Oweninny Wind Farm Phase 3

Environmental Impact Assessment Report

Appendix 7.2 Bat Survey Report

2023

Bat Assessment – Proposed Oweninny Wind Farm Phase 3, Co. Mayo

Dr Tina Aughney

Bat Eco Services

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Licenced Bat Specialist: Dr Tina Aughney (tina@batecoservices.com, 086 4049468)
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 Bord na Mona

Project Name & Location: Oweninny Wind Farm Phase 3, Co. Mayo.

Report Revision History

Date of Issue	Draft Number	Issued To (process of issuing)
5th March 2023	Draft 1	TOBIN (by email)
27th March 2023	Draft 2	TOBIN (by email)
28th March 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: Oweninny Wind Farm Phase 3, Co. Mayo**.**

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)	◯

Three passive bat detector surveillance periods were completed in each of the years 2020 and 2022 (Spring, Summer and Autumn) as well as one surveillance period of "at height" survey with on static unit deployed on weather mast. During 2020.

The remainder of the 2020 surveys included: Dusk Surveys (x6); Dawn Surveys (x1); Walking Transects (x8); Driving Transects (x4) & IR Filming of emergence of roosting bats (2 sessions).

Additional surveys completed in 2022 were as follows: Dusk Surveys (x3), Walking & Driving Transect (x2), Filming of emergence of roosting bats (3 sessions).

Citation: Bat Eco Services (2023) Bat assessment of the proposed Oweninny Wind Farm Phase 3, Co. Mayo. Unpublished report prepared for TOBINS.

Contents

1. Introduction

Bat Eco Services was commissioned by TOBIN, on behalf of Bord na Mona to undertaken a bat survey of a proposed wind farm at Oweninny (Phase 3), Co. Mayo.

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 9.1 for more details.

2. Project Description

2.1 Site Location

The proposed location of the wind turbine farm development is within the red line present on the following map (i.e. Planning Application Boundary). This are is located

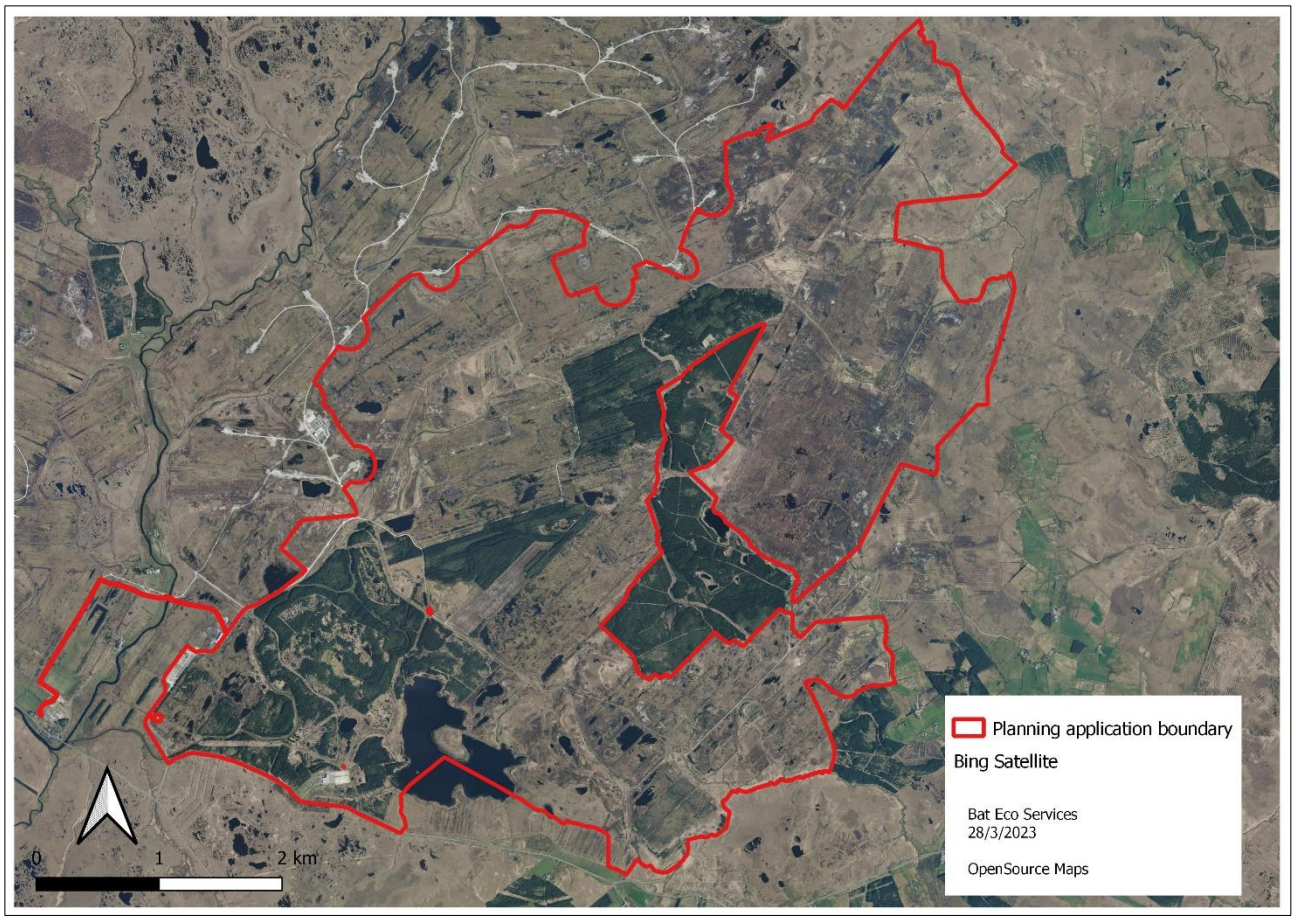


Figure 1a: Planning Application Boundary of the proposed development, Oweninny, Co. Mayo.

2.2 Proposed Project

OWENINNY WIND FARM PHASE 3 - PROJECT DESCRIPTION

The proposed development comprises the construction of 18 no. wind turbines and ancillary works.

The applicant, Bord na Móna Powergen Ltd., is a subsidiary of Bord na Móna Plc, a publicly owned company, originally established in 1946 to develop and manage some of Ireland's extensive peat resources on an industrial scale, in accordance with government policy at the time.

The proposed development will comprise:

- 18 no. wind turbines (including tower sections, nacelle, hub, and rotor blades) and all associated foundations and hard-standing areas in respect of each turbine;
- Decommissioning and removal of 21 no. existing Bellacorick Wind Farm wind turbines (including tower sections, nacelle, hub, and rotor blades);
- New internal site access roads, approximately 29,000m in length (permanent and temporary), passing bays, car parking and associated drainage;

- An amenity route through the site to the existing Visitors Centre with access from a local road off the N59 near Dooleeg;
- 2 no. borrow pits;
- 5 no. peat deposition areas;
- 1 No. permanent Meteorological Mast 120m high, and the decommissioning and removal of an existing 100m Meteorological Mast on site;
- 4 no. temporary construction compounds, including material storage, site welfare facilities, and site offices;
- 1 no. 110kV electrical substation compound. The electrical substation will have 2 No. control buildings, a 36m high telecommunications tower, associated electrical plant and equipment and a wastewater holding tank.
- All associated underground electrical and communications cabling connecting the wind turbines to the proposed substation;
- All works associated with the connection of the proposed wind farm to the national electricity grid, including a 110kV underground electrical cable from the proposed on-site electrical sub-station to the existing sub-station at Bellacorick;
- All related site works and ancillary development including (but not limited to):
    - Earthworks;
    - Peat management works;
    - Site security;
    - Groundwater and surface water management;
    - Overburden (soils/peat) storage and management; and
    - Site reinstatement, landscaping and erosion control.
- A 10-year planning permission and 30-year operational life from the date of commissioning of the entire wind farm.

The lands associated with the Oweninny Bog are owned by Bord na Móna. The Oweninny Bog is located in north County Mayo and encompasses a total of 5,090 hectares, all of which comprised primarily of cutaway bog land, partly developed bog land, yards, railway lines and areas of upland and undeveloped bog. The country's first commercial wind farm, a 21-turbine development known as the Bellacorrick Windfarm, has operated on this site since 1992. Furthermore, Oweninny Wind Farm Phase 1 is located on Oweninny Bog lands and was commissioned in 2019, with Phase 2 currently under construction.

Oweninny Bog is situated approximately 12km west of Crossmolina, 8km east of Bangor Erris, and just north of the N59 National Road. The closest settlement to the site is Bellacorick village which is located at the southwestern extents of the bog. The area around the Oweninny Bog is a relatively sparsely populated area. There are a number of sensitive receptors located within 2km of the bog boundary including residential and commercial properties, Special Protected Areas (SPA), Special Areas of Conservation (SAC), Natural Heritage Areas (pNHA) and recorded architectural heritage sites.

Some areas of a Coillte forest plantation on Bord na Móna owned lands are present on the bog. The bog also encompasses 192 hectares of private forest plantation land at Corvoderry.

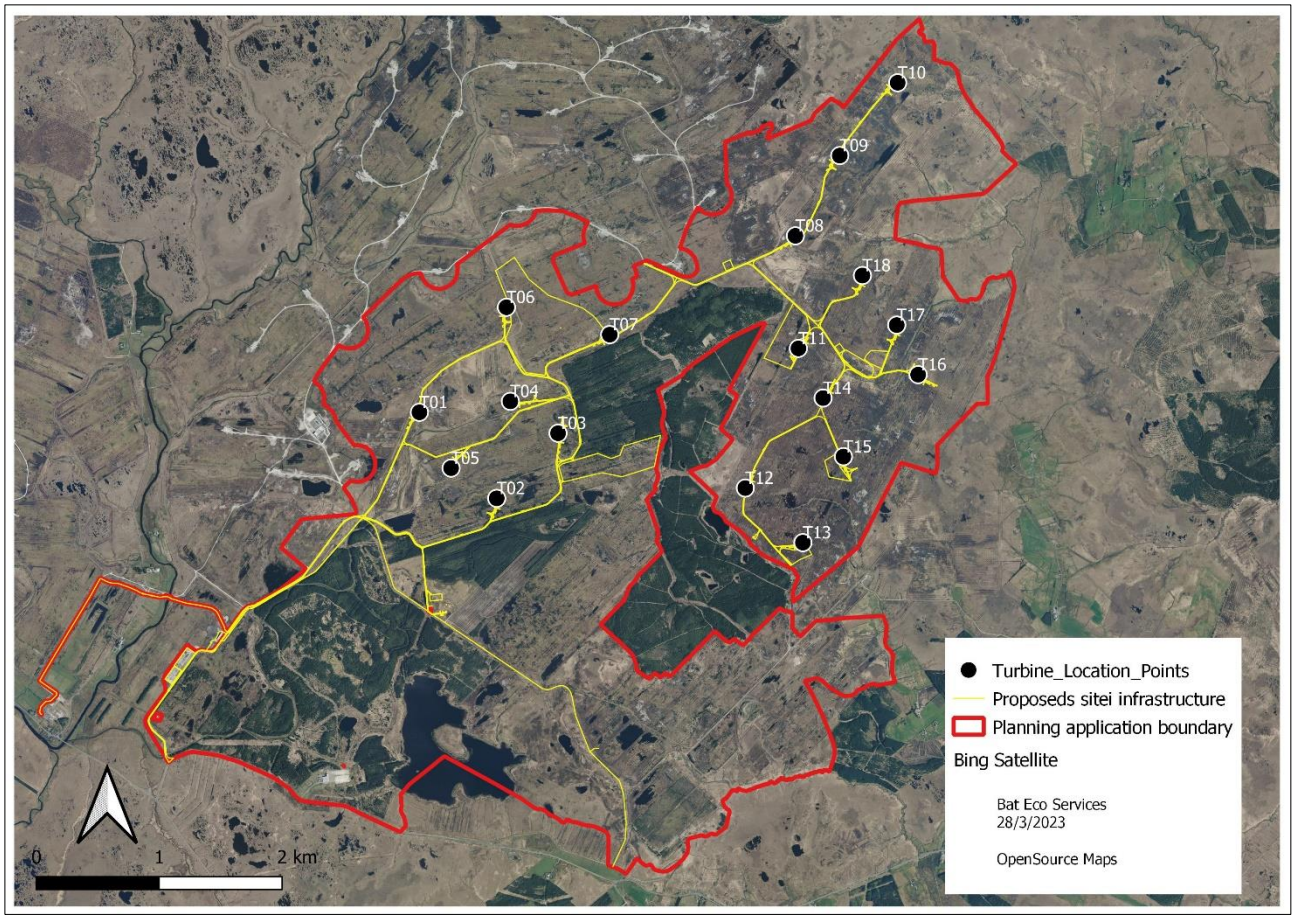


Figure 1b: Layout of the proposed development, Oweninny, Co. Mayo.

3. Bat Survey Methodology

3.1 Daytime Inspections

One purpose of daytime inspections is to determine the potential of bat roosts within the survey area. Due to the transient nature of bats and their seasonal life cycle, there are a number of different type of bat roosts. Where possible, one of the objectives of the surveys is to be able to identify the types of roosts present, if any. However, the determination of the type of roost present depends on the timing of the survey and the number of bat surveys completed. Consequently, the definition of roost types, in this report, will be based on the following:

Table 1: Bat Roost Types (adapted from Collins 2016).

Roost Type	Definition	Time of Survey
Day Roost	A place where individual bats or small groups of males, rest or shelter in the daytime but are rarely found by night in the summer.	Anytime of the year
Night Roost	A place where bats rest or shelter in the night but are rarely found in the day. May be used by a single bat on occasion or it could be used regularly by the whole colony.	Anytime of the year
Feeding Roost	A place where individual bats or a few bats rest or feed during the night but are rarely present by day.	Anytime of the year
Transitional Roost	A place used by a few individuals or occasionally small groups for generally short periods of time on waking from hibernation or in the period prior to hibernation.	Outside the main maternity and hibernation periods.
Swarming Site	Where large numbers of males and females gather. Appear to be important mating sites.	Late summer and autumn
Mating Site	Where mating takes place.	Late summer and autumn
Maternity Site	Where female bats give birth and raise their young to independence.	Summer months
Hibernation Site	Where bats are found, either individually or in groups in the winter months. They have a constant cool temperature and humidity.	Winter months in cold weather conditions
Satellite Roost	An alternative roost found in close proximity to the main nursery colony and is used by a few individuals throughout the breeding season.	Summer months

3.1.1 Building & Structure Inspection

Structures, buildings and other likely places that may provide a roosting space for bats are inspected during the daytime 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).

Buildings were assessed to determine their suitability as a bat and described using the parameters Negligible, Low, Medium or High suitability in view of Table 5.1 of Marnell *et al* (2022). Surveying was carried out in the preferred months of May to September (Collins, 2016). The level of suitability informed the level of surveying required (See Appendix 2 for details).

3.1.2 Bat Habitat & Commuting Routes Mapping

The survey site was assessed during daytime walkabout surveys, in relation to potential bat foraging habitat and potential bat commuting routes. Such habitats were classified according to Fossit, 2000. Bat habitats and commuting routes identified were considered in relation to the wider landscape to determine landscape connectivity for local bat populations through the examination of aerial photographs.

3.2 Night-time Bat Detector Surveys

3.2.1 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.

Dawn surveys were completed from 110 minutes before sunrise to at least 10 minutes after sunrise. Surveys are completed 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: BatLogger M2 Full Spectrum Bat Detector, Wildlife Acoustics Echo Meter Touch 2 Pro (Android) connected to Samsung Galaxy Tab S3 and Petersson D200 Heterodyne Bat Detector.

Surveyor 3: Anabat Scout Full Spectrum Bat Detector, Wildlife Acoustics Echo Meter Touch (Generation 1, Apple IOS) connected to iPad 2 (32 GB storage) and Petersson D200 Heterodyne Bat Detector.

Walking transects were generally completed post Dusk Emergence Surveys and involved the surveyor(s) walking the survey area, noting the time, location and bat species encountered. The mapping facility was used on the Wildlife Acoustics Echo Meter Touch2 Pro (Android) connected to Samsung Galaxy Tab S3, using Google Earth with a KLM file produced for mapping purposes in 2020 then undertaken with BatLogger M2 and Anabat Walkabout in 2022. Validation of bat records was completed by the principal bat surveyor prior to mapping. Otherwise, Irish Grid references were recorded and an excel file of bat locations was produced for mapping.

Driving transects were undertaken for on drivable tracks and local roads covering larger survey areas. The Wildlife Acoustics Echo Meter Touch2 Pro (Android) microphone was attached to a 5m extension microphone cable (attached to Samsung Galaxy Tab S3) and was located outside on the passenger side of a vehicle. This detector was used in 2020 and replaced with BatLogger M2 in 2022. 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. The recordings from the Wildlife Acoustics Echo Meter Touch 2 Pro (Android) connected to Samsung Galaxy Tab S3 were mapped using Google Earth with a KLM file produced for mapping purposes. While geo-referenced calls from the BatLogger M2 Full Spectrum Bat Detector was used for mapping. Validation of bat records was completed by the principal bat surveyor prior to mapping.

3.2.2 Passive Static Bat Detector Survey

A Passive Static Bat Surveys involves leaving a static bat detector unit (with ultrasonic microphone) in a specific location and set to record for a specified period of time (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 is effectively used as a bat activity data logger. This results in a far greater sampling effort over a shorter period of time. Bat detectors with ultrasonic microphones are used as the ultrasonic calls produced by bats cannot be heard by human hearing.

The microphone of the unit was position horizontally to reduce potential damage from rain. Passive bat detectors listed in Table 2 use Real Time recording as a technique to record bat echolocation calls and using specific software, the recorded calls are identified. It is these sonograms (2-d sound pictures) that are digitally stored on the SD card (or micro SD cards depending on the model) and downloaded for analysis. These results are depicted on a graph showing the number of bat passes per species per hour/night. Each bat pass does not correlate to an individual bat but is representative of bat activity levels. Some species such as the pipistrelles will continuously fly around a habitat and therefore it is likely that a series of bat passes within a similar time frame is one individual bat. On the other hand, Leisler's bats tend to travel through an area quickly and therefore an individual sequence or bat pass is more likely to be indicative of individual bats

The recordings were analysed using Wildlife Acoustics Kaleidoscope Pro. All of the recordings were analysed using the auto-id function and then recordings identified as Leisler's bat, *Myotis* species (Natterer's bat, Daubenton's bat and whiskered bat), brown long-eared bat, Noise and Unidentified were then manual checked. For recordings identified as common pipistrelle and soprano pipistrelle, 10-20% of calls were manually checked to ensure accurate identification. Each sequence of bat pulses are noted as a bat pass to indicate level of bat activity for each species recorded. This is either expressed as the number of bat passes per hour or per survey night.

The following static units were deployed during this static bat detector survey:

Table 2: Static Bat Detectors deployed during Static Bat Detector Surveys.

Static Unit Code	Bat Detector Type	Recording Function	Microphone
SM2 Unit 5	Wildlife Acoustics SongMeter 2 Bat+	Passive Full Spectrum	SMX-U1 (connected directly to unit)
SM4 Units 1-8	Wildlife Acoustics SongMeter 4 Bat FS	Passive Full Spectrum	SMM-U2, 4m cable
BL Unit A **BL Unit B**	Elekon BatLogger A+ bat detector	Passive Full Spectrum	FG Black microphone, 2m cable
SM3 Unit 1	Wildlife Acoustics SongMeter 3	Passive Full Spectrum	SMM-U1, 5m cable
SM Mini Bat Units 1-13	Wildlife Acoustics SongMeter Mini Bat	Passive Full Spectrum	SMM-UM

3.3 Desktop Review

3.3.1 Bat Conservation Ireland Database

A 10km search around the proposed development site was applied for in relation to Bat Conservation Ireland bat record database. The dataset consists of historical records up to 2022.

3.3.2 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. The degree of favourability is colour coded with lighter colours indicating a low favourability progressing towards a dark colour indicating a higher favourability. The value of favourability ranges from 0 – 100 with 0 indicating unsuitable and 100 deemed as suitable. The values of the grid squares represent the range of habitat suitability values the bat species can tolerate within each individual square. This is divided into five categories using "Natural breaks" (Jenks Natural Breaks Classification - is a data clustering method designed to determine the best arrangement of values into different classes. This is done by seeking to minimize each class's average deviation from the class mean, while maximizing each class's deviation from the means of the other groups. The method seeks to reduce the variance within classes and maximize the variance between classes (Jenks, 1967)). As a result of the classification, there are different values (i.e. percentage favourability) for each of the species models shown in the figures below. Each class is represented on a colour ramp to show the difference between 5km squares, where applicable. Therefore, due to the mosaic of land uses in a 5km square, there are no squares where the value a 100. This model is a broad generalisation of the bat species' geographical occurrence.

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.

3.3.3 Previous Bat Surveys

3.3.3.1 Corvoderry Wind Farm, Co. Mayo (EIA, Jennings O'Donovan & Partners)

Bat surveys were completed in 2011 for this proposed development site. Three transects were completed and three species of bat was recorded (Leisler's bat, soprano pipistrelle and *Myotis* spp.) in low levels. Two static recording units were set out in two locations for one surveillance period. Only two species of bat was recorded (Soprano pipistrelle and *Myotis* spp.).

3.3.3.2 Oweninny Wind Farm, Co. Mayo (EIS, ESB)

Bat surveys were completed in October 2011 and August 2012 for this proposed development site. Two dusk surveys were completed. The first dusk survey recorded common pipistrelle, soprano pipistrelle, Leisler's bat and Daubenton's bat. The second dusk survey recorded the four named bat species and Natterer's bat. In summary, a low level of bat activity was recorded.

3.4 Analysis

3.4.1 Ecobat Tool

Summary statistics of data collated from static surveillance, walking and driven transects and dusk and dawn surveys were completed.

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/). 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:

Acoustic surveys using bat detectors are widely used to determine species' presence and to quantify the activity of foraging bats as they are cost-effective, can be automated to run for long time periods, and are non-intrusive. Activity levels are dependent on a number of factors including seasonality, weather conditions and location, with the type of bat detector used during the survey also affecting detection rates.

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 3: 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

3.4.2 EUROBATS 200m Buffer Zone

A second analysis was undertaken in relation the location of wind turbines and the habitats present within the proposed development area. As noted by EUROBATS, wind turbines are recommended

to be a minimum distance of 200m from wooded habitats (i.e. potential ***"Bat Habitat"***). Therefore a layer was produced and named ***"200m Buffer"*** to represent the potential area/zone of influence for each individual wind turbine to aid analysis of the potential impact of the proposed wind turbine development on local bat populations.

3.4.3 Bat Habitats

All static recording locations sampled are also classed according to their favourability as a bat habitat within 200m radius of the static unit 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, habitats considered to be ***"Bat Habitat"*** were 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

Additional QGIS layers were created to aid analysis for this report. Each bat encounter was mapped. 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 ***"50m Buffer"*** and represents the potential distance that bat echolocation calls can be detected by an ultrasonic microphone (i.e. bat detector zone).

3.4.4 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 ***"Bat Habitat"*** layer, **"50m Buffer"** layer and the **"200m Buffer"** layer produced.

3.4.5 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.

4. Bat Survey Results

4.1 Daytime Inspections

4.1.1 Building & Structure Inspection

The following buildings / structures were inspected as part of the site investigation on 7/5/2020, 24/6/2020, 26/6/2020 and 22/4/2022. There are an array of buildings located south of the proposed turbine locations but these were surveyed as they were located within the Planning Application Boundary or adjacent to it. Four of the building inspected during the daytime were recorded as bat roosts. A follow up dusk and/or dawn surveys were undertaken of these buildings to confirm if such are bat roosts. These results are presented in 4.2.

Table 4: Buildings / Structures inspection results.

Building Code	Description	Grid Reference (Irish Grid)	Roost Type / Suitability	Bat Species
BnaM Warehouse – B1	Large corrugated structure	F9909019614	Low to Medium	Small scatter of bat droppings – *Pipistrellus* spp. Dead soprano pipistrelle recorded (male, adult)
BnaM Office – B2	Modern concrete block with tile roof	F9903619594	Low	No evidence
BnaM Shed 1 – B3	Loft concrete block building with slate roof	F9903819619	Medium	Small scatter of bat droppings – *Pipistrellus* spp. & brown long-eared bat
BnaM Shed 2 – B4	Loft concrete block building with slate roof	F9903719642	Medium	Small scatter of bat droppings – *Pipistrellus* spp.
Visitor's Centre – B5	Large modern building with open natural stone walls	F9806020693	Medium	No evidence
Substation – B6	Concrete block structure	F9912821517	Low	No evidence
Lumber Yard Shed – B7	Open corrugated iron barn	F9996620964	Low	No evidence
Toilet Block & Shed – B8	Corrugated iron shed with concrete toilet block	G0081322869	Low to Medium	Large scatter of bat droppings – *Myotis* spp. Dead juvenile bats in containers.

4.1.2 Bat Habitat & Commuting Routes Mapping

The habitat types, with reference to Fossit (2000), were recorded both within the survey area and adjacent to the survey area.

Table 5a: Habitat types present within survey area.

Habitat	Yes	Habitat	Yes	Habitat	Yes	Habitat	Yes
Cultivated land		Salt marshes		Exposed rock		Fens/flushes	
Built land	√	Brackish waters		Caves		Grasslands	√
Coastal structures		Springs		Freshwater marsh	√	Scrub	√
Shingle/gravel		Swamps		Lakes/ponds	√	Hedges/treelines	√
Sea cliffs/islets		Disturbed ground	√	Heath	√	Conifer plantation	√
Sand dunes		Watercourse	√	Bog	√	Woodland	√

Table 5b: Habitat types present adjacent to survey area.

Habitat	Yes	Habitat	Yes	Habitat	Yes	Habitat	Yes
Cultivated land		Salt marshes		Exposed rock		Fens/flushes	
Built land	√	Brackish waters		Caves		Grasslands	√
Coastal structures		Springs		Freshwater marsh	√	Scrub	√
Shingle/gravel		Swamps		Lakes/ponds	√	Hedges/treelines	√
Sea cliffs/islets		Disturbed ground	√	Heath	√	Conifer plantation	√
Sand dunes		Watercourse	√	Bog	√	Woodland	√

In addition, a habitats shapefile was provided by TOBINS and this is presented below with the current turbine layout. The principal habitat where the turbines are proposed to located is on cutover bog (PB4_Cutover_bog). In addition there are large areas of lowland blanket bog and conifer plantation within the proposed development site. There is also a large area in the middle of the survey area but outside the red line boundary that is comprised of mixed woodland. There is a lake body (Lough Dahybaun) is located along the southern boundary of the proposed development site and numerous smaller lake bodies throughout the survey area. The River Muing also flows through the proposed development site.

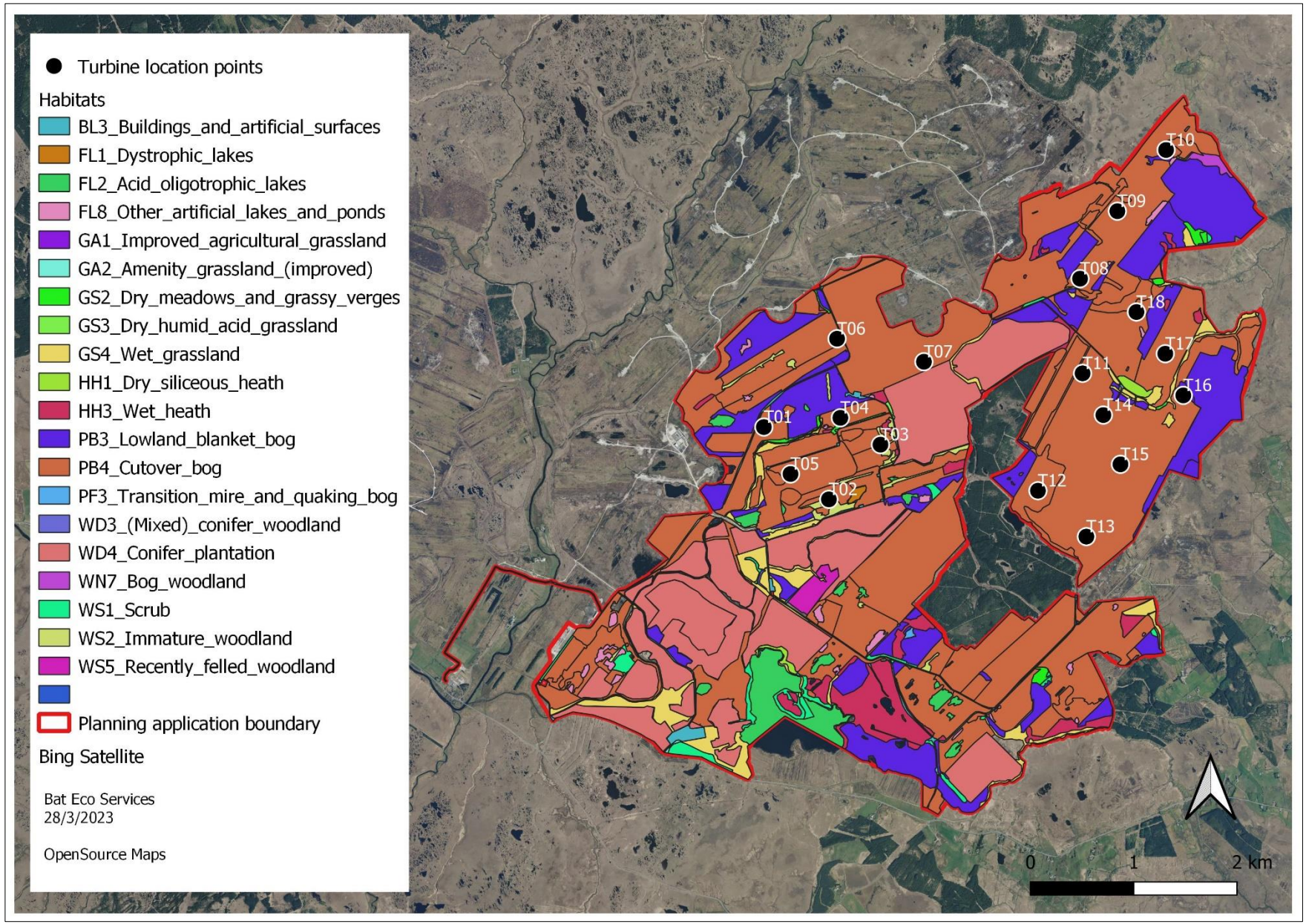


Figure 2: Habitats recorded within the planning application boundary (Source: TOBIN).

4.2 Night-time Bat Detector Surveys

4.2.1 Dusk & Dawn Bat Surveys 2020 & 2022

The following table summarises the results of the bat detector surveys completed in relation to buildings located within the proposed development area. There is only one building located within the main area of proposed turbine locations (B8) and this was recorded as Natterer's bat maternity roost. The remaining roosts are located in buildings in the southern half of the proposed development site or adjacent to it.

Table 6: Buildings / Structures survey results.

Building Code	Roost Type & Location	Bat Species (No. of bats)	Access Points	Vegetation / Lighting arrangement
BnaM Warehouse – B1 Dusk Survey 10/6/2020 Dusk Survey 29/8/2020 Dusk Survey 23/6/2022	**Satellite Roost** Dusk Survey 10/6/2020 Dusk Survey 23/6/2022	Highest Counts Soprano pipistrelle >5 individuals Natterer's bats >3 individuals	Gaps in corrugated iron panels along the woodland side of the buildings	Open hardcore area on three sides of the building, with woodland edge on remaining side. Small number of outdoor lights on one side of building.
BnM Office – B2 Dusk Survey 29/8/2020 Dusk Survey 23/6/2022	None	Not applicable	Not applicable	Not applicable
BnM Shed 1 – B3 Dusk Survey 29/8/2020 Dusk Survey 23/6/2022	**Satellite Roost** Dusk Survey 10/6/2020 Dusk Survey 23/6/2022	Highest Counts Soprano pipistrelle x1 Natterer's bat x1	Open windows	Located in middle of hardcore area. No immediate outdoor lighting.
BnM Shed 2 – B4 Dusk Survey 29/8/2020 Dusk Survey 23/6/2022	**Satellite Roost** Dusk Survey 10/6/2020 Dusk Survey 23/6/2022	Highest Counts Brown long-eared bat x1 Natterer's bat x1	Open windows and doorways	Located in middle of hardcore area. No immediate outdoor lighting.
Visitor's Centre – B5 Dusk Survey 7/5/2020	**Satellite Roost** Due to the type of natural stone wall cladding, this building has the	Soprano pipistrelles >5 individuals (recorded on 16/9/2020)	Open crevices in the natural stone walls cladding large section of the building.	Numerous sensor lighting. Note: this was a newly constructed building during the 2020 surveys

Dawn Survey 25/6/2020 Dusk Survey 16/9/2020 Thermal Imagery Filming: 22/4/2022, 22/6/2022 & 6/9/2022	potential of becoming an important roosting resource.	3 individuals recorded on 25/6/2020		and due to COVID 19, was not in operation. As a consequence, the full impact of outdoor lighting is unknown.
Substation – B6 Dusk Survey 10/6/2020	None	Not applicable	Not applicable	Not applicable
Lumber Yard Shed – B7 Dusk Survey 7/5/2020 Dusk Survey 10/6/2020 Dusk Survey 22/6/2022	**Night Roost**	Soprano pipistrelle x1 (recorded on 10/6/2020)	Open barn	Treeline and scrub No outdoor lighting
Toilet Block & Shed – B8 Dusk Survey 7/5/2020 Daytime Inspection, Hand netting & Dusk Survey 24/6/2020 IR Filming: 26/6/2020 Dusk Survey 29/8/2020 IR Filming: 22/4/2022, 22/6/2022 & 6/9/2022	**Maternity Roost** To make a positive species identification, an individual bat was caught using a hand net on 24/6/2020. This provided identification of a female Natterer's bat that had given birth = maternity roost.	Highest Count in 2020 - Natterer's roost - 28 individuals (recorded on 26/6/20) Highest Count in 2022 - Natterer's roosts – 43 individuals (recorded on 22/6/2022) Note: dead juvenile bats were recorded in oil drums within this structure. These were removed and the floor of the building was cleared to reduce potential future fatalities.	Open doorway – to ensure that this door, which was recorded as occasionally closed, an exit hole was incorporated into the doorway in 2020 by BnaM staff to ensure continuous access for bats.	Open grassland and cutover bog leading to scrub and waterways. No outdoor lighting.

The identification of the Toilet Block (Building No. 8) as a Natterer's bat maternity roost is a significant find as this is not a common bat species in west Mayo. The use of the toilet block, a building not normally considered as a suitable roosting place for a maternity roost for this species of bat, maybe used due to the paucity of suitable buildings in vicinity of suitable bat habitat such as the woodland areas present within the survey area. The area is also sufficiently dark for this light sensitive bat species.

The identification of the natural stone walls of the interpretative centre as a soprano pipistrelle roost is also an important find. While this species is common, the construction of the walls lend them to be highly suitable for individual or small groups of bats. This building, which was newly constructed during the 2020 surveys. As a consequence, it is important that outdoor lighting does not impact on the roosting value of the walls as this building is considered to be an important roosting resource for the survey area, due to the paucity of buildings within the proposed development site.

