	*Nyctalus leisleri*	0	0	0	1	1	18	Low
Autumn 9	*Pipistrellus pipistrellus*	0	0	0	1	5	6	Low
Autumn 9	*Plecotus auritus*	0	0	0	2	0	29	L to M

Differences in activity between static detector locations split by species and location is presented in the figure below. The centre line indicates the median activity level whereas the box represents the interquartile range (therefore the spread of the middle 50% of nights of activity). The plots indicate that, in general, the level of bat activity varied greatly from static location and that there was not a consistent level of bat species activity from night to night.

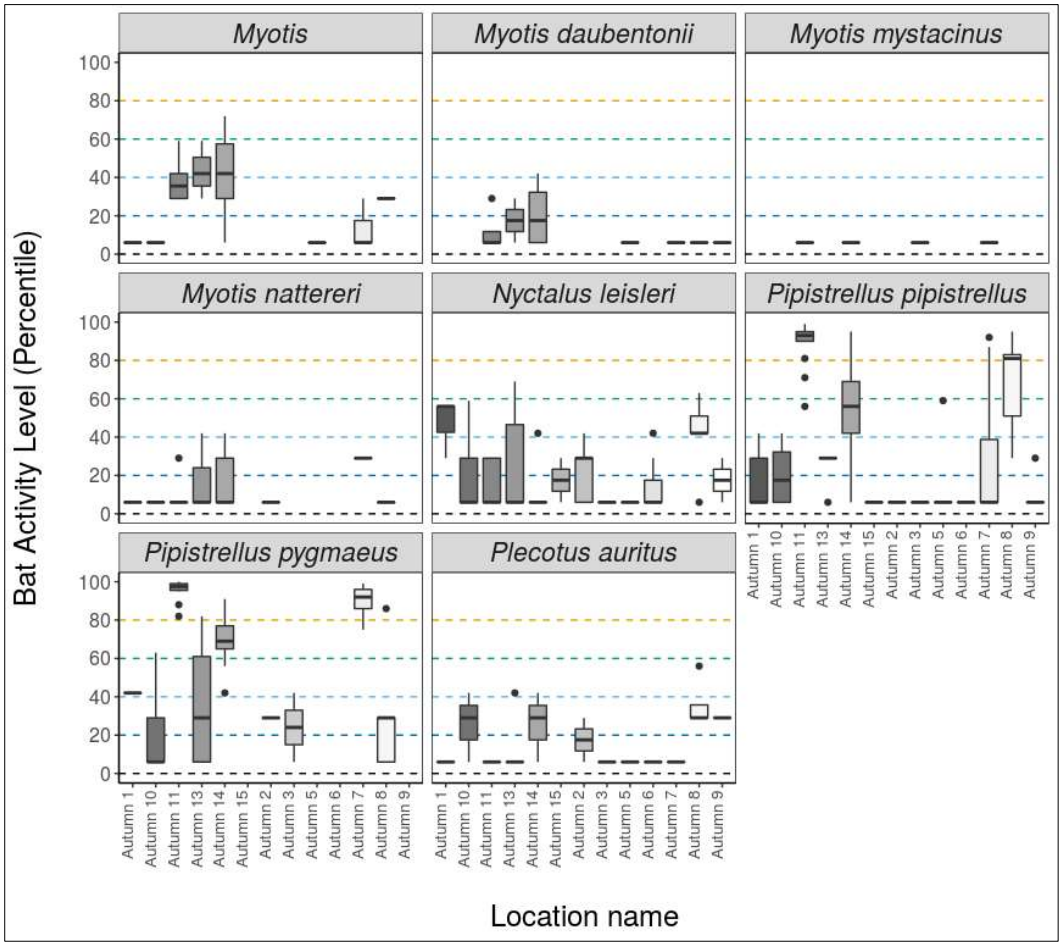

Figure 6b. Differences in activity between static detector locations, split by species and location. The centre line indicates the median activity level whereas the box represents the interquartile range (the spread of the middle 50% of nights of activity).

3.3.3 Spring Surveillance 2021

Bat surveys were conducted at Spring 11, Spring 12, Spring 14, Spring 13, Spring 6, Spring 8, Spring 9, Spring 5, Spring 7, Spring 3, Spring 1, Spring 10, Spring 15, Spring 2, Spring 4, for 12 nights between 2022-04-22 and 2022-05-03, using Wildlife Acoustics static bat detectors. The maximum of passes recorded in a single night was 319 passes, and 8 species were recorded.

From the table below, Spring 12 for *Myotis* species while Spring 14 had a High "Bat Activity Category" for a number of bat species including common pipistrelle, soprano pipistrelle, whiskered bat and *Myotis* species. Common pipistrelle and soprano pipistrelle are considered to be "High Risk" bat species in relation to wind turbines while whiskered bat and *Myotis* species are both considered "Low Risk". Spring 12 was located on a tree adjacent to a lake shore, a suitable area for foraging bat species. This area is 162m from T12. Spring 12 was located on a tree adjacent to the stone ruins and grove of mature Sycamore trees with numerous suitable features for roosting. This area is 360m from T7 and 350m from T8.

From the table below, Spring 5 had a Moderate to High "Bat Activity Category" for common pipistrelle (Highlighted in Orange) and Spring 5 had a Moderate to High "Bat Activity Category" for Daubenton's bat (Highlighted in Orange).

Table 6c: Summary table showing the number of nights recorded bat activity fell into each activity band for each bat species.

Location	Species/Species Group	Nights of High Activity	Nights of Moderate/ High Activity	Nights of Moderate Activity	Nights of Low/ Moderate Activity	Nights of Low Activity	Median Percentile	Bat Activity Category
Spring 1	*Pipistrellus pipistrellus*	0	0	0	1	3	5	Low
Spring 1	*Pipistrellus pygmaeus*	0	0	0	1	2	5	Low
Spring 10	*Pipistrellus pipistrellus*	0	0	0	0	4	5	Low
Spring 11	*Myotis*	0	0	0	0	1	5	Low
Spring 11	*Myotis daubentonii*	0	0	2	1	4	5	Low
Spring 11	*Myotis mystacinus*	0	0	1	0	1	25	L to M
Spring 11	*Myotis nattereri*	0	0	0	0	1	5	Low
Spring 11	*Nyctalus leisleri*	0	0	0	0	2	5	Low
Spring 11	*Pipistrellus pipistrellus*	1	3	4	0	3	51	Mod
Spring 11	*Pipistrellus pygmaeus*	1	3	0	2	2	51	Mod
Spring 11	*Plecotus auritus*	0	0	0	2	2	19	Low
Spring 12	*Myotis*	6	4	0	0	0	85	High
Spring 12	*Myotis daubentonii*	5	5	1	0	0	78	M to H
Spring 12	*Myotis mystacinus*	0	0	0	1	0	32	L to M
Spring 12	*Nyctalus leisleri*	0	0	2	0	1	45	Mod
Spring 12	*Pipistrellus pipistrellus*	3	2	1	2	2	58	Mod
Spring 12	*Pipistrellus pygmaeus*	2	1	4	2	0	57	Mod
Spring 13	*Myotis*	0	0	0	0	1	5	Low
Spring 13	*Pipistrellus pygmaeus*	0	0	0	0	2	5	Low
Spring 14	*Myotis*	5	2	0	0	0	93	High
Spring 14	*Myotis mystacinus*	5	1	1	0	0	92	High
Spring 14	*Myotis nattereri*	0	0	0	0	3	5	Low
Spring 14	*Nyctalus leisleri*	0	0	0	0	3	5	Low
Spring 14	*Pipistrellus pipistrellus*	4	3	0	0	0	83	High
Spring 14	*Pipistrellus pygmaeus*	8	1	0	1	1	86	High
Spring 14	*Plecotus auritus*	0	0	1	1	2	19	Low
Spring 15	*Pipistrellus pipistrellus*	0	0	0	0	2	5	Low
Spring 15	*Pipistrellus pygmaeus*	0	0	1	0	2	5	Low
Spring 2	*Pipistrellus pipistrellus*	0	0	0	0	1	5	Low
Spring 3	*Myotis daubentonii*	0	0	0	0	1	5	Low
Spring 3	*Myotis nattereri*	0	0	0	0	1	5	Low
Spring 3	*Nyctalus leisleri*	0	0	0	1	1	19	Low
Spring 3	*Pipistrellus pipistrellus*	1	0	1	2	0	39	L to M
Spring 3	*Pipistrellus pygmaeus*	0	0	0	0	1	5	Low
Spring 4	*Pipistrellus pipistrellus*	0	0	1	2	0	32	L to M
Spring 5	*Myotis daubentonii*	0	0	1	0	2	5	Low
Spring 5	*Myotis mystacinus*	0	0	0	1	4	5	Low
Spring 5	*Nyctalus leisleri*	0	0	0	0	2	5	Low
Spring 5	*Pipistrellus pipistrellus*	2	5	1	0	1	68	M to H
Spring 5	*Pipistrellus pygmaeus*	0	2	0	0	4	5	Low
Spring 5	*Plecotus auritus*	0	0	1	0	2	5	Low
Spring 6	*Myotis*	0	0	0	0	1	5	Low
Spring 6	*Myotis daubentonii*	0	0	0	0	1	5	Low

Spring 6	*Nyctalus leisleri*	0	0	0	1	1	19	Low
Spring 6	*Pipistrellus pipistrellus*	0	0	1	0	1	25	L to M
Spring 6	*Pipistrellus pygmaeus*	0	0	0	0	4	5	Low
Spring 6	*Plecotus auritus*	0	0	0	0	1	5	Low
Spring 7	*Myotis daubentonii*	0	0	0	0	1	5	Low
Spring 7	*Myotis nattereri*	0	0	0	0	1	5	Low
Spring 7	*Nyctalus leisleri*	0	0	0	1	2	5	Low
Spring 7	*Pipistrellus pipistrellus*	0	1	1	0	3	5	Low
Spring 7	*Pipistrellus pygmaeus*	0	3	3	1	2	45	Mod
Spring 7	*Plecotus auritus*	0	0	0	1	0	32	L to M
Spring 8	*Myotis*	0	0	0	0	1	5	Low
Spring 8	*Nyctalus leisleri*	0	0	1	0	2	5	Low
Spring 8	*Pipistrellus pipistrellus*	0	2	2	3	1	39	L to M
Spring 8	*Pipistrellus pygmaeus*	0	0	1	0	2	5	Low
Spring 8	*Plecotus auritus*	0	0	0	2	4	5	Low
Spring 9	*Myotis*	0	0	0	0	1	5	Low
Spring 9	*Pipistrellus pipistrellus*	0	0	0	0	3	5	Low
Spring 9	*Pipistrellus pygmaeus*	0	0	0	0	1	5	Low

Differences in activity between static detector locations split by species and location is presented in the figure below. The centre line indicates the median activity level whereas the box represents the interquartile range (therefore the spread of the middle 50% of nights of activity). The plots indicate that, in general, the level of bat activity varied greatly from static location and that there was not a consistent of species activity from night to night.

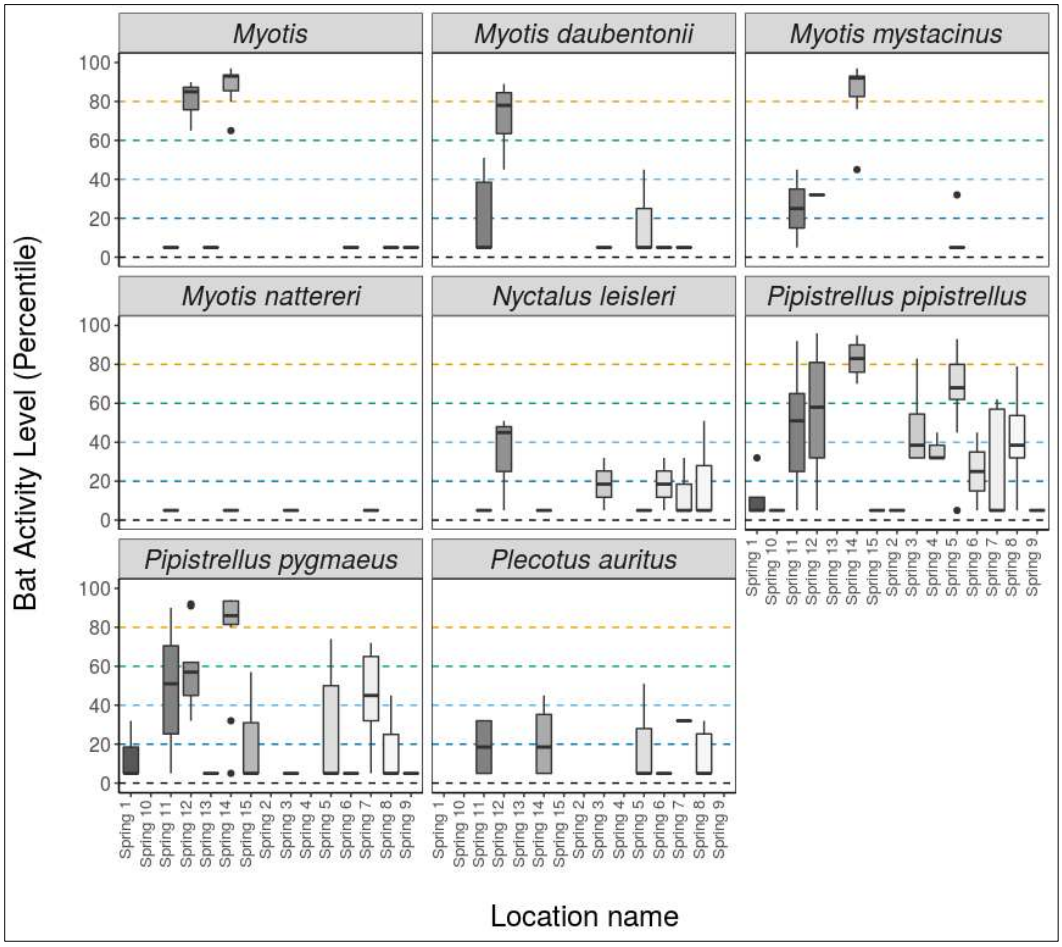

Figure 6c. Differences in activity between static detector locations, split by species and location. The centre line indicates the median activity level whereas the box represents the interquartile range (the spread of the middle 50% of nights of activity).

3.3.4 Summer Surveillance 2021

Bat surveys were conducted at Summer 18, Summer 15, Summer 27, Summer 19, Summer 28, Summer 17, Summer 20, Summer 24, Summer 21, Summer 25, Summer 26, Summer 22, Summer 29, Summer 23, for 15 nights between 2021-07-05 and 2021-07-19, using Wildlife Acoustics static bat detectors. The maximum of passes recorded in a single night was 814 passes, and 9 species were recorded.