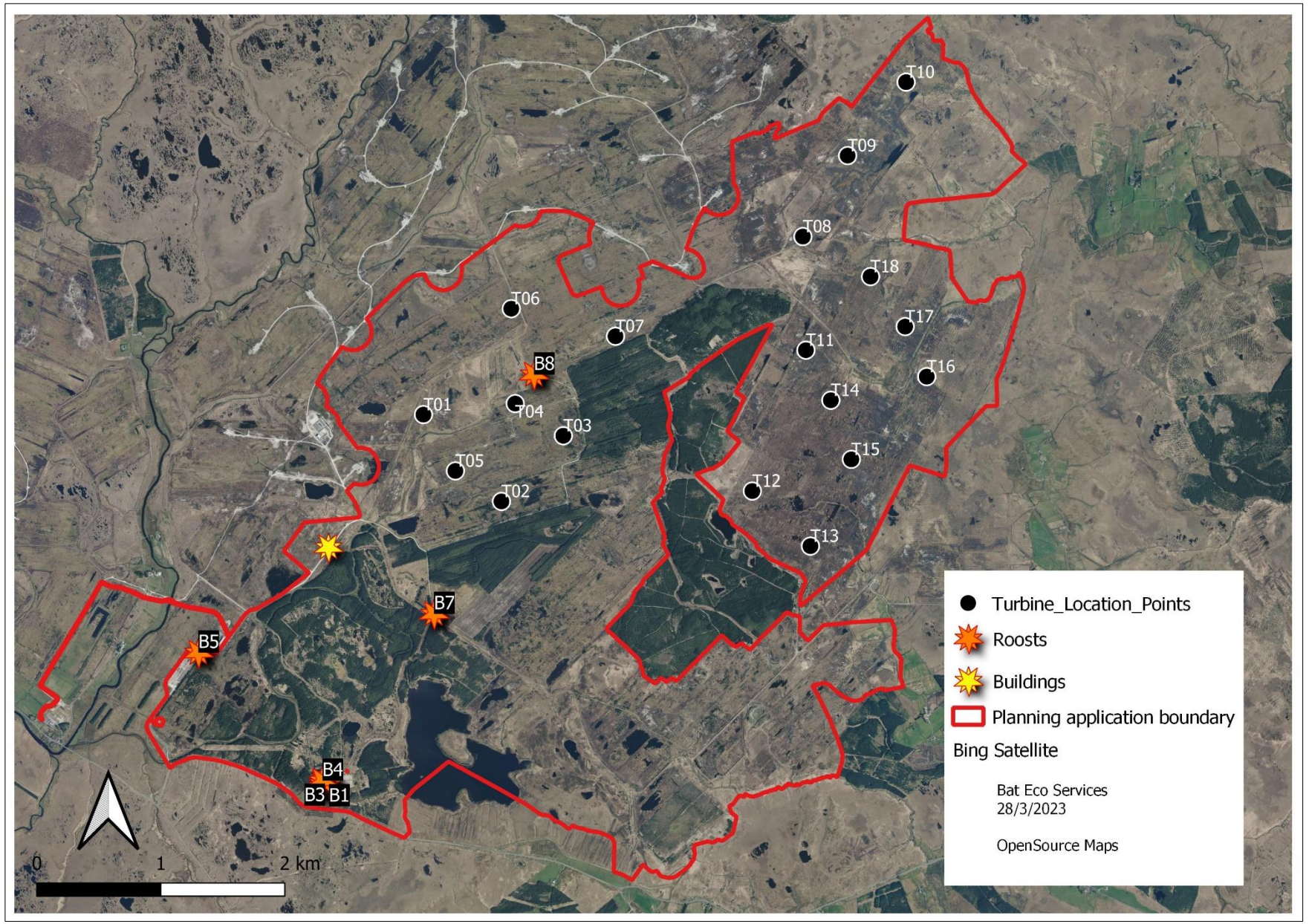


Figure 3: Location of buildings surveyed and roosts recorded during bat surveys.

4.2.2 Passive Static Bat Detector Survey 2020

The passive static bat detector survey comprised of three surveillance periods where 19 locations were sampled in Spring 2020, 20 locations were sampled in both Summer and Autumn 2020 with an additional unit erected on the weather mast for an extended period in Autumn 2020. The location of all of the statics are provided in the Appendices and presented on the figure below. Static units were deployed to sample the proposed turbine locations as provided in 2020 by TOBIN (Please note: proposed turbine locations have changed since 2020).

The current turbine locations (i.e. provided in November 2021) are less in number and are restricted to a smaller area to the north of the proposed development area. As a consequence, there are a number of static locations in the southern half of the proposed development are that are currently not associated with turbine locations. However, the results provide essential information on the bat usage of the entire proposed development area. In addition, the large number of static locations has ensured that there is a good spread of sampling and therefore the necessary information on the bat usage of the proposed development site. This is important for this large site that has limited safe accessibility during the hours of darkness to the northern section of the proposed development site for walking transects. The usage of static units allows the equipment to be deployed during the daytime and left in the field to record for a minimum of 10 days per static unit.

The following bat species were recorded during the static surveillance: common pipistrelle, soprano pipistrelle, Leisler's bat, Natterer's bat, Daubenton's bat, brown long-eared bat, whiskered bat and *Myotis* species (Please see Appendix 9.7, Tables A, B and C for a full breakdown of survey results for each static unit deployed). The following figure details the total number of bat passes recorded for each bat species during each static surveillance period (please note the difference in number of static units and number of nights of recording). Table 7a presents the average number of bat passes per night for each bat species recorded during the static surveillance.

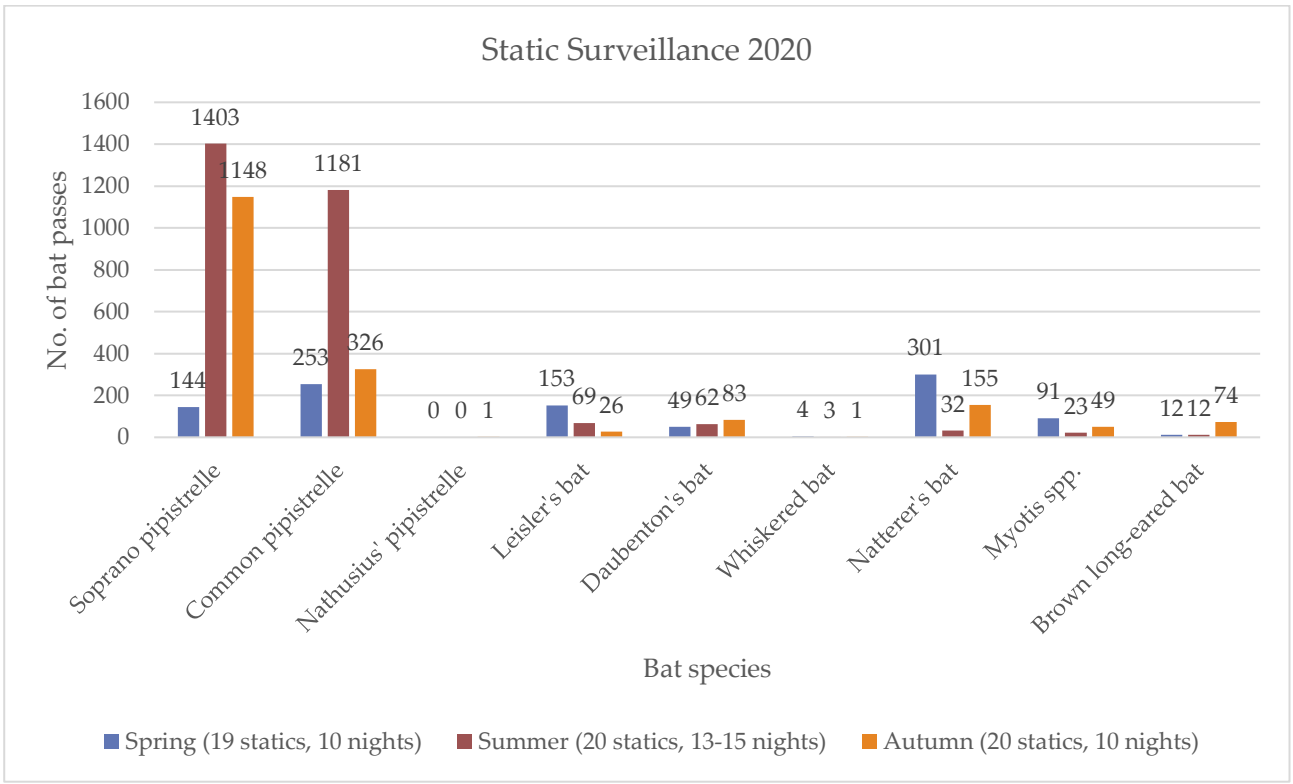


Figure 4: Total number of bat passes recorded for each bat species during static surveillance completed in Spring, Summer and Autumn 2020.

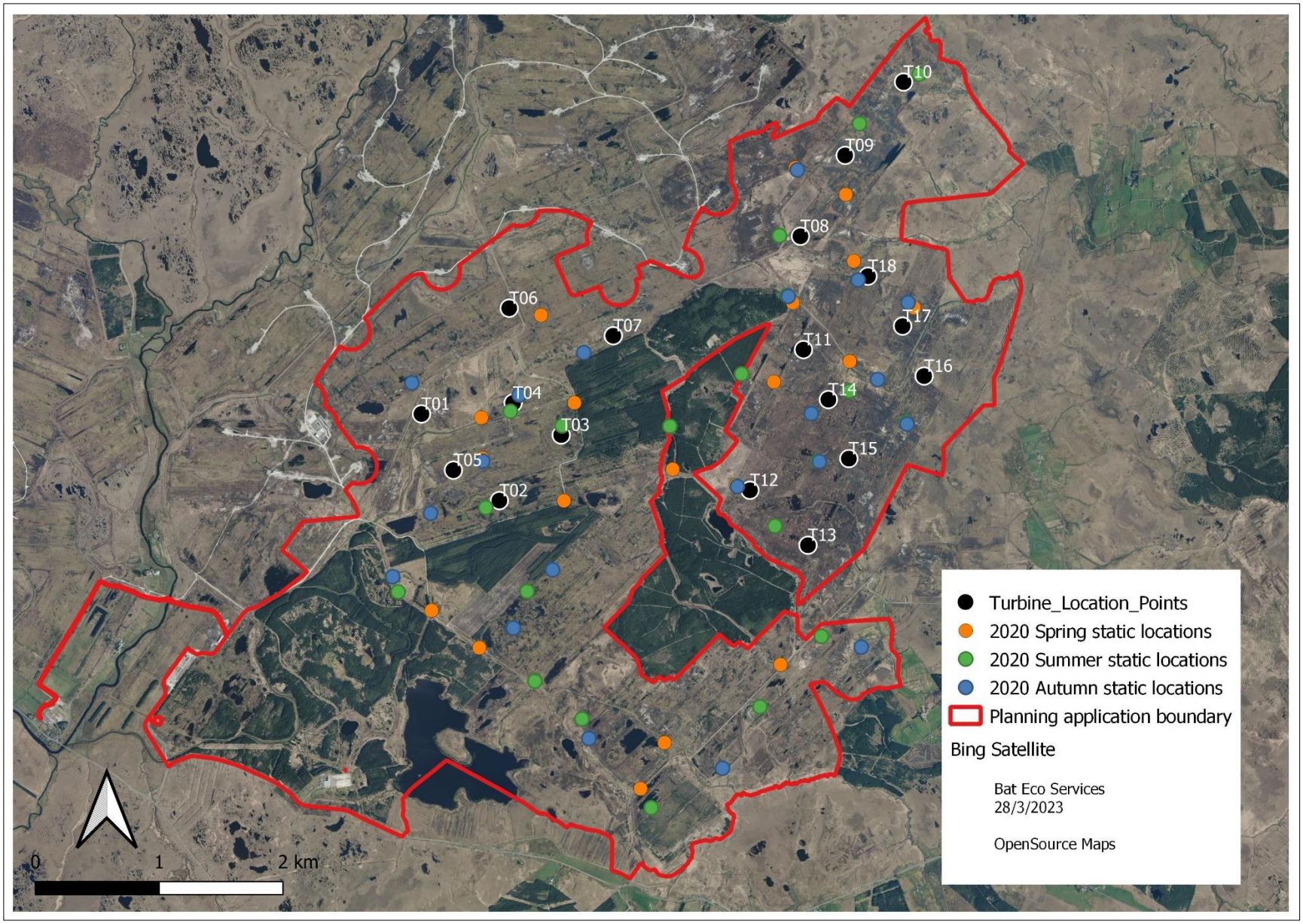


Figure 5a: Location of Spring, Summer and Autumn Static Surveillance undertaken in 2020 in relation to proposed turbine locations.

Table 7a: Average number of bat passes recorded per night for each bat species recorded during 2020 static surveillance.

Static Surveillance	SP	CP	Nath P	Leis	Daub	Whis	Natt	Myotis	BLE
Spring (19 statics, 10 nights)	0.76	1.33	0.00	0.81	0.26	0.02	**1.58**	0.48	0.06
Summer (20 statics, 13-15 nights)	**5.01**	**4.22**	0.00	0.25	0.22	0.01	0.11	0.08	0.04
Autumn (20 statics, 10 nights)	**5.74**	1.63	0.01	0.13	**0.42**	0.01	**0.78**	0.25	0.37

Note: SP = soprano pipistrelle, CP = common pipistrelle, Leis = Leisler's bat, Nath P = Nathusius' pipistrelle, Daub = Daubenton's bat, Whis = whiskered bat, Natt = Natterer's bat, Myotis = *Myotis* spp. and BLE = brown long-eared bat.

During the 2020 Spring surveillance, Natterer's bats was the most frequently recorded bat species. This is an interesting result as this species is not a common bat species. On examination of the static surveillance results, the majority of the bat passes for this species was recorded on Spring 17 followed by Spring 2 and 1. The maternity roost for Natterer's bat was recorded at B8 and therefore it is likely that individuals of this roost dispersed in the direction of the arrows presented on Figure 5b. During the dusk surveys, it was noted that emerging individuals commuted to the river network adjacent to the building and used this to disperse in the survey area.

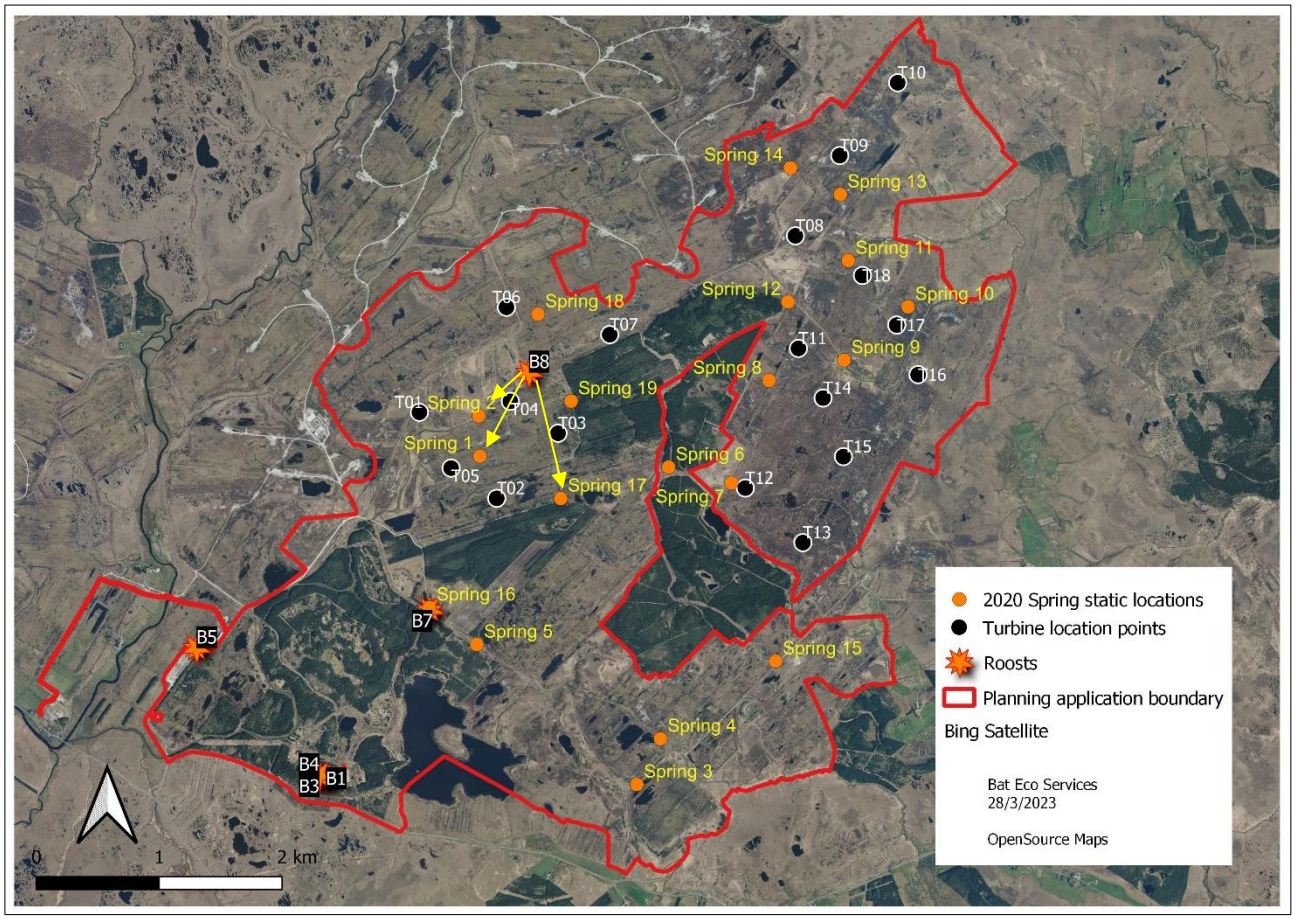


Figure 5b: Location of static units during the 2020 Spring Static Surveillance and location of roosts recorded along with potential Natterer's bat commuting routes.

During the 2020 Summer and Autumn Static Surveillance, soprano pipistrelle was the most frequently recorded bat species. Four soprano pipistrelle roosts were recorded (B1, B3, B5 and B7) and the three statics with the highest level of soprano pipistrelle bat passes was Summer 16, 10 and 1 respectively. Each of these were located adjacent to edge of woodland and conifer plantation. The potential commuting routes, as a result of summer surveillance, are shown as Yellow Arrows on the figure below.

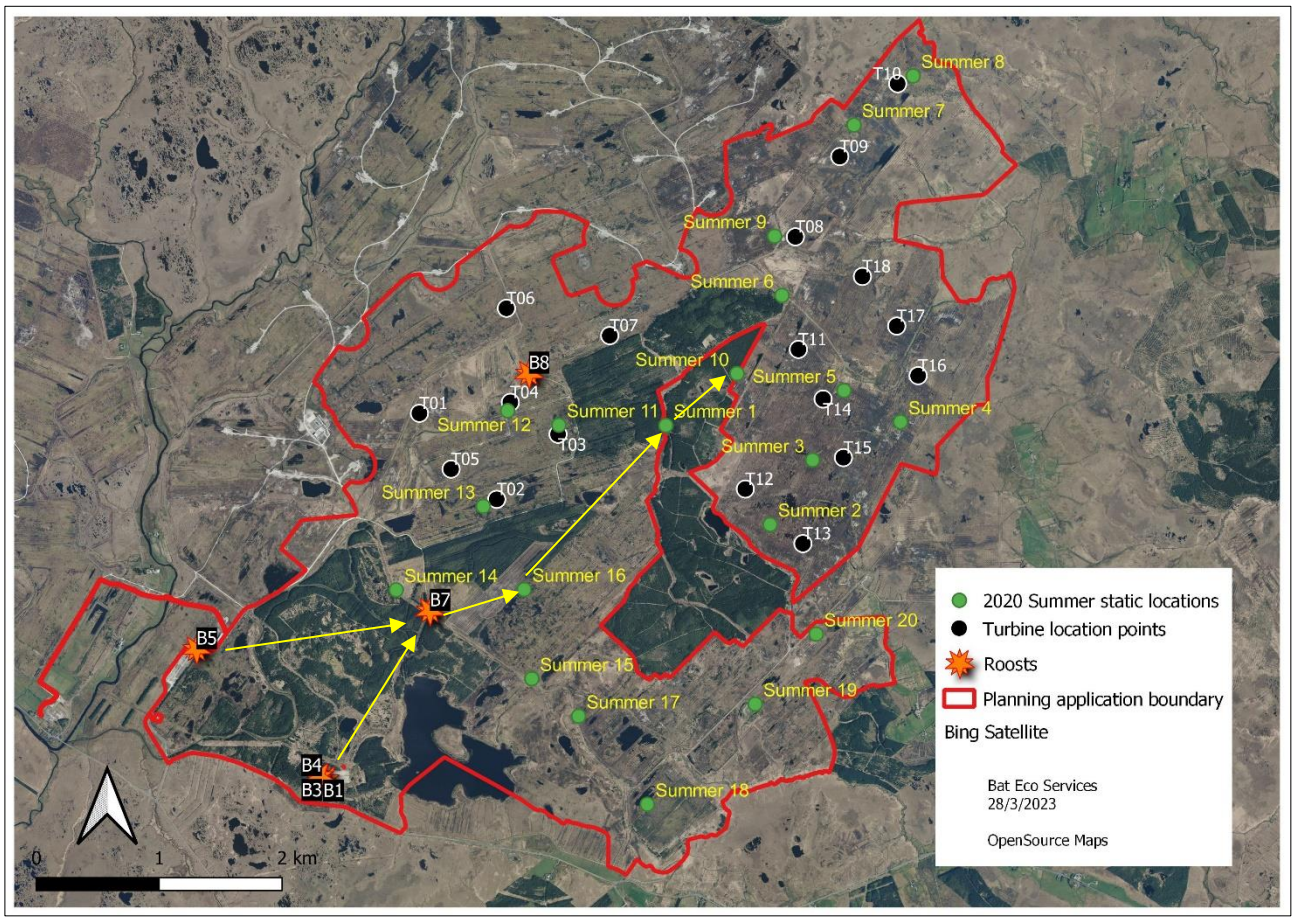


Figure 5c: Location of static units during the 2020 Summer Static Surveillance and location of roosts recorded along with potential soprano pipistrelle commuting routes.

Common pipistrelles were also recorded at a similar level of activity to soprano pipistrelles. with the highest level of common pipistrelle bat passes also recorded at statics Summer 16, 10 and 1 respectively. This emphasises the important of the woodland and conifer plantation edges as important commuting and/or foraging areas for this species.

During the Autumn surveillance, the highest level of soprano pipistrelles were recorded at static unit Autumn 10 (Figure 5d, Yellow circle), which is on the eastern boundary of the proposed development site. There are buildings located to the east of this static unit and therefore there is likely to be a roost outside the proposed development site.

The level of bat activity for Natterer's bat and Daubenton's bats were also noted. Natterer's bats were more frequently recorded on the static units Autumn 16, 18, 19 and 20 which are located in a radius around the building B8. Daubenton's bats were more frequently record (although in overall low numbers of bat passes) on the static units Autumn 14 (located near a waterbody), 16 (located near a waterbody), 18 (located near a river) and 20 (located adjacent to a river). This species of bat is generally associated with waterbodies.

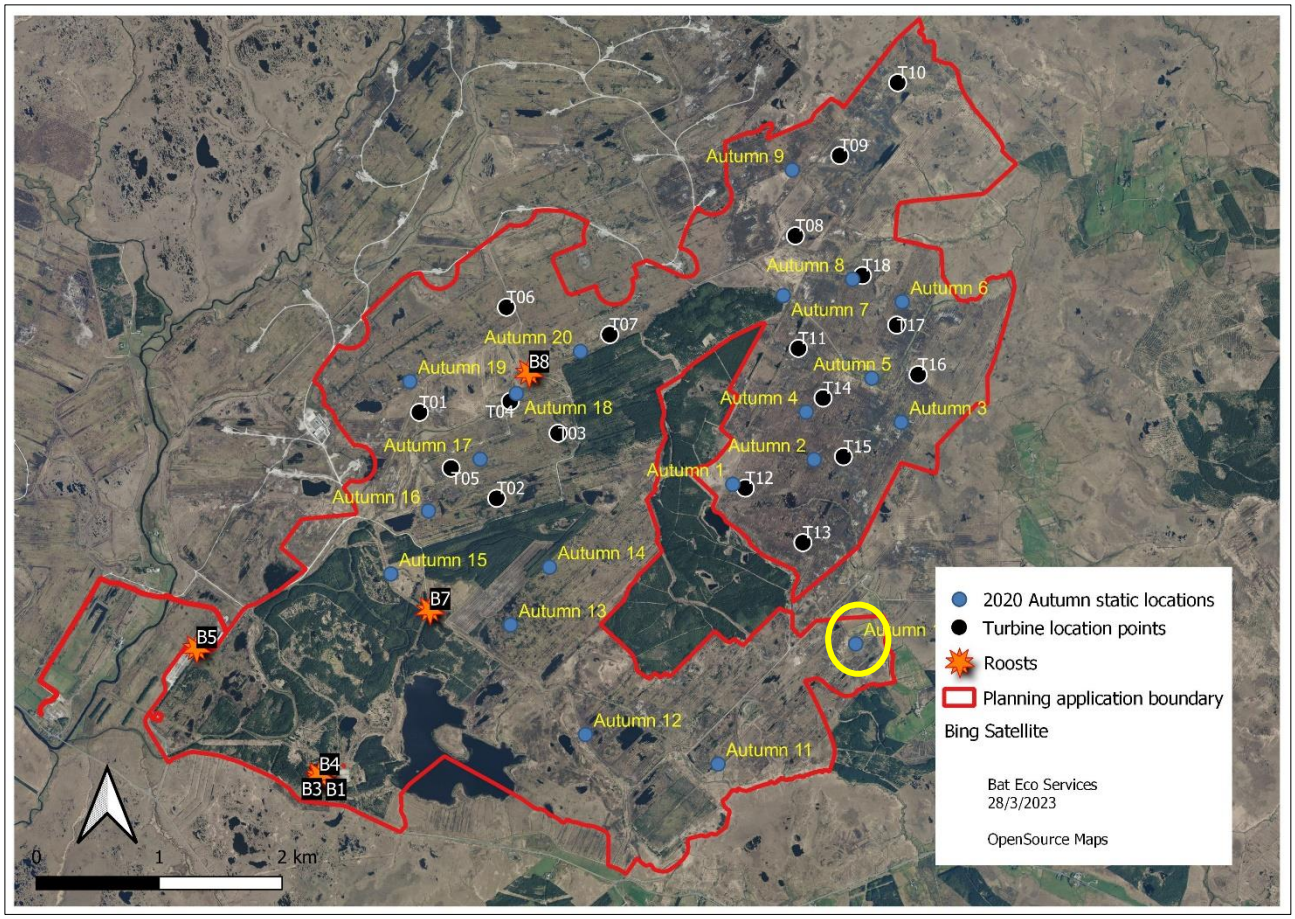


Figure 5d: Location of static units during the 2020 Autumn Static Surveillance and location of roosts recorded.

The overall level of bat passes is considered to be low with less than 10 bat passes recorded per night during the static surveillance: Spring Surveillance - 5.3 bat passes/night; Summer Surveillance – 9.95 bat passes/night and Autumn Surveillance – 9.32 bat passes/night.

In order to determine the static units with the higher bat activity levels, a graph was prepared (Figure 6). This illustrates the total number of bat passes recorded (See Table D, Appendix 9.7). Overall, the average number of bat passes for all bat species recorded during static surveillance was 8.33 bat passes per night (n=59 statics).

The following statics had >20 bat passes on average per night during the static surveillance: Spring 16 (29.90 bat passes per night, primarily Natterer's bat passes), Summer 16 (120.08 bat passes per night, primarily soprano pipistrelle and common pipistrelle bat passes) and Autumn 10 (73.40 bat passes per night, primarily soprano pipistrelle bat passes). Spring 16 is located within the proposed turbine locations while Summer 16 (920m from nearest turbine) and Autumn 10 (750m from nearest turbine) are located south of the nearest turbine location. All three of these static units are located greater than 500m from proposed turbine locations.

The following two statics had between 15 and 20 bat passes on average per night during the static surveillance: Summer 1 (16.27 bat passes per night, primarily common pipistrelle bat passes) and Summer 10 (18.27 bat passes per night, primarily soprano pipistrelle and common pipistrelle bat passes). Both of these static units are located greater than 500m from proposed turbine locations.

An additional 8 statics units had higher than the average of 8.33 bat passes per night: Spring 6, 9 and 12 and Autumn 7, 14, 16, 17, and 18 (range from 9.3 to 12.6 bat passes per night). The following table provides a summary of these results. Six of the static units were located <500m from proposed turbine locations while the remaining two statics were located >500m from proposed turbine locations.

Table 7b: 2020 Static units with above average bat passes/night.

Static Number	Average No. of bat passes/night	Nearest Turbine(distance)	Primary bat species recorded
Spring 16	29.90	T02 (1000m)	Natterer's bat
Summer 16	120.08	T02 (750m)	Soprano & Common pipistrelle
Autumn 10	73.40	T13 (930m)	Soprano pipistrelle
Summer 1	16.27	T12 (825m)	Common pipistrelle
Summer 10	18.27	T11 (540m)	Soprano & Common pipistrelle
Spring 6	12.60	T12 (650m)	Soprano pipistrelle & Leisler's bat
Spring 9	10.50	T11, T14 (340m)	Common pipistrelle
Spring 12	10.50	T11 (380m)	Common pipistrelle
Autumn 7	12.30	T11, T08 (440m)	Soprano & Common pipistrelle
Autumn 14	12.20	T02 (700m)	Soprano pipistrelle
Autumn 16	11.50	T05 (380m)	Soprano pipistrelle
Autumn 17	9.30	T05 (240m)	Soprano pipistrelle
Autumn 18	11.20	T04 (75m)	Natterer's bat

As part of the analysis of the 2020 static unit locations in comparison to the proposed turbine locations, a table is presented in the appendices detailing this information (Appendix 9.5, Table 2b). The degree of potential influence of the proposed turbine location on local bat populations decreases with distance from the static unit.

4.2.2.1 Static Unit on Weather Mast

A static unit was erected on the weather mast at 4m height with the microphone located at 55m height. This unit recorded from 20/9/2020 to 4/11/2020 (n=44 nights) and no bats were recorded during the surveillance period.

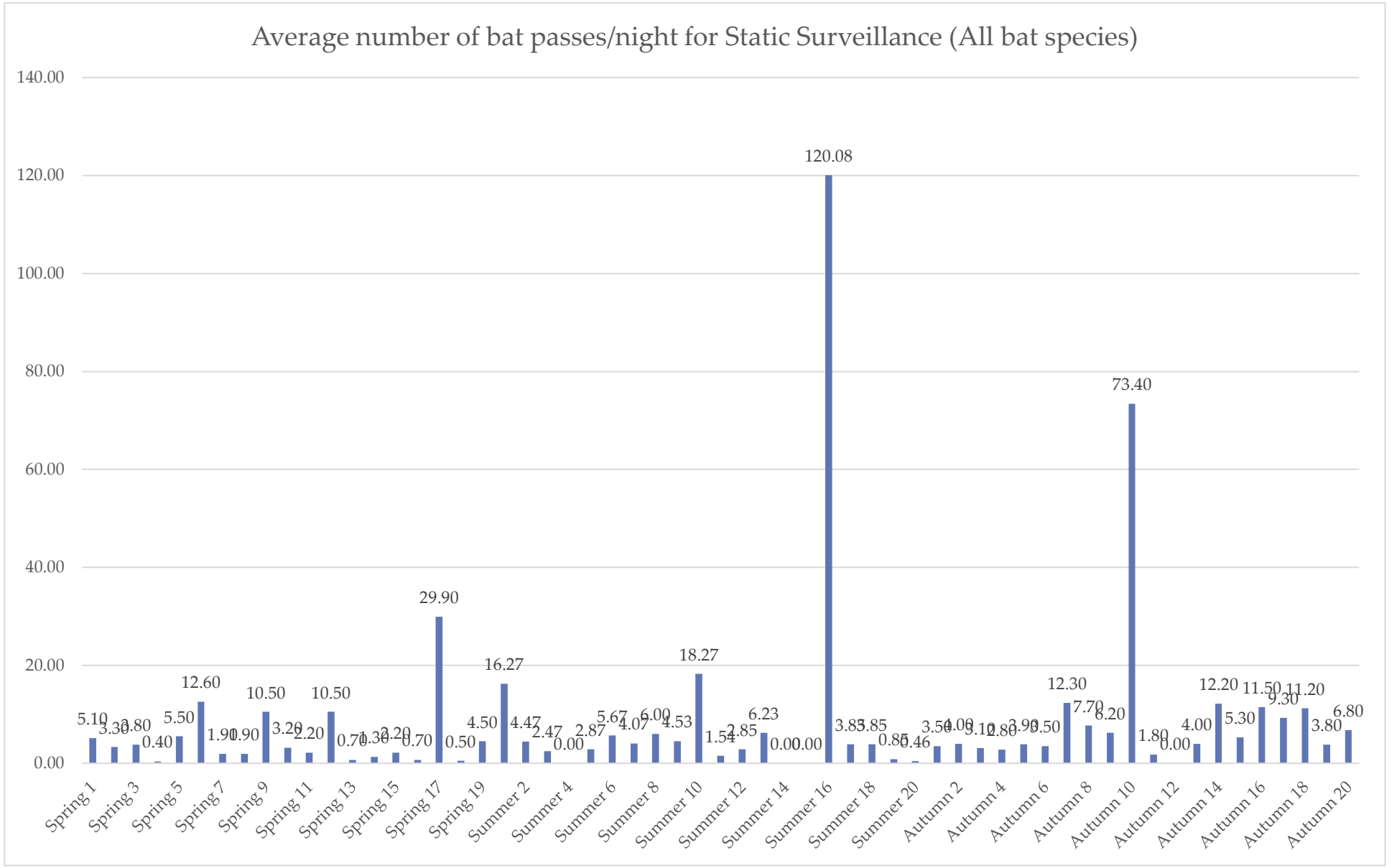


Figure 6: Average number of bat passes recorded per night at each static unit location during 2020 Spring, Summer and Autumn Surveillance.

4.2.3 Static Surveillance 2022

The 2022 passive static bat detector survey comprised of three surveillance periods where 13 locations were sampled in each of the surveillance periods. This was based on the proposed 18 turbines and the location of all of the statics are provided in the Appendices (Appendix 9.5) and presented on the figure below. Static units were deployed to sample the proposed turbine locations, the locations of which were provided in November 2021 by TOBIN.

The following bat species were recorded during the static surveillance: common pipistrelle, soprano pipistrelle, Leisler's bat, Natterer's bat, Daubenton's bat, brown long-eared bat, whiskered bat, *Myotis* species and Nathusius' pipistrelle (Please see Appendix 9.7, Tables E, F and G for a full breakdown of survey results for each static unit deployed). The following figure details the total number of bat passes recorded for each bat species during each static surveillance period (please note the difference in number of static units and number of nights of recording). Table 8a presents the average number of bat passes per night for each bat species recorded during the static surveillance.

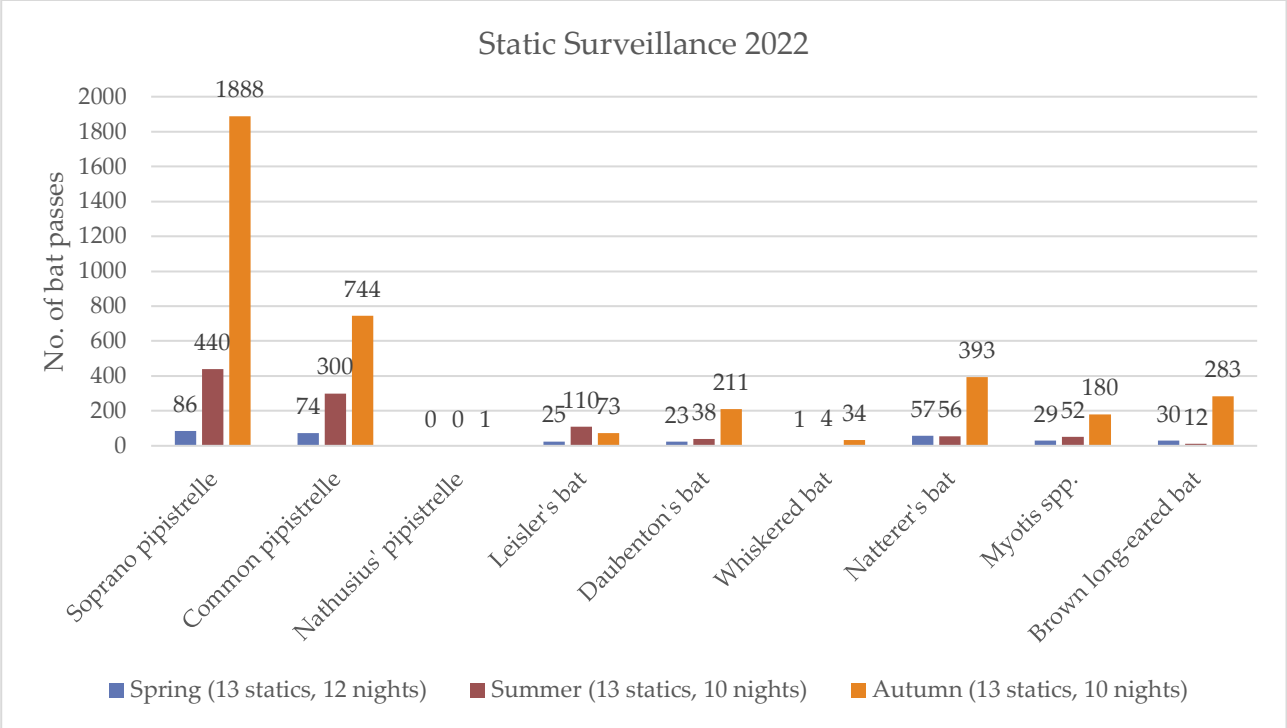


Figure 7: Total number of bat passes recorded for each bat species during static surveillance completed in Spring, Summer and Autumn 2022.

The following tables presented the average number of bat passes recorded per night for each bat species during the static surveillance for each period. Overall, Spring 2022 had a lower level of bat activity with a higher level of bat activity recorded in Autumn 2022. Five figures are highlighted in Table 8a (Red), drawing attention to values considered to represent potential Moderate to High level of bat activity. During the Summer Surveillance, a Moderate level of soprano pipistrelle activity was recorded. During the Autumn Surveillance, a High level of soprano pipistrelle activity was recorded while a Moderate level of activity was recorded for three species of bat: common pipistrelle, Natterer's bat and brown long-eared bat. The High level of soprano pipistrelle activity was recorded is greater than what was reported overall in 2020. This is predominantly due to >1,000 bat passes recorded on Autumn 22 static location.

Table 8a: Average number of bat passes recorded per night for each bat species recorded during 2020 static surveillance.

	SP	CP	Nath P	Leis	Daub	Whis	Natt	Myotis	BLE
Spring (13 statics, 12 nights)	0.55	0.47	0.00	0.16	0.15	0.01	0.37	0.19	0.19
Summer (13 statics, 10 nights)	**3.38**	2.31	0.00	0.85	0.29	0.03	0.43	0.40	0.09
Autumn (13 statics, 10 nights)	**14.52**	**5.72**	0.01	0.56	1.62	0.26	**3.02**	1.38	**2.18**

Note: SP = soprano pipistrelle, CP = common pipistrelle, Leis = Leisler's bat, Nath P = Nathusius' pipistrelle, Daub = Daubenton's bat, Whis = whiskered bat, Natt = Natterer's bat, Myotis = *Myotis* spp. and BLE = brown long-eared bat.

During the 2022 Spring surveillance, soprano pipistrelles was the most frequently recorded bat species followed by common pipistrelle but overall the level of bat activity was low during Spring 2022. As per Spring 2020, Natterer's bat activity was recorded on three statics located around the recorded maternity roost at B8 and therefore reconfirms the flight commuting roosts as individuals disperse from the roost (Yellow arrows).

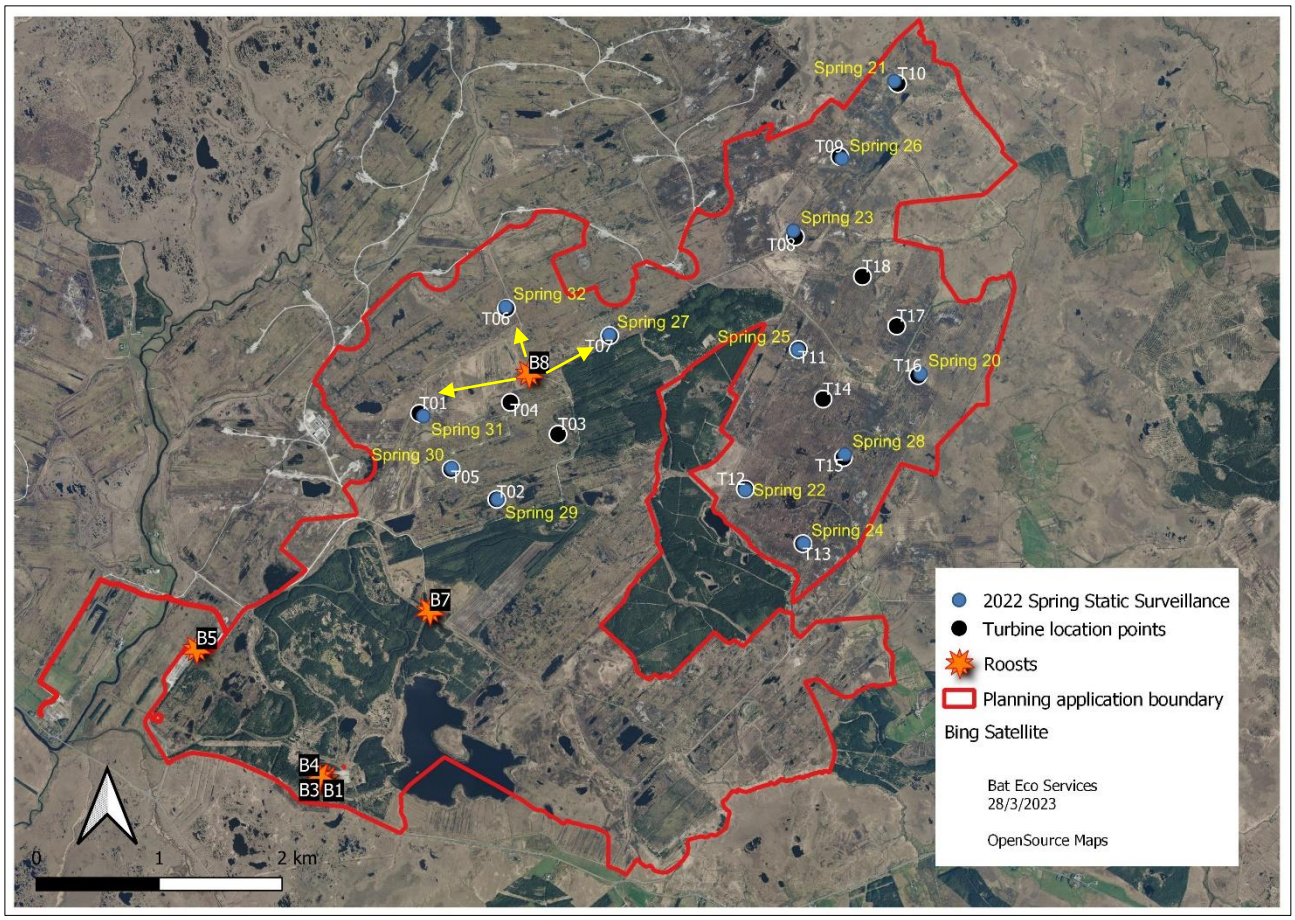


Figure 8a: Location of static units during the 2022 Spring Static Surveillance and location of roosts recorded along with potential Natterer's bat commuting routes.

During the 2022 Summer surveillance, soprano pipistrelles was the most frequently recorded bat species followed by common pipistrelle but overall the level of bat activity was low during Summer 2022. As per Spring 2022, Natterer's bat activity was primarily associated with the recordings on static unit Summer 33 located SW of maternity roost at B8 and therefore reconfirms the flight commuting roosts as individuals disperse from the roost (Yellow arrow).

Static units Summer 31 and Summer 24 recorded relatively high levels (compared to other statics) of soprano pipistrelle bat passes. Bats roosting in buildings south of Summer 31 may have dispersed to this static location while Summer 24 is located along the eastern boundary of the proposed development site. A similar pattern of results was recorded for common pipistrelle, but at a lower level of bat passes. A low level of Leisler's bat passes was recorded evenly across the static surveillance network.

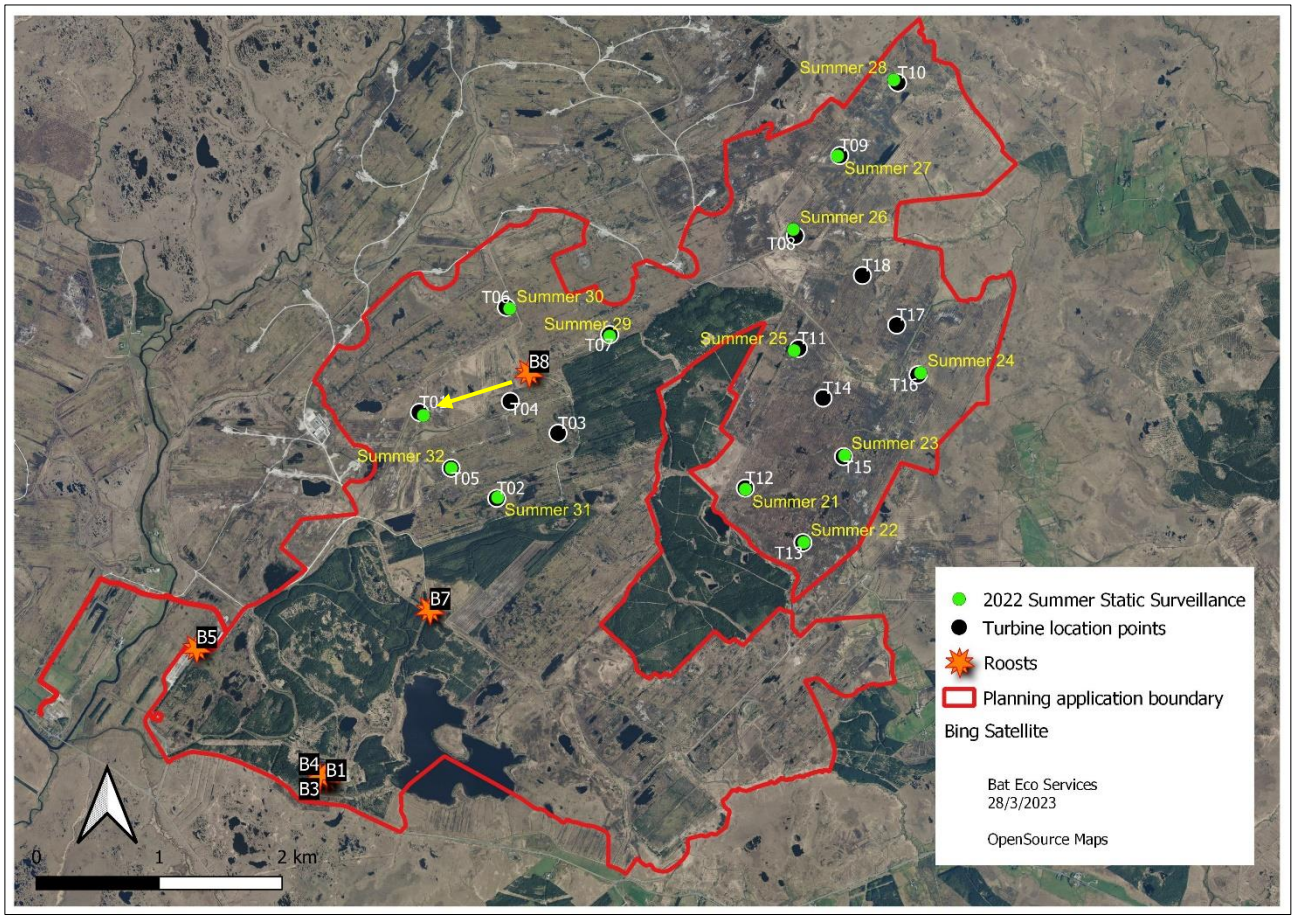


Figure 8b: Location of static units during the 2022 Summer Static Surveillance and location of roosts recorded along with potential Natterer's bat commuting route.

During the 2022 Autumn surveillance, an overall higher level of bat activity was recorded compared to the Spring 2022 and Summer 2022 static surveillance periods. As per Spring 2022 and Summer 2022, Natterer's bat activity was primarily associated with the recordings on static unit Autumn 25 located south-west of the maternity roost at B8 and therefore reconfirms the flight commuting roosts as individuals disperse from the roost.

Autumn 22 recorded high levels (compared to other statics) of soprano pipistrelle bat passes. Bats roosting in buildings south of Autumn 22 (located in the western area of the proposed development site) may have dispersed to this static location. Adjacent static units (Autumn 23, 24 and 26) recorded just over 100 bat passes in total per unit during this static surveillance (Autumn 22 - >1,000 bat

passes). All four static units were located in the western portion of the proposed development area and may be indicative of a dispersal area for this species of bat. A lower level of common pipistrelle and Leisler's bat passes was recorded evenly across the static surveillance network completed in Autumn 2022.

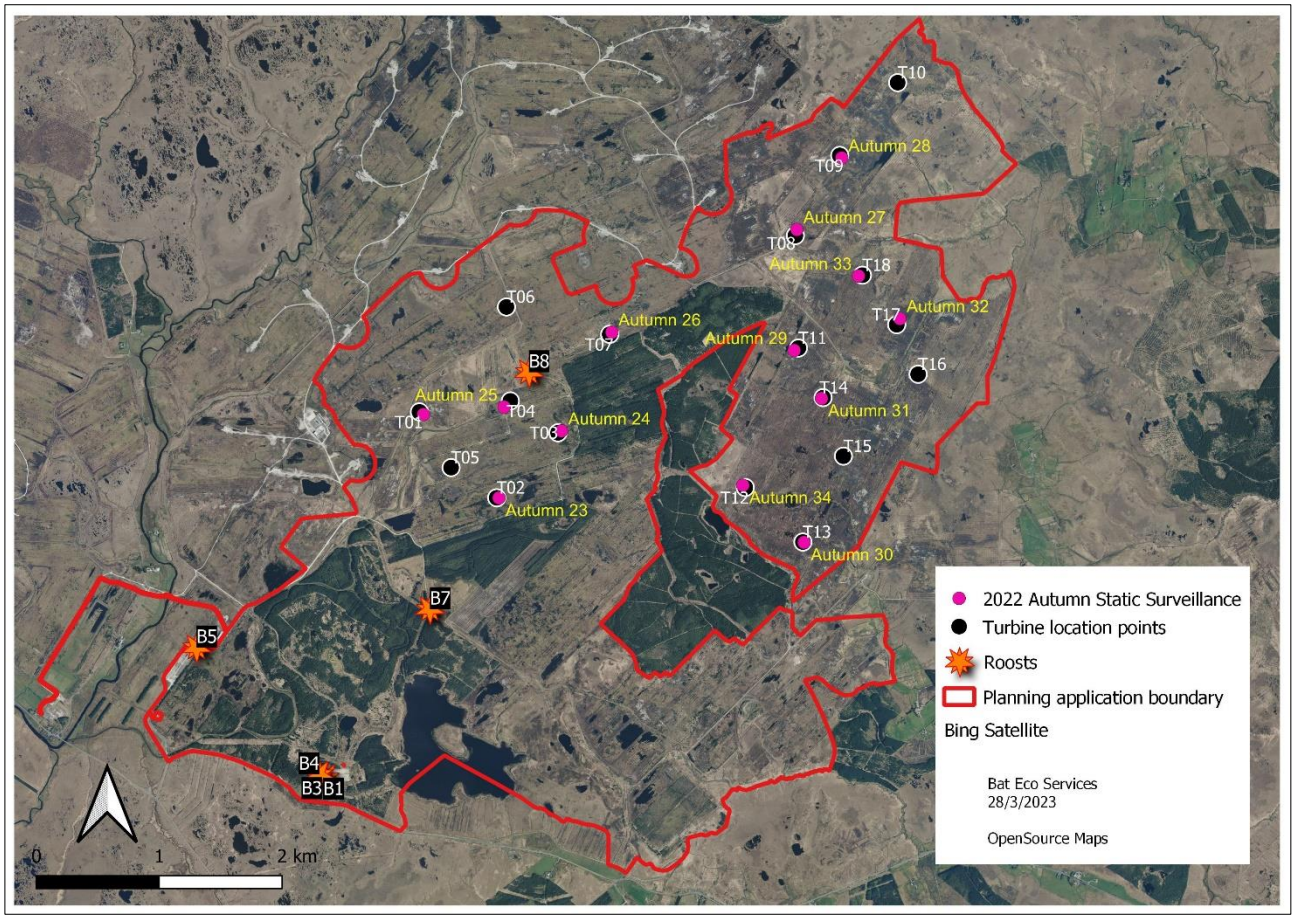


Figure 8c: Location of static units during the 2022 Autumn Static Surveillance and location of roosts recorded.

The overall level of bat passes is considered to be low with less than 10 bat passes recorded per night during the static surveillance for Spring and Summer: Spring Surveillance - 2.08 bat passes/night; Summer Surveillance – 7.78 bat passes/night which is less to that recorded for the same static surveillance period in 2020. However, as already stated, the 2022 Autumn Surveillance recorded an overall higher level of bat activity – 29.28 bat passes/night compared to 9.32 bat passes/night in 2020.

In order to determine the static units with the higher bat activity levels, a graph was prepared (Figure 9). This illustrates the average number of bat passes recorded . Overall, the average number of bat passes for all bat species recorded during 2022 static surveillance was 13.1 bat passes per night (n=39 statics) which was higher than the overall average number of bat passes for all bat species recorded during 2020 static surveillance (8.33 bat passes per night (n=59 statics)).

The following statics had >20 bat passes on average per night during the static surveillance: Summer 31, Autumn 22, Autumn 24, Autumn 25, Autumn 26, Autumn 32 and Autumn 33. The following five statics had between 15 and 20 bat passes on average per night during the static surveillance: Summer 24, Summer 33, Autumn 29, Autumn 30 and Autumn 31.

Table 8b: 2022 Static units with above average bat passes/night.

Static Number	Average No. of bat passes/night	Nearest Turbine	Primary bat species recorded (listed in order of importance)
Summer 31	27.5	T2	Soprano pipistrelle, common pipistrelle
Autumn 22	127.6	T1	Soprano pipistrelle, common pipistrelle
Autumn 23	29.6	T2	Soprano pipistrelle, brown long-eared bat
Autumn 24	30.8	T3	Soprano pipistrelle, Natterer's bat, Daubenton's bat
Autumn 25	36.6	T4	Natterer's bat, soprano pipistrelle
Autumn 26	30.5	T7	Soprano pipistrelle, common pipistrelle
Autumn 32	20.3	T17	Soprano pipistrelle, common pipistrelle
Autumn 33	27.3	T18	Soprano pipistrelle
Summer 24	15.9	T16	Soprano pipistrelle, common pipistrelle
Summer 33	16.2	T1	Natterer's bat
Autumn 29	17.2	T11	Common pipistrelle, soprano pipistrelle
Autumn 30	18.8	T13	Common pipistrelle, soprano pipistrelle
Autumn 31	17.0	T14	Common pipistrelle, soprano pipistrelle
Autumn 28	11.1	T9	Soprano pipistrelle, common pipistrelle

As the 2022 Autumn static surveillance recorded the highest level of bat passes compared to the Spring and Summer static surveillance periods, it should be noted which proposed turbine locations were not sampled during the autumn. This is particularly important in relation to the proposed turbines in the western portion of the proposed development area. T5 and T6 were not sampled in Autumn 2022 while the other five proposed turbine locations in this area were sampled. The number of bat passes recorded for T1, T2, T3, T4 and T7 during the 2022 Autumn static surveillance was >20 bat passes/night. In addition, the number of bat passes recorded for T2 and T1 during the 2022 Summer static surveillance was High (>20 bat passes/night) and Moderate (>15 – 20 bat passes/night) respectively.

As a consequence of this analysis, the following figure depicts the proposed turbine locations with a High (>20 bat passes/night) bat activity during the 2022 static surveillance: T1, T2, T3, T4, T7, T17 and T18.

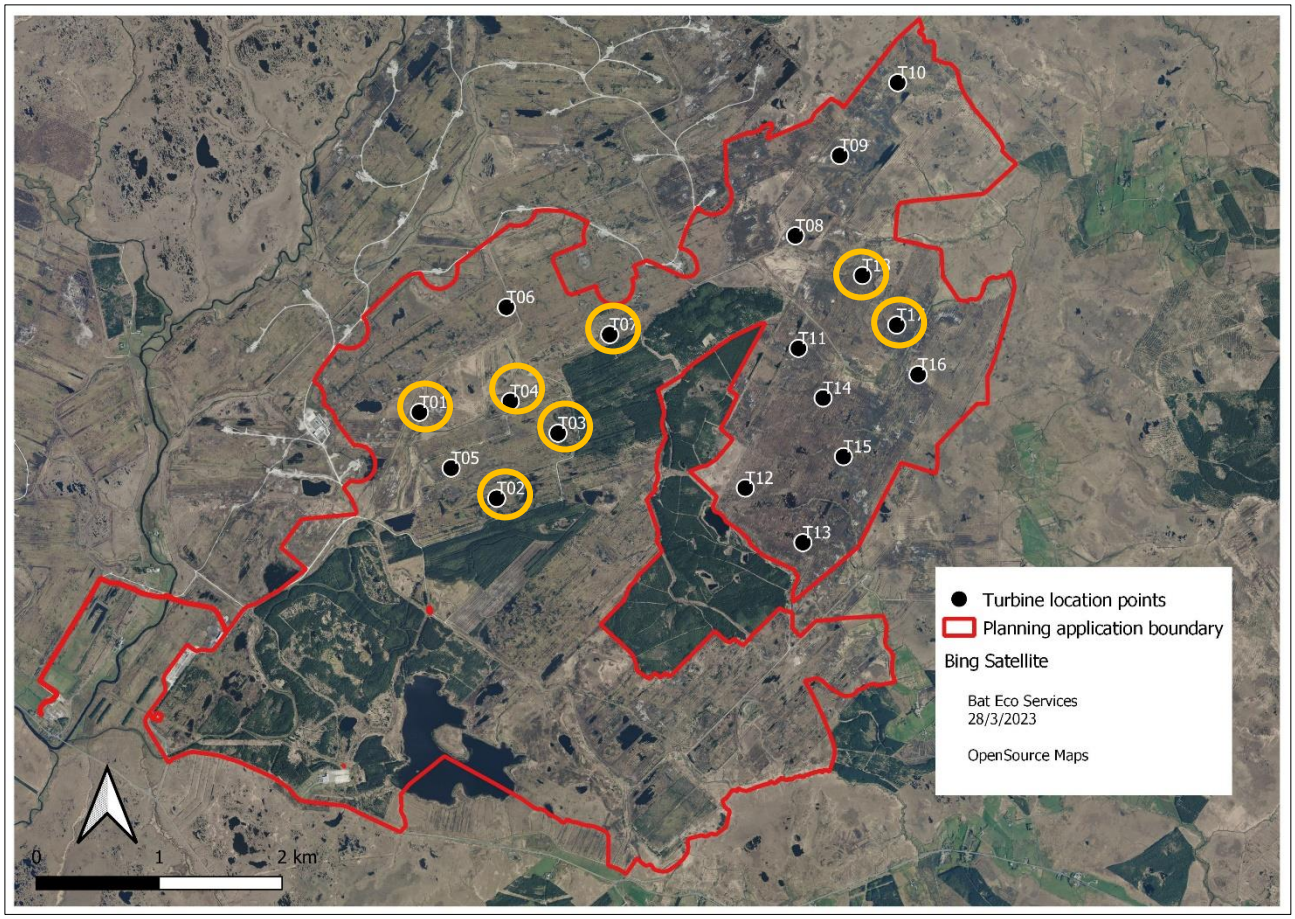


Figure 8d: Location of static units which recorded an average of >20 bat passes/night units during the 2022 Static Surveillance in relation to proposed turbine locations.

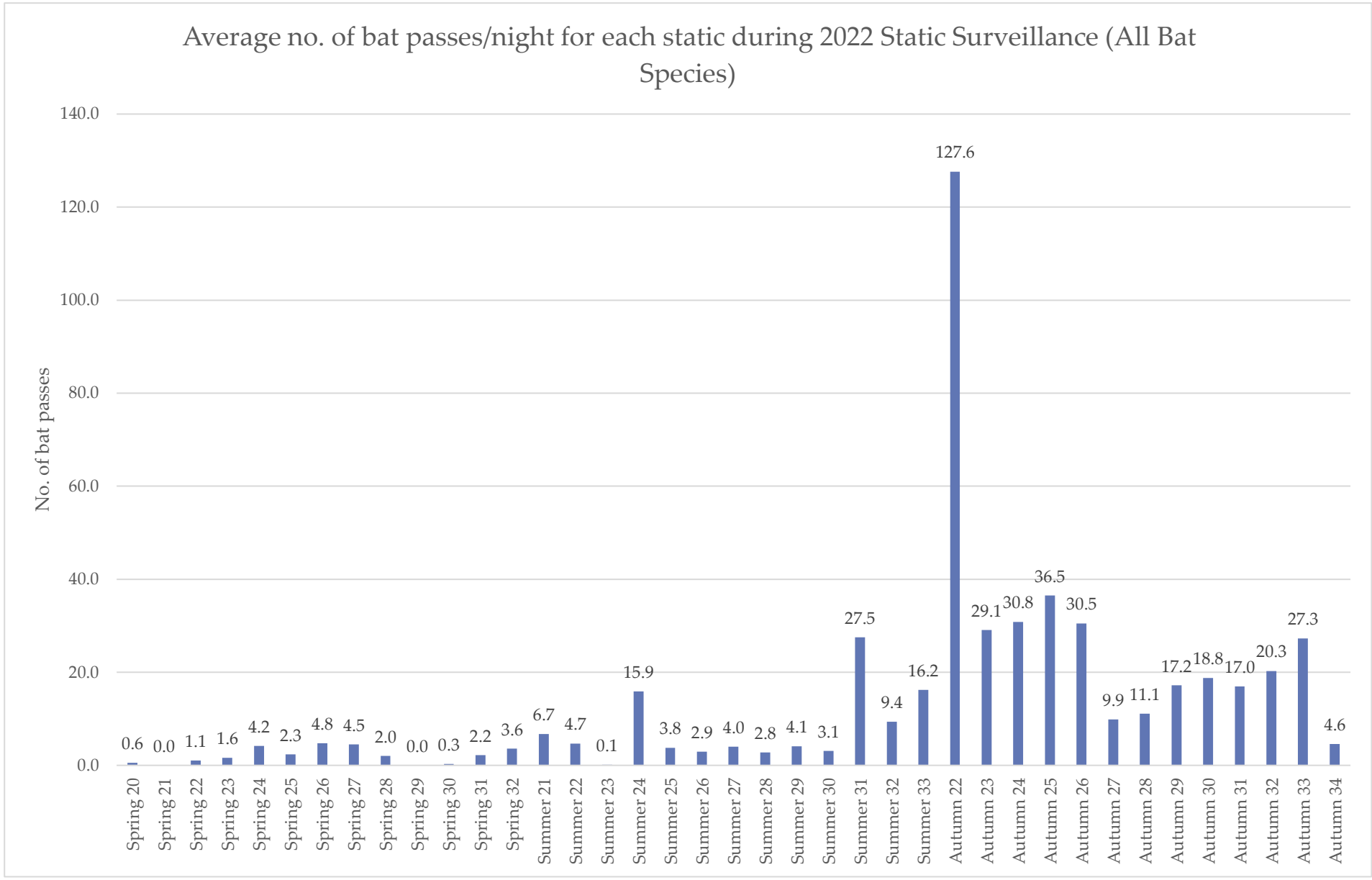


Figure 9: Average number of bat passes recorded per night at each static unit location during 2022 Spring, Summer and Autumn Surveillance.

4.2.4 Walking and Driving Transects 2020 & 2022

Walking and driving transects were generally undertaken post dusk surveys (i.e. 110 minutes post sunset). Two walking transects were undertaken 60 minutes after sunset after a 60 minute stationary survey at the start point to determine if roosting bats were commuting onto the proposed development site (e.g. start of track along eastern boundary from local road network south-east of T13). Walking transects were principally undertaken along the existing tracts within the survey area. Only one walking transect was undertaken to the north of the site (in vicinity of T1, T2, T3) as this required the surveyors to tract across open bog during the hours of darkness to get to these locations.

The bat encounters recorded during these surveys were add to the dataset that includes data collated from dusk and dawn surveys and the static surveillance periods to provide maps for each of the individual bat species recorded. These results are presented in the next section.

4.2.5 Bat Survey Results - Summary

The following figures illustrate the location of bat encounters during all of the bat surveys completed. A total of eight bat species were recorded within the proposed development site as a result of the array of bat surveys completed.

4.2.5.1 Soprano pipistrelle

A total of 182 geo-reference bat encounters were recorded for this species of bat during the array of bat surveys completed. As shown on Figure 10a, this bat species was recorded throughout the survey area. It was recorded on 88 of the 98 static unit locations. Four satellite roosts were also recorded. Records for this bat species was dispersed throughout the survey area.

4.2.5.2 Common pipistrelle

A total of 118 geo-reference bat encounters were recorded for this species of bat during the array of bat surveys completed. As shown on Figure 10b, this bat species was recorded throughout the survey area. It was recorded on 89 of the 98 static unit locations. No bat roosts were recorded within the survey area for this bat species. Records for this bat species was dispersed throughout the survey area.

4.2.5.3 Leisler's bat

A total of 96 geo-reference bat encounters were recorded for this species of bat during the array of bat surveys completed. As shown on Figure 10c, this bat species was recorded throughout the survey area. It was recorded on 70 of the 98 static unit locations. No bat roosts were recorded within the survey area for this bat species. Records for this bat species was dispersed throughout the survey area.

4.2.5.4 Nathusius' pipistrelle

Only two geo-reference bat encounters were recorded for this species of bat during the array of bat surveys completed. As shown on Figure 10d, this bat species was recorded in the north-west area of the proposed development site. It was recorded on 2 of the 98 static unit locations. No bat roosts were recorded within the survey area for this bat species. This bat species was only recorded during static surveillance at two locations in the western portion of the survey area.

4.2.5.5 Natterer's bat

A total of 117 geo-reference bat encounters were recorded for this species of bat during the array of bat surveys completed. As shown on Figure 10e, this bat species was recorded throughout the survey area. It was recorded on 32 of the 98 static unit locations. One maternity roost and three satellite roosts were also recorded. As a result of the maternity roost, this species was encountered frequently during dusk surveys and walking transects. Records for this bat species was dispersed throughout the survey area with a concentration in the western portion of the survey area coinciding with the location of the maternity roost.

4.2.5.6 Daubenton's bat

A total of 70 geo-reference bat encounters were recorded for this species of bat during the array of bat surveys completed, but predominantly during the static surveillance. As shown on Figure 10f, this bat species was recorded throughout the survey area. It was recorded on 41 of the 98 static unit locations. No bat roosts were recorded within the survey area for this bat species. Records for this bat species was dispersed throughout the survey area.

4.2.5.7 Whiskered bat

A total of 18 geo-reference bat encounters were recorded for this species which are shown on Figure 10g, all of which were recorded during static surveillance. It was recorded on 17 of the 98 static unit locations. No bat roosts were recorded within the survey area for this bat species. Records for this species were concentrated in the western portion of the survey area.

4.2.5.8 Brown long-eared bat

A total of 69 geo-reference bat encounters were recorded for this species of bat during the array of bat surveys completed. As shown on Figure 10h, this bat species was recorded throughout the survey area. It was recorded on 61 of the 98 static unit locations. Two satellite roosts were also recorded. Records for this bat species was dispersed throughout the survey area.