From the table below, Summer 15 had a High “Bat Activity Category” for common pipistrelle and soprano pipistrelle (Highlighted in Yellow). Both of these bat species are considered to be “High Risk” bat species in relation to wind turbines. Summer 15 was located on a tree adjacent to the stone ruins and adjacent to mixed woodland with mature trees with suitable features for roosting. This static unit is located 2.8km from the nearest proposed turbine location (T20).

From the table below, Spring 17 had a Moderate to High “Bat Activity Category” for soprano pipistrelle (Highlighted in Orange), Spring 18 had a Moderate to High “Bat Activity Category” for common and soprano pipistrelle, Summer 23 had Moderate to High “Bat Activity Category” for common pipistrelle and both Summer 24 and 27 had a Moderate to High “Bat Activity Category” for soprano pipistrelle.

Table 6d: Summary table showing the number of nights recorded bat activity fell into each activity band for each bat species.

Location	Species/Species Group	Nights of High Activity	Nights of Moderate/ High Activity	Nights of Moderate Activity	Nights of Low/ Moderate Activity	Nights of Low Activity	Median Percentile	Bat Activity Category
Summer 15	*Myotis*	0	0	1	1	0	43	Mod
Summer 15	*Myotis daubentonii*	0	0	0	0	2	6	Low
Summer 15	*Myotis mystacinus*	0	0	0	0	1	6	Low
Summer 15	*Myotis nattereri*	0	0	0	0	1	6	Low
Summer 15	*Nyctalus leisleri*	0	1	0	0	1	39	L to M
Summer 15	*Pipistrellus nathusii*	1	0	1	0	0	65	Mod
Summer 15	*Pipistrellus pipistrellus*	3	0	0	0	0	98	High
Summer 15	*Pipistrellus pygmaeus*	3	0	0	0	0	98	High
Summer 17	*Myotis*	0	0	0	0	1	6	Low
Summer 17	*Myotis daubentonii*	0	0	0	0	3	6	Low
Summer 17	*Nyctalus leisleri*	0	1	0	1	3	6	Low
Summer 17	*Pipistrellus pipistrellus*	0	3	3	2	0	55	Mod
Summer 17	*Pipistrellus pygmaeus*	4	3	2	1	0	72	M to H
Summer 17	*Plecotus auritus*	0	0	0	1	0	28	L to M
Summer 18	*Myotis*	0	1	3	4	1	39	L to M
Summer 18	*Myotis daubentonii*	0	0	0	1	2	6	Low
Summer 18	*Myotis nattereri*	0	0	0	0	2	6	Low
Summer 18	*Nyctalus leisleri*	0	0	1	1	4	6	Low
Summer 18	*Pipistrellus pipistrellus*	1	5	3	1	0	68	M to H
Summer 18	*Pipistrellus pygmaeus*	3	6	1	1	0	72	M to H
Summer 18	*Plecotus auritus*	0	0	0	1	2	6	Low
Summer 19	*Myotis*	0	0	0	0	1	6	Low
Summer 19	*Myotis daubentonii*	0	0	0	0	3	6	Low
Summer 19	*Myotis mystacinus*	0	0	0	0	1	6	Low
Summer 19	*Myotis nattereri*	0	0	0	0	1	6	Low
Summer 19	*Nyctalus leisleri*	2	0	0	2	1	28	L to M
Summer 19	*Pipistrellus pipistrellus*	0	1	2	2	1	40	L to M
Summer 19	*Pipistrellus pygmaeus*	0	0	1	2	2	28	L to M
Summer 19	*Plecotus auritus*	0	0	0	0	1	6	Low
Summer 20	*Myotis*	0	0	0	0	1	6	Low
Summer 20	*Myotis daubentonii*	0	0	0	1	0	39	L to M
Summer 20	*Nyctalus leisleri*	0	0	0	3	3	17	Low
Summer 20	*Pipistrellus pipistrellus*	0	0	0	1	1	17	Low
Summer 20	*Pipistrellus pygmaeus*	0	0	0	0	3	6	Low
Summer 20	*Plecotus auritus*	0	0	0	0	2	6	Low
Summer 21	*Myotis daubentonii*	0	0	0	1	1	17	Low
Summer 21	*Myotis nattereri*	0	0	0	0	2	6	Low
Summer 21	*Nyctalus leisleri*	0	0	0	0	4	6	Low
Summer 21	*Pipistrellus pipistrellus*	0	0	0	0	1	6	Low
Summer 21	*Pipistrellus pygmaeus*	0	0	0	1	1	17	Low
Summer 21	*Plecotus auritus*	0	0	0	0	1	6	Low
Summer 22	*Nyctalus leisleri*	0	0	0	1	1	17	Low
Summer 22	*Pipistrellus pipistrellus*	0	1	4	2	0	51	Mod

Summer 22	*Pipistrellus pygmaeus*	0	0	0	0	3	6	Low
Summer 22	*Plecotus auritus*	0	0	0	0	1	6	Low
Summer 23	*Pipistrellus nathusii*	0	0	0	0	3	6	Low
Summer 23	*Pipistrellus pipistrellus*	3	4	2	0	0	71	M to H
Summer 23	*Pipistrellus pygmaeus*	0	0	1	0	3	6	Low
Summer 24	*Myotis*	0	0	0	0	1	6	Low
Summer 24	*Pipistrellus pipistrellus*	1	0	0	1	2	17	Low
Summer 24	*Pipistrellus pygmaeus*	2	2	0	0	1	72	M to H
Summer 25	*Nyctalus leisleri*	0	0	0	1	4	6	Low
Summer 25	*Pipistrellus pipistrellus*	2	3	1	1	3	55	Mod
Summer 25	*Pipistrellus pygmaeus*	0	0	4	2	1	46	Mod
Summer 25	*Plecotus auritus*	0	0	0	0	1	6	Low
Summer 26	*Nyctalus leisleri*	0	0	0	1	2	6	Low
Summer 26	*Pipistrellus pipistrellus*	0	0	0	2	4	6	Low
Summer 27	*Myotis*	0	0	0	2	2	17	Low
Summer 27	*Myotis daubentonii*	0	0	0	2	3	6	Low
Summer 27	*Myotis nattereri*	0	0	0	0	2	6	Low
Summer 27	*Nyctalus leisleri*	0	0	0	2	4	6	Low
Summer 27	*Pipistrellus pipistrellus*	4	3	4	0	0	77	M to H
Summer 27	*Pipistrellus pygmaeus*	0	3	4	4	2	46	Mod
Summer 28	*Myotis*	0	0	0	0	1	6	Low
Summer 28	*Nyctalus leisleri*	0	0	1	3	2	28	L to M
Summer 28	*Pipistrellus pipistrellus*	0	5	0	7	0	39	L to M
Summer 28	*Pipistrellus pygmaeus*	0	0	0	3	4	6	Low
Summer 29	*Nyctalus leisleri*	0	0	0	0	6	6	Low
Summer 29	*Pipistrellus pipistrellus*	0	0	0	1	2	6	Low
Summer 29	*Pipistrellus pygmaeus*	0	0	0	0	4	6	Low
Summer 29	*Plecotus auritus*	0	0	0	0	1	6	Low

Differences in activity between static detector locations split by species and location is presented in the figure below. The centre line indicates the median activity level whereas the box represents the interquartile range (therefore the spread of the middle 50% of nights of activity). The plots indicate that, in general, the level of bat activity varied greatly from static location and that there was not a consistent of species activity from night to night.

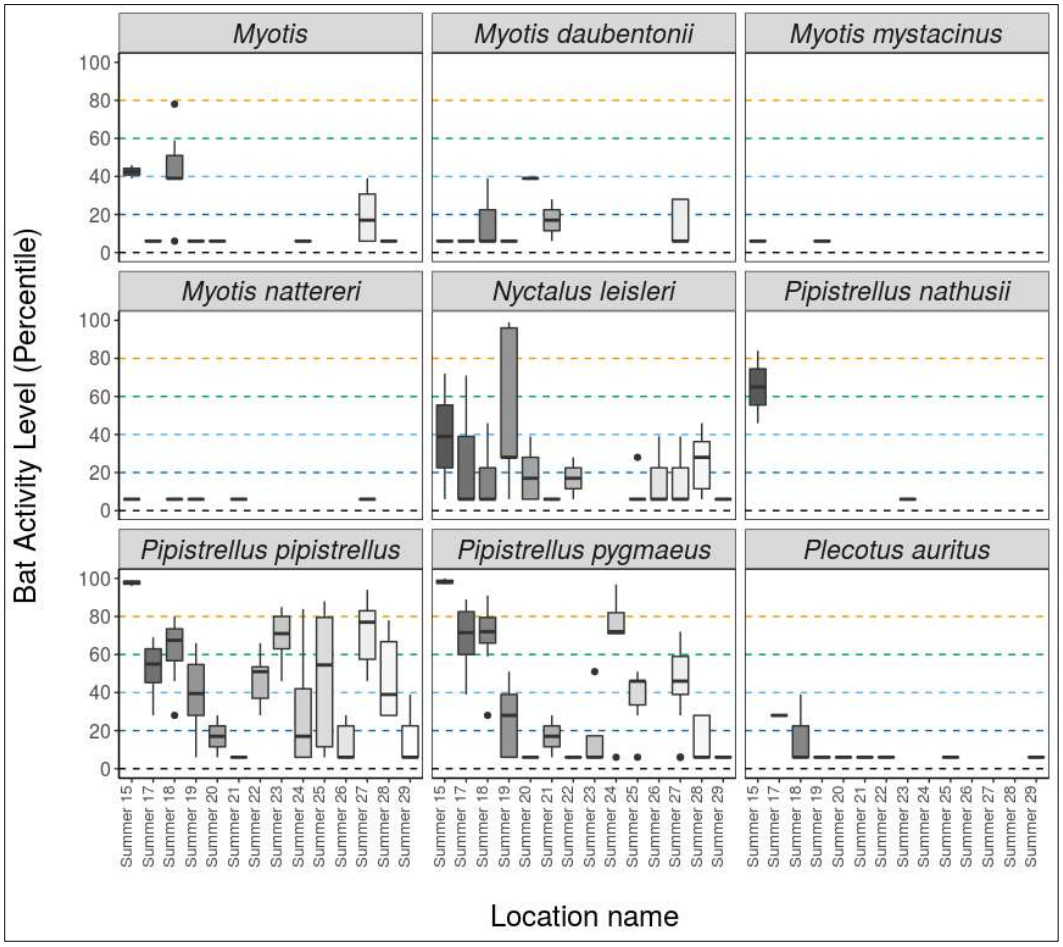

Figure 6d. Differences in activity between static detector locations, split by species and location. The centre line indicates the median activity level whereas the box represents the interquartile range (the spread of the middle 50% of nights of activity).

3.3.5 Autumn Surveillance 2021

Bat surveys were conducted at Autumn 23, Autumn 25, Autumn 17, Autumn 26, Autumn 29, Autumn 27, Autumn 30, Autumn 19, Autumn 20, Autumn 28, Autumn 21, Autumn 22, Autumn 24, Autumn 18, Autumn 16, for 14 nights between 2021-08-30 and 2021-09-12, using Wildlife Acoustics static bat detectors. The maximum of passes recorded in a single night was 1099 passes, and 9 species were recorded.

From the table below, Autumn 22 and Autumn 25 had a High “Bat Activity Category” for soprano pipistrelle while Autumn 23 and Autumn 25 had a High “Bat Activity Category” for both soprano pipistrelle and common pipistrelle (Highlighted in Yellow). Both of these bat species are considered to be “High Risk” bat species in relation to wind turbines. Autumn 22 was located on a tree adjacent to conifer plantation edge, stream and open scrub and the nearest turbine is T3 (225m away). Autumn 23 was located on a tree at the junction of two fire breaks between the conifer plantations and the nearest turbine is T4 (240m away). Autumn 25 was located on a timber post (2m) in open area of mixed woodland and the nearest turbine is T18 (2.2km away). Autumn 26 was located along woodland track and the nearest turbine is T20 (2.8km away).

Table 6e: Summary table showing the number of nights recorded bat activity fell into each activity band for each bat species.

Location	Species/Species Group	Nights of High Activity	Nights of Moderate/ High Activity	Nights of Moderate Activity	Nights of Low/ Moderate Activity	Nights of Low Activity	Median Percentile	Bat Activity Category
Autumn 16	*Pipistrellus pipistrellus*	0	0	0	2	1	30	L to M
Autumn 16	*Pipistrellus pygmaeus*	1	1	0	1	1	51	Mod
Autumn 17	*Myotis*	0	0	1	1	0	37	L to M
Autumn 17	*Myotis daubentonii*	0	0	0	0	3	4	Low
Autumn 17	*Myotis mystacinus*	0	0	0	0	2	4	Low
Autumn 17	*Myotis nattereri*	0	0	0	2	6	4	Low
Autumn 17	*Nyctalus leisleri*	0	0	2	2	2	30	L to M
Autumn 17	*Pipistrellus pipistrellus*	0	1	1	4	2	30	L to M
Autumn 17	*Pipistrellus pygmaeus*	0	3	4	2	1	55	Mod
Autumn 17	*Plecotus auritus*	0	0	0	2	5	4	Low
Autumn 18	*Myotis nattereri*	0	0	0	0	1	4	Low
Autumn 18	*Pipistrellus pipistrellus*	0	0	0	0	1	4	Low
Autumn 18	*Pipistrellus pygmaeus*	0	1	1	0	1	57	Mod
Autumn 18	*Plecotus auritus*	0	0	0	1	1	17	Low
Autumn 19	*Myotis*	0	0	0	2	2	17	Low
Autumn 19	*Myotis nattereri*	0	0	0	1	2	4	Low
Autumn 19	*Nyctalus leisleri*	0	0	0	2	0	30	L to M
Autumn 19	*Pipistrellus nathusii*	0	0	0	0	1	4	Low
Autumn 19	*Pipistrellus pipistrellus*	0	0	0	0	4	4	Low
Autumn 19	*Pipistrellus pygmaeus*	0	0	1	1	3	4	Low
Autumn 19	*Plecotus auritus*	0	0	1	1	5	4	Low
Autumn 20	*Myotis*	0	0	0	2	2	17	Low
Autumn 20	*Myotis daubentonii*	0	0	0	0	1	4	Low
Autumn 20	*Myotis nattereri*	0	0	0	0	1	4	Low
Autumn 20	*Nyctalus leisleri*	0	0	0	1	3	4	Low
Autumn 20	*Pipistrellus pipistrellus*	0	0	0	2	1	30	L to M
Autumn 20	*Pipistrellus pygmaeus*	0	0	1	1	5	4	Low
Autumn 20	*Plecotus auritus*	0	0	0	4	2	30	L to M
Autumn 21	*Myotis*	0	0	0	1	0	30	L to M
Autumn 21	*Myotis daubentonii*	0	0	0	0	3	4	Low
Autumn 21	*Myotis nattereri*	0	0	0	0	3	4	Low
Autumn 21	*Nyctalus leisleri*	0	0	0	1	0	30	L to M
Autumn 21	*Pipistrellus pipistrellus*	0	2	0	2	2	30	L to M
Autumn 21	*Pipistrellus pygmaeus*	2	2	2	1	2	52	Mod
Autumn 21	*Plecotus auritus*	0	0	1	1	4	4	Low
Autumn 22	*Myotis*	0	1	1	0	0	55	Mod
Autumn 22	*Myotis daubentonii*	0	0	0	1	3	4	Low
Autumn 22	*Myotis nattereri*	0	0	1	1	3	4	Low
Autumn 22	*Nyctalus leisleri*	0	0	0	0	1	4	Low
Autumn 22	*Pipistrellus pipistrellus*	2	4	3	2	0	61	Mod
Autumn 22	*Pipistrellus pygmaeus*	7	3	1	0	1	86	High
Autumn 23	*Myotis*	0	0	1	1	1	30	L to M
Autumn 23	*Myotis daubentonii*	0	0	0	0	1	4	Low

Autumn 23	*Myotis nattereri*	0	0	0	1	0	30	L to M
Autumn 23	*Pipistrellus pipistrellus*	3	0	0	0	0	98	High
Autumn 23	*Pipistrellus pygmaeus*	3	0	0	1	1	88	High
Autumn 23	*Plecotus auritus*	0	0	1	1	3	4	Low
Autumn 24	*Myotis daubentonii*	0	0	0	0	2	4	Low
Autumn 24	*Myotis nattereri*	0	0	0	1	2	4	Low
Autumn 24	*Nyctalus leisleri*	0	0	0	0	4	4	Low
Autumn 24	*Pipistrellus pipistrellus*	0	0	3	5	0	30	L to M
Autumn 24	*Pipistrellus pygmaeus*	0	2	5	0	1	52	Mod
Autumn 24	*Plecotus auritus*	0	0	0	0	2	4	Low
Autumn 25	*Myotis*	0	1	4	1	0	44	Mod
Autumn 25	*Myotis daubentonii*	0	0	0	0	3	4	Low
Autumn 25	*Myotis mystacinus*	0	0	0	0	2	4	Low
Autumn 25	*Myotis nattereri*	0	0	1	0	3	4	Low
Autumn 25	*Nyctalus leisleri*	0	0	3	1	0	44	Mod
Autumn 25	*Pipistrellus nathusii*	0	0	0	0	1	4	Low
Autumn 25	*Pipistrellus pipistrellus*	2	6	2	0	1	67	M to H
Autumn 25	*Pipistrellus pygmaeus*	7	3	0	1	1	81	High
Autumn 25	*Plecotus auritus*	0	1	2	3	4	30	L to M
Autumn 26	*Myotis*	0	1	2	2	1	41	Mod
Autumn 26	*Myotis mystacinus*	0	0	0	0	1	4	Low
Autumn 26	*Myotis nattereri*	0	0	0	2	2	17	Low
Autumn 26	*Nyctalus leisleri*	0	2	1	1	2	41	Mod
Autumn 26	*Pipistrellus nathusii*	0	0	0	0	1	4	Low
Autumn 26	*Pipistrellus pipistrellus*	10	0	0	0	0	98	High
Autumn 26	*Pipistrellus pygmaeus*	10	0	0	0	0	98	High
Autumn 26	*Plecotus auritus*	0	1	0	3	4	17	Low
Autumn 27	*Myotis*	0	0	1	2	2	30	L to M
Autumn 27	*Myotis daubentonii*	0	0	0	0	1	4	Low
Autumn 27	*Myotis mystacinus*	0	0	0	0	1	4	Low
Autumn 27	*Myotis nattereri*	0	0	0	0	3	4	Low
Autumn 27	*Nyctalus leisleri*	0	0	0	1	3	4	Low
Autumn 27	*Pipistrellus pipistrellus*	0	0	1	4	3	30	L to M
Autumn 27	*Pipistrellus pygmaeus*	0	2	2	3	4	30	L to M
Autumn 27	*Plecotus auritus*	0	1	2	3	2	30	L to M
Autumn 28	*Myotis*	0	0	0	1	1	17	Low
Autumn 28	*Pipistrellus nathusii*	0	0	0	0	1	4	Low
Autumn 28	*Pipistrellus pipistrellus*	0	0	3	1	0	48	Mod
Autumn 28	*Pipistrellus pygmaeus*	0	1	3	1	0	44	Mod
Autumn 29	*Myotis*	0	0	2	0	2	24	L to M
Autumn 29	*Myotis daubentonii*	0	0	0	0	2	4	Low
Autumn 29	*Myotis nattereri*	0	0	0	1	3	4	Low
Autumn 29	*Nyctalus leisleri*	0	0	1	0	2	4	Low
Autumn 29	*Pipistrellus nathusii*	0	0	0	0	1	4	Low
Autumn 29	*Pipistrellus pipistrellus*	1	2	1	2	3	30	L to M
Autumn 29	*Pipistrellus pygmaeus*	0	2	4	4	1	44	Mod
Autumn 29	*Plecotus auritus*	0	0	0	2	3	4	Low
Autumn 30	*Myotis*	0	0	5	2	0	44	Mod

Autumn 30	*Myotis daubentonii*	0	0	0	1	5	4	Low
Autumn 30	*Myotis mystacinus*	0	0	0	0	1	4	Low
Autumn 30	*Myotis nattereri*	0	0	1	3	2	30	L to M
Autumn 30	*Nyctalus leisleri*	0	0	0	0	1	4	Low
Autumn 30	*Pipistrellus pipistrellus*	0	2	6	2	2	48	Mod
Autumn 30	*Pipistrellus pygmaeus*	0	8	4	0	0	65	M to H
Autumn 30	*Plecotus auritus*	0	0	0	3	4	4	Low

Differences in activity between static detector locations split by species and location is presented in the figure below. The centre line indicates the median activity level whereas the box represents the interquartile range (therefore the spread of the middle 50% of nights of activity). The plots indicate that, in general, the level of bat activity varied greatly from static location and that there was not a consistent of species activity from night to night.

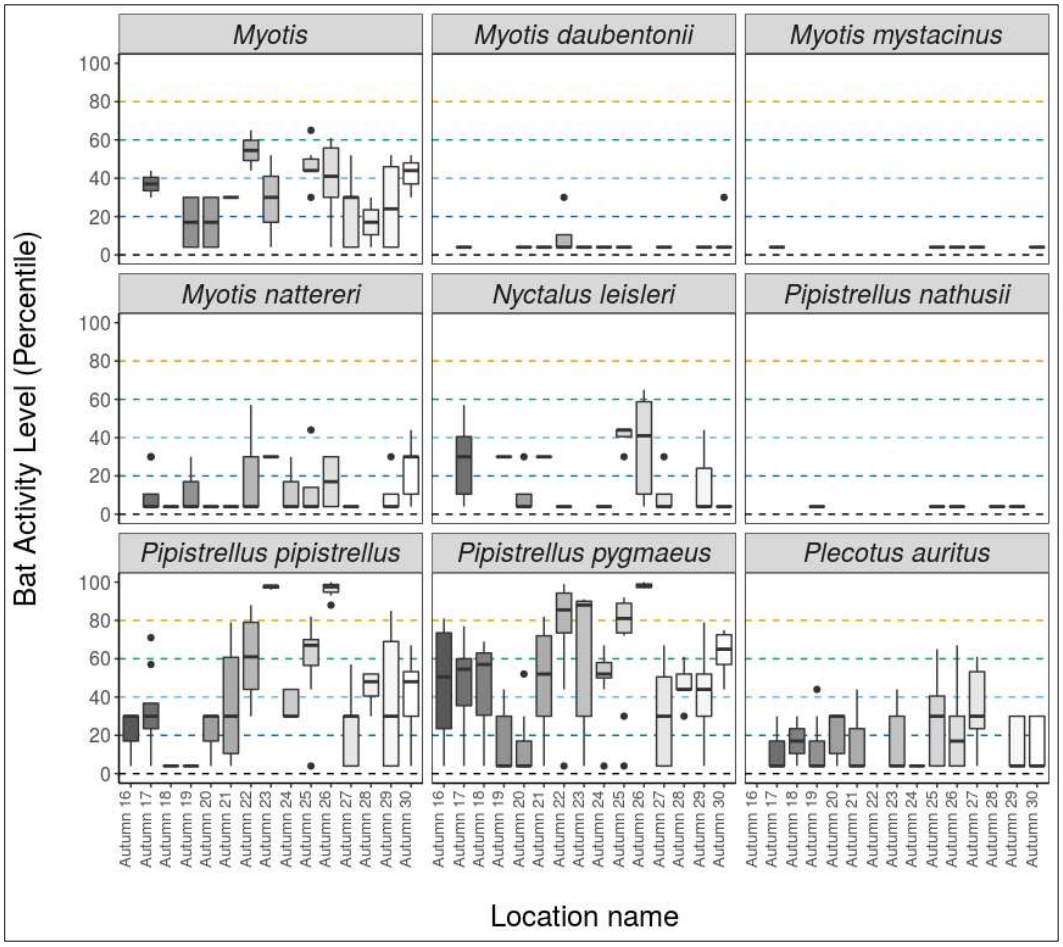

Figure 6e: Differences in activity between static detector locations, split by species and location. The centre line indicates the median activity level whereas the box represents the interquartile range (the spread of the middle 50% of nights of activity).

3.3.6 Spring Surveillance 2022

Bat surveys were conducted at Spring 28, Spring 17, Spring 23, Spring 25, Spring 21, Spring 27, Spring 19, Spring 22, Spring 24, Spring 29, Spring 20, Spring 26, for 17 nights between 2022-04-25 and 2022-05-11, using Wildlife Acoustics static bat detectors. The maximum of passes recorded in a single night was 56 passes, and 9 species were recorded.

From the table below, Spring 17 had a High "Bat Activity Category" for Leisler's bat. This bat species is considered to be "High Risk" bat species in relation to wind turbines. Spring 17 was located on a tree on a fire break track and the nearest turbine is T21 (125m away).

Table 6f: Summary table showing the number of nights recorded bat activity fell into each activity band for each bat species.

Location	Species/Species Group	Nights of High Activity	Nights of Moderate/ High Activity	Nights of Moderate Activity	Nights of Low/ Moderate Activity	Nights of Low Activity	Median Percentile	Bat Activity Category
Spring 17	*Myotis*	0	0	0	1	0	31	L to M
Spring 17	*Myotis nattereri*	0	0	0	0	2	4	Low
Spring 17	*Nyctalus leisleri*	3	2	0	0	2	75	High
Spring 17	*Pipistrellus pipistrellus*	0	1	2	0	4	4	Low
Spring 17	*Pipistrellus pygmaeus*	0	0	2	0	2	27	L to M
Spring 17	*Plecotus auritus*	0	0	0	0	3	4	Low
Spring 19	*Myotis daubentonii*	0	0	0	0	2	4	Low
Spring 19	*Nyctalus leisleri*	0	0	1	2	1	31	L to M
Spring 19	*Pipistrellus nathusii*	0	0	0	0	1	4	Low
Spring 19	*Pipistrellus pygmaeus*	0	0	0	0	1	4	Low
Spring 19	*Plecotus auritus*	0	0	0	0	1	4	Low
Spring 20	*Pipistrellus pygmaeus*	0	0	0	0	1	4	Low
Spring 21	*Myotis daubentonii*	0	0	0	0	4	4	Low
Spring 21	*Nyctalus leisleri*	0	0	0	1	2	4	Low
Spring 21	*Pipistrellus pipistrellus*	0	0	0	1	5	4	Low
Spring 21	*Pipistrellus pygmaeus*	0	0	1	2	2	31	L to M
Spring 21	*Plecotus auritus*	0	0	0	1	3	4	Low
Spring 22	*Nyctalus leisleri*	0	0	0	1	3	4	Low
Spring 22	*Pipistrellus pygmaeus*	0	0	0	1	2	4	Low
Spring 23	*Myotis*	0	0	1	0	0	50	Mod
Spring 23	*Myotis daubentonii*	0	0	1	3	2	31	L to M
Spring 23	*Myotis mystacinus*	0	0	0	0	1	4	Low
Spring 23	*Myotis nattereri*	0	0	0	0	2	4	Low
Spring 23	*Nyctalus leisleri*	0	0	0	0	4	4	Low
Spring 23	*Pipistrellus pipistrellus*	1	5	3	2	1	59	Mod
Spring 23	*Pipistrellus pygmaeus*	0	1	0	2	8	4	Low
Spring 23	*Plecotus auritus*	0	0	0	1	5	4	Low
Spring 24	*Nyctalus leisleri*	0	0	0	0	1	4	Low
Spring 24	*Pipistrellus pipistrellus*	2	1	4	0	1	56	Mod
Spring 24	*Pipistrellus pygmaeus*	0	0	0	0	1	4	Low
Spring 24	*Plecotus auritus*	0	0	1	0	1	24	L to M
Spring 25	*Myotis daubentonii*	0	0	0	1	2	4	Low

Spring 25	*Nyctalus leisleri*	0	0	0	0	1	4	Low
Spring 25	*Pipistrellus pipistrellus*	0	0	0	1	1	18	Low
Spring 25	*Pipistrellus pygmaeus*	0	0	0	2	4	4	Low
Spring 25	*Plecotus auritus*	0	0	0	0	3	4	Low
Spring 26	*Pipistrellus pygmaeus*	0	0	0	0	1	4	Low
Spring 27	*Myotis daubentonii*	0	0	0	0	1	4	Low
Spring 27	*Myotis nattereri*	0	0	0	1	2	4	Low
Spring 27	*Nyctalus leisleri*	0	0	0	0	1	4	Low
Spring 27	*Pipistrellus pipistrellus*	0	0	0	1	6	4	Low
Spring 27	*Pipistrellus pygmaeus*	0	2	6	3	3	44	Mod
Spring 27	*Plecotus auritus*	0	0	0	0	2	4	Low
Spring 28	*Myotis*	0	0	1	0	0	56	Mod
Spring 28	*Myotis daubentonii*	0	0	1	0	0	44	Mod
Spring 28	*Myotis nattereri*	0	0	0	1	1	18	Low
Spring 28	*Nyctalus leisleri*	0	0	1	1	1	31	L to M
Spring 28	*Pipistrellus pipistrellus*	0	0	0	1	3	4	Low
Spring 28	*Pipistrellus pygmaeus*	0	0	2	3	6	4	Low
Spring 28	*Plecotus auritus*	0	0	0	0	3	4	Low
Spring 29	*Nyctalus leisleri*	0	0	0	0	3	4	Low
Spring 29	*Pipistrellus pipistrellus*	0	0	0	0	2	4	Low
Spring 29	*Pipistrellus pygmaeus*	0	0	0	0	7	4	Low
Spring 29	*Plecotus auritus*	0	0	1	1	4	4	Low

Differences in activity between static detector locations split by species and location is presented in the figure below. The centre line indicates the median activity level whereas the box represents the interquartile range (therefore the spread of the middle 50% of nights of activity). The plots indicate that, in general, the level of bat activity varied greatly from static location and that there was not a consistent of species activity from night to night.