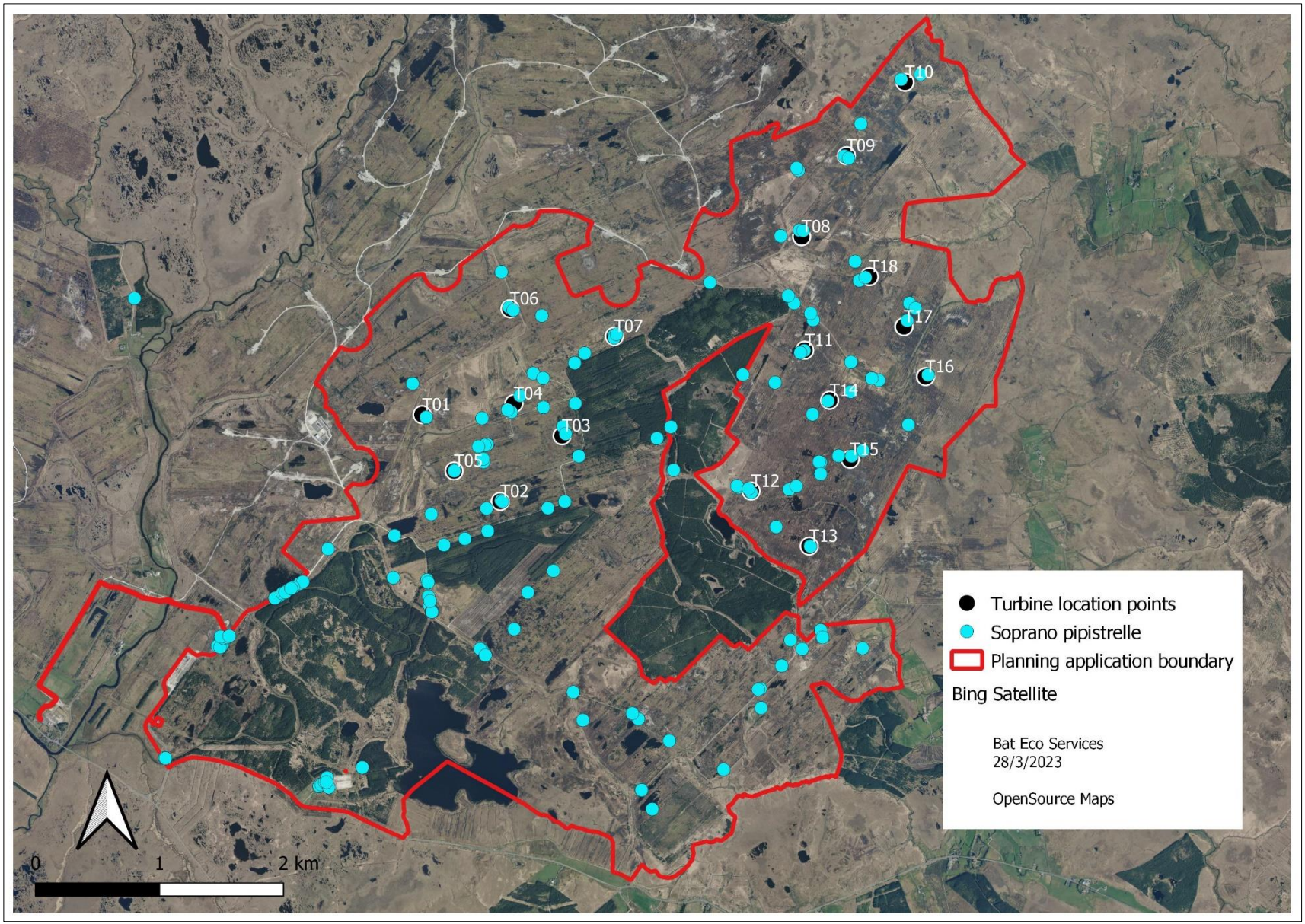


Figure 10a: Soprano pipistrelle bat encounters during 2020 and 2022 bat surveys.

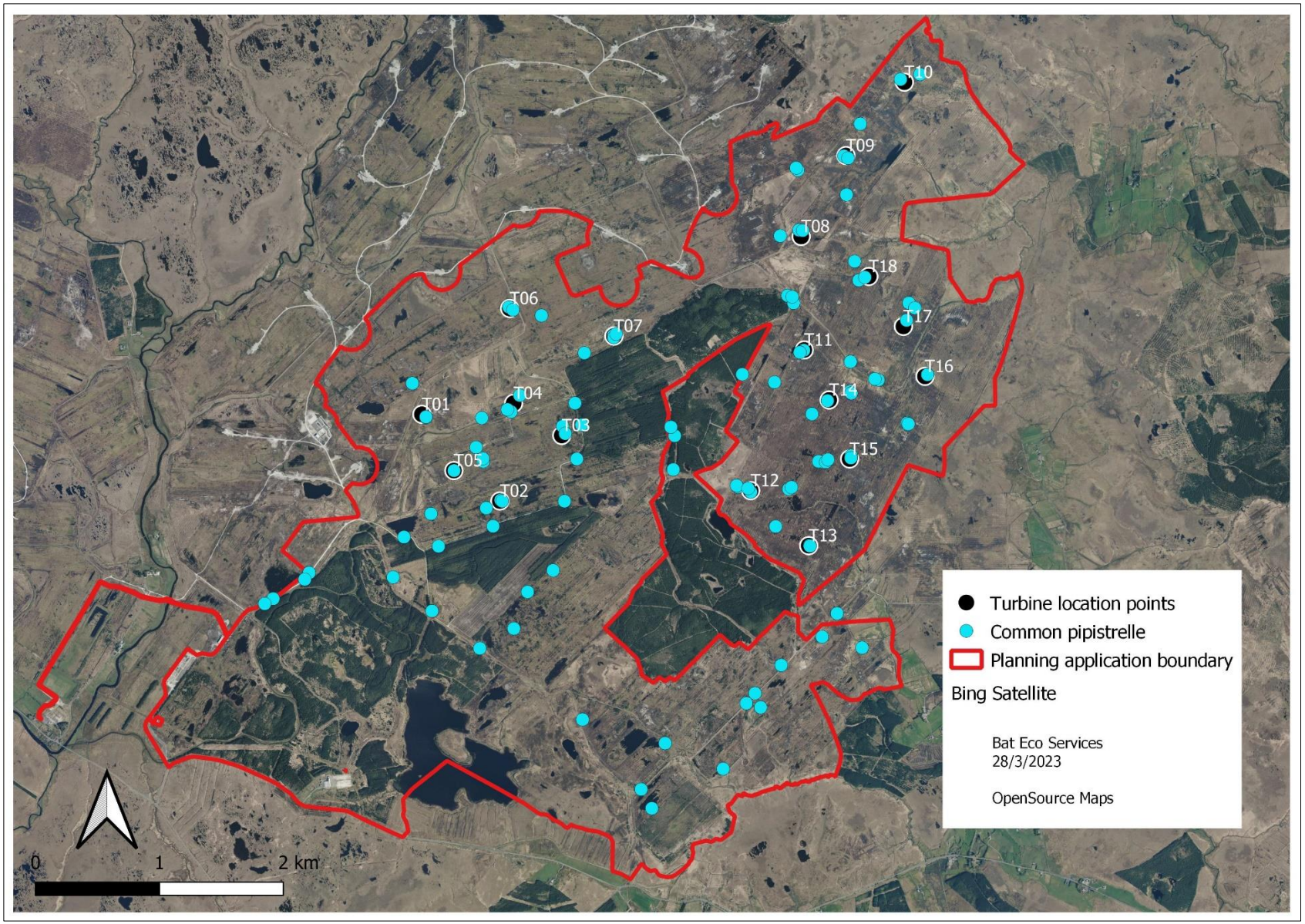


Figure 10b: Common pipistrelle bat encounters during 2020 and 2022 bat surveys.

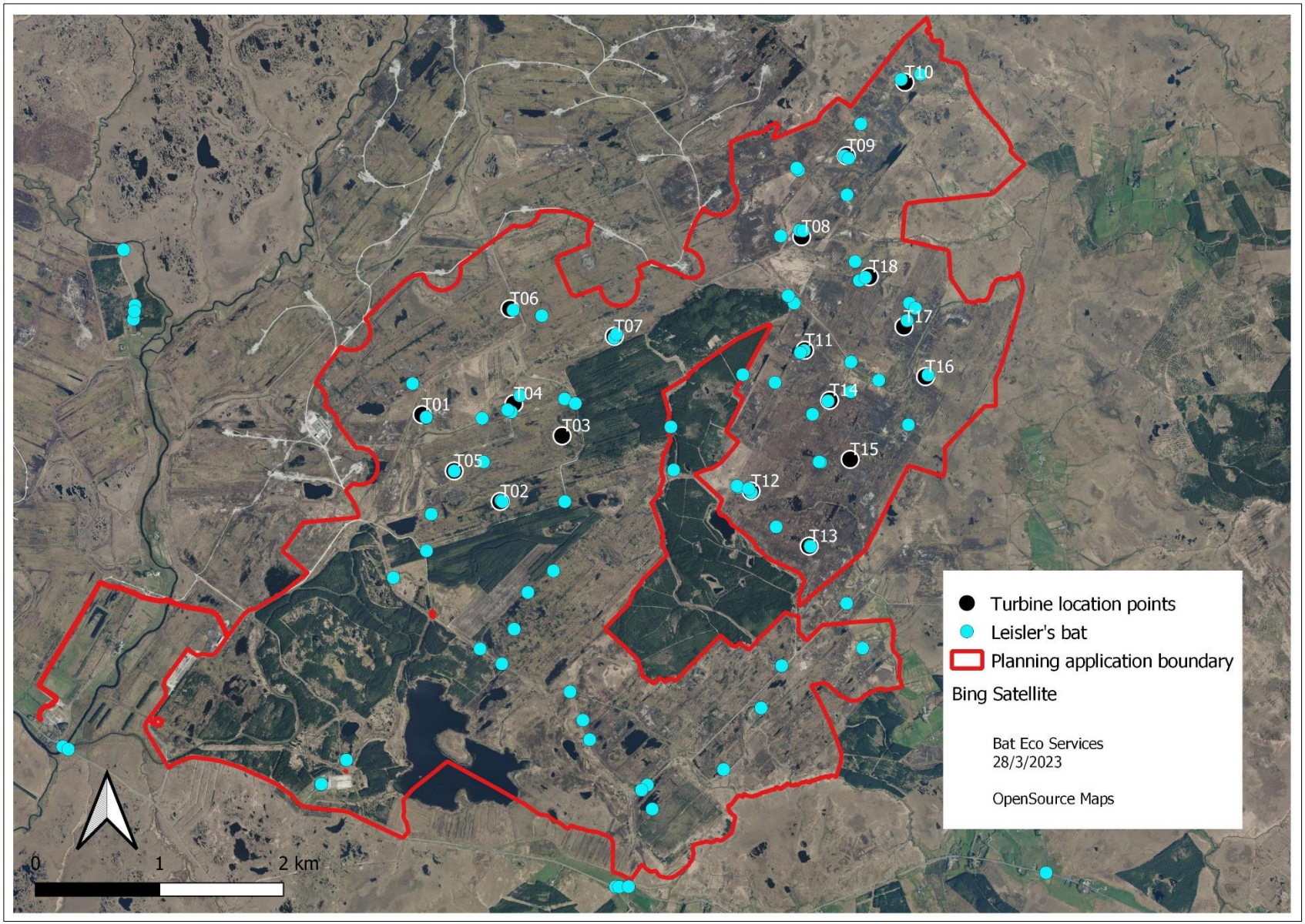


Figure 10c: Leisler's bat encounters during 2020 and 2022 bat surveys.

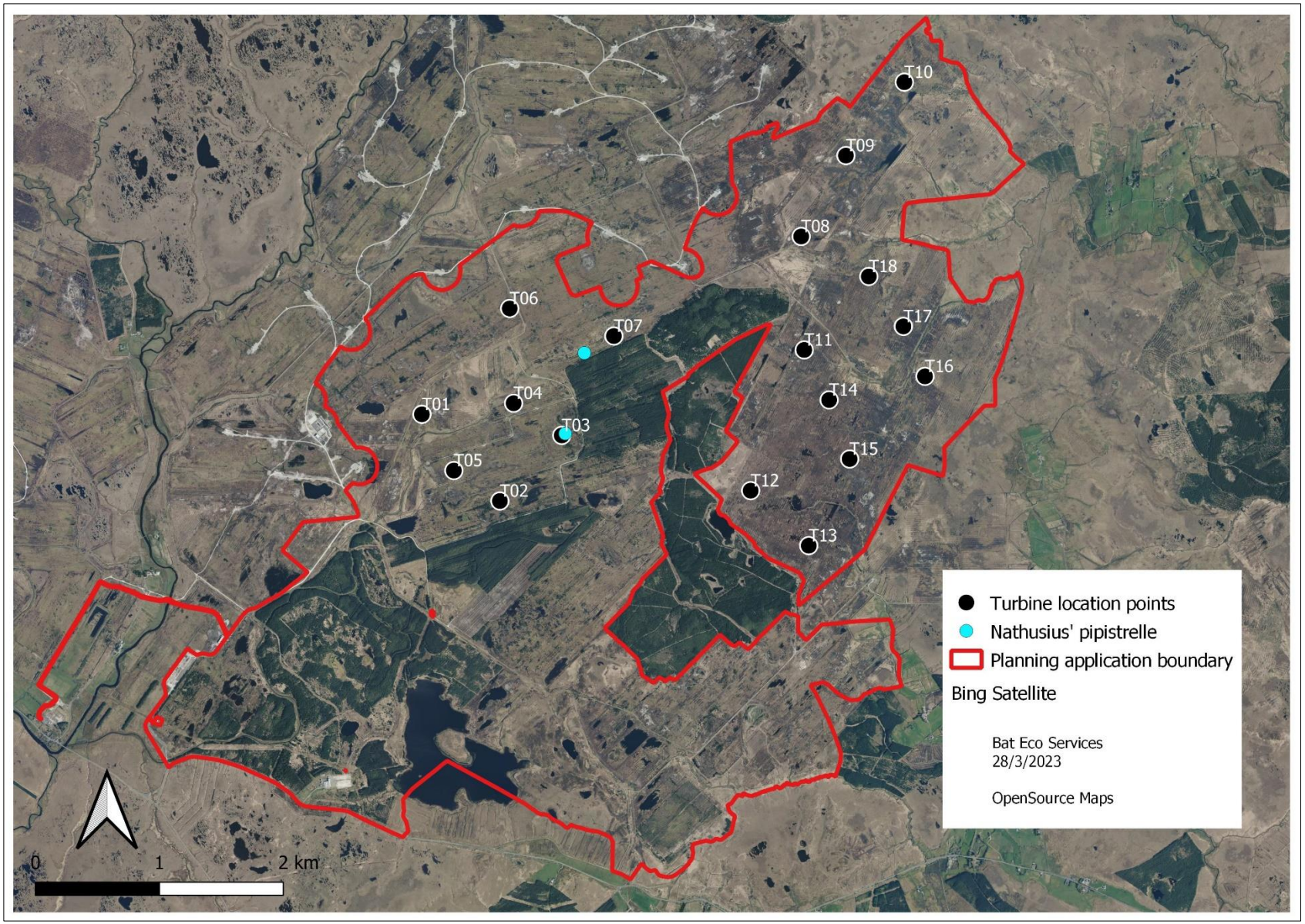


Figure 10d: Nathusius' pipistrelle bat encounters during 2020 and 2022 bat surveys.

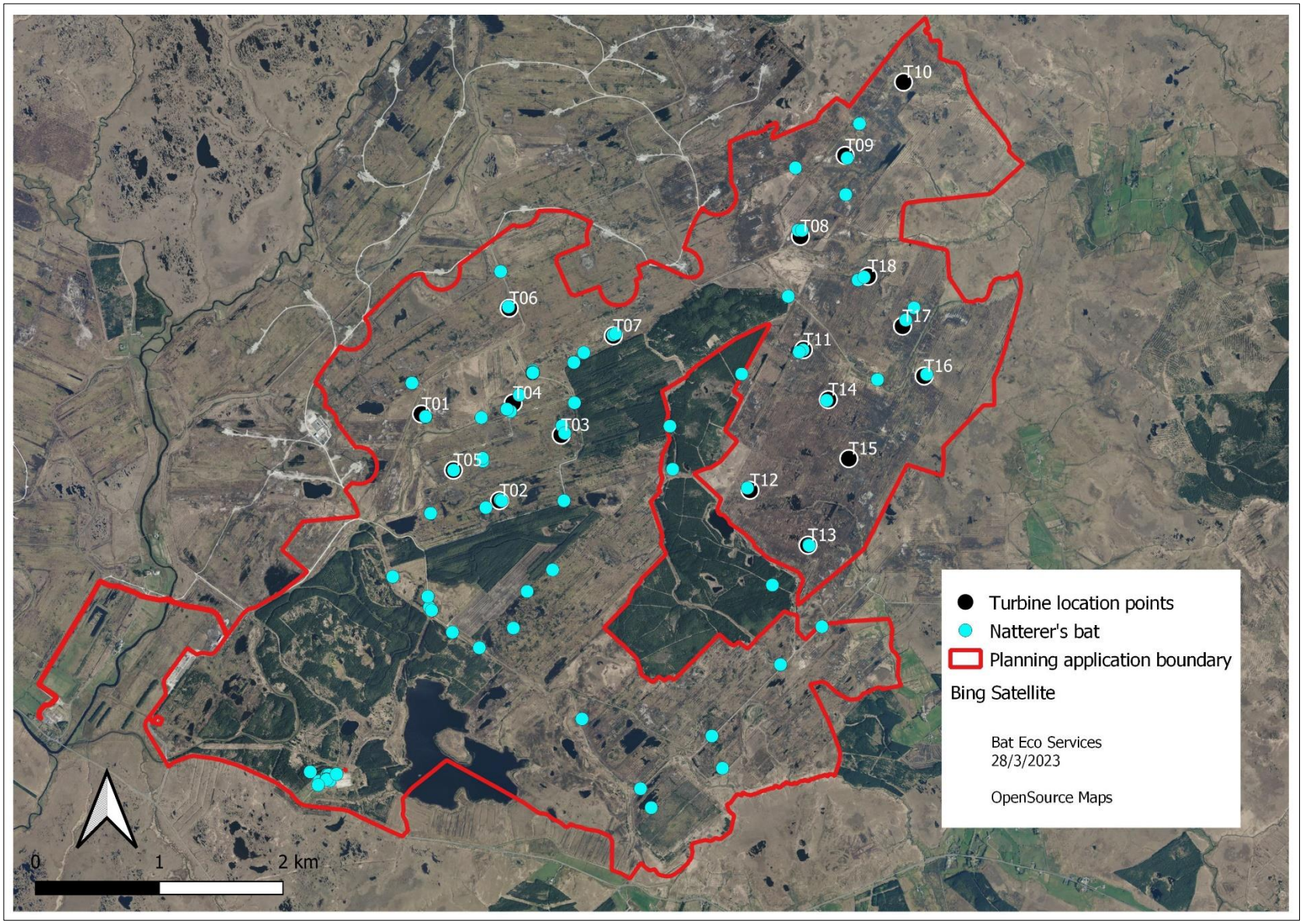


Figure10e: Natterer's bat encounters during 2020 and 2022 bat surveys.

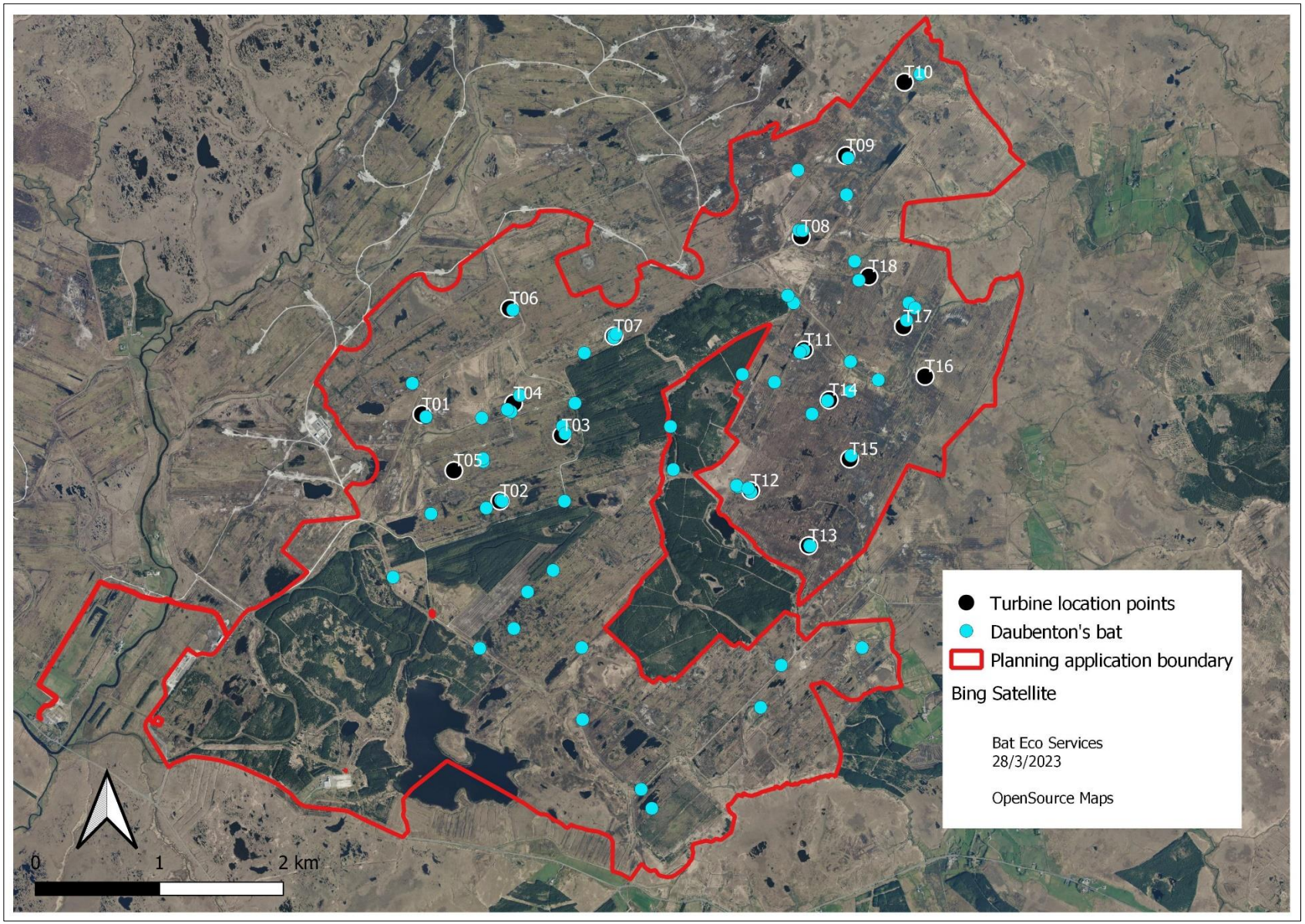


Figure 10f: Daubenton's bat encounters during 2020 and 2022 bat surveys.

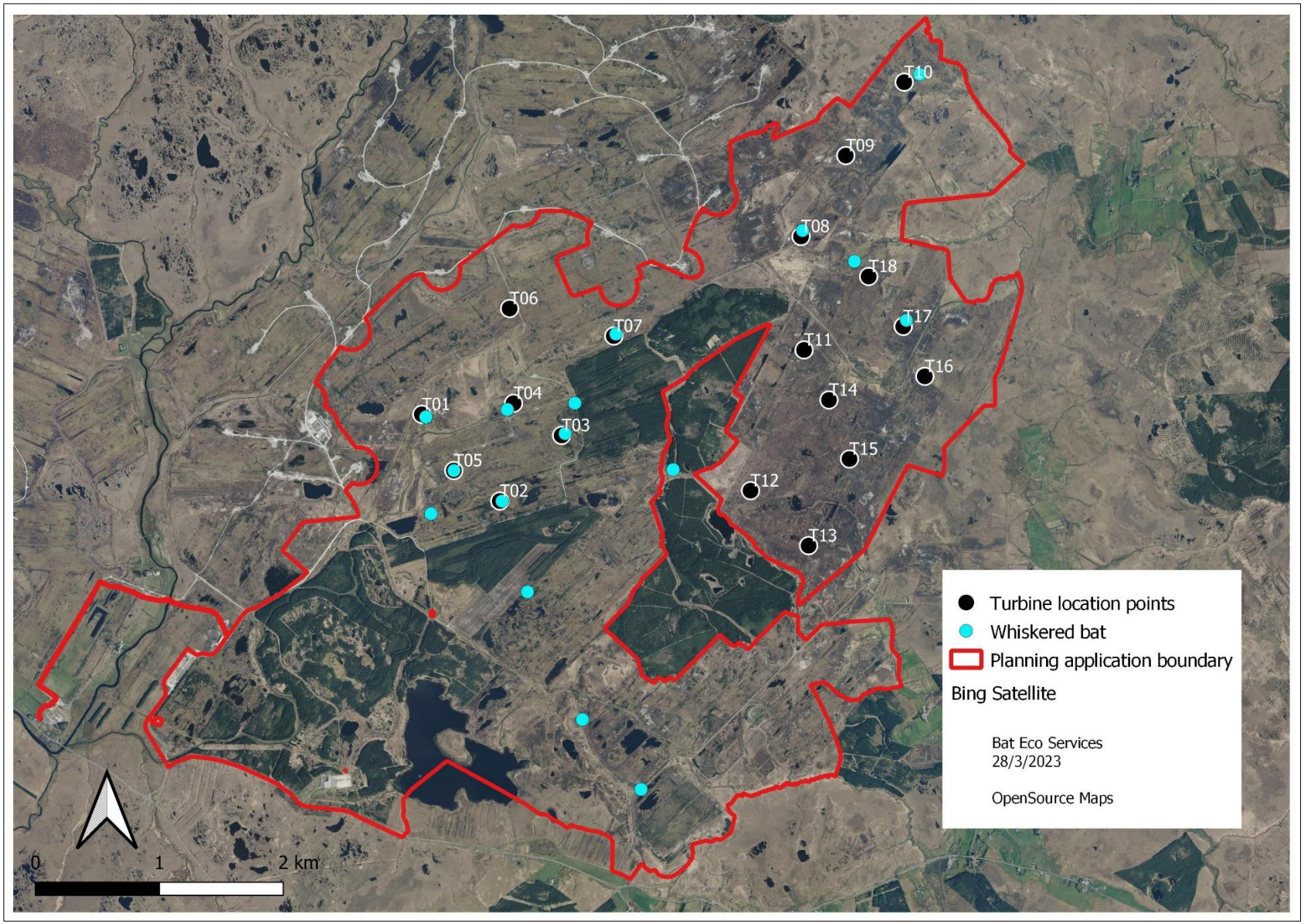


Figure 10g: Whiskered bat encounters during 2020 and 2022 bat surveys.

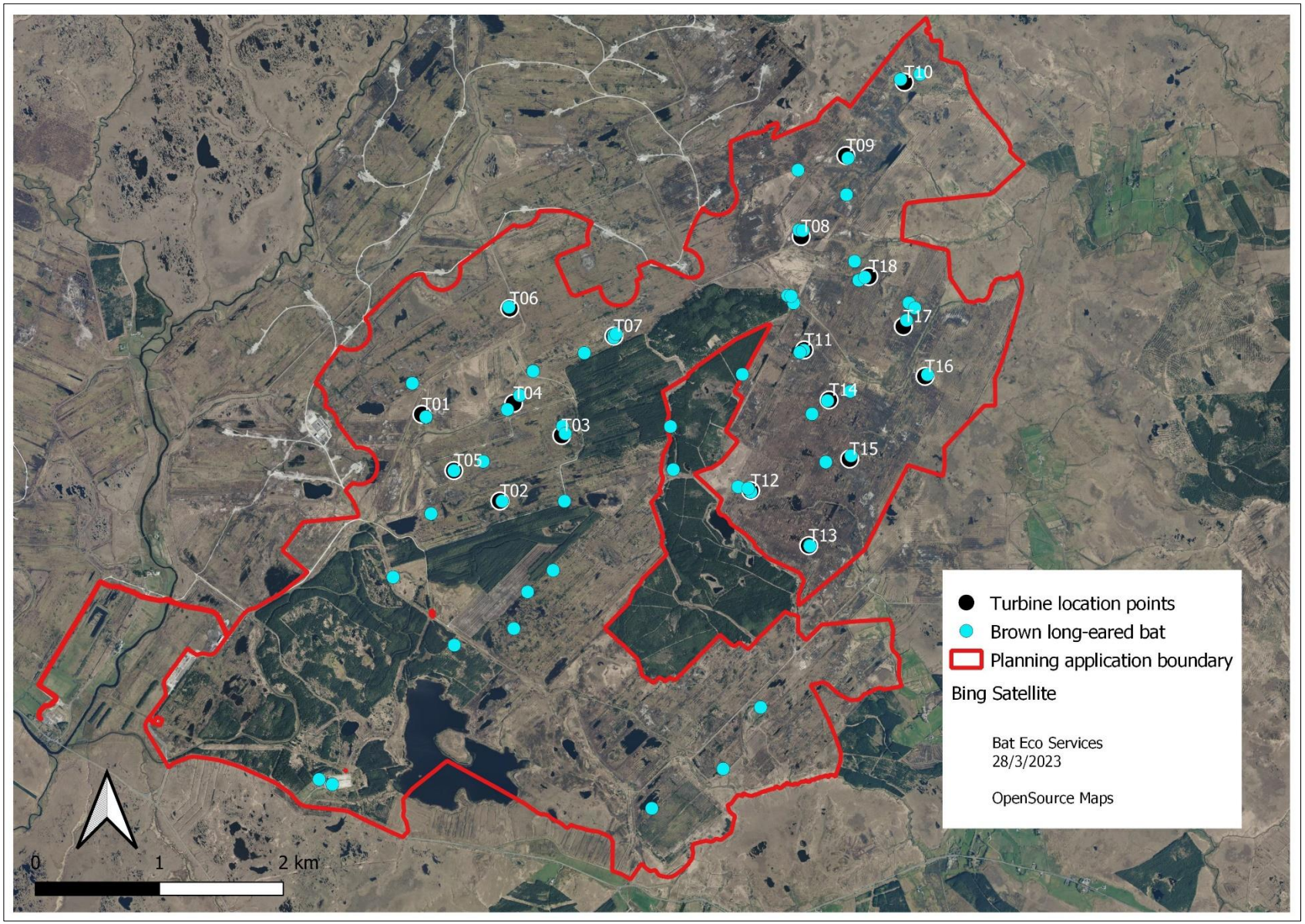


Figure 10h: Brown long-eared bat encounters during 2020 and 2022 bat surveys.

4.3 QGIS Analysis

4.3.1 200m Buffer – Turbine Locations

A 200m buffer was created around each of the proposed turbine locations to determine the habitat types within each zone. While the majority of the habitat within the 200m buffer zones is cutover bog, there is a greater mosaic of habitat present in some turbine locations with “Bat Habitat” present within some zones (e.g. T07). Using this buffer, analysis was undertaken for each individual turbine location.

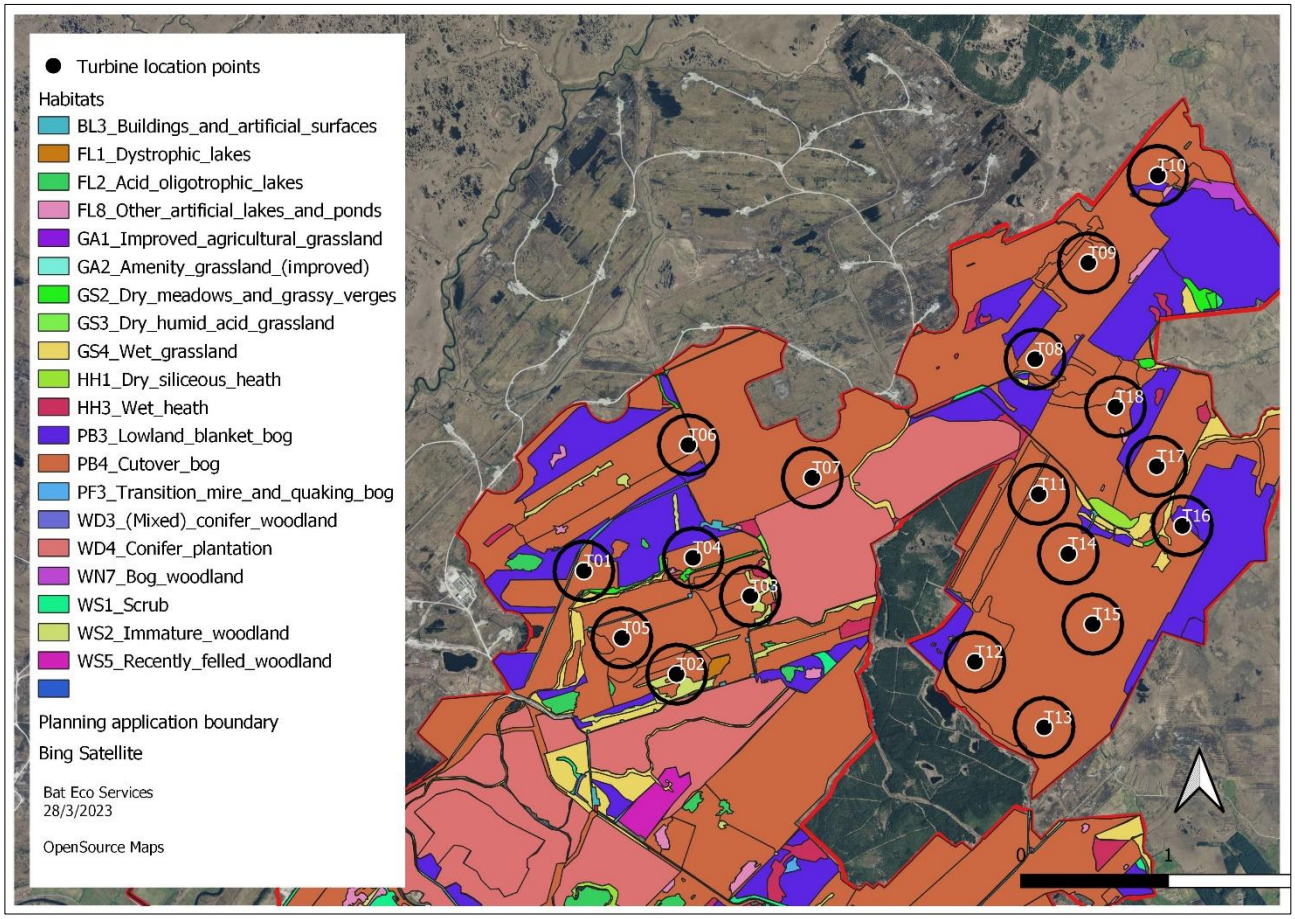


Figure 11a: Habitats present within 200m buffer around each turbine location.

4.3.2 50m Buffer – Bat Encounters

A 50m buffer was created around each of the geo-reference bat encounters to determine the habitat within each and to determine their location in respect of the 200m buffer around the proposed turbine locations. Using this buffer, analysis was undertaken for each individual turbine location. This is summarised in a table prepared for Section 5.

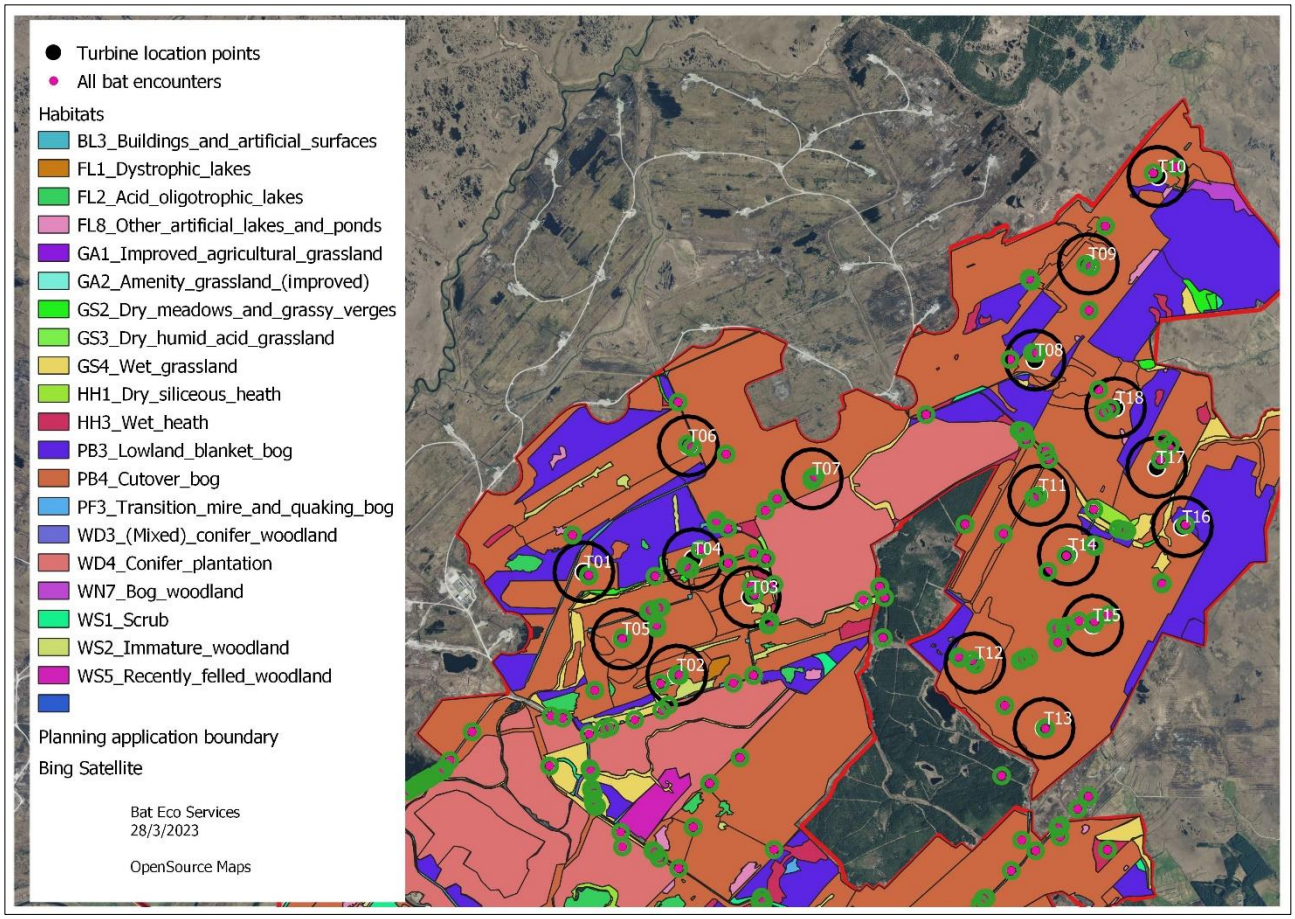


Figure 11b: 50m buffer around All bat encounters and their location with respect to the 200m buffer around each turbine location.

4.3.3 Support Infrastructure

The bat data (bat encounters and roosts recorded) was overlaid on the infrastructure plan for the proposed development site. The Natterer's bat maternity roost is located in a large area that is proposed to be a barrow pit (extraction point). Four separate maps have been prepared, two maps showing the location of the bat roosts and two maps showing where the bat encounters are located in relation infrastructure.

All of the roosts recorded are located in areas where infrastructure is proposed while there is a large proportion of the bat encounters located along the existing tracts within the proposed development area. This is a reflection of the accessible areas that were safe to walk during the hours of darkness. However, many of this tracks are proposed to be upgraded as roads as part of the infrastructure for the proposed development site.

There are two large areas of barrow pits are located in vicinity of T6 and T7 (Barrow Pit A) and south of T13 (Barrow Pit B). Both of these areas have the following bat activity:

- Barrow Pit A: soprano pipistrelles, Natterer's bat, Myotis species, Leisler's bat, common pipistrelle, brown long-eared bat. Static 2020 Spring 18 was located in the centre of this area and a low level of bat basses were recorded at this point.
- Barrow Pit B: soprano pipistrelles, Natterer's bat, Daubenton's bat, Leisler's bat, common pipistrelle. Static 2020 Spring 15 and 2020 Summer 20 were located in the centre of this area and a low level of bat basses were recorded at both points.

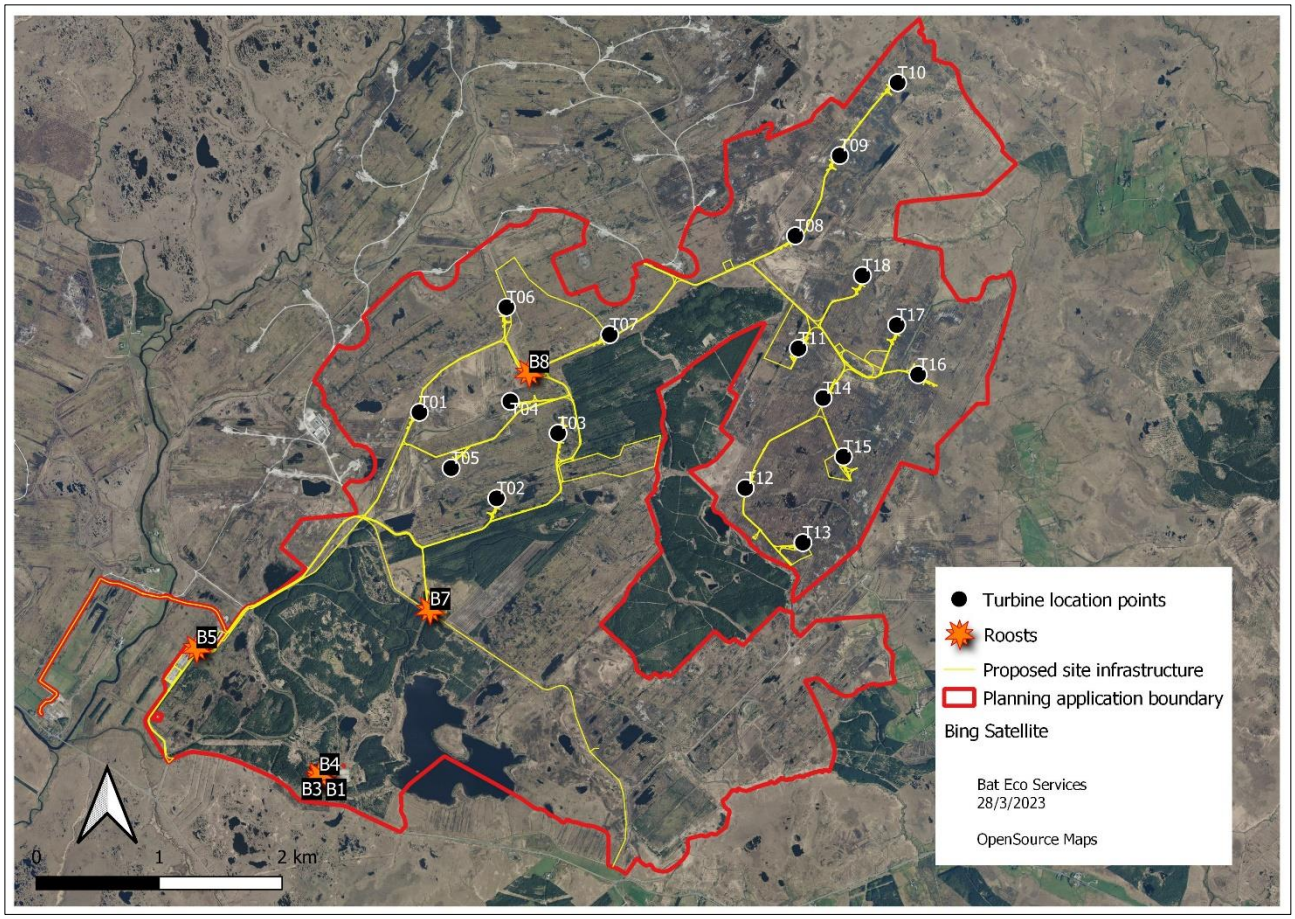


Figure 11c: Location of roosts in relation to infrastructure for the proposed development site.

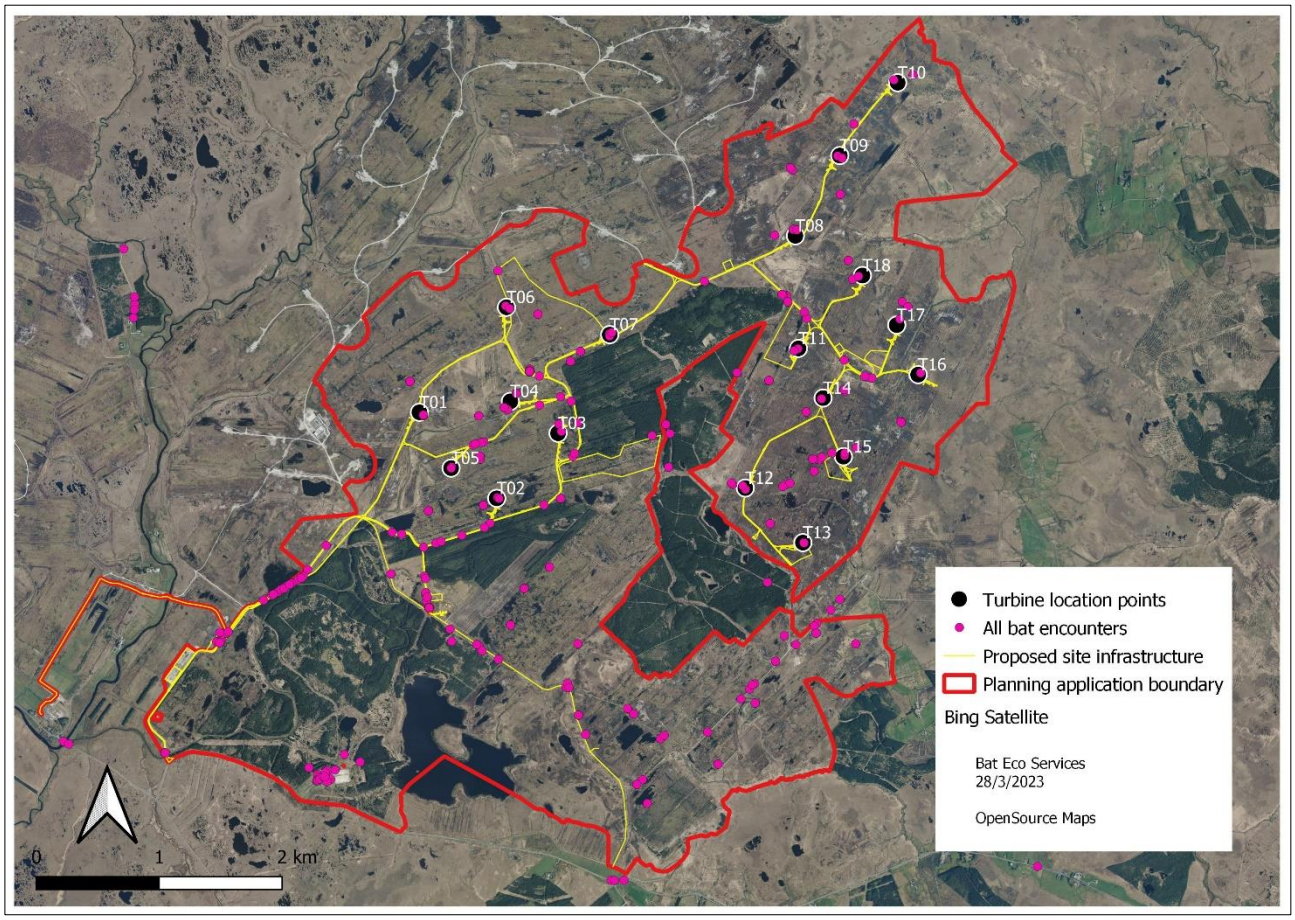


Figure 11d: Location of bat encounters in relation to infrastructure for the proposed development site.

4.4 EcoBat Tool Results 2020 Only

All of the static surveillance results from 2020 were entered into the "Per Night" forms and submitted for analysis using the EcoBat tool. These forms were collated for the three seasonal surveillance periods – Spring 2020, Summer 2020 and Autumn 2020. The 2022 data was not analysed by the EcoBat Tool as the website has been offline for essential maintenance since November 2022 and there is not date reported for when it will be available. However, the 2022 data is compared to the 2020 EcoBat Tool analysis results to provide a comparative analysis for this report.

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 (Table 3, presented earlier in the report):

4.4.1 Spring Surveillance 2020

The following is the data from the EcoBat Tool Analysis:

Bat surveys were conducted at Spring 10, Spring 11, Spring 16, Spring 2, Spring 3, Spring 5, Spring 6, Spring 8, Spring 9, Spring 18, Spring 19, Spring 12, Spring 13, Spring 15, Spring 7, Spring 1, Spring 14, Spring 17, Spring 4, for 10 nights between 2020-05-07 and 2020-05-16, using Wildlife Acoustics static bat detectors. The maximum of passes recorded in a single night was 141 passes, and 8 species were recorded.

From the table below, Spring 16 has a High "Bat Activity Category" for Natterer's bats and *Myotis* species. This static is located along the commuting path for this species of bat from a known maternity roost. Spring 2, Spring 6 and Spring 19 have a Moderate to High "Bat Activity Category" for *Myotis* species, common pipistrelle and Leisler's bats respectively. However, Spring 19 highlights Leisler's bat activity as this species is a High Risk species in relation to wind turbines. This is the same for common pipistrelle at Spring 6.

Table 9a: Results of EcoBat Tool for Spring Surveillance.

Note: *Myotis nattereri* = Natterer's bat; *Myotis daubentonii* = Daubenton's bat; whiskered bat = *Myotis mystacinus; Nyctalus leisleri* = Leisler's bat; *Pipistrellus pipistrellus* = common pipistrelle; *Pipistrellus pygmaeus* = soprano pipistrelle and *Plecotus auritus* = brown long-eared bat.

Yellow = High, Orange = Moderate to High, Green = Moderate

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	*Myotis nattereri*	0	4	1	0	0	67	M to H
Spring 1	*Pipistrellus pygmaeus*	0	0	0	1	0	34	L to M
Spring 2	*Myotis*	0	2	0	1	0	64	M to H
Spring 2	*Myotis daubentonii*	0	0	1	0	0	45	Moderate
Spring 2	*Myotis nattereri*	0	0	1	3	0	34	L to M
Spring 2	*Pipistrellus pipistrellus*	0	0	0	1	0	34	L to M
Spring 2	*Pipistrellus pygmaeus*	0	0	0	1	0	34	L to M
Spring 3	*Myotis*	0	0	1	1	0	43	Moderate
Spring 3	*Myotis daubentonii*	0	0	1	2	0	34	L to M
Spring 3	*Myotis nattereri*	0	0	0	1	0	34	L to M
Spring 3	*Nyctalus leisleri*	0	0	2	1	0	45	Moderate
Spring 3	*Pipistrellus pipistrellus*	0	0	0	1	0	34	L to M
Spring 3	*Pipistrellus pygmaeus*	0	0	1	2	0	34	L to M
Spring 4	*Pipistrellus pipistrellus*	0	0	0	1	0	34	L to M
Spring 5	*Myotis*	0	1	0	1	0	51	Moderate
Spring 5	*Myotis daubentonii*	0	0	3	0	0	45	Moderate
Spring 5	*Myotis nattereri*	0	0	0	1	0	34	L to M
Spring 5	*Nyctalus leisleri*	0	0	0	1	0	34	L to M
Spring 5	*Pipistrellus pipistrellus*	0	1	0	2	0	34	L to M
Spring 5	*Pipistrellus pygmaeus*	0	0	0	2	0	34	L to M
Spring 6	*Myotis*	0	0	2	0	0	49	Moderate
Spring 6	*Myotis daubentonii*	0	0	0	0	4	10	Low
Spring 6	*Myotis mystacinus*	0	0	0	0	1	10	Low
Spring 6	*Myotis nattereri*	0	0	0	1	2	10	Low
Spring 6	*Nyctalus leisleri*	1	0	1	1	0	45	Moderate
Spring 6	*Pipistrellus pipistrellus*	0	4	0	0	0	66	M to H
Spring 6	*Pipistrellus pygmaeus*	0	4	1	3	0	53	Moderate
Spring 6	*Plecotus auritus*	0	0	0	0	1	10	Low
Spring 7	*Myotis daubentonii*	0	0	0	0	1	10	Low
Spring 7	*Nyctalus leisleri*	0	1	0	0	1	36	L to M
Spring 7	*Pipistrellus pipistrellus*	0	0	0	1	2	10	Low
Spring 7	*Pipistrellus pygmaeus*	0	0	2	0	1	45	Moderate
Spring 8	*Myotis*	0	0	0	0	1	10	Low
Spring 8	*Myotis daubentonii*	0	0	0	0	2	10	Low
Spring 8	*Nyctalus leisleri*	0	0	1	1	1	34	L to M
Spring 8	*Pipistrellus pipistrellus*	0	0	1	0	3	10	Low
Spring 8	*Pipistrellus pygmaeus*	0	0	0	1	2	10	Low

Spring 9	*Myotis*	0	0	0	0	1	10	Low
Spring 9	*Myotis daubentonii*	0	0	0	1	1	22	L to M
Spring 9	*Nyctalus leisleri*	0	0	1	0	0	52	Moderate
Spring 9	*Pipistrellus pipistrellus*	1	1	1	1	1	45	Moderate
Spring 9	*Pipistrellus pygmaeus*	0	1	0	0	1	41	Moderate
Spring 10	*Myotis*	0	0	0	1	0	34	L to M
Spring 10	*Myotis daubentonii*	0	0	0	0	1	10	Low
Spring 10	*Myotis nattereri*	0	0	0	1	1	22	L to M
Spring 10	*Nyctalus leisleri*	0	1	0	2	0	34	L to M
Spring 10	*Pipistrellus pipistrellus*	0	0	1	3	1	34	L to M
Spring 10	*Pipistrellus pygmaeus*	0	0	0	1	2	10	Low
Spring 10	*Plecotus auritus*	0	0	0	0	1	10	Low
Spring 11	*Myotis*	0	0	1	0	0	45	Moderate
Spring 11	*Myotis daubentonii*	0	0	0	0	1	10	Low
Spring 11	*Myotis mystacinus*	0	0	0	0	1	10	Low
Spring 11	*Nyctalus leisleri*	0	0	0	0	1	10	Low
Spring 11	*Pipistrellus pipistrellus*	0	0	2	1	2	34	L to M
Spring 11	*Pipistrellus pygmaeus*	0	0	0	1	1	22	L to M
Spring 11	*Plecotus auritus*	0	0	0	0	1	10	Low
Spring 12	*Myotis daubentonii*	0	0	0	0	2	10	Low
Spring 12	*Myotis nattereri*	0	0	1	1	2	22	L to M
Spring 12	*Nyctalus leisleri*	0	1	3	0	1	57	Moderate
Spring 12	*Pipistrellus pipistrellus*	1	1	1	3	0	40	Moderate
Spring 12	*Pipistrellus pygmaeus*	0	1	2	1	1	52	Moderate
Spring 12	*Plecotus auritus*	0	0	1	1	2	22	L to M
Spring 13	*Myotis daubentonii*	0	0	0	0	1	10	Low
Spring 13	*Myotis nattereri*	0	0	0	0	1	10	Low
Spring 13	*Nyctalus leisleri*	0	0	0	1	0	34	L to M
Spring 13	*Pipistrellus pipistrellus*	0	0	0	0	2	10	Low
Spring 13	*Plecotus auritus*	0	0	0	0	1	10	Low
Spring 14	*Myotis nattereri*	0	0	0	0	1	10	Low
Spring 14	*Nyctalus leisleri*	0	0	1	0	0	52	Moderate
Spring 14	*Pipistrellus pipistrellus*	0	0	0	2	0	34	L to M
Spring 14	*Pipistrellus pygmaeus*	0	0	0	1	1	22	L to M
Spring 15	*Myotis daubentonii*	0	0	0	1	1	22	L to M
Spring 15	*Myotis nattereri*	0	0	0	1	2	10	Low
Spring 15	*Nyctalus leisleri*	0	0	1	0	2	10	Low
Spring 15	*Pipistrellus pipistrellus*	0	0	1	0	2	10	Low
Spring 15	*Pipistrellus pygmaeus*	0	0	0	0	3	10	Low
Spring 16	*Myotis*	4	0	0	0	0	89	High
Spring 16	*Myotis daubentonii*	0	0	0	0	1	10	Low
Spring 16	*Myotis nattereri*	3	1	0	0	0	86	High
Spring 16	*Nyctalus leisleri*	0	1	0	0	1	42	Moderate
Spring 16	*Pipistrellus pipistrellus*	0	0	0	0	1	10	Low
Spring 16	*Pipistrellus pygmaeus*	0	1	0	0	2	10	Low
Spring 16	*Plecotus auritus*	0	0	0	0	1	10	Low

Spring 17	*Myotis nattereri*	0	0	0	0	4	10	Low
Spring 17	*Pipistrellus pipistrellus*	0	0	0	0	6	10	Low
Spring 17	*Pipistrellus pygmaeus*	0	0	0	0	2	10	Low
Spring 18	*Myotis*	0	0	0	0	1	9	Low
Spring 18	*Pipistrellus pygmaeus*	0	0	0	0	4	9	Low
Spring 19	*Myotis*	0	0	1	0	1	26	L to M
Spring 19	*Myotis daubentonii*	0	0	0	0	1	9	Low
Spring 19	*Myotis mystacinus*	0	0	0	0	1	9	Low
Spring 19	*Myotis nattereri*	0	0	0	1	1	21	L to M
Spring 19	*Nyctalus leisleri*	0	1	0	0	0	79	M to H
Spring 19	*Pipistrellus pipistrellus*	0	0	1	1	1	32	L to M
Spring 19	*Pipistrellus pygmaeus*	0	1	0	0	3	9	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.

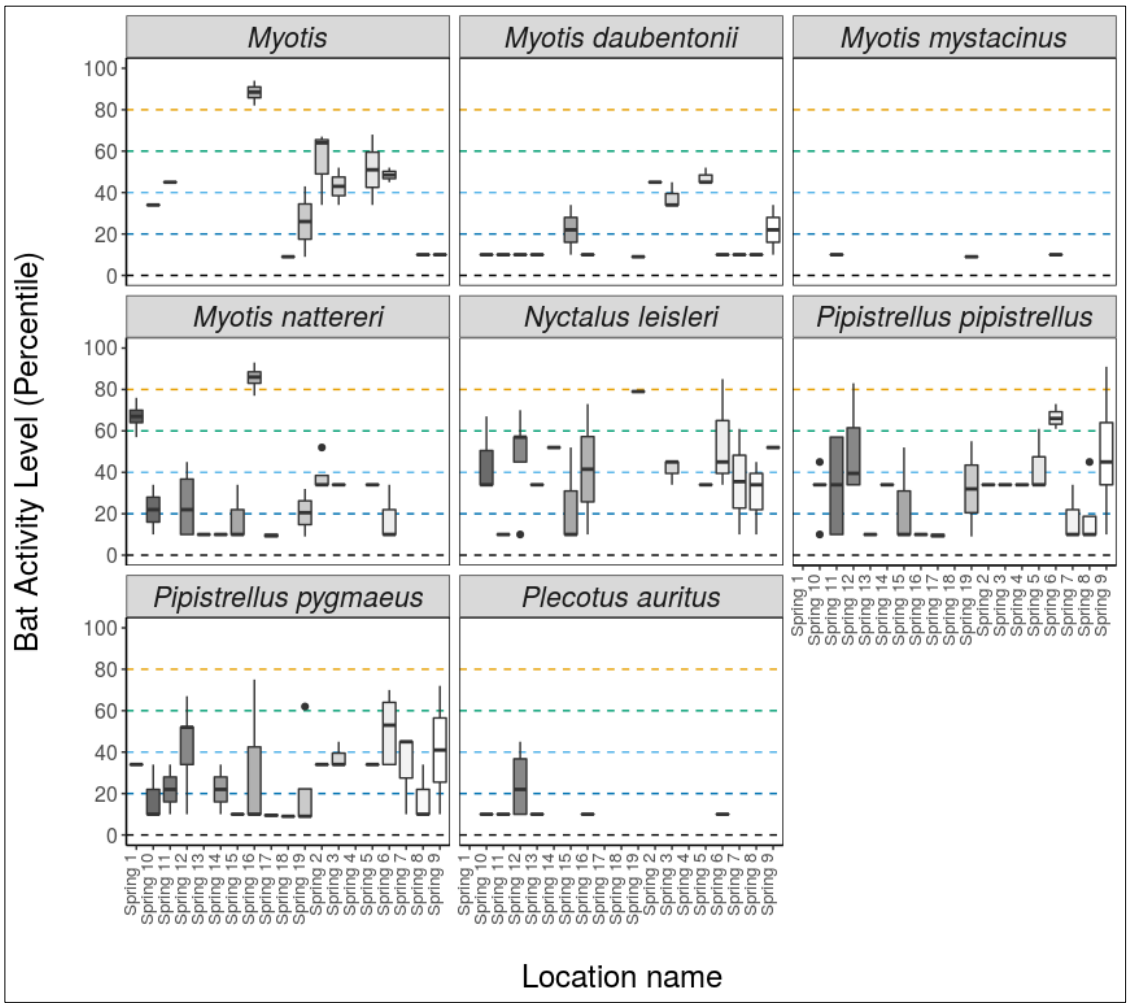


Figure 12a. Differences in activity between static detector locations, split by species and location. The centre line indicates the median activity level whereas the box represents the interquartile range (the spread of the middle 50% of nights of activity).

4.4.2 Summer Surveillance 2020

The following is the data from the EcoBat Tool Analysis:

Bat surveys were conducted at Summer 1, Summer 10, Summer 6, Summer 7, Summer 5, Summer 8, Summer 2, Summer 3, Summer 9, Summer 12, Summer 13, Summer 16, Summer 17, Summer 19, Summer 18, Summer 11, Summer 20, for 23 nights between 2020-06-11 and 2020-07-07, using Wildlife Acoustics static bat detectors. The maximum of passes recorded in a single night was 294 passes, and 8 species were recorded.

From the table below, Summer 16 has a High "Bat Activity Category" for common pipistrelle and soprano pipistrelle, both considered to be High Risk bat species in relation to wind turbones. In addition, Summer 1 and Summer 10 have a Moderate to High "Bat Activity Category" for these two bat species. All three static locations are associated with woodland edge, a preferred habitat for foraging and commuting by these bat species.

Table 9b: Results of EcoBat Tool for Summer Surveillance.

Note: *Myotis nattereri* = Natterer's bat; *Myotis daubentonii* = Daubenton's bat; whiskered bat = *Myotis mystacinus; Nyctalus leisleri* = Leisler's bat; *Pipistrellus pipistrellus* = common pipistrelle; *Pipistrellus pygmaeus* = soprano pipistrelle and *Plecotus auritus* = brown long-eared bat.

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	1	1	1	38	L to M
Summer 1	*Myotis daubentonii*	0	0	0	1	4	6	Low
Summer 1	*Myotis nattereri*	0	0	0	1	1	17	Low
Summer 1	*Nyctalus leisleri*	0	1	0	1	1	27	L to M
Summer 1	*Pipistrellus pipistrellus*	3	5	1	0	0	74	M to H
Summer 1	*Pipistrellus pygmaeus*	1	7	1	1	0	67	M to H
Summer 1	*Plecotus auritus*	0	0	0	1	1	17	Low
Summer 2	*Nyctalus leisleri*	0	0	1	1	1	38	L to M
Summer 2	*Pipistrellus pipistrellus*	0	1	2	4	1	38	L to M
Summer 2	*Pipistrellus pygmaeus*	0	2	2	1	1	52	Moderate
Summer 3	*Nyctalus leisleri*	0	0	0	1	1	17	Low
Summer 3	*Pipistrellus pipistrellus*	0	0	2	3	2	38	L to M
Summer 3	*Pipistrellus pygmaeus*	0	0	2	2	2	33	L to M
Summer 5	*Myotis daubentonii*	0	0	0	0	1	6	Low
Summer 5	*Nyctalus leisleri*	0	0	0	1	2	6	Low
Summer 5	*Pipistrellus pipistrellus*	0	0	3	1	2	37	L to M
Summer 5	*Pipistrellus pygmaeus*	0	0	1	4	2	27	L to M
Summer 5	*Plecotus auritus*	0	0	0	0	1	6	Low
Summer 6	*Myotis*	0	0	0	1	1	17	Low
Summer 6	*Myotis daubentonii*	0	0	0	0	1	6	Low
Summer 6	*Nyctalus leisleri*	0	0	0	0	1	6	Low
Summer 6	*Pipistrellus pipistrellus*	0	3	1	4	0	47	Moderate
Summer 6	*Pipistrellus pygmaeus*	0	3	1	4	0	42	Moderate
Summer 7	*Myotis*	0	0	0	0	2	6	Low
Summer 7	*Myotis nattereri*	0	0	0	0	1	6	Low
Summer 7	*Nyctalus leisleri*	0	0	0	0	2	6	Low

Summer 7	*Pipistrellus pipistrellus*	0	3	2	3	1	46	Moderate
Summer 7	*Pipistrellus pygmaeus*	0	0	0	4	3	27	L to M
Summer 8	*Myotis daubentonii*	0	0	0	0	2	6	Low
Summer 8	*Myotis mystacinus*	0	0	0	0	1	6	Low
Summer 8	*Nyctalus leisleri*	0	0	0	1	2	6	Low
Summer 8	*Pipistrellus pipistrellus*	0	3	2	3	1	46	Moderate
Summer 8	*Pipistrellus pygmaeus*	0	2	4	0	2	46	Moderate
Summer 8	*Plecotus auritus*	0	0	1	0	0	46	Moderate
Summer 9	*Nyctalus leisleri*	0	0	0	3	0	27	L to M
Summer 9	*Pipistrellus pipistrellus*	0	3	3	3	2	46	Moderate
Summer 9	*Pipistrellus pygmaeus*	0	0	1	2	5	6	Low
Summer 10	*Myotis*	0	0	1	3	1	38	L to M
Summer 10	*Myotis daubentonii*	0	0	0	2	3	6	Low
Summer 10	*Myotis nattereri*	0	0	0	1	1	17	Low
Summer 10	*Nyctalus leisleri*	0	0	1	2	1	38	L to M
Summer 10	*Pipistrellus pipistrellus*	2	6	2	0	1	74	M to H
Summer 10	*Pipistrellus pygmaeus*	1	6	1	3	1	60	M to H
Summer 11	*Myotis daubentonii*	0	0	0	0	1	7	Low
Summer 11	*Myotis nattereri*	0	0	0	1	1	17	Low
Summer 11	*Pipistrellus pipistrellus*	0	0	0	1	2	7	Low
Summer 11	*Pipistrellus pygmaeus*	0	0	2	1	1	37	L to M
Summer 11	*Plecotus auritus*	0	0	0	0	1	7	Low
Summer 12	*Myotis*	0	0	1	0	0	46	Moderate
Summer 12	*Myotis daubentonii*	0	0	0	0	2	7	Low
Summer 12	*Myotis nattereri*	0	0	0	1	1	17	Low
Summer 12	*Nyctalus leisleri*	0	0	0	0	1	7	Low
Summer 12	*Pipistrellus pipistrellus*	0	0	2	0	1	46	Moderate
Summer 12	*Pipistrellus pygmaeus*	0	2	0	1	1	47	Moderate
Summer 13	*Myotis*	0	0	0	2	0	33	L to M
Summer 13	*Myotis daubentonii*	0	0	0	2	2	17	Low
Summer 13	*Myotis nattereri*	0	0	0	1	1	17	Low
Summer 13	*Pipistrellus pipistrellus*	0	2	2	0	1	57	Moderate
Summer 13	*Pipistrellus pygmaeus*	0	2	2	1	0	57	Moderate
Summer 16	*Myotis*	0	1	0	2	0	38	L to M
Summer 16	*Myotis daubentonii*	0	1	0	1	3	7	Low
Summer 16	*Myotis mystacinus*	0	0	0	0	1	7	Low
Summer 16	*Myotis nattereri*	0	1	1	1	0	46	Moderate
Summer 16	*Nyctalus leisleri*	0	0	0	0	1	7	Low
Summer 16	*Pipistrellus pipistrellus*	4	0	0	0	1	95	High
Summer 16	*Pipistrellus pygmaeus*	5	0	2	1	0	89	High
Summer 16	*Plecotus auritus*	0	0	0	0	1	7	Low
Summer 17	*Myotis daubentonii*	0	0	3	0	2	46	Moderate
Summer 17	*Myotis mystacinus*	0	0	0	0	1	7	Low
Summer 17	*Myotis nattereri*	0	0	0	0	2	7	Low
Summer 17	*Nyctalus leisleri*	0	0	1	1	2	17	Low
Summer 17	*Pipistrellus pipistrellus*	0	1	1	1	1	42	Moderate
Summer 17	*Pipistrellus pygmaeus*	0	0	1	1	2	17	Low
Summer 18	*Myotis daubentonii*	0	0	0	1	2	7	Low
Summer 18	*Myotis nattereri*	0	0	0	0	1	7	Low

Summer 18	*Nyctalus leisleri*	0	0	1	0	2	7	Low
Summer 18	*Pipistrellus pipistrellus*	0	0	0	3	0	38	L to M
Summer 18	*Pipistrellus pygmaeus*	0	1	3	1	1	49	Moderate
Summer 19	*Myotis daubentonii*	0	0	0	0	1	7	Low
Summer 19	*Nyctalus leisleri*	0	0	0	0	2	7	Low
Summer 19	*Pipistrellus pipistrellus*	0	0	0	1	1	17	Low
Summer 19	*Pipistrellus pygmaeus*	0	0	1	1	1	27	L to M
Summer 19	*Plecotus auritus*	0	0	0	1	1	17	Low
Summer 20	*Pipistrellus pipistrellus*	0	0	0	1	1	17	Low
Summer 20	*Pipistrellus pygmaeus*	0	0	0	1	1	17	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. During the Summer Surveillance, there a more consistent bat activity for common pipistrelles and soprano pipistrelles compared to the Spring Surveillance.