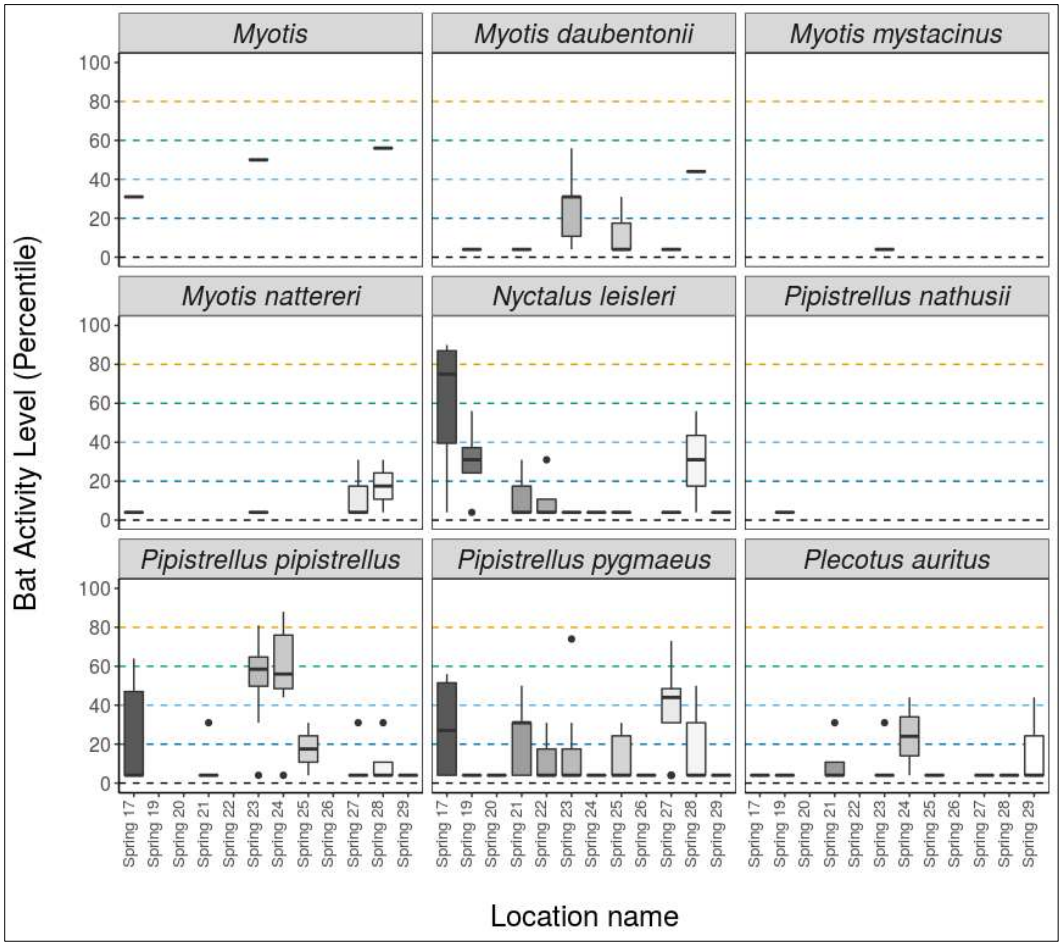

Figure 6f: Differences in activity between static detector locations, split by species and location. The centre line indicates the median activity level whereas the box represents the interquartile range (the spread of the middle 50% of nights of activity).

3.3.7 Summer Surveillance 2022

The EcoBat Tool was unable to generate a report for this data. It was checked by The Mammal Society to determine what the issue is and no issue was found. Therefore full analysis table is not available for this this draft. However, an examination of the CSV file report was undertaken with reference to all other reports prepared and the following data analysis is available:

From the CSV table, Summer 43 had a High “Bat Activity Category” for both common pipistrelle and soprano pipistrelle while Summer 31, 33, 36 and 38 had a High “Bat Activity Category” for common pipistrelle. These bat species is considered to be “High Risk” bat species in relation to wind turbines. Summer 43 was located on a tree on a cleared section of conifer below ESB lines and the nearest turbine is T (50m away). Summer 31 was located on timber post (2m) along fire break opening and track leading to waterbodies. The nearest turbine is T12 located 10m away. Summer 33 was located on a tree along a fire break track 30m from T1. Summer 36 located on a timber post (2m) in an open scrub area and the nearest turbine was T9 (280m away). Summer 38 was located in a clearing in between conifer trees and the nearest turbine is T14 (320m away).

3.4 Desktop Review

3.4.1 Bat Conservation Ireland Database

The bat records within a 1km and 10km radius of the proposed development on the BCIreland database. There are no bat records at the 1km radius level. Bat records at the 10km radius consists of three roosts records (brown long-eared bat x2 and soprano pipistrelle x1). Seven transect records are available with records for Leisler's bats, common pipistrelle, soprano pipistrelle and brown long-eared bat. A total of 42 Ad Hoc records consisting of records are available for the following bat species: Natterer's bat, Daubenton's bat, Leisler's bats, common pipistrelle, soprano pipistrelle and brown long-eared bat.

The bat survey results confirms that all of the above bat species are present in the survey area as well as recording new records for whiskered bat and Nathusius' pipistrelle.

3.4.2 Bat Conservation Landscape Favourability

Figure 7 depicts the BCIreland Landscape Favourability Model (Lundy *et al.,* 2011). The county is divided into 5km squares and the darker the shading of the square, the higher favourability of the 5km square for bats. A 5km covers the survey area and this squares has an overall Low landscape value for bats.

Figure 7: BCIreland Landscape Favourability Model for survey area (www.biodiversityireland.ie).

3.5 Survey Effort, Constraints & Survey Assessment

The following table details any Survey Constraints encountered and a summary of Scientific Assessment completed.

Table 7: Survey Effort, Constraints & Survey Assessment Results.

Category	Discussion
Timing of surveys	Seasonal static surveillance and night-time surveys were undertaken during appropriate survey months.
Survey Type A wide array of survey were undertaken to ensure that a full species list was recorded along with their pattern of usage of the proposed survey area.	Bat Survey Duties Completed (Indicated by red shading) Tree PBR Survey ● Static Detector Survey ● Dusk Bat Survey ● Walking Transect ● Trapping/Mist Netting ○ Endoscope Inspection ● Daytime Building Inspection ● Daytime Bridge Inspection ○ Dawn Bat Survey ● Driving Transect ● IR Camcorder filming ● Other (Thermal Imagery) ●
Weather conditions	Variable, but additional static surveillance nights were undertaken to account for this. All walking and driving transects, dusk and dawn surveys were undertaken in suitable weather conditions.
Survey Constraints	No access to some private buildings outside the proposed development area. However extensive walking and driving transects were undertaken adjacent to the survey area to compensate for this constraint. Limited tracks within the immediate area of turbine locations to allow safe walking during the hours of darkness. However, a large number of static unit locations compensate for the this constraint. Changing turbine locations during the 2020-2022 survey period influenced the locations of statics. As a consequence there is a large number of static unit locations but due to the uniform nature of the proposed turbine location, the static surveillance represents the current proposed turbine locations.
Survey effort **Total:10,982 hrs**	Dusk & Dawn Surveys – 30 hrs Walking & Driving transects – 33 hrs Daytime Inspections – 10 hours Static Surveillance – 10,909 hrs
Extent of survey area	Static surveillance undertaken within the proposed development area. Due to changes to turbine locations, some static units were located in areas >1km from current turbine proposals. Walking and driving transects covered local road network. Building surveys confined to those private buildings where permission was available while additional unoccupied buildings located adjacent to local public roads were surveyed.
Equipment	All in good working order

The extent of the surveys undertaken has achieved to determine:

- Presence / absence of bat within the survey area;
- A bat species list for the survey area;
- Extent and pattern of usage by bats within the survey area.

Surveying was completed according to SNH (2021) and the timing and survey level meets this guidance document. Surveying was also completed according Collins (2016) and the timing and survey level meets this guidance document.

It is therefore deemed that the Scientific Assessment completed is Appropriate in order to completed the aims of the bat survey.

4. Bat Ecological Evaluation

4.1 Bat Species Recorded & Sensitivity

Eight species of bat and additional records for *Myotis* species group were recorded during the 2020-2022 bat surveys. This represents all eight bat species know to be resident in County Donegal. The table below provides an ecological valuation of each bat species and the collision risk factor in relation to wind farms. Three of the bat species recorded is considered to be High risk.

Using CIEM (2016) Guidelines for ecological value, "Bat Risk" in relation to Wind Turbines (SNH, 2021) and with reference to Wray et al., 2010 (Table 2 in SNH, 2021) in relation to level of potential vulnerability of populations extrapolated for Irish bat species, Irish status according to Marnell *et al.,* 2019 and population numbers and core area from Roche et al., 2014.

Yellow = low population vulnerability
Orange = medium population vulnerability
Red = high population vulnerability

Table 8: Evaluation of the bat species recorded during the bat survey.

Bat Species	Ecological Value / Geographical Scale of Importance	Irish Status	Bat Risk	Population Numbers / Core Area
Leisler's bat	International	Least Concern	High	Common
Natterer's bat	County	Least Concern	Low	Widespread
Whiskered bat	Regional	Least Concern	Low	Rare
Nathusius' pipistrelle	Regional	Least Concern	High	Rare
Daubenton's bat	County	Least Concern	Low	Common
Brown long-eared bat	County	Least Concern	Low	Widespread
Common pipistrelle	Local	Least Concern	High	Common
Soprano pipistrelle	Local	Least Concern	High	Common

4.2 EcoBat Tool Evaluation

The static surveillance data collected since 2020 was analysed using the EcoBat Tool. This identified locations where a high value of bat activity for specific bat species was recorded. Due to the changing proposed turbine locations during the survey period (i.e. 2020 to 2022), QGIS analysis of the static unit locations and the current proposed turbine layout showed that there are static units located within 200m of T1 to T18. The nearest static unit location for T19 is 300m. Therefore, two distance standards are used for the evaluation below: <200m and up to 300m.

The table below lists the static units according to their EcoBat Tool Code and these are mapped in relation to the proposed turbine locations. Seventeen static unit locations out of the 102 points recorded a "High" EcoBat Bat Activity value. Of these 17 units, 16 of the locations related to "High Risk" bat species. Six of these static units were located within 200m of a proposed turbine site with an additional two units located within 300m of a turbine site. This list identifies locations where bat mitigation measures are required.

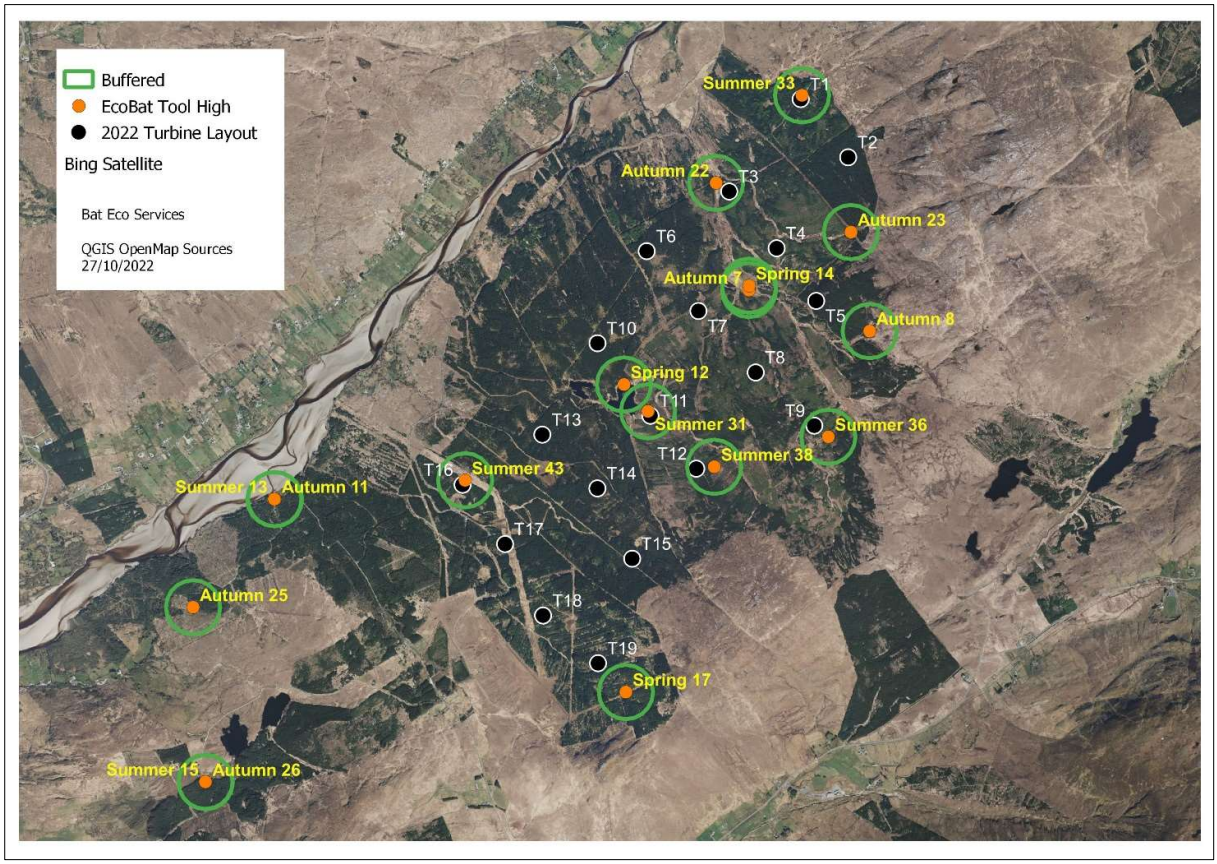

Figure 8a: Location of static units with an EcoBat Tool Bat Activity value of "High".

Table 9a: Evaluation of the bat activity value of static surveillance using the EcoBat Tool – High Value statics (High Risk bat species in bold).

EcoBat Tool Code	Value	Bat Species	Turbine (200m)
Autumn 11	High	**Soprano pipistrelle & common pipistrelle**	
Autumn 22	High	**Soprano pipistrelle**	T3 <200m
Autumn 23	High	**Soprano pipistrelle & common pipistrelle**	
Autumn 25	High	**Soprano pipistrelle**	
Autumn 26	High	**Soprano pipistrelle & common pipistrelle**	
Autumn 7	High	**Soprano pipistrelle**	
Autumn 8	High	**Common pipistrelle**	
Spring 12	High	Myotis species	T11 – 300m
Spring 14	High	Myotis species, whiskered bat, **Soprano pipistrelle & common pipistrelle**	
Spring 17	High	**Leisler's bat**	T19 – 295m
Summer 13	High	**Soprano pipistrelle**	
Summer 15	High	**Soprano pipistrelle & common pipistrelle**	
Summer 31	High	**Common pipistrelle**	T11 <200m
Summer 33	High	**Common pipistrelle**	T1 <200m
Summer 36	High	**Common pipistrelle**	T9 <200m
Summer 38	High	**Common pipistrelle**	T12 <200m
Summer 43	High	**Soprano pipistrelle & common pipistrelle**	T16 <200m

Those static units identified where a Moderate to High value of bat activity for specific bat species was recorded has also been extracted and present in the table below and these are mapped in relation to the proposed turbine locations. Fourteen static unit locations out of the 102 points recorded a “Moderate to High” EcoBat Bat Activity value. Of these 14 units, 13 of the locations relation to “High Risk” bat species. Six of these static units were located within 200m of a proposed turbine site with an additional three units located within 300m of a turbine site. This list identifies locations where bat mitigation measures are required.

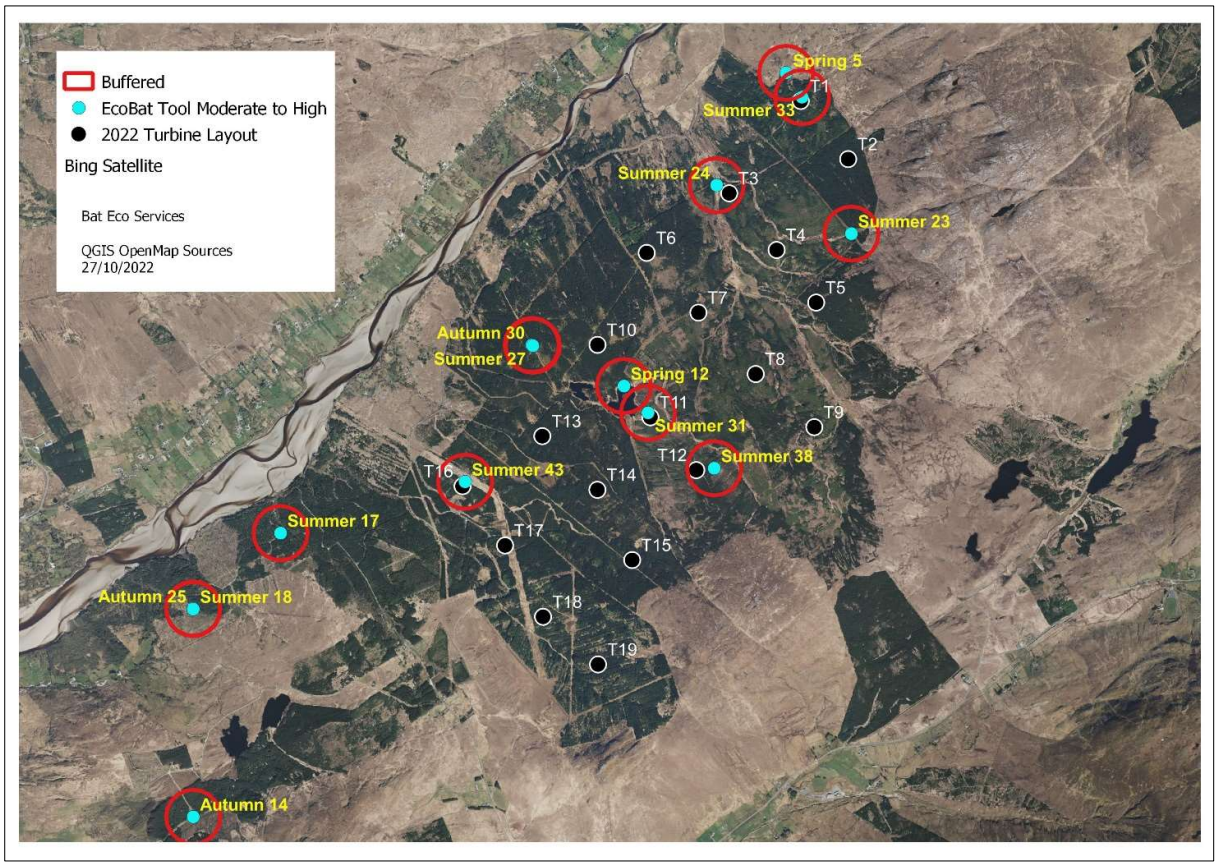

Figure 8b: Location of static units with an EcoBat Tool Bat Activity value of “Moderate to High”.

Table 9b: Evaluation of the bat activity value of static surveillance using the EcoBat Tool – Moderate to High Value statics (High Risk bat species in bold).

EcoBat Tool Code	Value	Bat Species	Turbine (200m)
Autumn 14	M to H	**Soprano pipistrelle**	
Autumn 25	M to H	**Common pipistrelle**	
Autumn 30	M to H	**Soprano pipistrelle**	
Spring 12	M to H	**Daubenton’s bat**	T11 – 300m
Spring 5	M to H	**Common pipistrelle**	T1 – 230m
Summer 17	M to H	**Soprano pipistrelle**	
Summer 18	M to H	**Soprano pipistrelle, Common pipistrelle**	
Summer 23	M to H	**Common pipistrelle**	
Summer 24	M to H	**Soprano pipistrelle**	T3<200m
Summer 27	M to H	**Common pipistrelle**	
Summer 38	M to H	**Soprano pipistrelle**	T12<200m

Summer 31	M to H	**Soprano pipistrelle**	T11<200m
Summer 33	M to H	**Soprano pipistrelle**	T1 <200m

Therefore, in summary, the following proposed turbine locations are considered to be important in relation to level of bat activity recorded during static surveillance and their potential impact on local bat populations:

- T1, T3, T6, T9, T11, T12, T16, T19.

4.3 QGIS Analysis

To facilitate the construction of the proposed wind turbine, an internal wind farm access tracks are required. This may result in the removal of habitats and the potential impact of this is investigated using the ***"Habitats"*** layer, **"Buffered Bat Encounters"** layer and the **"Buffered Turbine Locations"** layer produced (See Section 3.3.3 for a greater explanation of this process).

- "Habitats" layer = shapefile provided by Tobin
- "Buffered Bat Encounters" = all bat encounters within 1km of turbine locations (to represent the primary proposed development area) was extracted from full bat dataset. This new dataset was named "Bat Encounters within boundary" and each of these bat encounters were buffered to 50m.
- "Buffered Turbine Locations" = all turbine locations were buffered to 200m to aid analysis.

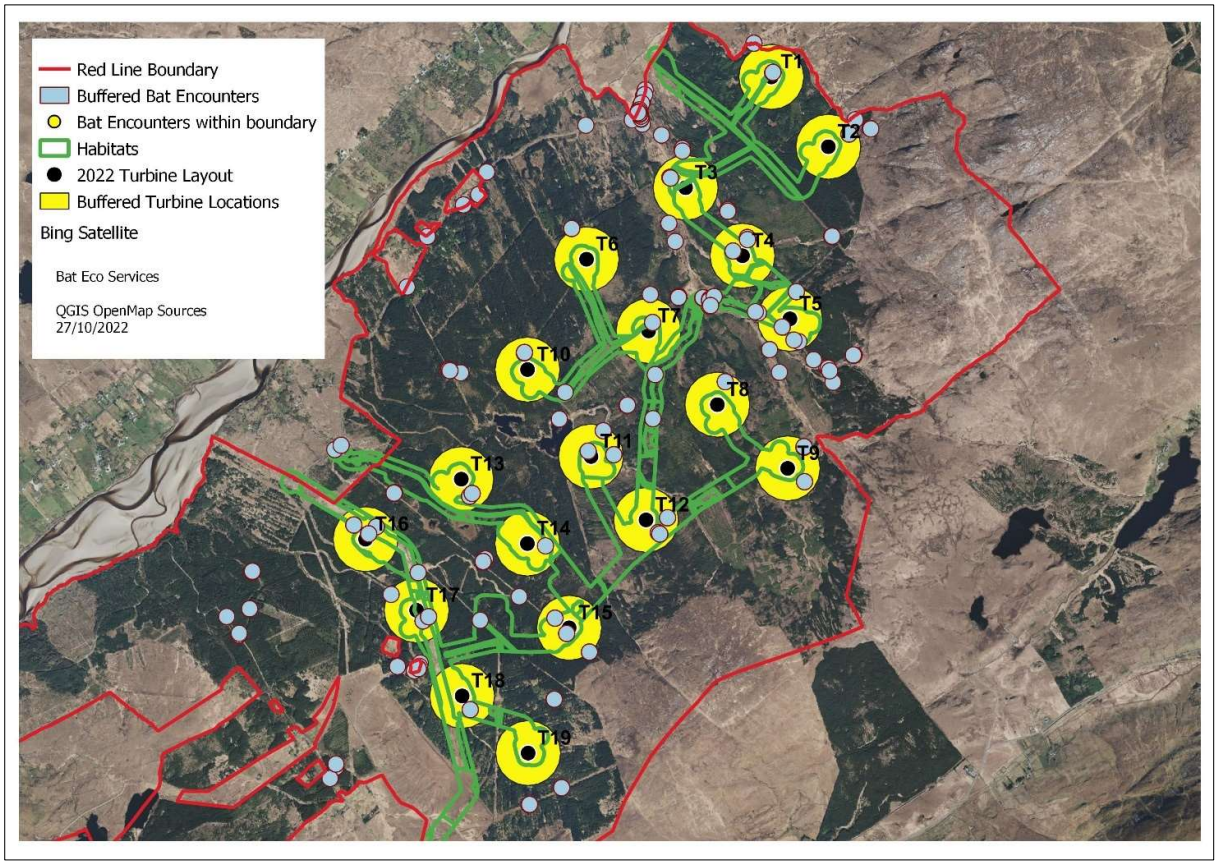

Figure 8c: QGIS analysis of bat encounters within 200m of turbine locations and habitats shapefile.

4.4 Site Risk Assessment

The Site Risk Assessment is calculated according to SNH, 2021 (See Appendix 8.3 for details of how this is calculated).

The assessment value (i.e. Turbine Risk value) is compared to the ranges below:

- Low (green) 0-4
- Medium (amber) 5-12
- High (red) 15-25

While Leisler's bat can be considered as common in Ireland, its status as an "Internationally Important" population, ranks it higher than the two common *Pipistrellus* species. Therefore, separate Risk assessments were completed for this bat species.

4.4.1 Leisler's bat

With reference to the Median EcoBat category as a combination of nightly bat activity at each of the static locations, the majority of the proposed wind turbines have a potential Low Risk factor in relation to Leisler's bat (n = 18 turbines) while there a one Medium Risk (i.e. T10) and one High Risk turbine (i.e. T19).

With reference to the Highest EcoBat nightly bat activity on a single night at each of the static locations, the majority of the proposed wind turbines have a potential Low Risk factor in relation to Leisler's bat (n = 16 turbines) while a two is of Medium Risk in relation to Ecobat median values (n = 2 turbines). There a one High Risk turbines (i.e. T19).

Table 10a: Risk assessment for each proposed turbine location for Leisler's bats only.

Turbine No.	Site Risk Value	Ecobat Median Activity Category	Turbine Risk		Ecobat Highest Category	Turbine Risk
			Site Risk x Ecobat			Site Risk x Ecobat
1	3	1	3		1	3
2	3	1	3		1	3
3	3	0	0		0	0
4	3	0	0		0	0
5	3	1	3		1	3
6	3	1	3		1	3
7	3	1	3		1	3
8	3	0	0		0	0
9	3	1	3		1	3
10	3	2	6		3	9
11	3	1	3		1	3
12	3	1	3		2	6
13	3	0	0		0	0
14	3	0	0		0	0
15	3	1	3		1	3
16	3	1	3		1	3
17	3	0	0		0	0
18	3	1	3		1	3
19	3	5	15		5	15

4.4.2 Common pipistrelle

With reference to the Median EcoBat category as a combination of nightly bat activity at each of the static locations, the majority of the proposed wind turbines have a potential Low Risk factor in relation to common pipistrelle (n = 11 turbines) while there are six with a Medium Risk factor and two with a High Risk turbines (i.e. T10 and T16).

With reference to the Highest EcoBat nightly bat activity on a single night at each of the static locations, the majority of the proposed wind turbines have a potential Medium Risk factor in relation to common pipistrelle (n = 11 turbines) while a four is of Low Risk in relation to Ecobat median values and four with a High Risk factor turbines).

Table 10b: Risk assessment for each proposed turbine location for Common pipistrelle only.

Turbine No.	Site Risk Value	Ecobat Median Activity Category	Turbine Risk		Ecobat Highest Category	Turbine Risk
			Site Risk x Ecobat			Site Risk x Ecobat
1	3	3	9		4	12
2	3	1	3		3	9
3	3	1	3		5	15
4	3	1	3		2	6
5	3	1	3		3	9
6	3	3	9		4	12
7	3	1	3		1	3
8	3	2	6		2	6
9	3	3	9		5	15
10	3	5	12		4	15
11	3	4	12		5	15
12	3	2	6		2	6
13	3	1	3		1	3
14	3	1	3		1	3
15	3	1	3		2	6
16	3	5	15		5	15
17	3	1	3		2	6
18	3	1	3		1	3
19	3	1	3		4	12

4.4.3 Soprano pipistrelle

With reference to the Median EcoBat category as a combination of nightly bat activity at each of the static locations, the majority of the proposed wind turbines have a potential Low Risk factor in relation to soprano pipistrelle (n = 16 turbines) while there are six with a Medium Risk factor and no High Risk factor turbines.