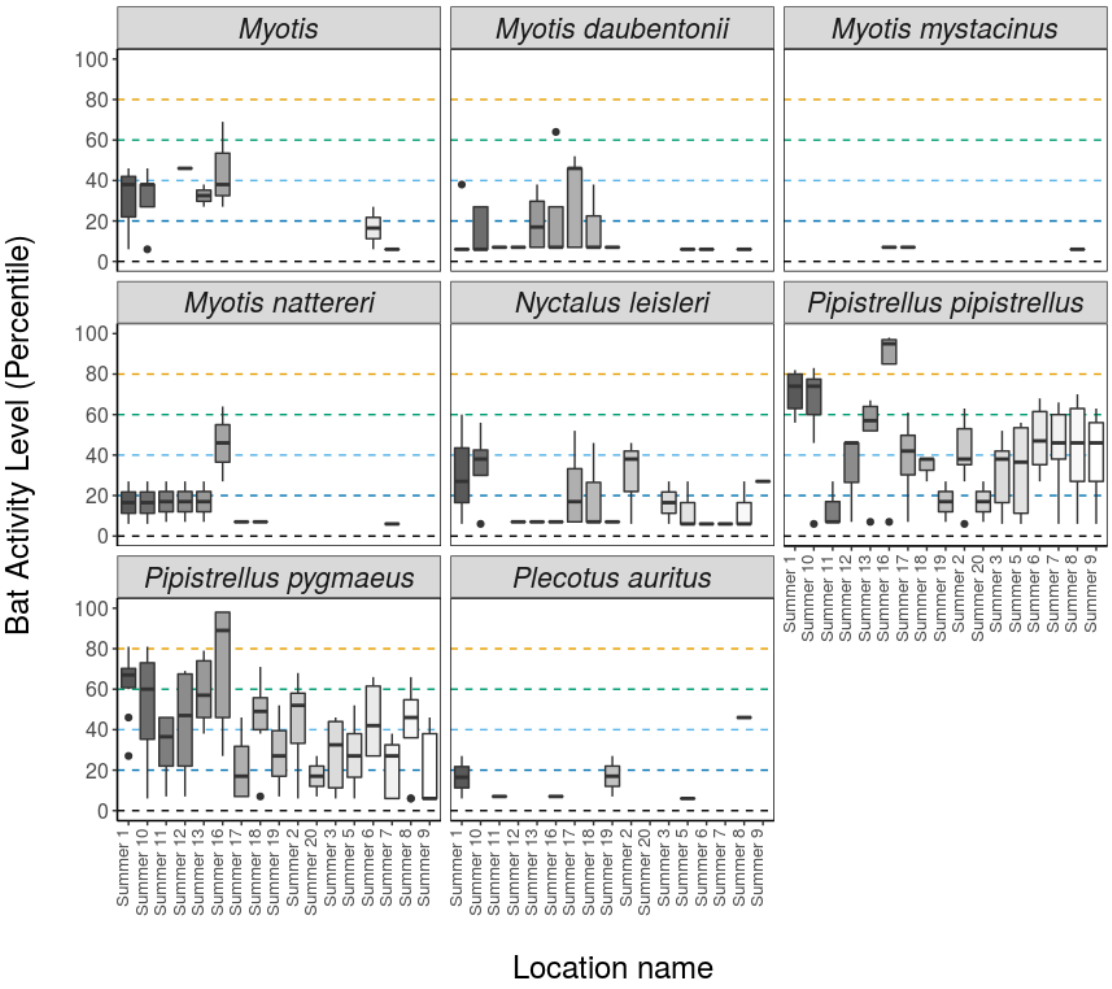


Figure 12b. Differences in activity between static detector locations, split by species and location. The centre line indicates the median activity level whereas the box represents the interquartile range (the spread of the middle 50% of nights of activity)

4.4.3 Autumn Surveillance 2020

The following is the data from the EcoBat Tool Analysis:

Bat surveys were conducted at Autumn 7, Autumn 8, Autumn 9, Autumn 1, Autumn 4, Autumn 5, Autumn 6, Autumn 2, Autumn 3, Autumn 17, Autumn 18, Autumn 15, Autumn 16, Autumn 20, Autumn 14, Autumn 13, Autumn 19, Autumn 10, Autumn 11, for 20 nights between 2020-09-06 and 2020-09-28, using Wildlife Acoustics static bat detectors. The maximum of passes recorded in a single night was 283 passes, and 8 species were recorded.

From the table below, Autumn 10 has a High "Bat Activity Category" for common pipistrelle and soprano pipistrelle. Both of these bat species are a High Risk species in relation to wind turbines. There is a higher number of static location with Moderate to High "Bat Activity Category" for common pipistrelles: Autumn 3, 5, 7, 8, 9 and 14 compared to the other surveillance periods. This is the same for soprano pipistrelles: Autumn 7, 14, 15, 17 and 19. There is also a Moderate to High "Bat Activity Category" for *Myotis* spp. and Natterer's bat (both a Low Risk classification in relation to wind turbines) at statics Autumn 15, 16, 17 and 18. This higher level maybe the result of greater movement of individual bats at this time of the year when roosts are breaking up in preparation for the swarming/mating season.

Table 9c: Results of EcoBat Tool for Autumn Surveillance.

Note: *Myotis nattereri* = Natterer's bat; *Myotis daubentonii* = Daubenton's bat; whiskered bat = *Myotis mystacinus; Nyctalus leisleri* = Leisler's bat; *Pipistrellus pipistrellus* = common pipistrelle; *Pipistrellus pygmaeus* = soprano pipistrelle and *Plecotus auritus* = brown long-eared bat.

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	1	0	0	43	Moderate
Autumn 1	*Myotis daubentonii*	0	0	0	0	2	20	Low
Autumn 1	*Nyctalus leisleri*	0	0	0	0	3	20	Low
Autumn 1	*Pipistrellus pipistrellus*	0	2	2	0	2	49	Moderate
Autumn 1	*Pipistrellus pygmaeus*	0	2	1	0	1	53	Moderate
Autumn 1	*Plecotus auritus*	0	0	0	0	1	20	Low
Autumn 2	*Pipistrellus pipistrellus*	0	2	3	0	0	43	Moderate
Autumn 2	*Pipistrellus pygmaeus*	0	2	0	0	3	20	Low
Autumn 3	*Pipistrellus pipistrellus*	1	2	2	0	0	67	M to H
Autumn 3	*Pipistrellus pygmaeus*	0	2	1	0	1	55	Moderate
Autumn 4	*Myotis*	0	0	1	0	2	20	Low
Autumn 4	*Myotis daubentonii*	0	0	1	0	1	32	L to M
Autumn 4	*Pipistrellus pipistrellus*	0	1	3	0	1	54	Moderate
Autumn 4	*Pipistrellus pygmaeus*	0	1	1	0	1	54	Moderate
Autumn 4	*Plecotus auritus*	0	0	0	0	1	20	Low
Autumn 5	*Myotis*	0	0	0	0	1	20	Low
Autumn 5	*Myotis daubentonii*	0	0	0	0	1	20	Low
Autumn 5	*Myotis nattereri*	0	0	0	0	2	20	Low
Autumn 5	*Nyctalus leisleri*	0	0	0	0	2	20	Low
Autumn 5	*Pipistrellus pipistrellus*	0	3	1	0	0	62	M to H
Autumn 5	*Pipistrellus pygmaeus*	0	2	1	0	2	54	Moderate

Autumn 6	*Myotis*	0	0	1	0	1	32	L to M
Autumn 6	*Myotis daubentonii*	0	0	0	0	2	20	Low
Autumn 6	*Nyctalus leisleri*	0	0	0	0	2	20	Low
Autumn 6	*Pipistrellus pipistrellus*	0	2	2	0	2	49	Moderate
Autumn 7	*Myotis*	0	3	2	0	1	58	Moderate
Autumn 7	*Myotis daubentonii*	0	1	0	0	3	20	Low
Autumn 7	*Myotis nattereri*	0	0	1	0	3	20	Low
Autumn 7	*Nyctalus leisleri*	0	0	1	0	2	20	Low
Autumn 7	*Pipistrellus pipistrellus*	2	3	0	0	2	67	M to H
Autumn 7	*Pipistrellus pygmaeus*	2	3	0	0	1	71	M to H
Autumn 7	*Plecotus auritus*	0	0	1	0	2	20	Low
Autumn 8	*Myotis*	0	3	2	0	0	62	M to H
Autumn 8	*Myotis daubentonii*	0	0	1	0	1	32	L to M
Autumn 8	*Myotis nattereri*	0	2	1	0	3	37	L to M
Autumn 8	*Pipistrellus pipistrellus*	1	2	2	0	0	67	M to H
Autumn 8	*Pipistrellus pygmaeus*	0	2	2	0	1	54	Moderate
Autumn 9	*Myotis*	0	0	4	0	2	43	Moderate
Autumn 9	*Myotis daubentonii*	0	0	0	0	2	20	Low
Autumn 9	*Nyctalus leisleri*	0	0	0	0	1	20	Low
Autumn 9	*Pipistrellus pipistrellus*	1	3	0	0	2	71	M to H
Autumn 9	*Pipistrellus pygmaeus*	0	2	1	0	1	57	Moderate
Autumn 9	*Plecotus auritus*	0	0	0	0	3	20	Low
Autumn 10	*Myotis daubentonii*	0	0	0	1	0	20	Low
Autumn 10	*Pipistrellus pipistrellus*	2	0	1	0	0	83	High
Autumn 10	*Pipistrellus pygmaeus*	4	1	2	0	0	90	High
Autumn 11	*Myotis nattereri*	0	0	1	0	0	56	Moderate
Autumn 11	*Pipistrellus pipistrellus*	0	0	0	1	0	20	Low
Autumn 11	*Pipistrellus pygmaeus*	0	0	2	1	0	56	Moderate
Autumn 11	*Plecotus auritus*	0	0	3	2	0	44	Moderate
Autumn 13	*Myotis daubentonii*	0	0	2	1	0	44	Moderate
Autumn 13	*Myotis nattereri*	0	1	2	3	0	32	L to M
Autumn 13	*Nyctalus leisleri*	0	0	1	1	0	38	L to M
Autumn 13	*Pipistrellus pipistrellus*	0	0	0	2	0	20	Low
Autumn 13	*Pipistrellus pygmaeus*	0	1	1	3	0	20	Low
Autumn 13	*Plecotus auritus*	0	0	2	3	0	20	Low
Autumn 14	*Myotis*	0	0	0	1	0	20	Low
Autumn 14	*Myotis daubentonii*	0	0	3	4	0	20	Low
Autumn 14	*Myotis nattereri*	0	0	2	3	0	20	Low
Autumn 14	*Nyctalus leisleri*	0	0	1	2	0	20	Low
Autumn 14	*Pipistrellus pipistrellus*	0	0	0	2	0	20	Low
Autumn 14	*Pipistrellus pygmaeus*	3	2	2	2	0	77	M to H
Autumn 14	*Plecotus auritus*	0	0	1	2	0	20	Low
Autumn 15	*Myotis*	0	2	0	0	0	68	M to H
Autumn 15	*Myotis daubentonii*	0	0	1	2	0	20	Low
Autumn 15	*Myotis nattereri*	0	1	2	3	0	32	L to M
Autumn 15	*Nyctalus leisleri*	0	0	1	0	0	44	Moderate

Autumn 15	*Pipistrellus pipistrellus*	0	0	2	1	0	44	Moderate
Autumn 15	*Pipistrellus pygmaeus*	1	2	1	1	0	63	M to H
Autumn 15	*Plecotus auritus*	0	0	1	1	0	32	L to M
Autumn 16	*Myotis*	0	5	1	0	0	66	M to H
Autumn 16	*Myotis daubentonii*	0	0	2	6	0	20	Low
Autumn 16	*Myotis mystacinus*	0	0	0	1	0	20	Low
Autumn 16	*Myotis nattereri*	0	1	7	1	0	44	Moderate
Autumn 16	*Nyctalus leisleri*	0	0	0	1	0	20	Low
Autumn 16	*Pipistrellus pipistrellus*	0	0	2	1	0	56	Moderate
Autumn 16	*Pipistrellus pygmaeus*	3	0	4	0	0	56	Moderate
Autumn 16	*Plecotus auritus*	0	1	3	0	0	56	Moderate
Autumn 17	*Myotis*	0	3	1	1	0	68	M to H
Autumn 17	*Myotis daubentonii*	0	0	1	6	0	20	Low
Autumn 17	*Myotis nattereri*	0	4	2	1	0	63	M to H
Autumn 17	*Nyctalus leisleri*	0	0	0	1	0	20	Low
Autumn 17	*Pipistrellus pipistrellus*	0	2	2	2	0	44	Moderate
Autumn 17	*Pipistrellus pygmaeus*	0	6	1	0	0	63	M to H
Autumn 17	*Plecotus auritus*	0	0	1	2	0	20	Low
Autumn 18	*Myotis*	1	1	0	0	0	74	M to H
Autumn 18	*Myotis daubentonii*	0	0	2	6	0	20	Low
Autumn 18	*Myotis nattereri*	0	4	4	1	0	56	Moderate
Autumn 18	*Nyctalus leisleri*	0	0	0	1	0	20	Low
Autumn 18	*Pipistrellus pipistrellus*	1	1	1	1	0	56	Moderate
Autumn 18	*Pipistrellus pygmaeus*	1	2	2	1	0	56	Moderate
Autumn 18	*Plecotus auritus*	0	0	1	5	0	20	Low
Autumn 19	*Myotis daubentonii*	0	0	0	1	0	20	Low
Autumn 19	*Myotis nattereri*	0	0	1	3	0	20	Low
Autumn 19	*Nyctalus leisleri*	0	0	0	1	0	20	Low
Autumn 19	*Pipistrellus pipistrellus*	0	1	2	0	0	44	Moderate
Autumn 19	*Pipistrellus pygmaeus*	0	3	2	1	0	60	M to H
Autumn 19	*Plecotus auritus*	0	0	0	3	0	20	Low
Autumn 20	*Myotis*	0	0	2	1	0	44	Moderate
Autumn 20	*Myotis nattereri*	0	0	1	2	0	20	Low
Autumn 20	*Pipistrellus pipistrellus*	0	1	1	0	0	58	Moderate
Autumn 20	*Pipistrellus pygmaeus*	0	2	3	1	0	50	Moderate
Autumn 20	*Plecotus auritus*	0	0	4	0	0	44	Moderate

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. During the Autumn Surveillance, there a more consistent bat activity for common pipistrelles and soprano pipistrelles compared to the Spring Surveillance.

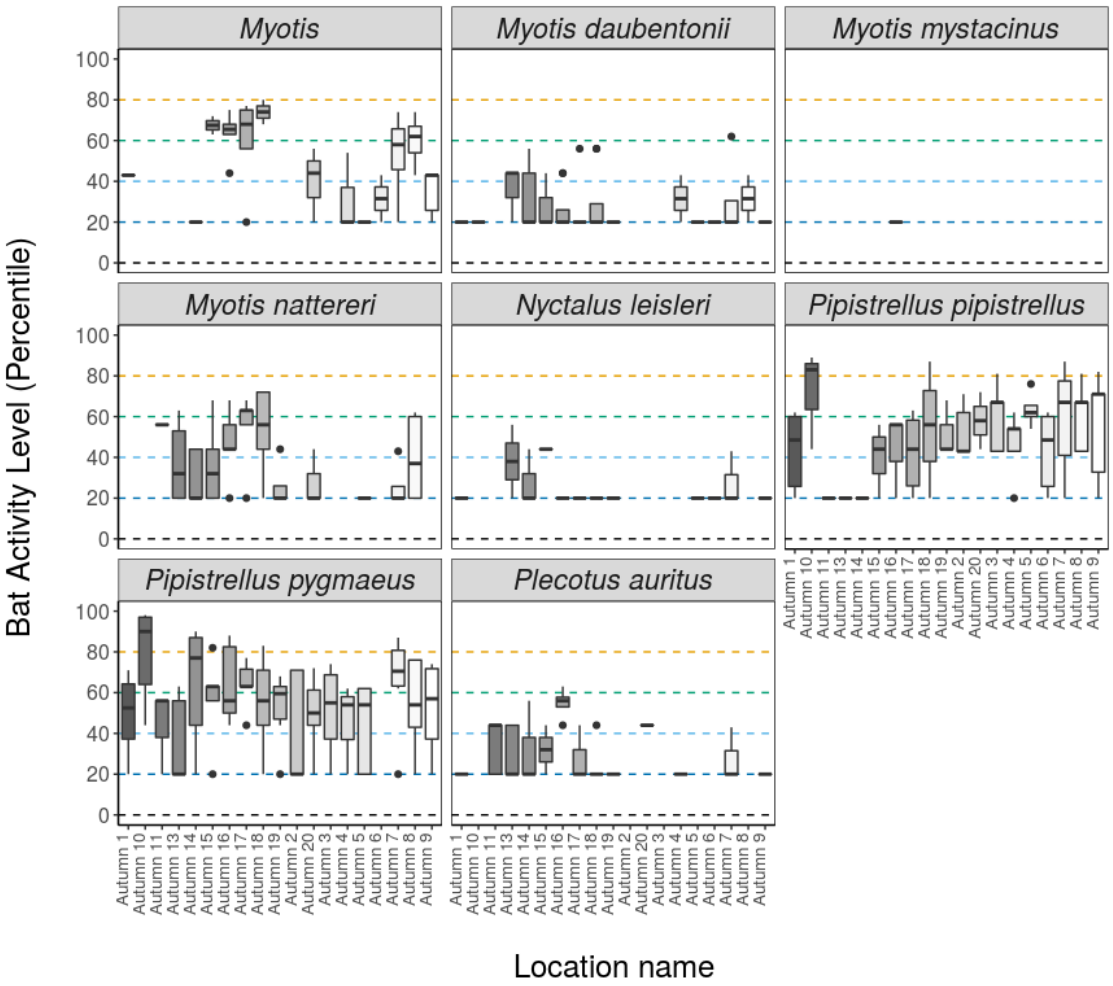


Figure 12c. Differences in activity between static detector locations, split by species and location. The centre line indicates the median activity level whereas the box represents the interquartile range (the spread of the middle 50% of nights of activity)

4.4.4 Summary of EcoBat Results 2020 only

The EcoBat analysis have highlighted a number of static location with High or Moderate to High "Bat Activity Category" (i.e. Yellow and Orange highlighted cells in previous tables) for a number of bat species. In order to allow a clear visualisation of this in relation to locations, the following figure is repeated with these results marked on it.

BLUE SQUARES - Spring Surveillance: Spring 16, 2, 6, 19.

YELLOW SQUARES - Summer Surveillance: Summer 16, 1, 10.

ORANGE SQUARES - Autumn Surveillance: Autumn 10, 3, 5, 7, 8, 9, 14 ,15, 17, 18, 19.

Due to the fact that EcoBat Tool is currently off-line, the results of the statics highlight above will be used to compare to 2022 statics to compare against the results of 2022 static locations.

Please note – some static locations were repeatedly sampled e.g. Autumn 9 is in the same location as Spring 14.

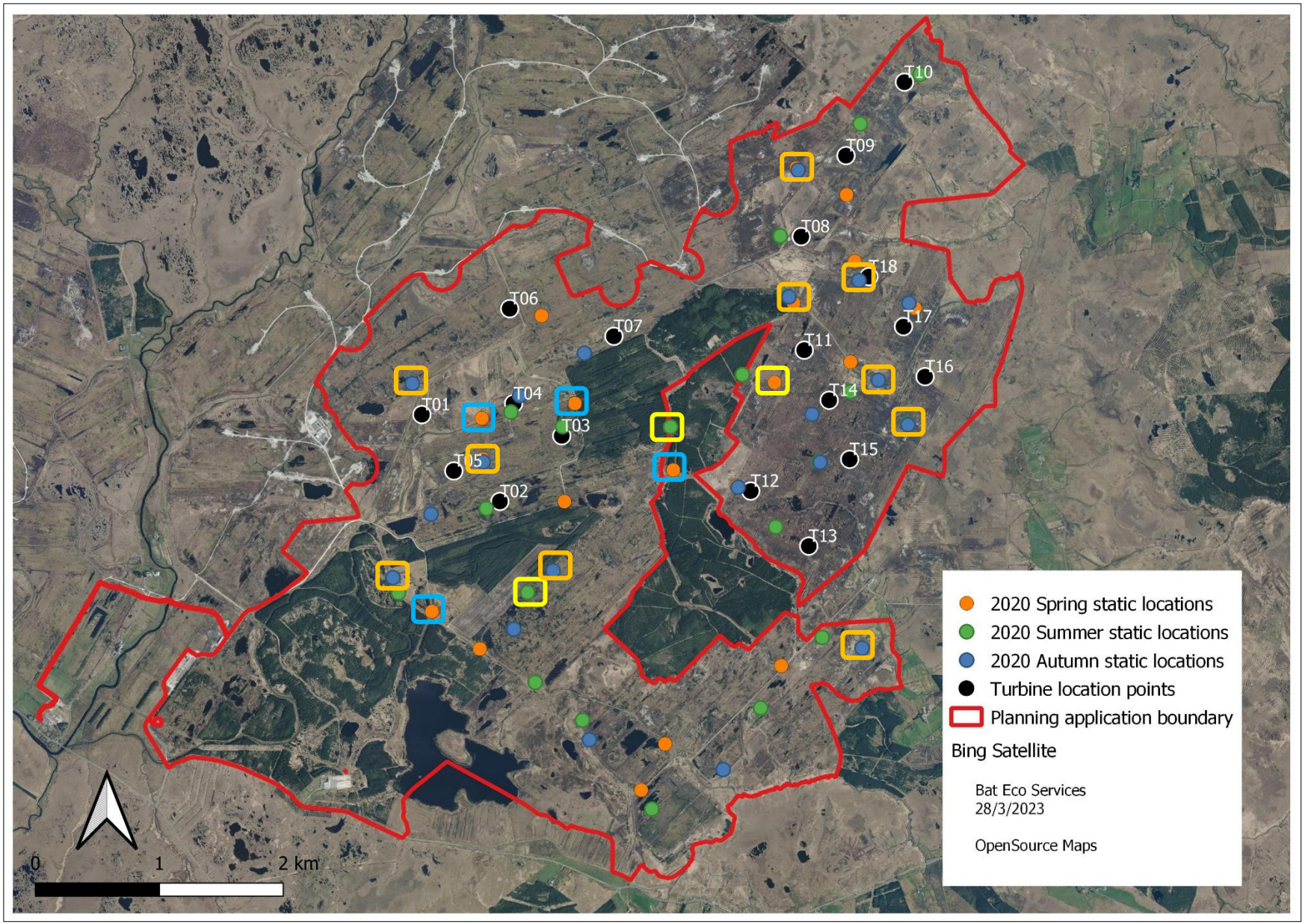


Figure 12d:Static locations with High or Moderate to High “Bat Activity Category” in relation to EcoBat Tool analysis (2020 Static Surveillance).

4.4.5 2020 Static Surveillance versus 2022 Static Surveillance

Using the 2020 Static Surveillance EcoBat Tool results and the analysis presented in Table 7b (2020 Static Surveillance – statics located <500m from proposed turbine locations) and Table 8b (2022 Static Surveillance), this section aims to highlight which proposed turbine locations may have an impact on local bat populations.

Table 10a: Static surveillance results with above average bat passes/night.

RED = High or >20 bat passes/night; PURPLE = High to Moderate or >15 to 20 bat passes/night, GREEN = Moderate or >10 to 15 bat passes/night. Bat species colour coded to reflect highest activity value in relation to High and Moderate to High only value.

Turbine No.	2020 Static Surveillance Table 7b	2020 Static Surveillance EcoBat Tool	2022 Static Surveillance Table 8b	Primary bat species recorded (listed in order of importance)
Turbine 1			**Summer 31, Autumn 22, Summer 33**	**Common pipistrelle, Soprano pipistrelle, Natterer's bat**
Turbine 2		**Summer 13**	**Autumn 23**	**Natterer's bat, Myotis species, Common pipistrelle, Soprano pipistrelle**
Turbine 3			**Autumn 24**	**Soprano pipistrelle, Natterer's bat, Leisler's bat**
Turbine 4	**Autumn 18**	**Spring 2, Summer 12**	**Autumn 25**	**Soprano pipistrelle, Natterer's bat, Myotis species**
Turbine 5	**Autumn 16, Autumn 17**	**Summer 13**		General bat activity
Turbine 6				
Turbine 7			**Autumn 26**	**Soprano pipistrelle, Common pipistrelle**
Turbine 8	**Autumn 7**	**Summer 9, Autumn 7**		**Common pipistrelle, Soprano pipistrelle**
Turbine 9		**Spring 14. Summer 7**	**Autumn 28**	**Common pipistrelle, Soprano pipistrelle**
Turbine 10		**Summer 8**		General bat activity
Turbine 11	**Spring 9, Spring 12, Autumn 7**	**Spring 12, Summer 6, Autumn 7**	**Autumn 29**	**Common pipistrelle, Soprano pipistrelle**
Turbine 12	***Spring 6***	**Summer 10, Spring 7, Summer 2, Autumn 1**		**Common pipistrelle, Soprano pipistrelle**
Turbine 13		**Summer 2**	**Autumn 30**	**Soprano pipistrelle, Common pipistrelle**
Turbine 14	**Spring 9**	**Spring 9, Autumn 5, Autumn 4, Autumn 5**	**Autumn 31**	**Soprano pipistrelle, Common pipistrelle**
Turbine 15		Autumn 2		General bat activity
Turbine 16		**Autumn 3, Autumn 5**	**Summer 24**	**Soprano pipistrelle, Common pipistrelle**
Turbine 17		**Autumn 6**	**Autumn 32**	**Soprano pipistrelle, Common pipistrelle**
Turbine 18		**Spring 11**	**Autumn 33**	**Soprano pipistrelle**

As the 2020 static surveillance unit locations do not exactly match the location of the proposed turbine locations, the turbines listed in relation to 2020 static analysis refers to static units located within a 500m buffer of proposed turbine location (See Table 2b, Appendix 9.5 for details). Where

static units are located >500m, these are listed in Italics with corresponding footnotes to the table (Only High and Moderate to High value statics listed as it may be considered to have a less risk when >500m in distance). Data from 2022 is also considered to be more useful as that statics were positioned in vicinity of the proposed turbine locations. Therefore the 2022 data is the primary source for Risk Value to determine High and Moderate to High Risk Turbines.

The EcoBa Tool analysis compares nightly bat activity for each bat species as part of the analysis. As there are EcoBat Tool analysis results for all of the 2020 statics, a table was prepared (See Tables I, Appendix 9.8) to compare the 2020 to the 2022 static survey results. Using Tables I and J in Appendix 9.8, a EcoBat Tool Value is calculated for each of the proposed turbine locations and is presented in Table 10b below. Please consult Appendix 9.8 for more information.

Table 10b: Risk Value of proposed turbine locations in relation to local bat populations.

Turbine No.	Total Risk Value	No. of Surveillance Periods (2022 only)	Total Risk Value/No. of Surveillances	EcoBat Tool Value
1	11	3	4	Moderate to High
2	11	3	4	Moderate to High
3	5	1	5	High
4	5	1	5	High
5	4	2	2	Low to Moderate
6	6	2	3	Moderate
7	11	3	4	Moderate to High
8	9	3	3	Moderate
9	9	3	3	Moderate
10	4	2	2	Low to Moderate
11	9	3	3	Moderate
12	7	3	2	Low to Moderate
13	9	3	3	Moderate
14	3	1	3	Moderate
15	4	2	2	Low to Moderate
16	4	2	2	Low to Moderate
17	3	1	3	Moderate
18	3	1	3	Moderate

4.5 Desktop Review

4.5.1 Bat Conservation Ireland Database

There are bat records for the following bat species within a 10km radius of the proposed development site: soprano pipistrelle, common pipistrelle, Leisler's bat, Daubenton's bat, *Pipistrelle* spp. and *Myotis* spp.

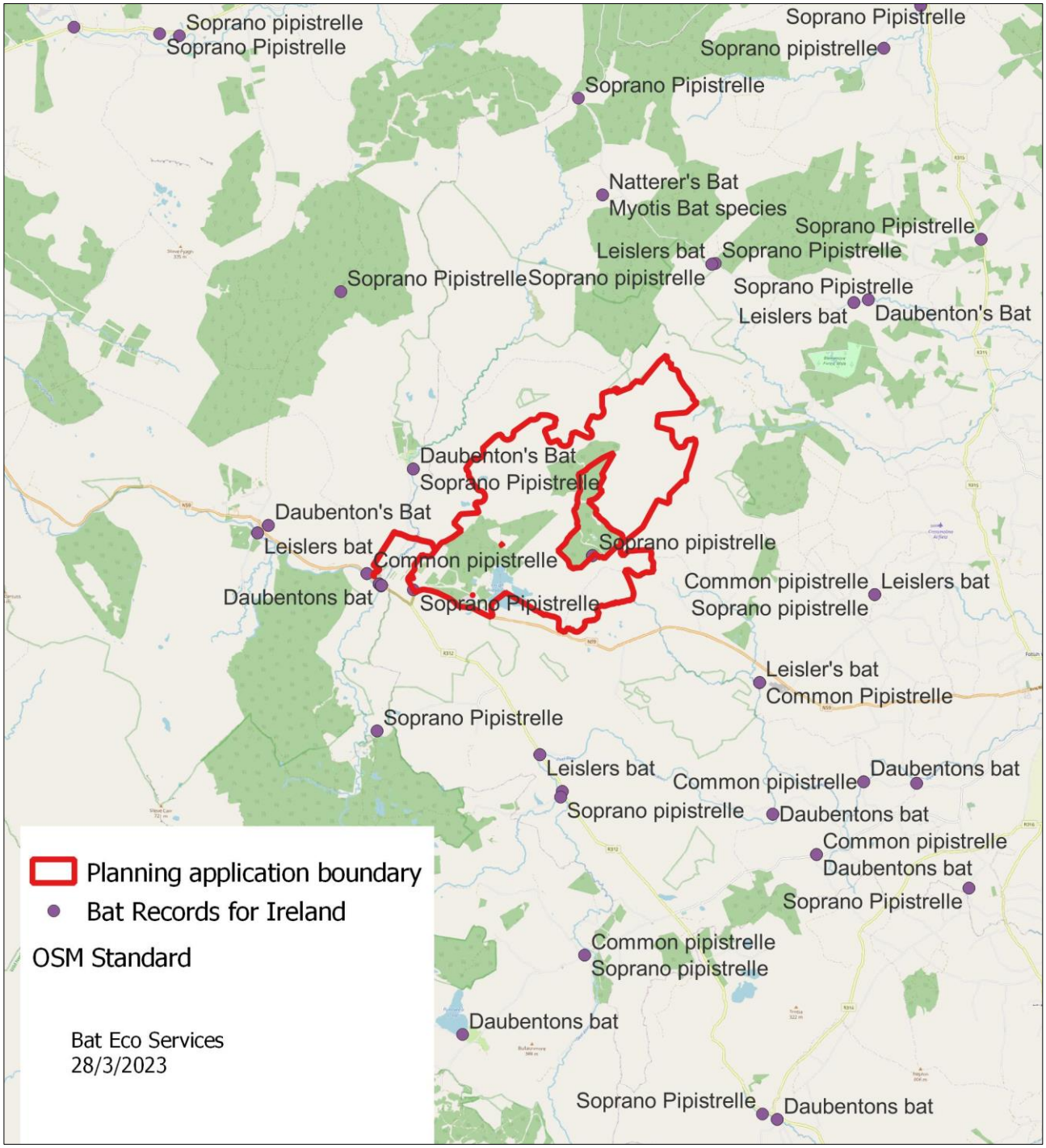


Figure 13a: Bat Conservation Ireland bat records (Source Bat Conservation Ireland Database).

4.5.2 International & National Site Designations

There are a number of SAC and pNHA designation within and adjacent to the proposed development site but bats are not a qualifying species for any of these sites.

4.5.3 Bat Conservation Landscape Favourability

Figure 13b depicts the BCIreland Bat Landscape Favourability Model (Lundy *et al.,* 2011) for all bat species (individual species values are presented in the table below). The county is divided into 5km squares and the darker the shading of the square, the higher favourability of the 5km square for bats. This GIS layer is hosted on the NBDC website www.biodiversityireland.ie. The proposed development site is approximately located in the Red boundary.

There are 5x 5km squares that enclose the proposed development area. The five squares, overall, have a low favourability for bats. For the bat species recorded during this bat survey, the 5km squares have an array of favourability levels for each of the different bat species. These are presented in Table 11a.

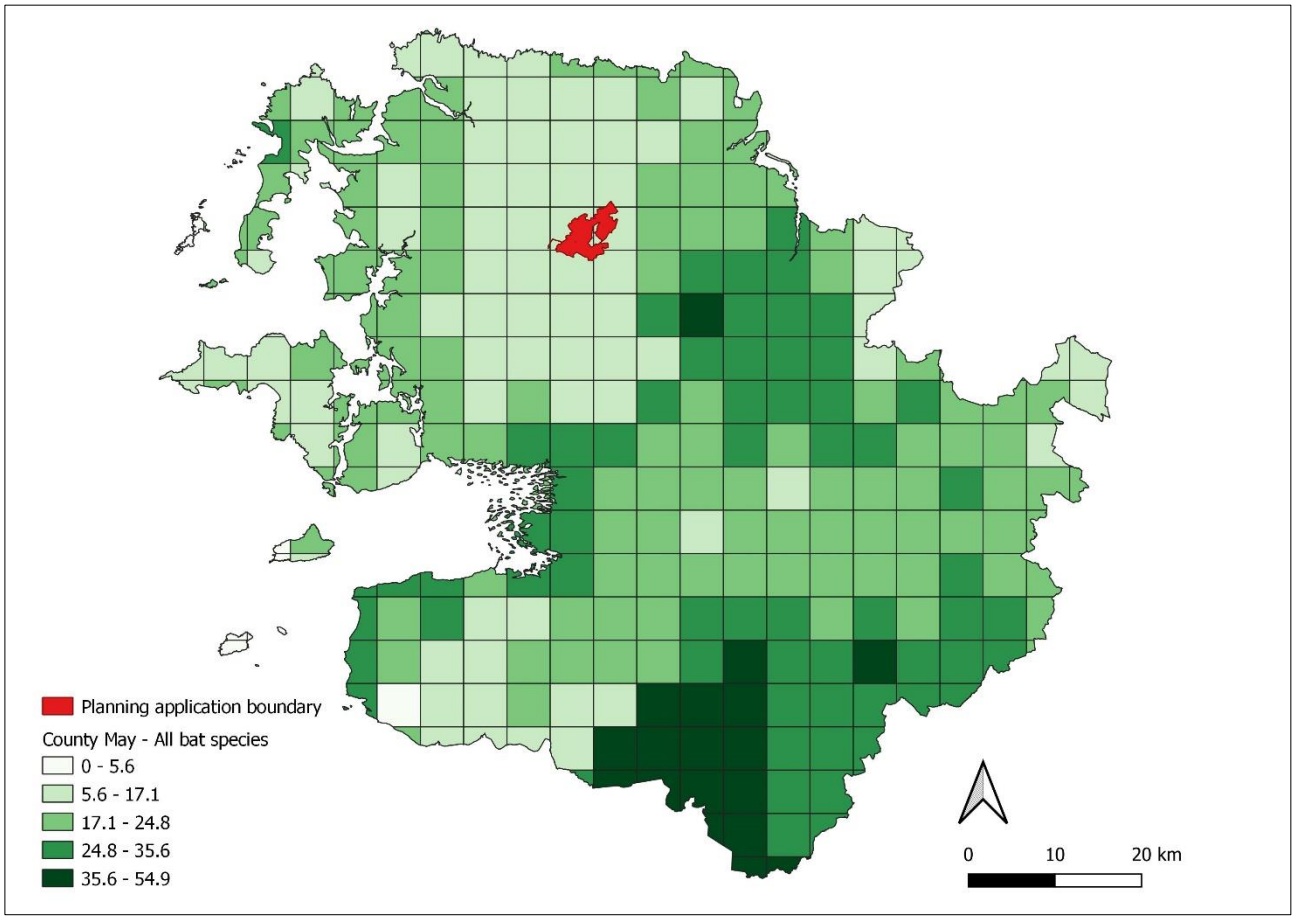


Figure 13b: Bat Landscape Favourability Model (All Bats) for County Mayo (Source: Bat Conservation Ireland) – Red Line = Planning application boundary.