With reference to the Highest EcoBat nightly bat activity on a single night at each of the static locations, the majority of the proposed wind turbines have a potential Low Risk factor in relation to common pipistrelle (n = 10 turbines) while there are seven turbines of Medium Risk in relation to EcoBat median values and two with a High Risk factor turbines.

Table 10c: Risk assessment for each proposed turbine location for Soprano pipistrelle only.

Turbine No.	Site Risk Value	EcoBat Median Activity Category	Turbine Risk		EcoBat Highest Category	Turbine Risk
			Site Risk x Ecobat			Site Risk x Ecobat
1	3	3	9		4	12
2	3	0	0		0	0
3	3	4	12		5	15
4	3	1	3		1	3
5	3	0	0		0	0
6	3	4	12		4	12
7	3	0	0		0	0
8	3	0	0		0	0
9	3	0	0		0	0
10	3	1	3		2	6
11	3	3	9		4	12
12	3	1	3		3	9
13	3	1	3		2	6
14	3	0	0		0	0
15	3	1	3		1	3
16	3	4	12		5	15
17	3	1	3		1	3
18	3	1	3		1	3
19	3	2	6		3	9

In summary, for the three high risk bat species, the propose turbine locations have the following Risk Factor:

Low: T7, T14, T18

Medium: T1, T2, T4, T5, T6, T8, T12, T13, T15, T17

High: T3, T9, T10, T11, T16, T19

5. Assessment of Potential Impact

5.1 Impact Assessment

The impact assessment takes into consideration the following:

- Eight bat species were recorded during the 2020 to 2022 bat surveys of the proposed development site.
- Four of these species are considered to be High Risk bat species in relation to wind turbines: Leisler's bat, common pipistrelle, soprano pipistrelle and Natusius' pipistrelle.
- The remaining four species are Low Risk: Natterer's bat, Daubenton's bat, whiskered bat and brown long-eared bat.
- EcoBat Tool Analysis results highlighted turbine locations with High Risk and Medium Risk for Leisler's bats, common pipistrelle and soprano pipistrelle.
- Spread of bat encounter records within the proposed development site, particularly, in relation to infrastructure.
- Bat habitats present within 200m of turbine locations and along infrastructure routes.

5.1.1 Core Sustenance Areas

No bat roosts were recorded within the proposed development area or in adjacent buildings surveyed. BCIreland bat records at the 10km radius consists of three roosts records (brown long-eared bat x2 and soprano pipistrelle x1). All three roosts are located 3.5km, 3.7km and 3.9km from the red line boundary. The CSZ for brown long-eared bat and soprano pipistrelle is 3km. Therefore, the proposed development is located outside the CSZ for the known bat roosts recorded on the BCIreland database.

5.1.2 Potential Impact on Local Bat Populations

One set of buildings is located within the proposed development area but no bats were recorded roosting in them during the array of bat surveys completed. These stone ruins are surrounded by mature trees deemed as Potential Bat Roosts. However it was confirmed that neither these ruins or the mature trees will be impacted on by the proposed development. Therefore there will be no loss of PBRs identified in this area.

The following table summarises the result of the impact assessment for each of the turbine locations. If no mitigation measures are implemented, there are six High Risk turbines (T3, T9, T10, T11, T16 and T19).

5.1.3 Cumulative Impacts of Existing Forestry Operations

Forestry operations will continue within sections of the proposed development site during the construction phase and throughout the life span of the proposed development. Such operations include clear felling and new planting. The cumulative impact of these forestry operations in combination with the proposed development will not cause a significant increase to potential impacts of the proposed development identified above.

Table 11: Summary of bat survey data and EcoBat Tool assessments.

T No.	Risk Assessment Leisler's bat		Risk Assessment Common pipistrelle		Risk Assessment Soprano pipistrelle		Other Bat Species Recorded? (Within 200m of Turbine location)	Bat Habitat		Bat encounters along proposed wind farm access tracks	If no mitigation is applied, what is the potential impact level?
	Ecobat Median	Ecobat Activity	Ecobat Median	Ecobat Activity	Ecobat Median	Ecobat Activity		Within 200m buffer of turbine	Along access tracks	In vicinity of Turbine location	Taking into consideration the clarifying comment.
1	3	3	9	12	9	12	Natt Whis BLE My Daub	Yes	Yes	Natt Whis BLE My Daub	Moderate
2	3	3	3	9	0	0	Whis BLE My Daub	Yes	Yes	Whis BLE My Daub	Moderate
3	0	0	3	15	12	15	Whis My Daub	Yes	Yes	Whis My Daub	High
4	0	0	3	6	3	3	BLE Daub	Yes	Yes	BLE Daub	Moderate
5	3	3	3	9	0	0	BLE My	Yes	Yes	BLE My	Moderate
6	3	3	9	12	12	12		Yes	Yes		Moderate
7	3	3	3	3	0	0	BLE	Yes	Yes	BLE	Low
8	0	0	6	6	0	0	My	Yes	Yes	My	Moderate
9	3	3	9	15	0	0	Natt BLE My Daub	Yes	Yes	Natt BLE My Daub	High
10	6	9	12	15	3	6	VLE My Daub	Yes	Yes	VLE My Daub	High
11	3	3	12	15	9	12	Natt My Daub	Yes	Yes	Natt My Daub	High
12	3	6	6	6	3	9	Nat My Daub	Yes	Yes	Nat My Daub	Moderate
13	0	0	3	3	3	6	Natt Whis BLE My Daub	Yes	Yes	Natt Whis BLE My Daub	Moderate
14	0	0	3	3	0	0		Yes	Yes		Low
15	3	3	3	6	3	3	Natt Whis BLE Daub	Yes	Yes	Natt Whis BLE Daub	Moderate
16	3	3	15	15	12	15	Natt Whis BLE Daub	Yes	Yes	Natt Whis BLE Daub	High
17	0	0	3	6	3	3	Natt Whis BLE Daub	Yes	Yes	Natt Whis BLE Daub	Moderate
18	3	3	3	3	3	3	BLE	Yes	Yes	BLE	Low
19	15	15	3	12	6	9		Yes	Yes		Moderate

Natt = Natterer's bat, Daub = Daubenton's bat, BLE = brown long-eared bat, Nath pip = Nathusius' pipistrelle, Whis = whiskered bat, MY = Myotis spp.

5.1.4 Cumulative Impacts of Additional Planning Applications

Using the Core Sustenance Zone radius of 4km (this is the CSZ for Natterer's bat, the widest zone value for the eight bat species recorded during the surveys), a buffer of 4km was created from the proposed wind farm site boundary of the proposed development site. This was mapped in relation to the list of developments permitted and proposed supplied by TOBIN, in preparation of the Policy, Planning and Development chapter for the Environmental Impact Assessment Report (EIAR) of the proposed development (Chapter 4). None of these developments are within the 4km buffer radius of the proposed wind farm site boundary of the proposed development. The closest existing wind farm to the proposed development is the Loughderryduff (Maas) Wind Farm, located c. 5km southwest of the proposed wind farm site. The shortest turbine to turbine distance between the Loughderryduff wind farm and the proposed development is approximately 8.5km. Therefore, there are no cumulative impacts of additional planning applications in relation to local bat populations.

5.2 Mitigation Measures

In order to reduce the potential impact of the proposed development on local bat populations the following mitigation is recommended.

5.2.1 Construction Phase

Mitigation is best achieved through avoidance especially in relation to bat fauna. It is proposed that the following measures be put in place to avoid or lessen the degree of impacts on local bat populations.

5.2.1.1 Minimum Buffer Zone

To minimize risk to bat populations, a buffer zone is recommended around any forestry, treeline, hedgerow, woodland feature, into which no part of the turbine should intrude. Using the formula quoted below, the minimum distances of wind turbines for bat mitigation are calculated for each of the potential turbine models (information supplied by TOBIN).

formula: $\text{Buffer distance} = \sqrt{(50 + b1)^2 - (hh - fh)^2}$
where bl = blade length, hh = hub height, fh = feature height (all in meters)

The dimensions of the potential wind turbine models proposed are to be finalised and once available, the minimum buffer zone will be calculated. Feature height is 25m (typical conifer plantation height, the predominant habitat type present within the survey area).

$\text{Buffer distance} = \sqrt{(?? + ??)^2 - (?? - ??)^2}$

Providing alternative foraging areas outside the wind farm zone has been shown to reduce the presence of bats within cleared zones around individual wind turbines (i.e. bats are attracted to the more favourable foraging habitats). Therefore compensatory habitat is recommended and, where possible, such planting should include deciduous woodland.

5.2.1.2 Construction Phase

Following the formula in the above section, ensure that the required minimum distance from tall vegetation is achieved.

Table 12: Bat Mitigation Measures recommended during the Construction Phase.

EcoBat Tool High Level Turbine Locations This applies to T3, T9, T10, T11, T15, T19 and two Medium Risk turbines: T1 & T6	**EcoBat Tool Medium Level Turbine Locations** This applies to T2, T4, T8, T12, T13, T15, T17 This also applies to remaining Internal Road Network	**EcoBat Tool Low Level Turbine Locations**T his applies to T7, T14 & T18
Ensure that wind turbine is >50m away from plantation edge. Using the formula listed above, the minimum distance will be determined. T19 – due to the fact this this turbine location has a high level of Leisler's bat activity, a zone of at least 100m radius vegetation clearance is required.	Ensure that wind turbine is >50m away from plantation edge.	Ensure that wind turbine is >50m away from plantation edge.
A zone of >50m around the wind turbines (from the tip of the blade) should be cleared of tall vegetation (shrubs, trees, scrub etc.) to reduce favourability of this zone for foraging and commuting bats. A low level of vegetation should be maintained for the entire operational phase. This should be monitored to ensure that scrub vegetation does not develop within the zone around the turbines.	A zone of 50m around the wind turbines (from the tip of the blade) should be cleared of tall vegetation (shrubs, trees, scrub etc.) to reduce favourability of this zone for foraging and commuting bats. A low level of vegetation should be maintained for the entire operational phase. This should be monitored to ensure that scrub vegetation does not develop within the zone around the turbines.	A zone of 50m around the wind turbines (from the tip of the blade) should be cleared of tall vegetation (shrubs, trees, scrub etc.) to reduce favourability of this zone for foraging and commuting bats. A low level of vegetation should be maintained for the entire operational phase. This should be monitored to ensure that scrub vegetation does not develop within the zone around the turbines.
Complete clearance work at least 6 months prior to installation of wind turbines. Studies have shown that bats are attracted to clear felled forestry areas due to increase insect loading. This has been shown to occur for a period of 3-6 months before the insect loading reduces to pre-cleared felled levels.	Complete clearance work at least 6 months prior to installation of wind turbines. Studies have shown that bats are attracted to clear felled forestry areas due to increase insect loading. This has been shown to occur for a period of 3-6 months before the insect loading reduces to pre-cleared felled levels.	Complete clearance work at least 6 months prior to installation of wind turbines. Studies have shown that bats are attracted to clear felled forestry areas due to increase insect loading. This has been shown to occur for a period of 3-6 months before the insect loading reduces to pre-cleared felled levels.
The ruins (Section 3.1.1) and mature deciduous trees (Section 3.1.2) surrounding the ruins will not be removed during construction of the proposed development. This area will be protected from any		

construction works proposed to be undertaken in vicinity of this area. This area will also be protected during the operation of the proposed development.

5.2.2 Operational Phase

5.2.2.1 Feathering of blades

The operation of the turbines should be in a manner that will restrict the rotation of turbine blades as much as possible below the manufacturer's cut-in speed (e.g. by feathering the blades during low wind levels - changes in blade feathering by altering the angle of the blade and therefore preventing the blades from rotating during low wind situations). This would prevent freewheeling or idling of the blades.

Therefore ensure that blades of turbines are prevented from freewheeling (idling/spinning). Feathering of the blades during low wind conditions are recommended for all turbines.

5.2.2.2 Turbine Cut-in Speeds

There are few bat mitigation measures available in relation to wind farms to reduce fatalities. One successful measure applied to wind farms in Europe is to increase the cut-in speeds of the individual turbines. This is important in order to protect High Risk species (Leisler's bat, soprano and common pipistrelle) foraging/commuting in vicinity of turbine locations.

Increasing the cut-in speed to 5.5 m/s from 30 minutes prior to sunset and to 30 minutes after sunrise to reduce bat collisions with turbines should be employed where required (i.e. at turbine locations where surveillance recorded high bat activity levels for High Risk and Medium Risk bat species and/or bat carcasses were recorded). The duration required depends on the level of bat mitigation required for individual turbine sites (i.e. full bat activity season or confined to spring & autumn months – this will be determine by first year surveillance). A risk assessment should be undertaken using the surveillance data and analysed using best practice e.g. assessment of static data should be completed using the online tool *EcoBat* (http://www.mammal.org.uk/science-research/ecostat/) as recommended by SNH, 2021 or other equivalent tool depending on most up to-date recommendations at the time of monitoring.

Where cut-in speeds are required, they should be operated according to specific weather conditions. In a previous bat survey undertaken by the author, static units were erected on an anemometer at 4m and 50m level. The number of bat passes recorded on the static units was analysed according to temperature and wind speed recorded at similar height levels. During this survey, it was determined that:

1. The vast majority of bat passes were recorded at the temperatures of 8°C and greater. Therefore, when the air temperature was less than 7°C there was no bat activity recorded below this temperature during the surveys completed.
2. In general, bat activity was highest at low wind speeds (<5.5m/s). It has been shown that curtailing the operations of wind turbines at low wind speeds can reduce bat mortality dramatically, especially during the late summer and early autumn months.

Reducing fatalities can be reduced by changing the speed trigger or cut-in speeds of the turbines (i.e. meaning that the turbine is not operational during low wind speeds) or by changing the turbine blades angles which will mean that higher wind speeds are needed to start the wind turbine blades

moving. Modern remotely operated wind turbines allow such cut-in speeds to be controlled centrally and automatically.

Due to the high levels of bat activity, cut-in speeds is required at T3, T9, T10, T11, T15 and T19. In addition, two proposed turbine locations categorised has having a Medium Risk are also included to be included in the list of turbines with required cut-in speeds: T1 and T6.

For all the other turbines, operation will take place without increases in cut-in speeds coupled with three years of post-construction monitoring.

To determine if cut-in speeds are required in the long-term, intensive surveillance is recommended by SNH (2021). It is recommended that surveillance is undertaken at the High Risk turbines and the two additional Medium Risk turbines over a period of three years (first three years of operation, but an annual review is required to determine in the cut-in speeds should be implement after 1 year of operation). If the Leisler's bat and *Pipistrellus* spp. activity remains high at the High Risk turbines and the two Medium Risk turbines after the first year of surveillance then the cut-in speeds (coupled with carcass search results) should continue to be put in place immediately. Surveillance will continue to review the situation at each individual turbine location for the remaining two years.

As recommended by SNH, 2019, *"the effectiveness of curtailment needs to be monitored in order to determine (a) whether it is working effectively (i.e. the level of bat mortality is considered to be incidental), and (b) whether the curtailment regime can be refined such that turbine down-time can be minimised whilst ensuring that it remains effective at preventing casualties".*

"Where the need for curtailment has been identified, a curtailment regime should be developed and presented as a part of the supporting Environmental Statement for the project. The proposed operating regime should specify, and be designed around the values for the key weather parameters and other factors that are known to influence collision risk which may include any or all of the following:

- *Wind speed in m/s (measured at nacelle height)*
- *Time after sunset*
- *Month of the year*
- *Temperature (ºC)*
- *Precipitation (mm/hr) "*

Post construction acoustic surveys provide additional information which, when used in conjunction with appropriate carcass search data, can support any proposed changes to pre-application predictions concerning the need for curtailment or adjustments to an agreed curtailment regime.

This surveillance and annual review should be carried out by an independent experienced bat ecologist and all reports should be issued to the Local Authority and NPWS for review.

Table 13: Bat Mitigation Measures recommended during the Operational Phase.

EcoBat Tool High Level Turbine Locations This applies to T3, T9, T10, T11, T15, T19 & two additional Medium Risk turbines T1 & T6	**EcoBat Tool Medium Level Turbine Locations** This applies to T2, T4, T8, T12, T13, T15, T17 This also applies to remaining Internal Road Network	**EcoBat Tool Low Level Turbine Locations**T This applies to T7, T14 & T18
Operate the wind turbines in a manner that reduces the movement of the blades below the cut-in speed (e.g. by feathering the blades).	Operate the wind turbines in a manner that reduces the movement of the blades below the cut-in speed (e.g. by feathering the blades).	Operate the wind turbines in a manner that reduces the movement of the blades below the cut-in speed (e.g. by feathering the blades).
Monitoring the first three years of operation to determine bat activity levels post construction. Review the results of monitoring at individual High Risk turbines after Year 1. Determine if curtailment is required. Operate the wind turbine from 30 minutes prior sunset to 30 minutes after sunrise at a cut-in speed of 5.5 m/s during specified weather conditions (SNH, 2021) and during the active bat season (April to October). Operate wind farm with specific cut-in speeds from Day 1 of Year 2, if required, and review after surveillance/monitoring is completed.		.
Undertake a carcass search for 3 years post operation of the wind farm to determine whether a higher cut-in speed of the blades is required. Review after Year 1 along with bat activity monitoring.	Undertake a carcass search for 3 years post operation of the wind farm.	Undertake a carcass search for 3 years post operation of the wind farm.
Annual inspection of each buffer zone around each turbine will be undertaken and any regenerating trees or tall shrubs will be cut back.	Annual inspection of each buffer zone around each turbine will be annually inspected and any regenerating trees or tall shrubs will be cut back.	Annual inspection of each buffer zone around each turbine will be annually inspected and any regenerating trees or tall shrubs will be cut back.

Bat mitigation measures during the Operational Phase can be reviewed by implementing a strict surveillance programme for the first three years of operation of the wind farm in order to identify if there exists a substantial risk at a particular turbine location or during a particular time-period (3 yrs - as per recommendation of SNH, 2021 guidelines). This surveillance should then be repeated at Year 10 and Year 20 of the operation of the wind farm to ensure that sufficient mitigation is being implemented. This surveillance required is as follows:

a) Bat activity surveillance
   The level of bat activity should be monitoring for a minimum of 10 nights at each turbine location (ground level) during three of the eight month activity period (March/April to October/November). The surveillance periods should be divided into three survey periods to represent the three main periods where bat collisions have been documented: Spring (April/May); Summer (June/July) and Autumn (August/September).
b) Carcass search
   During the surveillance periods of specific wind turbines, carcass search is required for a minimum of 1 morning per turbine (i.e. 3/4 mornings in total over the 1 year surveillance i.e. one per surveillance period). For each turbine, the search area should be 100m radius after ideal bat foraging weather conditions (mild, calm and dry weather and greater than 10ºC). A scavenger trial is required to facilitate analysis (as per SNH, 2021 guidelines).
c) For exact protocols consult most up-date best practice guidelines from current research publications / guidelines (e.g. SNH, 2021).
d) Assessment of static data should be completed using the online tool *EcoBat Tool* (http://www.mammal.org.uk/science-research/ecostat/) as recommended by SNH, 2021 or other equivalent tool depending on most up to-date recommendations at the time of monitoring.

5.2.3 Bat Surveys – Age of Data

It is recommended that if three years lapse from between pre-construction surveys and the construction of the wind turbines, it may be necessary to repeat the pre-construction surveys (Rodrigues *et al.*, 2015). Surveys completed for this report concluded in 2022. Therefore, a review should be undertaken no later than Spring 2025. Future survey work should be completed according to best practice guidelines available.

6. Survey Conclusions

An array of bat surveys were completed since 2020 and the results of these surveys and analysis are summarised as follows:

- Eight bat species were recorded during the bat surveys of the proposed development site.
- No bat roosts were recorded within the proposed development or in buildings surveyed adjacent to the proposed development.
- Four of these species are considered to be High Risk bat species in relation to wind turbines: Leisler's bat, common pipistrelle, soprano pipistrelle and Nathusius' pipistrelle.
- The remaining four species are Low Risk: Natterer's bat, Daubenton's bat, whiskered bat and brown long-eared bat.
- EcoBat Tool Analysis results highlighted turbine locations with High Risk and Medium Risk for Leisler's bats, common pipistrelle and soprano pipistrelle.

Bat mitigation measures have been provided for the Construction and Operation Phases of the proposed development. Different levels of bat mitigation measures are provided depending on the potential risk of individual turbines on specific bat species. The strict implementation of these measures will reduce the potential impact of the proposed development on local bat populations. This coupled with monitoring during operation of the proposed development will also allow any further fine tuning of bat mitigation measures that may be required.

It is therefore considered that there will be no significant impacts on local bats populations if bat mitigations measures are strictly implemented.

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8. Appendices

8.1 Appendix 1 Relevant Legislation & Bat Species Status in Ireland

8.1.1 Irish Statutory Provisions

A small number of animals and plants are protected under Irish legislation (Nelson, *et al.,* 2019). The principal statutory provisions for the protection of animal and plant species are under the Wildlife Act 1976 (as amended) and the European Communities (Birds and Natural Habitats) Regulations 2011, as amended. The Flora (Protection) Order 2015 (S.I. no. 356 of 2015) lists the plant species protected by Section 21 of the Wildlife Acts. See www.npws.ie/ legislation for further information.

The codes used for national legislation are as follows:

- WA = Wildlife Act, 1976, Wildlife (Amendment) Act, 2000 and other relevant amendments
- FPO = Flora (Protection) Order, 2015 (S.I. No. 356 of 2015)

8.1.2 EU Legislation

The Birds Directive (Directive 2009/147/EC) and Habitats Directive (Council Directive 92/43/EEC) are the legislative instruments which are transposed into Irish law, *inter alia,* by the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011) ('the 2011' Regulations), as amended.

The codes used for the Habitats Directive (Council Directive 92/43/EEC) are:

- Annex II Animal and plant species listed in Annex II
- Annex IV Animal and plant species listed in Annex IV
- Annex V Animal and plant species listed in Annex V

The main aim of the Habitats Directive is the conservation of biodiversity by requiring Member States to take measures to maintain or restore natural habitats and wild species listed on the Annexes to the Directive at a favourable conservation status. These annexes list habitats (Annex I) and species (Annexes II, IV and V) which are considered threatened in the EU territory. The listed habitats and species represent a considerable proportion of biodiversity in Ireland and the Directive itself is one of the most important pieces of legislation governing the conservation of biodiversity in Europe.

Under Article 11 of the 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 on 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. There are three volumes with the third listing details of the species assessed.

Article 12 of the Habitats Directive requires Member States to take measures for the establishment of a strict protection regime for animal species listed in Annex IV(a) of the Habitats Directive within the whole territory of Member States. Article 16 provides for derogation from these provisions under defined conditions. These provisions are implemented under Regulations 51 and 54 of the 2011 Regulations.

8.1.3 IUCN Red Lists

The International Union for the Conservation of Nature (IUCN) coordinates the Red Listing process at the global level, defining the categories so that they are standardised across all taxa. Red Lists are also produced at regional, national and subnational levels using the same IUCN categories (IUCN 2012, 2019). Since 2009, Red Lists have been produced for the island of Ireland by the National Parks and Wildlife Service (NPWS) and the Northern Ireland Environment Agency (NIEA) using these IUCN categories. To date, 13 Red Lists have been completed. The Red Lists are an assessment of the risk of extinction of each species and not just an assessment of their rarity. Threatened species are those species categorised as Critically Endangered, Endangered or Vulnerable (IUCN, 2019) – also commonly referred to as 'Red Listed'.

8.1.4 Irish Red List - Mammals

Red Lists in Ireland refer to the whole island, i.e. including Northern Ireland, and so follow the guidelines for regional assessments (IUCN, 2012, 2019). The abbreviations used are as follows:.

- RE Regionally Extinct
- CR Critically Endangered
- EN Endangered
- VU Vulnerable
- NT Near Threatened
- DD Data Deficient
- LC Least Concern
- NA Not Assessed
- NE Not Evaluated

There are 27 terrestrial mammals species in Ireland, which includes the nine resident bat species listed. The terrestrial mammal, according to Marnell *et al.,* 2019, list for Ireland consists of all terrestrial species native to Ireland or naturalised in Ireland before 1500. The IUCN Red List categories and criteria are used to assess that status of wildlife. This was recently completed for the terrestrial mammals of Ireland. Apart from the two following two mammal species (grey wolf *Canis lupus* (regionally extinct) and black rat *Rattus rattus* (Vulnerable)), the remaining 25 species were assessed as least concern in the most recent IUCN Red List publication by NPWS (Marnell *et al*., 2019).

8.1.5 Irish Bat Species

All Irish bat species are protected under the Wildlife Act (1976) and Wildlife Amendment Acts (2000 and 2010). Also, the EC Directive on The Conservation of Natural habitats and of Wild Fauna and Flora (Habitats Directive 1992), seeks to protect rare species, including bats, and their habitats and requires that appropriate monitoring of populations be undertaken. All Irish bats are listed in Annex IV of the Habitats Directive and the lesser horseshoe bat *Rhinolophus hipposideros* is further listed under Annex II. Across Europe, they 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, enacted 1983) was instigated to protect migrant species across all European boundaries. The Irish government has ratified both these conventions.

Also, under existing legislation, the destruction, alteration or evacuation of a known bat roost is an offence. The most recent guidance document is "Guidance document on the strict protection of animal species of Community interest un the Habitats Directive (Brussels, 12.10.2021 C(2021) 7391 final".

Regulation 51(2) of the 2011 Regulations provides –

(*"(2) Notwithstanding any consent, statutory or otherwise, given to a person by a public authority or held by a person, except in accordance with a licence granted by the Minister under Regulation 54, a person who in respect of the species referred to in Part 1 of the First Schedule—*

(a) deliberately captures or kills any specimen of these species in the wild, (b) deliberately disturbs these species particularly during the period of breeding, rearing, hibernation and migration,

(c) deliberately takes or destroys eggs of those species from the wild,

(d) damages or destroys a breeding site or resting place of such an animal, or

(e) 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."

The grant of planning permission does not permit the commission of any of the above acts or render the requirement for a derogation licence unnecessary in respect of any of those acts.

Any works interfering with bats and especially their roosts, may only be carried out under a derogation licence granted by National Parks and Wildlife Service (NPWS) pursuant to Regulation 54 of the European Communities (Birds and Natural Habitats) Regulations 2011 (which transposed the EU Habitats Directive into Irish law).

There are eleven recorded bat species in Ireland, nine of which are considered resident on the island. Eight resident bat species and one of the vagrant bat species are vesper bats and all vespertilionid bats have a tragus (cartilaginous structure inside the pinna of the ear). Vesper bats are distributed throughout the island. Nathusius' pipistrelle *Pipistrellus nathusii* is a recent addition while the Brandt's bat has only been recorded once to-date (Only record confirmed by DNA testing, all other records has not been genetically confirmed). The ninth resident species is the lesser horseshoe bat *Rhinolophus hipposideros*, which belongs to the Rhinolophidea and has a complex nose leaf structure on the face, distinguishing it from the vesper bats. This species' current distribution is confined to the western seaboard counties of Mayo, Galway, Clare, Limerick, Kerry and Cork. The eleventh bat species, the greater horseshoe bat, was only recorded for the first time in February 2013 in County Wexford and is therefore considered to be a vagrant species. A total of 41 SACs have been designated for the Annex II species lesser horseshoe bat (1303), of which nine have also been selected for the Annex I habitat 'Caves not open to the public' (8310).

Irish bat species list is presented in Table A along with their current status.

Table A: Status of the Irish bat fauna (Marnell *et al.*, 2019).

Species: Common Name	Irish Status	European Status	Global Status
Resident Bat Species ^			
Daubenton's bat *Myotis daubentonii*	Least Concern	Least Concern	Least Concern
Whiskered bat *Myotis mystacinus*	Least Concern	Least Concern	Least Concern
Natterer's bat *Myotis nattereri*	Least Concern	Least Concern	Least Concern
Leisler's bat *Nyctalus leisleri*	Least Concern	Least Concern	Least Concern
Nathusius' pipistrelle *Pipistrellus nathusii*	Least Concern	Least Concern	Least Concern
Common pipistrelle *Pipistrellus pipistrellus*	Least Concern	Least Concern	Least Concern
Soprano pipistrelle *Pipistrellus pygmaeus*	Least Concern	Least Concern	Least Concern
Brown long-eared bat *Plecotus auritus*	Least Concern	Least Concern	Least Concern
Lesser horseshoe bat *Rhinolophus hipposideros*	Least Concern	Least Concern	Least Concern
Possible Vagrants ^			
Brandt's bat Myotis brandtii	Data deficient	Least Concern	Least Concern
Greater horseshoe bat *Rhinolophus ferrumequinum*	Data deficient	Near threatened	Near threatened

^ Roche *et al.*, 2014

8.2 Appendix 2

Table B: Building Bat Roost Classification System & Survey Effort (Adapted from Collins, 2016 and Marnell *et al.*, 2022).