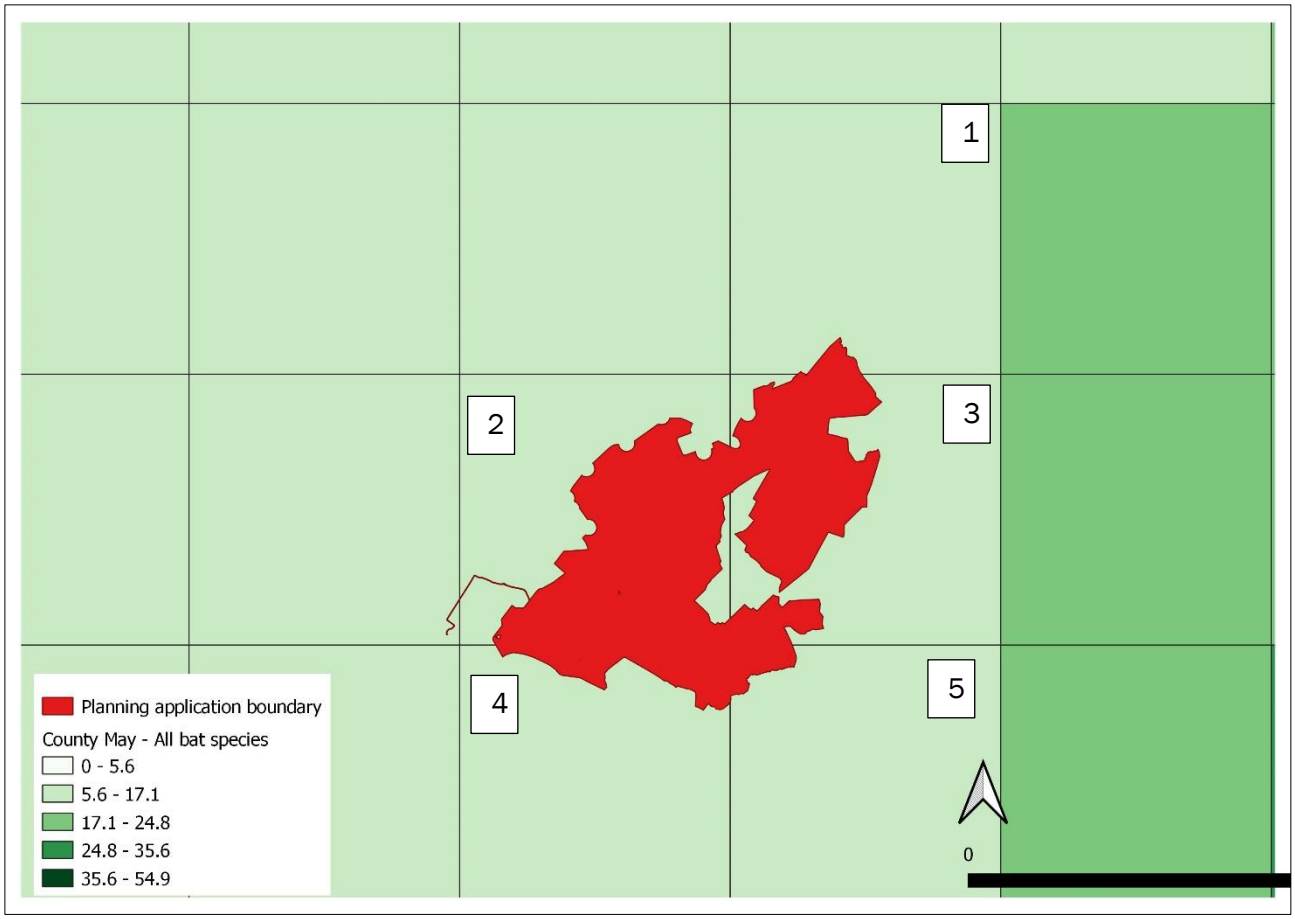


Figure 13c: Bat Landscape Favourability Model (All Bats) (Source: Bat Conservation Ireland) – Red Line = Planning application boundary.

Table 11a: Percentage suitability of 5km squares, encompassing the survey area, for each of the bat species.

Bat species	5km Square No. 1	5km Square No. 2	5km Square No. 3	5km Square no. 4	5km Square no. 5
Common pipistrelle	21% (Med)	17% (Low to Med)	16% (Low to Med)	25% (Med to High)	22% (Med)
Soprano pipistrelle	31% (High)	29% (High)	27% (Med to High)	39% (High)	36% (High)
Nathusius' pipistrelle	0%	0%	0%	0%	0%
Leisler's bat	15% (Low to Med)	14% (Low)	15% (Low to Med)	21% (Med)	20% (Med)
Brown long-eared bat	11% (Low)	12% (Low)	11% (Low)	10% (Low)	12% (Low)
Daubenton's bat	11% (Low)	11% (Low)	12% (Low)	16% (Low to Med)	20% (Med)
Natterer's bat	4% (Low)	2% (Low)	1% (Low)	2% (Low)	3% (Low)
Whiskered bat	0%	0%	0%	0%	0%
Lesser horseshoe bat	0%	0%	0%	0%	1%

4.6 Conservation Status

The conservation status of a species is defined as the sum of the influences acting on the species concerned that may affect the long-term distribution and abundance of its populations within the territory of the member states.

The conservation status of a species will be taken as favourable when:

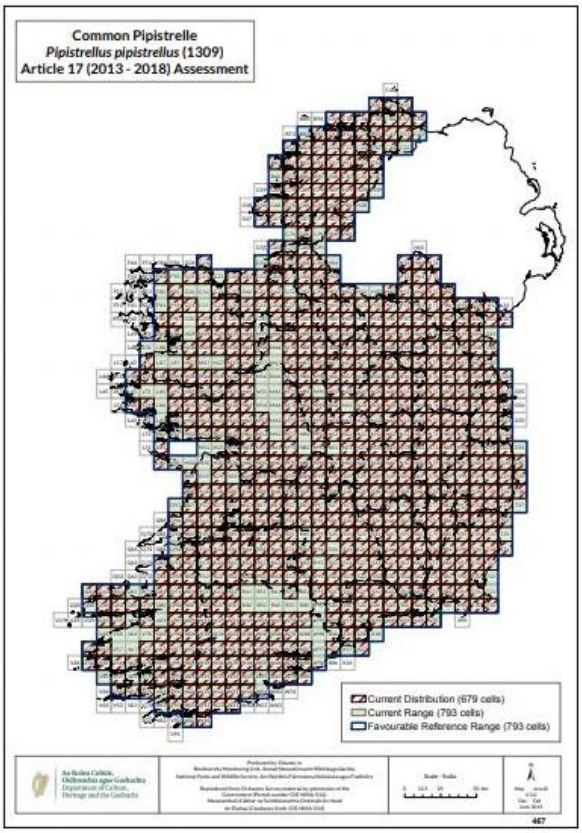
- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and

- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and

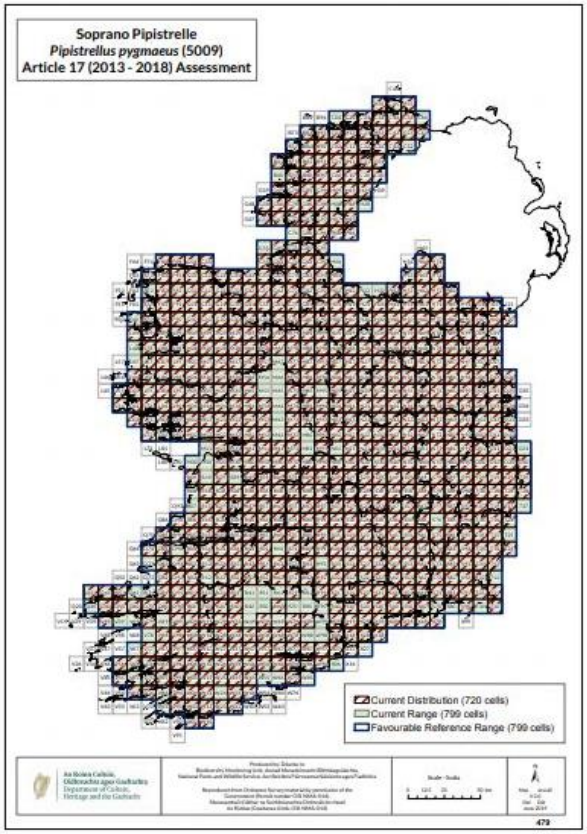
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

The conservation status of the bat species recorded during this bat survey is present below.

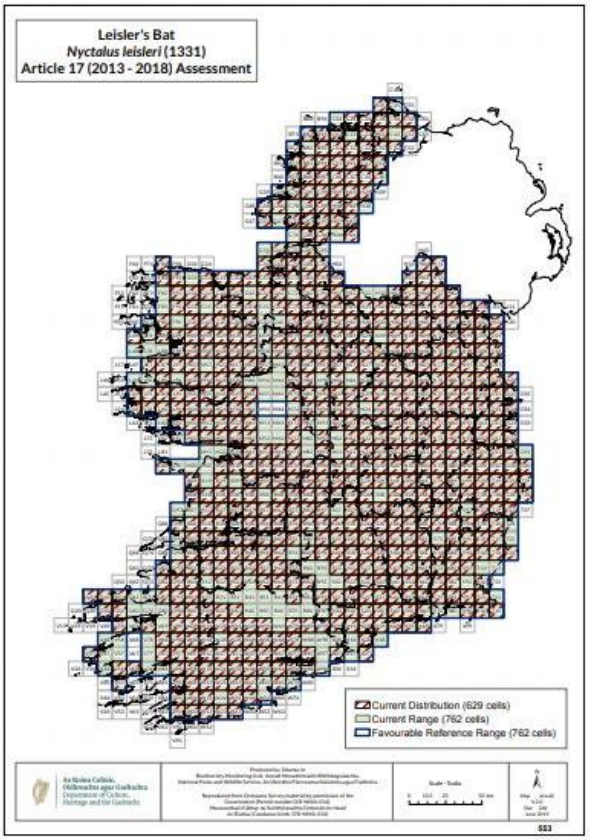
Figures 13d: Conservation Status of Irish Bat Species (Source: www.npws.ie)



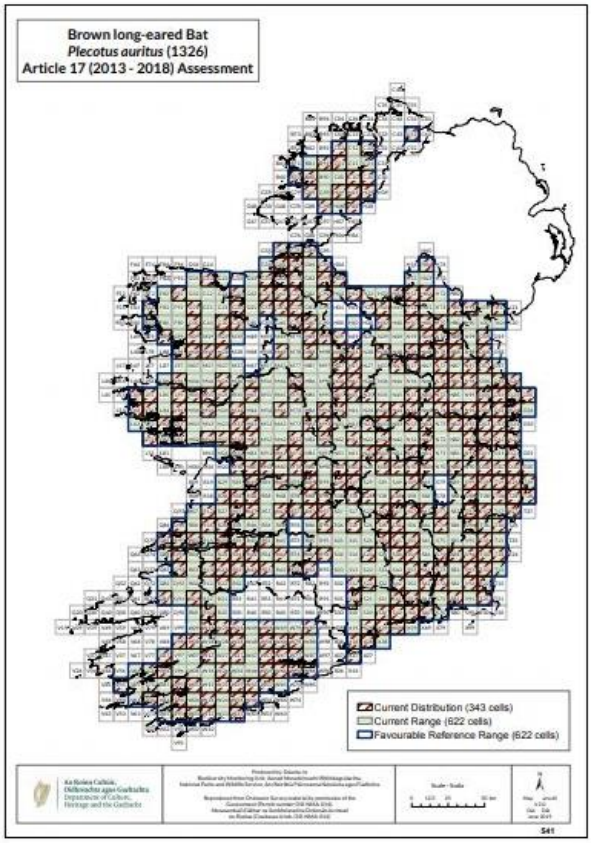
Common pipistrelle – Favourable



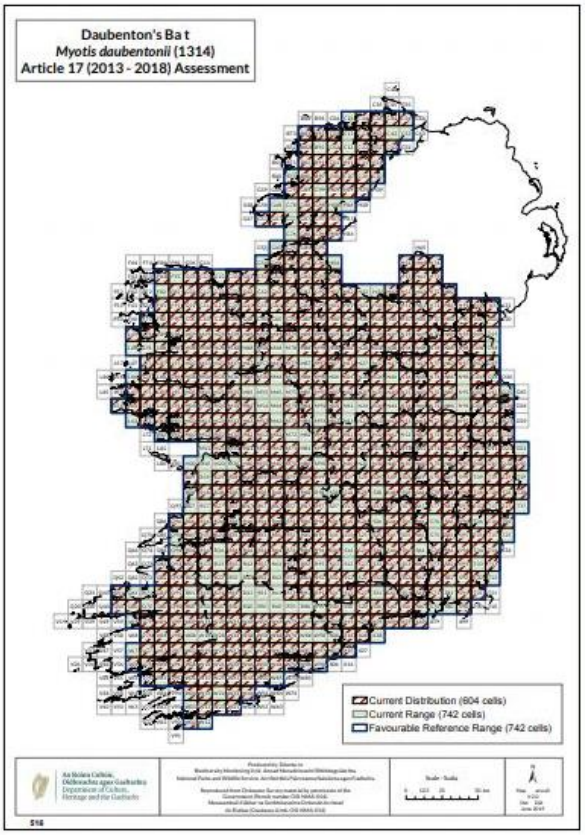
Soprano pipistrelle – Favourable



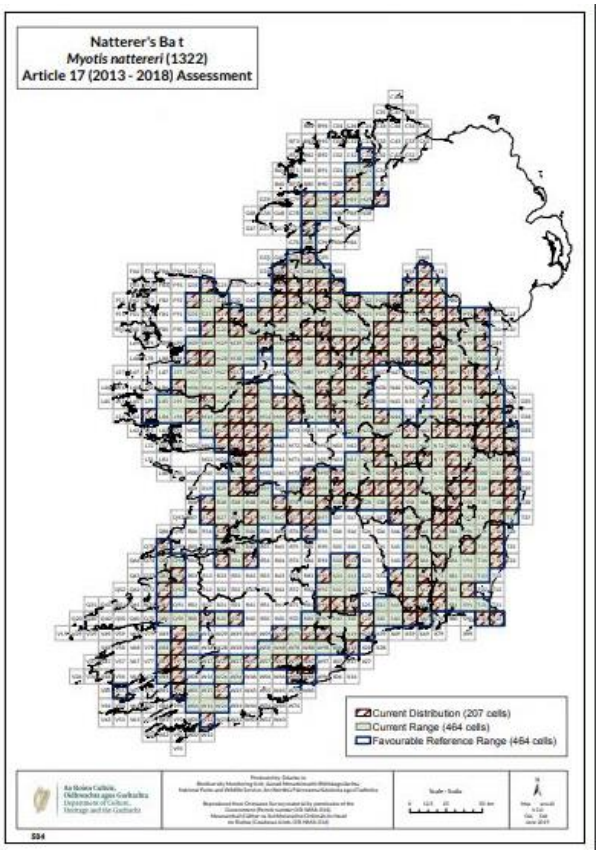
Leisler's bat – Favourable



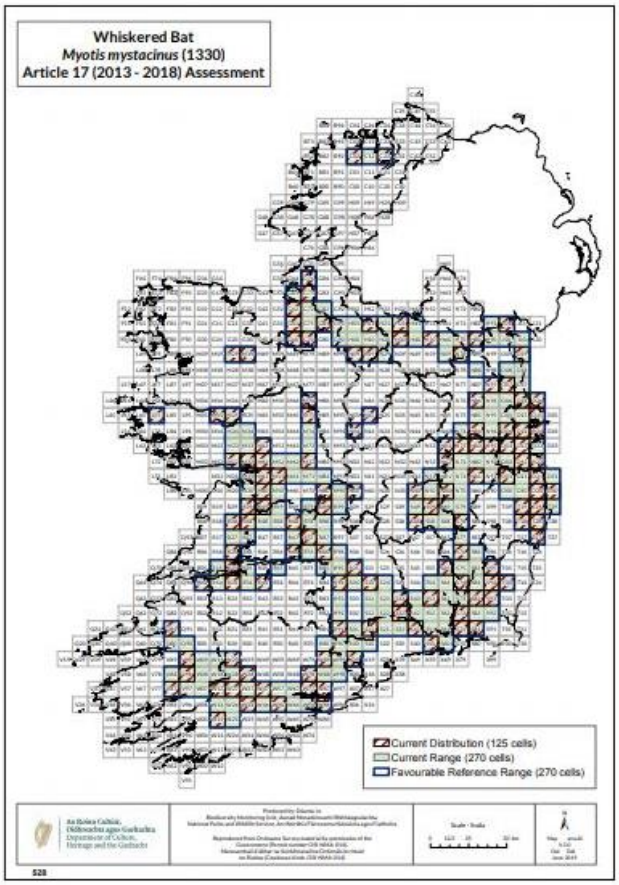
Brown long-eared bat – Favourable



Daubenton's bat – Favourable



Natterer's bat – Favourable



Whiskered bat - Favourable

Population estimates and favourable range is present below. All bat species recorded within the proposed development area have a favourable reference range in the 10km squares of the proposed development area.

Table 11b: Summary Distribution range and population estimate of bat species recorded during bat surveys completed for the proposed development area.

Bat Species	Distribution Range	Population Estimate
Daubenton's bat *Myotis daubentonii*	74,200 km^2	57,000 to 79,000
Whiskered bat *Myotis mystacinus*	27,000 km^2	Unknown
Natterer's bat *Myotis nattereri*	46,400 km^2	Unknown
Leisler's bat *Nyctalus leisleri*	76,200 km^2	63,000 to 113,000
Common pipistrelle *Pipistrellus pipistrellus*	79,300 km^2	1,070,000 to 2,400,000
Soprano pipistrelle *Pipistrellus pygmaeus*	79,900 km^2	500,000 to 1,200,000
Brown long-eared bat *Plecotus auritus*	62,200 km^2	62,000 to 97,000
Nathusius' pipistrelle *Pipistrellus nathusii*	13,543 km^2	10,000 to 18,000

4.7 Survey Effort, Constraints & Survey Assessment

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

Table 12: Survey Effort, Constraints & Survey Assessment Results.

Category	Discussion
Timing of surveys	As per bat survey guidelines – NaturScot, 2021, Collins, 2016
Survey Type **As per Collins (2016) & NaturScot (2021)**	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) ●
Weather conditions	Variable weather conditions but suitable for bat surveys.
Survey Constraints	Due to different landowners and restrictions of entering specific areas within the proposed development zone, there was limitations in relation to night-time work on Health & Safety grounds (i.e. safe traversing through the survey area during hours of darkness). This limited walking transects in the northern section of the survey area. However, static surveillance provided bat survey information for this area.
Survey effort **TOTAL = 9,652 hrs**	2020 Surveillance – 3 survey periods, 60 static locations (minimum 10 nights per static) = 5,400 hours 2022 Surveillance – 3 survey periods, 39 static locations (minimum 10 nights per static) = 4,186 hours Dusk & Dawn Surveys – 13 surveys (26 hours) IR Filming – 9 surveys (18 hours) Walking Transects – 10 surveys (16 hours) Driving Transects – 4 surveys (6 hours)
Extent of survey area	Principally undertaken within the red line boundary with driving transects undertaken of the local road network.
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.

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

5. Bat Ecological Evaluation

5.1 Bat Species Recorded & Sensitivity

Eight species of bat and additional records for *Myotis* species group were recorded during the 2020 and 2022 bat surveys. The table below provides an ecological valuation of each bat species and the collision risk factor in relation to wind farms. Four of the bat species recorded are considered to be High risk.

Table 13: Evaluation of the bat species recorded during the bat survey.

Using CIEM (2016) Guidelines for ecological value, "Bat Risk" in relation to Wind Turbines (NaturScot, 2021) and with reference to Wray et al., 2010 (Table 2 in NaturScot, 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

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

5.2 Site Risk Assessment & Impact Assessment

According to NaturScot (2021) wind farms can affect bats in the following ways:

1. Collision mortality, barotrauma and other injuries (although it is important to consider these in the context of other forms of anthropogenic mortality)
2. 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);
3. Loss of, or damage to, roosts;
4. Displacement of individuals or populations (due to wind farm construction or because bats avoid the wind farm area).

According to the NaturScot (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 additional details) in the NaturScot (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 (18 turbines);
- Habitat Risk = Low;
- Presence of other wind farms within 5km radius;
- Proposed tall wind turbines.

Therefore a value of 3 is applied to this proposed development site 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. The overall value of the site is based on a summary of tables presented in Appendices (Section 9.3).

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

But as the EcoBat Tool was not available for the 2022 static surveillance analysis, Table 10b figures were used to calculate the Risk Assessment.

Therefore the following points are assigned to the different proposed turbine locations:

Low = 1 point - T5, T10, T12, T15, T16
Moderate = 3 points – T6, T8, T9, T11, T13, T14, T17, T18
High = 5 points - T1, T2, T3, T4, T7

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

While Leisler's bat can be considered as common in Ireland, its status as "International Important" population, ranks it higher than the two common *Pipistrellus* species. However much of the bat activity recorded during the bat surveys is in relation to Common pipistrelle and Soprano pipistrelle and therefore the assessment is completed for these two species, combined.

Table 14: Risk assessment for each proposed turbine location for common *Pipistrellus* species.

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

Due to the moderate levels of nightly bat activity at many of the static locations, the majority of the proposed wind turbines have a potential Medium Risk factor in relation to the two common *Pipistrellus* species (n = 8 turbines) while a slightly less number is of High Risk value (n = 5 turbines). The High Risk turbines are located in the western section of the proposed development site. The peak of bat activity was predominantly in the Autumn months.

However, while T17 and T18 (shown with an asterisk in Table 14) are considered to have a Medium Risk, the fact that there was a high level of *Pipistrellus* species activity in Autumn 2022, there are concerns in relation to these two turbines. Therefore, as a precaution, these two proposed turbine locations will be treated as a High Risk turbines.

Soprano pipistrelles roosts (small satellite or daytime roosts) were recorded to the south of the proposed turbine locations. Results documented soprano pipistrelle activity in vicinity of specific proposed turbine locations which are deemed High Risk or Medium Risk which require additional mitigation measures. Proposed turbine locations T5 and T6 are part of the proposed turbines in the western section of the proposed development site. While the five other proposed turbine locations (T1, T2, T3, T4 and T7) in this area are all deemed High Risk, T5 and T6 were not. However it is important the post-construction monitoring is undertaken in vicinity of these two additional turbine locations due to the fact that they are in vicinity of commuting routes for soprano pipistrelles. Therefore T5 is included in the Medium Risk turbines as a precaution.

5.3 Conservation Value of Bat Roosts

The Conservation Significance, in relation to roosts recorded, according to Marnell *et al.* (2022) was also assessed. Six bat roosts were recorded within the proposed development site and this consisted of one maternity roosts, four satellite roosts and one night roost for three species of bat: Natterer's bat, brown long-eared bat and soprano pipistrelles. Of particular importance for County Mayo is the recording and confirmation of a maternity roost in Building No 8.

Table 15: Buildings / Structures survey results.

Building Code	Roost Type & Location	Conservation Significance
BnaM Warehouse – B1	**Satellite Roost** Soprano pipistrelle >5 individuals Natterer's bats >3 individuals	Soprano pipistrelle – Low (individual bats of common species) Natterer's bat – Medium (small number of rarer species. Not a maternity roost).
BnM Shed 1 – B3	**Satellite Roost** Soprano pipistrelle x1 Natterer's bat x1	Soprano pipistrelle – Low (individual bats of common species) Natterer's bat – Medium (small number of rarer species. Not a maternity roost).
BnM Shed 2 – B4	**Satellite Roost** Brown long-eared bat x1 Natterer's bat x1	Medium (small number of rarer species. Not a maternity roost).
Visitor's Centre – B5	**Satellite Roost** Soprano pipistrelles >5 individuals	Low (individual bats of common species).
Lumber Yard Shed – B7	**Night Roost** Soprano pipistrelle x1	Low (individual bats of common species).
Toilet Block & Shed – B8	**Maternity Roost** Natterer's roost - 28 to 43 individuals	Medium to High (Maternity sites for rarer species). County importance.

6. Impact Assessment & Mitigation

6.1 Impact Assessment

The impact assessment takes into consideration the following:

- Eight bat species were recorded during the 2020 and 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 Nathusius' pipistrelle.
- The remaining four species are Low Risk: Natterer's bat, Daubenton's bat, whiskered bat and brown long-eared bat.
- Eco Bat Analysis results and additional analysis highlighted turbine locations with High Risk and Medium Risk for common pipistrelle and soprano pipistrelle. Five turbine locations are deemed High Risk and this is primarily due to autumnal activity which may be related to dispersal movements at this time of the year. An additional eight turbine locations have a Medium Risk value for local bat populations but two have been highlighted (T17 and T18) due to high level of *Pipistrellus* species bat activity in Autumn 2022. While a Low Risk proposed turbine location (T5) is added to the Medium risk due to its location within the Core Sustenance Zone for soprano pipistrelles.
- A Natterer's bat maternity roost is located in Building No. 8 adjacent to proposed Turbine 4 and infrastructure area (Barrow Pit A).
- Additional Satellite and Night roosts recorded south of the turbine locations but within the proposed development site.
- Greater dispersal and higher activity levels were recorded in Autumn compared to Spring and Summer surveillance periods for both 2020 and 2022, but a higher level of bat activity was recorded in 2022.
- There is a wide spread of bat encounter records within the proposed development site, and this is particularly important in relation to infrastructure.
- There are bat habitats present within 200m of turbine locations and along infrastructure routes.

6.1.1 Potential Impact on Local Bat Populations

If no mitigation measures are implemented, there are five High Risk turbines (T1, T2, T3, T4 and T7) and two additional turbine locations considered to be a risk to local bat populations (T17 and T18). Seven proposed turbine locations are deemed to have a Medium Risk to local bat populations (T5, T6, T8, T9, T11, T13 and T14) while the remaining proposed turbine locations are considered to have a Low Risk (T10, T12, T15 and T16).

In addition, there is a potential low risk to the Natterer's bat maternity roost due to construction of infrastructure and operation of proposed development.

6.1.2 Core Sustenance Zones

An array of bat roosts were recorded within the proposed development area or in adjacent buildings surveyed. The CSZ for Natterer's bat is 4km and for soprano pipistrelle and brown long-eared bat, it is 3km. Therefore, the proposed development is located within the CSZ for the bat roosts recorded during bat surveys. While Natterer's bats and brown long-eared bats are not considered to be a High Risk bat species in relation to wind turbines, soprano pipistrelles are and therefore this is considered in the potential impacts on local bat populations and in relation to proposed bat mitigation measures. This is presented in the next section and accompanying table.

6.1.3 Potential Impact on Roosts

The Conservation Significance of roosts, according to Marnell *et al.* (2022), determines the bat mitigation measures required in relation to potential impacts of proposed development. This is presented in the table below.

Table 16a: Buildings / Structures survey results.

Building Code	Conservation Significance	Potential Impact / Monitoring Requirements
BnaM Warehouse – B1 **Satellite Roost/Day Roost** **Soprano pipistrelle >5 individuals** **Natterer's bats >3 individuals**	Soprano pipistrelle – Low (individual bats of common species) Natterer's bat – Medium (small number of rarer species. Not a maternity roost).	No direct impacts. Structure will remain in-situ. Indirect impacts: construction traffic may cause disturbance. Structure is located within 3km of proposed turbine locations (Core Sustenance Zone – soprano pipistrelle of 3km)
BnM Shed 1 – B3 **Satellite Roost/Day Roost** **Soprano pipistrelle x1** **Natterer's bat x1**	Soprano pipistrelle – Low (individual bats of common species) Natterer's bat – Medium (small number of rarer species. Not a maternity roost).	No direct impacts. Structure will remain in-situ. Indirect impacts: construction traffic may cause disturbance. Structure is located within 3km of proposed turbine locations (Core Sustenance Zone – soprano pipistrelle of 3km)
BnM Shed 2 – B4 **Satellite Roost/Day Roost** **Brown long-eared bat x1** **Natterer's bat x1**	Medium (small number of rarer species. Not a maternity roost).	No direct impacts. Structure will remain in-situ. Indirect impacts: construction traffic may cause disturbance.
Visitor's Centre – B5 **Satellite Roost** **Soprano pipistrelles >5 individuals**	Low (individual bats of common species). However, due to the newness of this building, it is likely that the bat usage of this structure will increase and therefore it's Conservation Significance.	No direct impacts. Structure will remain in-situ. Indirect impacts: construction traffic may cause disturbance. Structure is located within 3km of proposed turbine locations (Core Sustenance Zone – soprano pipistrelle of 3km)
Lumber Yard Shed – B7 **Night Roost** **Soprano pipistrelle x1**	Low (individual bats of common species).	Indirect impacts: construction traffic may cause disturbance. Structure is located within 3km of proposed turbine locations (Core Sustenance Zone – soprano pipistrelle of 3km)
Toilet Block & Shed – B8 **Maternity Roost** **Natterer's roost - 28 individuals**	Medium to High (Maternity sites for rarer species). County Value.	No plans to remove structure however indirect impact may result due to construction and operational traffic. Barrow Pit proposed adjacent to this structure. Therefore likely to impact on structure. Mitigation – Replacement Like-For-Like. Monitoring for at least 2 years. NPWS Derogation License may be required if direct impacts are likely.

6.1.4 Cumulative Impacts of Existing Wind Farm Operations

The following information was provided by TOBINS in relation to other proposed, permitted and/or constructed wind farms.

Information on the relevant projects within the vicinity of the proposed development is described in Chapter 4 of this EIAR (Policy, Planning & Development Context). The information was sourced by TOBINS from a search of the local authorities planning registers, EPA website, planning applications, EIAR documents and planning drawings which facilitated the identification of past and future projects, their activities and their potential environmental impacts.

Table 16b: Other Wind Farm Operations (Source: TOBINS).

Project	Planning Status	Number of Turbines	Distance to Proposed Development Site
Oweninny Wind Farm Phase 1	Constructed	29	Immediately north-west of the proposed development site boundary
Oweninny Wind Farm Phase 2	Under Construction	31	2km west of the proposed development site boundary
Dooleeg Wind Farm (Planning Ref.: 20467)	Conditional	1	300m south of the proposed development site boundary
Sheskin Wind Farm (Planning Ref.: 15825)	Under Construction	8	6.5km north-west of the proposed development site boundary
Sheskin South Wind Farm	In planning	21	6km from proposed development site boundary
Glencora Wind Farm	In planning	22	12km north of proposed development site boundary

Oweninny Windfarm

The Oweninny Wind Farm Project is being developed by Oweninny Power Ltd. which is comprised of Phase 1 (operational) and Phase 2 (under construction) a joint venture between ESB Wind Development Limited and Bord na Móna Energy Limited, and this Bord na Móna application for the proposed Phase 3. Phase 1 of the Oweninny Wind Farm project, which has been in operation since mid-2019, is located across lands immediately to the northwest of the proposed development site. While Phase 2 of the Oweninny Wind Farm Project, which is currently under construction and expected to be fully operational in early 2023, is located c. 2km west of the proposed development site, to the west of the Owenniny River.

An Environmental Impact Statement (EIS) of the proposed windfarm was prepared by ESB and Bord na Móna in 2013 which included an assessment of potential significant effects from the proposed development on terrestrial and aquatic ecology within the receiving environment. The EIS concluded that the implementation of appropriate mitigation measures will minimise significant ecological impacts and there is no potential for residual impacts on local bat populations.

Sheskin Wind Farm

Sheskin Wind Farm (Mayo Co. Co. Planning reference: 15825) is comprised of 8 wind turbines and associated works, is located approximately 6.5km from the proposed development sit. Each turbine will have a maximum overall height of 150m. It was granted conditional planning permission in 2016. An EIAR for this development was produced and concluded that with the implementation of appropriate mitigation measures, the proposed wind farm at Sheskin will have an imperceptible to

slight, positive residual impact on the existing environment. In relation to bats, the operation of the wind farm at Sheskin Wind Farm was considered to have the potential to result in some continuing low-level disturbance to commuting and foraging bats. Bat activity at the site was considered to be low with a very low rate of registrations of bats detected across the site as a result of static surveillance and trainings.

Sheskin South Wind Farm

Sheskin South Wind Farm (An Bord Pleanala Case Reference: 315933) is comprised of 21 no. wind turbines and all associated works and is located approximately 6km from the proposed development site. The application for this proposed development was submitted on the 1/3/2023 and no decision has been determine at the time of writing (March 2023). An EIAR for this development was produced and concluded that with the implementation of appropriate mitigation measures, the proposed development will have ni significant effects on the existing environment including habitats, designated sites, and faun (including bats).

Dooleeg Wind Turbine

Permission for a single wind turbine generator (Mayo Co. Co. Planning Reference: 20467**)**, with an overall max height of 180 metres and 20kV grid connection to Bellacorick 110kV substation. It is located approximately 300m from the proposed development site and was granted conditional permission in 2021. An EIAR have been produced for this proposed development. The EIAR concluded that with the appropriate mitigation measures implemented, the proposed development will not have the potential to result in significant negative residual impacts on have any significant effects to habitats or fauna occurring at or in the wider area of the proposed development.

Glencora Wind Farm

This proposed wind farm, located approximately 12km north of the proposed development site, is currently in the pre-planning stage and will be comprised of 22 no. wind turbines and all associated works[1]. A pre-application consultation with An Bord Pleanála (Case reference: 310528) for this proposed development was submitted on the 16/06/2023 and no decision has been determined at time of writing (March 2023).

Open Cycle Gas Turbine (OCGT) Power Plant

The development of a gas power plant (Mayo Co. Co. Planning Reference: 2360028) is proposed at a site approximately 1km from the proposed development site boundary. An EIAR for this development have been produced, which included an assessment of potential significant effects from the proposed development on nearby protected sites and terrestrial and aquatic ecology within the receiving environment. A building within the survey area was recorded as a bat roost (Natterer's bat *Myotis* nattereri). These reports concluded that the implementation of appropriate mitigation measures will minimise significant ecological impacts and there is no potential for residual impacts. There is therefore no potential for cumulative negative effects on biodiversity with the proposed development under appraisal in this report.

There is the potential for cumulative operational impacts on local bat populations in relation to the combined impacts of this wind farm and other proposed, permitted and/or constructed wind farms. This increases the importance of strict implementation of the bat mitigation measures presented in this report.

6.2 Mitigation Measures

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

6.2.1 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.

6.2.1.1 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 to be used are provided in the table below. Feature height is 25m (typical conifer plantation height, the predominant habitat type present within the survey area). Dimensions of Blade length and Hub height were provided and the calculation is as follows:

$\text{Buffer distance} = \sqrt{(50 + 79)^2 – (121 – 25)^2}$

(Information supplied by TOBIN: 200m tip height, rotor diameter 158m, hub height 121m, blade length 79m).