Suitability Category	Description (examples of criteria)	Survey Effort (Timings)
Negligible	Building have no potential as a roost site Urban setting, heavily disturbed, building material unsuitable, building in poor condition etc.	No surveys required.
Low	Building has a low potential as a roost site. No evidence of bat usage (e.g. droppings)	One dusk or dawn survey.
Medium	Building with some suitable voids / crevices for roosting bats. Some evidence of bat usage Suitable foraging and commuting habitat present.	At least one survey in May to August, minimum of two surveys (one dusk and one dawn).
High	Building with many features deemed suitable for roosting bats. Evidence of bat usage. Largely undisturbed setting, rural, suitable foraging and commuting habitat, suitable roof void and building material.	At least two surveys in May to August, with a minimum of three surveys (at least one dusk survey and one dawn survey).

Table C: Tree Bat Roost Category Classification System (adapted from Collins, 2016).

Tree Category	Description
1 High	Trees with multiple, highly suitable features (Potential Roosting Features = PRFs) capable of supporting larger roosts
2 Moderate	Trees with definite bat potential but supporting features (PRFs) suitable for use by individual bats;
3 Low	Trees have no obvious potential although the tree is of a size and age that elevated surveys may result in cracks or crevices being found or the tree supports some features (PRFs) which may have limited potential to support bats;
4 Negligible	Trees have no potential.

8.3 Appendix 3 - Site Risk Assessment & Impact Assessment

According to SNH, 2021 wind farms can affect bats in the following ways:

- Collision mortality, barotrauma and other injuries (although it is important to consider these in the context of other forms of anthropogenic mortality)
- Loss or damage to commuting and foraging habitat, (wind farms may form barriers to commuting or seasonal movements, and can result in severance of foraging habitat);
- Loss of, or damage to, roosts;
- Displacement of individuals or populations (due to wind farm construction or because bats avoid the wind farm area).

According to the SNH, 2021 to ensure that bats are protected by minimising the risk of collision, an assessment of impact at a site requires an appraisal of:

- The level of activity of all bat species recorded at the site assessed both spatially and temporally.
- The risk of turbine-related mortality for all bat species recorded at the site during bat activity surveys.
- The effect on the species' population status if predicted impacts are not mitigated.

In addition, it is recommended to consider the relevant factors in the assessment process:

- Is the bat species at the edge of its range
- Cumulative effects
- Presents of protected sites
- Proximity of maternity roosts
- Key foraging areas
- Key flight lines
- Possible migration routes.

Using Table 3 (See Appendices for details) in the SNH (2021) guidelines the following risk assessment for the individual turbines in relation to each bat species recorded was completed using the following values:

- Project Size = Medium (19 turbines);
- Habitat Risk = Low;
- Proposed tall wind turbines.

Therefore a value of 3 is applied to this proposed development site (Stage 1 Site Risk Assessment) and this is multiplied by the EcoBat value for the three most common bat species recorded which are also High Risk species (i.e. Leisler's bat, common pipistrelle and soprano pipistrelle) for two separate value categories. However as there is a large array of static surveillance units located across the proposed development area, a table was produced to determine which static unit results are used to assess each proposed turbine location (Please see Appendices for this table).

The overall value of the site is based on a summary of Tables ?? as presented in Appendices.

- Highest Ecobat activity category recorded;
- Most frequent activity category (i.e. median value).

Overall assessment value (i.e. Turbine Risk value) is then compared to the ranges below:

- Low (green) 0-4
- Medium (amber) 5-12
- High (red) 15-25

8.4 Appendix 4 – Core Sustenance Areas

Please note that there is a greater number of bat species resident in the UK compared to Ireland and therefore some of the species listed below are not resident in Ireland.

Table 1. Core Sustenance Zone sizes calculated for UK bat species

Species	CSZ radius (km)
Greater horseshoe bat *Rhinolophus ferrumequinum*	3
Lesser horseshoe bat *Rhinolophus hipposideros*	2
Barbastelle *Barbastella barbastellus*	6
Brown long-eared bat *Plecotus auritus*	3
Grey long-eared bat *Plecotus austriacus*	3
Daubenton's bat *Myotis daubentonii*	2
Natterer's bat *Myotis nattereri*	4
Whiskered/Brandt's/Alcathoe bat *Myotis mystacinus/brandtii/ alcathoe*	1
Bechstein's bat *Myotis bechsteinii*	3**
Common pipistrelle *Pipistrellus pipistrellus*	2
Soprano pipistrelle *Pipistrellus pygmaeus*	3
Nathusius pipistrelle *Pipistrellus nathusii*	3
Noctule *Nyctalus noctula*	4
Leisler's bat *Nyctalus leisleri*	3
Serotine *Eptesicus serotinus*	4

** Note: There may be justification with Annex II and other rare species to increase the CSZ to reflect use of the landscape by all bats in a population. We suggest increasing the CSZ of Bechstein's bat to at least 3km, reflecting its very specific habitat requirements.

Extracted from Bat-Species-Core-Sustenance-Zones-and-Habitats-for-Biodiversity-Net-Gain.pdf (bats.org.uk)

9. Bat Species Profile

9.1 Leisler's bat

Ireland's population is deemed of international importance and the paucity of knowledge of roosting sites, makes this species vulnerable. However, it is considered to be widespread across the island. The modelled Core Area for Leisler's bats is a relatively large area that covers much of the island of Ireland (52,820km^2). The Bat Conservation Ireland Irish Landscape Model indicated that the Leisler's bat habitat preference has been difficult to define in Ireland. Habitat modelling for Ireland shows an association with riparian habitats and woodlands (Roche *et al.,* 2014). The landscape model emphasised that this is a species that cannot be defined by habitats preference at a local scale compared to other Irish bat species but that it is a landscape species and has a habitat preference at a scale of 20.5km. In addition, of all Irish bat species, Leisler's bats have the most specific roosting requirements. It tends to select roosting habitat with areas of woodland and freshwater.

Irish Status	Near Threatened
European Status	Least Concern
Global Status	Least Concern
Irish Population Trend	2003-2013 ↑
Estimated Irish Population Size	73,000 to 130,000 (2007-2013) Ireland is considered the world stronghold for this species
Estimate Core Area (Lundy *et al. 2011*)	52,820 km^2

Taken from Roche *et al.,* 2014, Lysaght & Marnell, 2016 & Marnell *et al.*, 2019

The principal concerns for Leisler's bats are poorly known in Ireland but those that are relevant for this survey area are as follows:

- Selection of maternity sites is limited to specific habitats;
- Relative to the population estimates, the number of roost sites is poorly recorded;
- Tree felling, especially during autumn and winter months; and
- Increasing urbanisation.

9.2 Common pipistrelle

This species is generally considered to be the most common bat species in Ireland. The species is widespread and is found in all provinces. The modelled Core Area for common pipistrelles is a large area that covers much of the island of Ireland (56,485km^2) which covers primarily the east and south east of the area (Roche *et al.,* 2014). The Bat Conservation Ireland Irish Landscape Model indicated that the Common pipistrelle selects areas with broadleaf woodland, riparian habitats and low density urbanization (<30%) (Roche *et al.,* 2014).

Irish Status	Least Concern
European Status	Least Concern
Global Status	Least Concern
Irish Population Trend	2003-2013 ↑
Estimated Irish Population Size	1.2 to 2.8 million (2007-2012)
Estimate Core Area (km^2) (Lundy *et al. 2011*)	56,485

Taken from Roche *et al.,* 2014, Lysaght & Marnell, 2016 & Marnell *et al.*, 2019

Principal concerns for Common pipistrelles in Ireland that are relevant for this survey area are as follows:

- Lack of knowledge of roosting requirements
- This species has complex habitat requirements in the immediate vicinity of roosts. Therefore, careful site specific planning for this species is required in order to ensure all elements are maintained.
- Renovation or demolition of derelict buildings.
- Tree felling
- Increasing urbanisation (e.g. increase in lighting)

9.3 Soprano pipistrelle

This species is generally considered to be the second most common bat species in Ireland. The species is widespread and is found in all provinces, with particular concentration along the western seaboard. The modelled Core Area for soprano pipistrelle is a large area that covers much of the island of Ireland (62,020km^2). The Bat Conservation Ireland Irish Landscape Model indicated that the soprano pipistrelle selects areas with broadleaf woodland, riparian habitats and low density urbanisation (Roche *et al.,* 2014).

Irish Status	Least Concern
European Status	Least Concern
Global Status	Least Concern
Irish Population Trend	2003-2013 ↑
Estimated Irish Population Size	0.54 to 1.2 million (2007-2012)
Estimate Core Area (km²) (Lundy *et al. 2011)*	62,020

Taken from Roche *et al.,* 2014, Lysaght & Marnell, 2016 & Marnell *et al.*, 2019

Principal concerns for Soprano pipistrelles in Ireland that are relevant for this survey area are as follows:

- Lack of knowledge of roosts;
- Renovation or demolition of structures;
- Tree felling; and
- Increasing urbanisation (e.g. increase in lighting).

9.4 Brown long-eared Bat

This species is generally considered to be widespread across the island. The modelled Core Area for Brown long-eared bats is a relatively large area that covers much of the island of Ireland (52,820km^2) with preference suitable areas in the southern half of the island. The Bat Conservation Ireland Irish Landscape Model indicated that the Brown long-eared bat habitat preference is for areas with broadleaf woodland and riparian habitats on a small scale of 0.5km emphasising the importance of local landscape features for this species (Roche *et al.,* 2014).

Irish Status	Least Concern
European Status	Least Concern
Global Status	Least Concern
Irish Population Trend	2008-2013 Stable
Biographical Range	km²
Estimate Core Area (Lundy *et al. 2011)*	49,929 km²

Taken from Roche *et al.,* 2014, Lysaght & Marnell, 2016 & Marnell *et al.*, 2019

Principal concerns for brown long-eared bats are poorly known in Ireland, but those that are relevant for this survey area are as follows:

- Selection of maternity sites is limited to specific habitats;
- Lack of knowledge of winter roosts;
- Loss of woodland, scrub and hedgerows;
- Tree surgery and felling;
- Increasing urbanisation; and
- Light pollution.

9.5 Natterer's bat

There are three species included in the *Myotis* species family and their echolocation calls are very similar across these three species. The modelled Core Area for Natterer's bats is a relatively large area that covers much of the island of Ireland (52,864km^2). The Bat Conservation Ireland Irish Landscape Model indicated that the Natterer's bat selects areas with broadleaf woodland, riparian habitats and areas with larger scale provision of mixed forest (Roche *et al.,* 2014). Therefore, it is likely that this species is more widespread within the survey area.

Irish Status	Least Concern
European Status	Least Concern
Global Status	Least Concern
Irish Population Trend	Unknown
Estimated Irish Population Size	Unknown
Estimate Core Area (Lundy *et al. 2011)*	52,864

Taken from Roche *et al.,* 2014, Lysaght & Marnell, 2016 & Marnell *et al.*, 2019

Principal concerns for Natterer's bats in Ireland that are relevant for this survey area are as follows:

- Lack of knowledge of roosting requirements;
- This species has complex habitat requirements in the immediate vicinity of roosts. Therefore careful site specific planning for this species is required in order to ensure all elements are maintained;
- Tree felling; and
- Increasing urbanisation (e.g. increase in lighting).

9.6 Daubenton's bat

The modelled Core Area for Daubenton's bats is a relatively large area that covers much of the island of Ireland (41,285km^2) reflecting the distribution of sizeable river catchments. The Irish Landscape Model indicated that the Daubenton's bat habitat preference is for areas with broadleaf woodland, riparian habitats and low density urbanisation (Roche *et al.,* 2014).

Irish Status	Least Concern
European Status	Least Concern
Global Status	Least Concern
Irish Population Trend	2008-2013 Stable
Estimated Irish Population Size	81,000 to 103,000 (2007-2012)
Estimate Core Area (km^2) (Lundy *et al. 2011)*	41,285

Taken from Roche *et al.,* 2014, Lysaght & Marnell, 2016 & Marnell *et al.*, 2019

Principal concerns for Daubenton's bats are poorly known in Ireland but those that are relevant for this survey area are as follows:

- Potential roost loss due to bridge maintenance;
- Loss of woodland and forest clearance;
- Loss of woodland, scrub and hedgerows;
- Tree surgery and felling;
- Increasing urbanisation; and
- Light pollution.

9.7 Whiskered bat

The modelled Core Area for whiskered bats is a relatively small area (29,222 km2) compared to the other two resident *Myotis* bat species. The range is restricted to southern and eastern areas of Ireland. The Irish Landscape Model indicated that the whiskered bat habitat preference is for areas of woodland cover, small areas of pasture, urban and scrub habitat (Roche *et al.,* 2014).

Irish Status	Least Concern
European Status	Least Concern
Global Status	Least Concern
Irish Population Trend	Unknown
Estimated Irish Population Size	Unknown
Estimate Core Area (km²) (Lundy *et al. 2011)*	29,222

Taken from Roche *et al.,* 2014, Lysaght & Marnell, 2016 & Marnell *et al.*, 2019

Principal concerns for whiskered bats are poorly known in Ireland but those that are relevant for this survey area are as follows:

- Lack of knowledge of roosting requirements, swarming sites
- Riparian habitat loss
- Loss of woodland and forest clearance
- Loss of woodland, scrub and hedgerows
- Tree surgery and felling
- Increasing urbanisation
- Light pollution

9.8 Nathusius' pipistrelle

The modelled Core Area for Nathusius' pipistrelle is a relatively restricted area (13,543km^2) and these areas are primarily associated with large water bodies such as Lough Neagh and the Lough Erne complex. The Bat Conservation Ireland Irish Landscape Model indicated that the Nathusius' pipistrelle habitat preference is large waterbodies (Roche *et al.,* 2014). But due to the paucity of information on this species, the knowledge of this species preference in Ireland is limited, any records recorded for this species is important.

Irish Status	Least Concern
European Status	Least Concern
Global Status	Least Concern
Irish Population Trend	2003-2013 (limited data, probably stable
Estimated Irish Population Size	10,000 to 18,000 (2007-2013)
Estimate Core Area (km²) (Lundy *et al. 2011)*	13,543

Taken from Roche *et al.,* 2014, Lysaght & Marnell, 2016 & Marnell *et al.*, 2019

The principal concerns for Nathusius' pipistrelle is the fact that roosting sites are poorly known in the Republic of Ireland:

- Lack of knowledge of winter sites and whether migration occurs;
- Renovation or demolition of derelict buildings and structures may cause undocumented roost losses; and
- Water pollution may be a threat to this species because it is particularly associated with lakes.