Buffer distance is calculated as 86.2m.

Table 17a: Bat Mitigation Measures recommended during the Construction Phase.

High Level Bat Mitigation This applies to T1, T2, T3, T4, T7, T17, T18	**Moderate Level Bat Mitigation** This applies to T6, T8, T9, T11, T13, T14 & T5 (precautionary) This also applies to remaining Internal Road Network	**Low Level Bat Mitigation** This applies to T10, T12, T15 & T16
Ensure that wind turbine is >86.2m away from bat habitat according to English Nature calculation.	Ensure that wind turbine is >86.2m away from bat habitat according to English Nature calculation.	Ensure that wind turbine is >86.2m away from bat habitat according to English Nature calculation.
A zone of 100m 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. The clearance of deciduous vegetation should be assessed to ensure that such clearance is necessary and will not reduce increase the potential impact of the proposed development on local bat populations. 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. The clearance of deciduous vegetation should be assessed to ensure that such clearance is necessary and will not reduce increase the potential impact of the proposed development on local bat populations. 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. The clearance of deciduous vegetation should be assessed to ensure that such clearance is necessary and will not reduce increase the potential impact of the proposed development on local bat populations. 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.
Investigate the possibility of providing “bat habitat” of 2 hectares/wind turbine. This land should be located at least 1km away from the	Investigate the possibility of providing “bat habitat” of 0.5 hectares/wind turbine (e.g. replant lands).	Investigate the possibility of providing “bat habitat” of 0.25 hectares/wind turbine (e.g. replant lands).

nearest wind turbine (e.g. replant lands).		
Undertaken a Potential Bat Roost (PBR) survey of trees proposed to be felled and fell according to PBR value.		
Investigate the potential of providing alternative bat roosting sites in operation buildings (e.g. potential substation location outside the buffer zones of the individual turbines) required for the operation of the proposed wind farm. Measures can be implemented to provide roosting spaces and this is required to mitigation for potential PBR trees proposed to be felled.		
Any biodiversity conservation measures proposed within the proposed development area should be assessed using the following question – Are such measures going to increase or encourage the likelihood of bats commuting and foraging in close proximity of proposed turbine locations and therefore increasing the likely impact of the proposed development on local bat populations?		

6.2.2 Operational Phase

6.2.2.1 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.

6.2.2.2 Turbine Cut-in Speeds

There are few bat mitigation measures available in relation to wind farms to reduce bat 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 standard duration required is during the principal activity season of Spring to Autumn months but can depends on the level of bat mitigation required for individual turbine sites (i.e. curtailment regime tailored according to post construction monitoring coupled with carcass searches). For such post-construction monitoring 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 NaturScot (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 8ºC and greater. Therefore, when the air temperature was less than 7ºC 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.
3. NaturScot (2021) recommend that curtailment is implement for 10ºC and above.

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 seven proposed turbine locations. As recommended by SNH, 2019 if curtailment is put into operation, *"then 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 17b: Bat Mitigation Measures recommended during the Operational Phase.

High Level Bat Mitigation This applies to T1, T2, T3, T4, T7, T17 and T18	**Moderate Level Bat Mitigation** This applies to T6, T8, T9, T11, T13, T14 & T5 (precautionary) This also applies to remaining Internal Road Network	**Low Level Bat Mitigation** This applies to T10, T12, T15 & T16
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).
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 and during the active bat season (April to October) when air temperatures are 10^{o}C or more at the nacelle height. Undertake 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. Use such monitoring coupled with carcass search to determine if a more tailored curtailment regime is required.	Put in a monitoring programme for the first year of operation to ensure that bat activity is at a low level in vicinity of these turbines. Review monitoring results to determine if further bat mitigation measures are required (e.g. cut-in speeds to be applied to listed proposed turbine locations).	
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. If dead bats are recorded, curtailment (as per High Risk Turbines) should be put into operation.	Undertake a carcass search for 3 years post operation of the wind farm. If dead bats are recorded, curtailment (as per High Risk Turbines) should be put into operation.
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 NaturScot, 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 10^{o}C). A scavenger trial is required to facilitate analysis (as per NaturScot, 2021 guidelines).
c) For exact protocols consult most up-date best practice guidelines from current research publications / guidelines (e.g. NaturScot, 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 NaturScot, 2021 or other equivalent tool depending on most up to-date recommendations at the time of monitoring.

6.2.3 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 were 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.

6.2.4 Conservation of Bat Roosts

6.2.4.1 Natterer's Bat Roost

A maternity roost was recorded in the Toilet Block (Building No. 8) located adjacent to propose turbine T4. As this building is located next to a large barrow pit site and within the operational zone of the proposed wind farm, the following is recommended as a precaution for local Natterer's bat populations:

- 50m protection zone around Building No. 8
- Construction of alternative bat roost

A bat house is to be constructed and located adjacent to woodland/conifer plantation (Yellow Circle on Figure 14a). While this species is considered to a be a Low Risk species in relation to wind farm operations, there is still potential risk. Therefore, it is deemed important to provide alternative bat roosting to reduce risk to the local Natterer's bat population especially in consideration that the colony using Building No. 8 is a confirmed maternity roost and deemed of county importance. The proposed location for the bat house is adjacent to good foraging habitat, along accessible tracks to aid construction and >500m away from proposed turbine locations but in the area that this species is known to forage and commute.

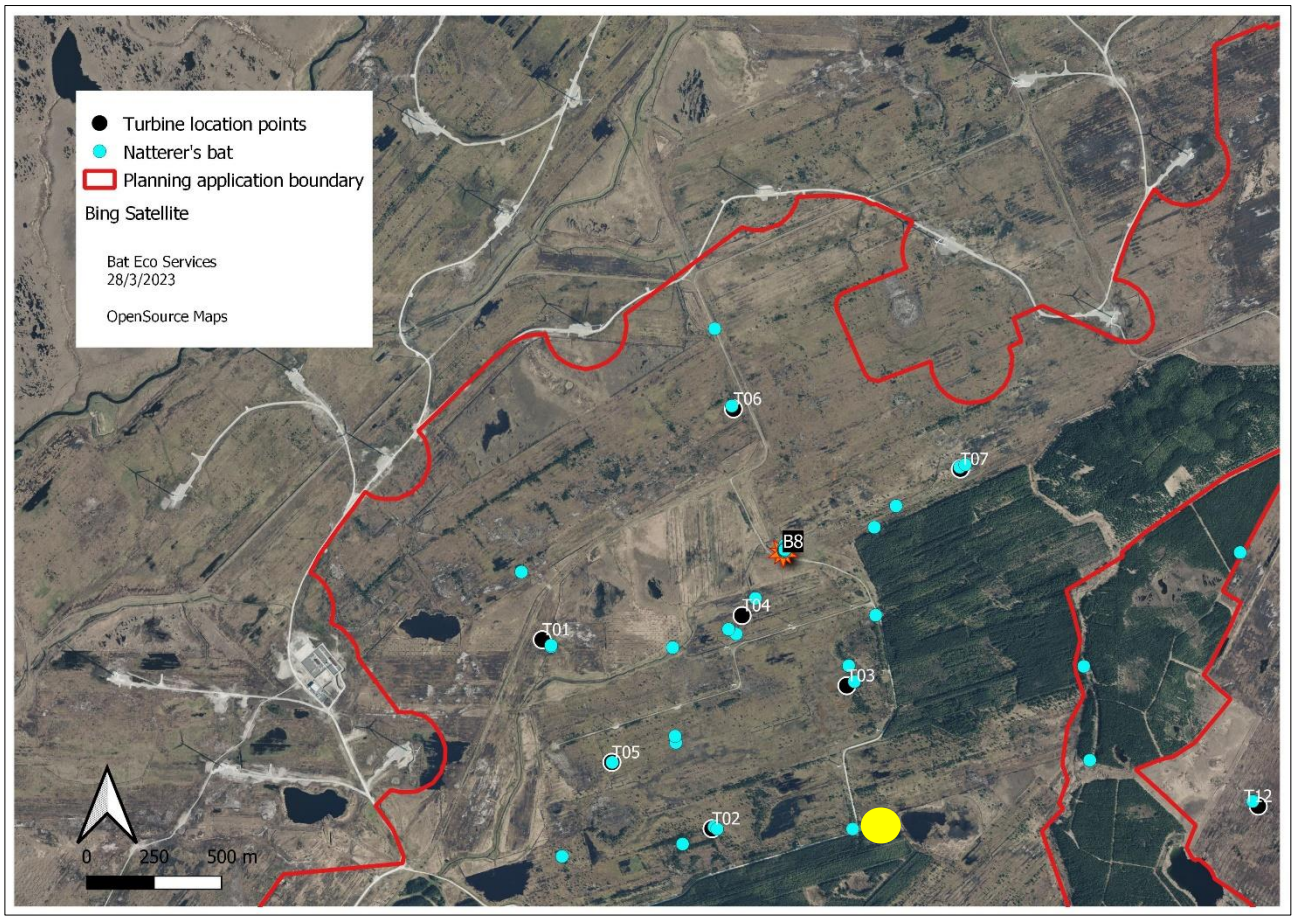


Figure 14a: Proposed location of alternative bat roost.

This bat house is to the have the following features:

- 3m x 3m (internal floor space) 1½ storey (internal height of 4.5m from floor level to highest point of roof space) building constructed from concrete block (insulation between the two walls).
- A-roof, constructed of natural slate and 1F bitumous felt (no modern breathable felt is to be used in the bat house) on timber joists (9 x 2 inch joists). A loft space is required.
- Single entrance point is required to be inserted into the wall facing the woodland edge (gable wall, at 4m height). This will be an open window of 50cm wide by 20cm high (window slit). This will require “Pine Marten” proofing externally (e.g. smooth lead sheeting fixed around the base (window sill) and sides of the window slit to prevent Pine Marten climbing into the space).
- The ground floor entrance will be a solid door on opposite gable wall to bat entrance point (locked).

Internally, the following is recommended:

- The floor of the building is to be a layer of crushed stone (2/3 inch down) (minimum use of concrete is recommended in order to reduce the negative impact of this material on the thermal conditions of the building) with a upper layer of 804 Clause (crushed) stone.
- A loft space is to be constructed with a trap door entrance (open) to allow bats to fly between the floors (50cm by 50cm). A floor is to be constructed dividing the building into a ground floor and loft floor. Timber joists (9x2 inch timber) will be sheeted with marine ply wood (leaving the timber joists exposed at the ground floor level (i.e. under the ply wood sheets) – this will provide additional roosting space for bats.
- Ladder / stairwell (with safety rail) to be constructed to allow human access to loft to undertake monitoring of this section of the bat house.
- A partition box (one side of which is open to allow bats to fly into the loft space) internally around the widow slit is required to be constructed (marine ply) to reduce light penetrating the loft space.

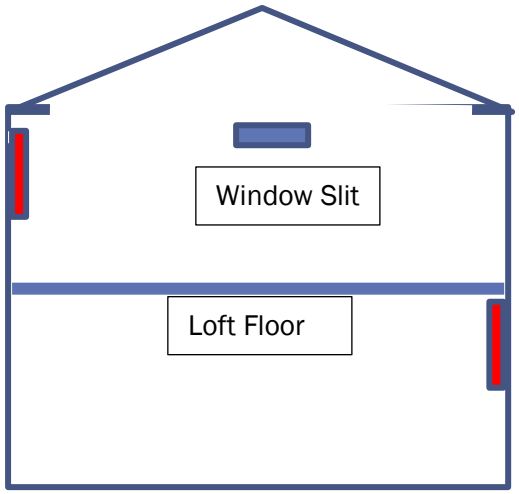


Figure 14b: Basic layout of the proposed Bat House (bats will be free to fly between the two floors through trap door).

Additional roosting

- External walls

Insert 4 Bat Tubes along the external walls to provide roosting sites for crevice dwelling bats. These should be inserted at a minimum of 3m height.

- Internal walls

Hang 4 units of Integrated Woodstone Bat Box on the internal walls, 2m minimum off the ground.

This Bat House is to be constructed prior to construction of the proposed development in order to provide alternative roosting prior to any works that may impact on the Toilet Block (Building No. 8).

- Landscaping

Mature trees (native species) and native hedgerow is required to be around the sides of the proposed Bat House to buffer from wind farm activity and to provide shelter and bat commuting habitat immediately adjacent to the structure and to ensure that it is connected to the adjacent woodland and treelines. Fast growing tree species (e.g. alder) is recommended to ensure that the new landscaping is established quickly.

- Protection of Toilet Block (Building No. 8)

An exclusion zone of 50m is required around the structure to ensure that construction and operation works do not impact on the colony of bats roosting in it. Annual monitoring of the structure should be undertaken until the alternative bat house has sufficiently replace this structure as a roost. Monitoring should also include the installation of TinyTag temperature data loggers to monitoring the internal temperature of the existing structure and proposed new bat house (set to record hourly).

6.2.5 Lighting

Any external lighting for the proposed development should strictly follow the guidelines provide below in relation to luminaire design and these should be strictly implemented during construction and operation phase of the proposed development design is extremely important to achieve an appropriate lighting regime.

However, in general, external outdoor lighting should be avoided and it is not permitted adjacent buildings recorded as bat roosts. No lighting is permitted within 200m of Building No. 8 and there should be no lighting erected within the 500m zone between Building No. 8 and proposed location of bat house.

This is taken from the most recent BCT Lighting Guidelines (BCT, 2018).

- All luminaires used will lack UV/IR elements to reduce impact.
- LED luminaires will be used due to the fact that they are highly directional, lower intensity, good colour rendition and dimming capability.
- A warm white spectrum (<2700 Kelvins will be used to reduce the blue light component of the LED spectrum).
- Luminaires will feature peak wavelengths higher than 550nm to avoid the component of light most disturbing to bats.
- Column heights should be carefully considered to minimise light spill. The shortest column height allowed should be used where possible.

- Only luminaires with an upward light ratio of 0% and with good optical control will be used.
- Luminaires will be mounted on the horizontal, i.e. no upward tilt.
- Any external security lighting will be set on motion-sensors and short (1min) timers.
- As a last resort, accessories such as baffles, hoods or louvres will be used to reduce light spill and direct it only to where it is needed.

Any external lighting for the proposed development should strictly follow the above guidelines and these should be strictly implemented during construction and operation phase of the proposed development.

6.2.6 *Monitoring: Operational phase*

Acoustic surveys can be used to continue to assess bat activity and behaviour following construction of turbines to assess the ongoing need for curtailment mitigation. For example, it may be that the construction of wind turbines significantly reduces bat activity at the site relative to that recorded pre-construction and to a level at which there is no longer a need for curtailment.

The mitigation measures should be monitored by wildlife experts at intervals during the initial years of operation of the development to ensure successful implementation. Good practice also requires that impacts on adjoining areas are also monitored.

As described above, Years 1-3 Surveillance, Year 10 Surveillance and Year 20 Surveillance is required.

a) Static Surveys
- Minimum of 5 nights surveillance per turbine
- 3 periods within the months of March/April to October/November
- 3 periods should be Spring, Summer and Autumn to investigate bat activity during the 3 periods where bat collisions have been documented and when bat movement is at its highest.

b) Carcass Searches
- Minimum of 1 morning per turbine during the 5 day static survey.
- After ideal bat foraging weather conditions (mild, calm and dry weather and greater than 10^{o}C). Searches should be completed at dawn in order to find bats before predation of corpses occurs.
- Follow best practice carcass search protocols as new guidelines are published/updated.
- Include scavenger trials as per NaturScot (2021) guidelines.

c) Curtailment Monitoring
- As per NaturScot (2021) guidelines at the turbines where curtailment will be applied.

It should aim to assess changes in bat activity patterns and the efficacy of mitigation to inform any changes to curtailment. Monitoring should take place for at least 3 years post-construction, but the effects of habitat modification and off-site enhancements on bat activity may require monitoring over a longer period.

7. Survey Conclusions

The survey area is deemed to have a Low landscape favourability for Irish bat species. However there is medium connectivity between the linear habitats and woodland habitats and this increases the favourability for the proposed development site for foraging and commuting bats.

During bat surveys eight species of bat were recorded within the survey area and this is a high level of bat biodiversity. The level of bat activity recorded in 2020 was in general Low but some Moderate to High levels were recorded on specific statis units during surveillance, particularly for Leisler's bats, common pipistrelle and soprano pipistrelle., While all three species are common Irish bat species they are also considered to be High Risk bat species in relation to the operation of wind farms. In 2022, there was generally higher level of bat activity recorded during the static surveillance periods, particularly for the *Pipistrellus* species (i.e. common and soprano pipistrelles).

In areas of open cutover bog or lowland blanket bog, the level of bat activity was lower and generally less commuting individuals was recorded along with occasional opportunistic feeding. However, areas with deciduous treelines, woodland edge and woodland tracks had a higher level of bat activity, particularly commuting individuals to preferred foraging habitats. There was a higher level of bat dispersal recorded during the Autumn Surveillance periods compared to the Spring and Summer Surveillance periods.

Eighteen turbines are proposed as part of this wind farm development. Bat activity was recorded at all or in vicinity of the proposed turbine locations. Additional bat activity was recorded along much of the walking and driven transect routes while a lower level was recorded in open areas of cutover bog and lowland bog. But this is also a reflection of restricted survey locations during the hours of darkness.

A number of bat roosts were recorded the proposed development site, including a maternity roost of Natterer's bats. Specific bat mitigation measures are recommended to protect this colony.

The location of wind turbines is important in relation to their potential impact on local bat populations. To reduce impact on High Risk species such as common and soprano pipistrelle, it is important to ensure that turbines are not located adjacent to the linear habitat features and habitat considered important for foraging bats. To reduce the impact on High Risk species such as Leisler's bats that flying high and over tree canopies, it important to ensure that turbine are located away from mature trees (treelines, woodland etc.). The proposed development will impact on local bat populations and this is primarily due to the moderate to high levels of bat activity of three common bat species. All three of these bat species are considered to be High Risk species in relation to wind farms. As a consequence bat mitigation measures are required.

The mitigation measures recommended in this report require strict implementation to reduce the long-term impact of the proposed wind farm on local bat populations. The proposed wind farm is likely to have an overall Moderate impact on local bat populations. The implementation of mitigation measures will likely potential reduces this to a Low Impact on local bat populations.

Monitoring (including acoustic surveillance and carcass surveys) is essential to determine that mitigation measures recommended are reducing the potential impacts on local bat populations. The operation of the wind farm should be flexible to implement changes, if recommended, by the monitoring results.

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9. Appendices

9.1 Appendix 1 Relevant Legislation & Bat Species Status in Ireland

9.1.1 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)

9.1.2 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.

9.1.3 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'.

9.1.4 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).

9.1.5 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

9.2 Appendix 2 Tables from Collins (2016)

Table 1a: 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 1b: 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.

9.3 Appendix 3 Site Risk Assessment & Impact Assessment

According to NaturScot, 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 NaturScot, 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 NaturScot (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 (18 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

Tables from NaturScot (2021)

Table 3a: *Stage 1 - Initial site risk assessment*

Site Risk Level (1-5)*		Project Size		
		Small	**Medium**	**Large**
Habitat Risk	**Low**	1	2	3
	Moderate	2	3	4
	High	3	4	5

Key: Green (1-2) - low/lowest site risk; Amber (3) - medium site risk; Red (4-5) - high/highest site risk.

* Some sites could conceivably be assessed as being of no (0) risk to bats. This assessment is only likely to be valid in more extreme environments, such as above the known altitudinal range of bats, or outside the known geographical distribution of any resident British species.

Habitat Risk	Description
Low	Small number of potential roost features, of low quality. Low quality foraging habitat that could be used by small numbers of foraging bats. Isolated site not connected to the wider landscape by prominent linear features.
Moderate	Buildings, trees or other structures with moderate-high potential as roost sites on or near the site. Habitat could be used extensively by foraging bats. Site is connected to the wider landscape by linear features such as scrub, tree lines and streams.
High	Numerous suitable buildings, trees (particularly mature ancient woodland) or other structures with moderate-high potential as roost sites on or near the site, and/or confirmed roosts present close to or on the site. Extensive and diverse habitat mosaic of high quality for foraging bats. Site is connected to the wider landscape by a network of strong linear features such as rivers, blocks of woodland and mature hedgerows. At/near edge of range and/or on an important flyway. Close to key roost and/or swarming site.

Project Size	Description
Small	Small scale development (≤10 turbines). No other wind energy developments within 10km. Comprising turbines <50m in height.
Medium	Larger developments (between 10 and 40 turbines). May have some other wind developments within 5km. Comprising turbines 50-100m in height.
Large	Largest developments (>40 turbines) with other wind energy developments within 5km. Comprising turbines >100m in height.

Table 3b: *Stage 2 - Overall risk assessment*

Site risk level (from Table 3a)	Ecobat activity category (or equivalent justified categorisation)					
	Nil (0)	Low (1)	Low-moderate (2)	Moderate (3)	Moderate-high (4)	High (5)
Lowest (1)	0	1	2	3	4	5
Low (2)	0	2	4	6	8	10
Med (3)	0	3	6	9	12	15
High (4)	0	4	8	12	15	18
Highest (5)	0	5	10	15	20	25

9.4 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)

9.5 Appendix 5 Location of Static Units 2020 & 2022

Table 2a: Static Surveillance Periods and Location of static units deployed in 2020.

EcoBat Code	Static Unit Type	ITM Easting	ITM Northing	Latitude	Longitude
Spring 1	SM4 Unit 1	500359	822217	54.139298	-9.524901
Spring 2	SM4 Unit 2	500357	822544	54.142235	-9.5250396
Spring 3	SM4 Unit 3	501578	819527	54.115372	-9.5053779
Spring 4	SM4 Unit 4	501779	819894	54.118703	-9.5024311
Spring 5	SM4 Unit 5	500301	820690	54.125572	-9.5252842
Spring 6	SM Mini Bat 1	501892	822095	54.138497	-9.5014113
Spring 7	SM Mini Bat 2	502400	821956	54.137346	-9.4935957
Spring 8	SM Mini Bat 3	502723	822781	54.144817	-9.4889232
Spring 9	SM Mini Bat 4	503339	822933	54.146298	-9.4795453
Spring 10	SM Mini Bat 5	503867	823354	54.150177	-9.4716068
Spring 11	SM Mini Bat 6	503389	823740	54.153563	-9.4790385
Spring 12	SM Mini Bat 7	502890	823415	54.150549	-9.4865693
Spring 13	SM Mini Bat 8	503335	824277	54.158375	-9.4800366
Spring 14	SM Mini Bat 9	502934	824501	54.160306	-9.4862461
Spring 15	SM Mini Bat 10	502729	820503	54.124357	-9.4880953
Spring 16	SM3	499922	820999	54.128274	-9.5311821
Spring 17	SM2 Unit 5	501009	821860	54.136217	-9.5148411
Spring 18	Unit A	500856	823358	54.149642	-9.5176717
Spring 19	Unit B	501111	822647	54.143306	-9.5135387
Summer 1	SM Mini Bat 1	501877	822442	54.141611	-9.5017535
Summer 2	SM Mini Bat 2	502708	821620	54.134386	-9.4887762
Summer 3	SM Mini Bat 3	503065	822136	54.139088	-9.4834814
Summer 4	SM Mini Bat 4	503786	822430	54.141864	-9.472546
Summer 5	SM Mini Bat 5	503332	822694	54.14415	-9.4795758
Summer 6	SM Mini Bat 6	502844	823476	54.151082	-9.4872934
Summer 7	SM Mini Bat 7	503458	824845	54.163494	-9.4783366
Summer 8	SM Mini Bat 8	503947	825233	54.167071	-9.4709756
Summer 9	SM Mini Bat 9	502794	823958	54.155408	-9.4882081
Summer 10	SM Mini Bat 10	502465	822850	54.145388	-9.4928903
Summer 11	SM Mini Bat 1	501007	822463	54.141633	-9.5150746
Summer 12	SM Mini Bat 2	500593	822589	54.142688	-9.521445
Summer 13	SM Mini Bat 3	500378	821818	54.135715	-9.524479
Summer 14	SM Mini Bat 4	499655	821155	54.12963	-9.535307
Summer 15	SM Mini Bat 5	500743	820411	54.123154	-9.5184337
Summer 16	SM Mini Bat 6	500696	821136	54.129652	-9.519388
Summer 17	SM Mini Bat 7	501117	820099	54.120423	-9.512611
Summer 18	SM Mini Bat 8	501661	819372	54.113991	-9.5040621
Summer 19	SM Mini Bat 9	502556	820167	54.121304	-9.4906294
Summer 20	SM Mini Bat 10	503064	820724	54.126402	-9.483043
Autumn 1	SM Mini Bat 3	502411	821945	54.13725	-9.4934279
Autumn 2	SM Mini Bat 4	503077	822132	54.139055	-9.4833008
Autumn 3	SM Mini Bat 5	503791	822419	54.141768	-9.4724576
Autumn 4	SM Mini Bat 6	503020	822519	54.142522	-9.4842854
Autumn 5	SM Mini Bat 7	503560	822782	54.144988	-9.4761098
Autumn 6	SM Mini Bat 8	503820	823396	54.150551	-9.4723257
Autumn 7	SM Mini Bat 9	502854	823467	54.151002	-9.4871373
Autumn 8	SM Mini Bat 10	503420	823587	54.152187	-9.4785148
Autumn 9	SM Mini Bat 11	502948	824483	54.160149	-9.4860249
Autumn 10	SM Mini Bat 1	503384	820630	54.125621	-9.4781191
Autumn 11	SM Mini Bat 3	502243	819678	54.116854	-9.4952607
Autumn 12	SM Mini Bat 4	501169	819941	54.119012	-9.511768
Autumn 13	SM Mini Bat 5	500579	820843	54.127	-9.5210862
Autumn 14	SM Mini Bat 6	500906	821305	54.13121	-9.5162407
Autumn 15	SM Mini Bat 7	499614	821278	54.13072	-9.5359888
Autumn 16	SM Mini Bat 8	499931	821782	54.135309	-9.5313074
Autumn 17	SM Mini Bat 9	500361	822193	54.139084	-9.5248655

Autumn 18	SM Mini Bat 10	500667	822719	54.143864	-9.5203574
Autumn 19	SM Mini Bat 11	499803	822835	54.144743	-9.5336148
Autumn 20	SM Mini Bat 12	501195	823049	54.146934	-9.5123872

Table 2b: Static Surveillance Periods and Location of static units deployed in relation to proposed turbine locations in 2020.

EcoBat Code	Static Unit Type	Turbine No. (within 500m)	Distance (m)
Spring 1	SM4 Unit 1	T5	255m
Spring 2	SM4 Unit 2	T4	280m
Spring 3	SM4 Unit 3	No turbine	
Spring 4	SM4 Unit 4	No turbine	
Spring 5	SM4 Unit 5	No turbine	
Spring 6	SM Mini Bat 1	No turbine	
Spring 7	SM Mini Bat 2	T12	120m
Spring 8	SM Mini Bat 3	T11	255m
Spring 9	SM Mini Bat 4	T14	250m
Spring 10	SM Mini Bat 5	T17	175m
Spring 11	SM Mini Bat 6	T18	160m
Spring 12	SM Mini Bat 7	T11	385m
Spring 13	SM Mini Bat 8	T9	310m
Spring 14	SM Mini Bat 9	T9	420m
Spring 15	SM Mini Bat 10	No turbine	
Spring 16	SM3	No turbine	
Spring 17	SM2 Unit 5	No turbine	
Spring 18	Unit A	T6	270m
Spring 19	Unit B	T3	290m
Summer 1	SM Mini Bat 1	No turbine	
Summer 2	SM Mini Bat 2	T12 & T13	350m, 310m
Summer 3	SM Mini Bat 3	T15	260m
Summer 4	SM Mini Bat 4	T16	400m
Summer 5	SM Mini Bat 5	T14	180m
Summer 6	SM Mini Bat 6	T11	460m
Summer 7	SM Mini Bat 7	T9	280m
Summer 8	SM Mini Bat 8	T10	140m
Summer 9	SM Mini Bat 9	T8	160m
Summer 10	SM Mini Bat 10	No turbine	
Summer 11	SM Mini Bat 1	T3	75m
Summer 12	SM Mini Bat 2	T4	70m
Summer 13	SM Mini Bat 3	T2 & T5	120m, 400m
Summer 14	SM Mini Bat 4	No turbine	
Summer 15	SM Mini Bat 5	No turbine	
Summer 16	SM Mini Bat 6	No turbine	
Summer 17	SM Mini Bat 7	No turbine	
Summer 18	SM Mini Bat 8	No turbine	
Summer 19	SM Mini Bat 9	No turbine	
Summer 20	SM Mini Bat 10	No turbine	
Autumn 1	SM Mini Bat 3	T12	110m
Autumn 2	SM Mini Bat 4	T15	230m
Autumn 3	SM Mini Bat 5	T16	410m
Autumn 4	SM Mini Bat 6	T14	180m
Autumn 5	SM Mini Bat 7	T14 & T16	420m, 380m
Autumn 6	SM Mini Bat 8	T17	195m
Autumn 7	SM Mini Bat 9	T8 & T11	490m, 445m
Autumn 8	SM Mini Bat 10	T18	85m
Autumn 9	SM Mini Bat 11	T9	400m
Autumn 10	SM Mini Bat 1	No turbine	
Autumn 11	SM Mini Bat 3	No turbine	
Autumn 12	SM Mini Bat 4	No turbine	
Autumn 13	SM Mini Bat 5	No turbine	

Autumn 14	SM Mini Bat 6	No turbine	
Autumn 15	SM Mini Bat 7	No turbine	
Autumn 16	SM Mini Bat 8	T5	400m
Autumn 17	SM Mini Bat 9	T5 & T2	250m, 340m
Autumn 18	SM Mini Bat 10	T4 & T3	85m, 470m
Autumn 19	SM Mini Bat 11	T1	365m
Autumn 20	SM Mini Bat 12	T7	270m

Table 2c: Static Surveillance Periods and Location of static units deployed in 2022.

EcoBat Code	Static Unit Type	ITM Easting	ITM Northing
Spring 20	SM Mini 1	503958	822818
Spring 21	SM Mini 3	503793	825195
Spring 22	SM Mini 5	502512	821904
Spring 23	SM Mini 6	502946	823999
Spring 24	SM Mini 8	502978	821462
Spring 25	SM Mini 10	502964	823033
Spring 26	SM Mini 11	503354	824574
Spring 27	SM Mini 12	501434	823187
Spring 28	SM4 Unit 2	503328	822177
Spring 29	SM4 Unit 3	500495	821873
Spring 30	SM4 Unit 4	500128	822134
Spring 31	SM4 Unit 7	499907	822560
Spring 32	SM4 Unit 8	500595	823431
Summer 21	SM Mini 2	502513	821902
Summer 22	SM Mini 6	502979	821462
Summer 23	SM Mini 1	503326	822159
Summer 24	SM4U1	503958	822816
Summer 25	SM Mini 10	502933	823018
Summer 26	SM Mini 13	502946	824001
Summer 27	SM Mini 11	503320	824589
Summer 28	SM Mini 7	503790	825196
Summer 29	SM Mini 5	501435	823168
Summer 30	SM Mini 12	500627	823408
Summer 31	SM4 U8	500496	821879
Summer 32	SM4 U7	500124	822125
Summer 33	SM4 U3	499907	822557
Autumn 22	SM4 U9	499907	822562
Autumn 23	SM4 U10	500507	821871
Autumn 24	SM4 U1	501027	822404
Autumn 25	SM4 U5	500565	822607
Autumn 26	SM Mini 12	501454	823196
Autumn 27	SM Mini 10	502976	823997
Autumn 28	SM Mini 4	503353	824571
Autumn 29	SM Mini 5	502933	823017
Autumn 30	SM Mini 7	502981	821457
Autumn 31	SM Mini 11	503147	822623
Autumn 32	SM Mini 13	503798	823257
Autumn 33	SM4 U6	503469	823610
Autumn 34	SM Mini 8	502492	821931

Table 2d: Static Surveillance Periods and Location of static units deployed in relation to proposed turbine locations in 2022.

EcoBat Code	Static Unit Type	Turbine No.
Spring 20	SM Mini 1	T16
Spring 21	SM Mini 3	T10
Spring 22	SM Mini 5	T12
Spring 23	SM Mini 6	T8
Spring 24	SM Mini 8	T13
Spring 25	SM Mini 10	T11
Spring 26	SM Mini 11	T9
Spring 27	SM Mini 12	T7
Spring 28	SM4 Unit 2	T15
Spring 29	SM4 Unit 3	T2
Spring 30	SM4 Unit 4	T5
Spring 31	SM4 Unit 7	T1
Spring 32	SM4 Unit 8	T6
Summer 21	SM Mini 2	T12
Summer 22	SM Mini 6	T13
Summer 23	SM Mini 1	T15
Summer 24	SM4U1	T16
Summer 25	SM Mini 10	T11
Summer 26	SM Mini 13	T8
Summer 27	SM Mini 11	T9
Summer 28	SM Mini 7	T10
Summer 29	SM Mini 5	T7
Summer 30	SM Mini 12	T6
Summer 31	SM4 U8	T2
Summer 32	SM4 U7	T5
Summer 33	SM4 U3	T1
Autumn 22	SM4 U9	T1
Autumn 23	SM4 U10	T2
Autumn 24	SM4 U1	T3
Autumn 25	SM4 U5	T4
Autumn 26	SM Mini 12	T7
Autumn 27	SM Mini 10	T8
Autumn 28	SM Mini 4	T9
Autumn 29	SM Mini 5	T11
Autumn 30	SM Mini 7	T13
Autumn 31	SM Mini 11	T14
Autumn 32	SM Mini 13	T17
Autumn 33	SM4 U6	T18
Autumn 34	SM Mini 8	T12

9.6 Appendix 6 2020 Survey Work Log

No.	Date	Survey Type	Location	Start time	End Time	Surveyor
1	07/05/2020	Static deployment	T1- T16	13:00	20:00	TA, SB
2	07/05/2020	Dusk surveys	Visitor centre, Shed	21:11	22:51	TA, SB
3	07/05/2020	Walking transects	Visitor centre to BnM T13.	22:51	00:35	TA
4	07/05/2020	Walking transects	Woodland track from BnM T13 to proposed location of T15. Along tracks of existing BnM turbines.	22:51	00:40	SB
5	13/05/2020	Change batteries of 3 static units	Bat Logger Unit A & Unit B, Sm2 Unit 2.	17:00	18:00	SB
6	13/05/2020	Driving transect	Location roads and N59	22:00	23:30	SB
7	10/06/2020	Dusk surveys	Lumber shed	22:00	23:40	TA, SB
8	10/06/2020	Driving transect	Accessible tracks	23:40	01:20	TA, SB
9	11/06/2020	Static deployment	x10 units	09:00	18:00	TA, SB
10	24/06/2020	Static collect	x10 units	09:00	18:00	TA, SB
11	24/06/2020	Walking transects	Bog & tracks	22:15	02:30	SB
12	24/06/2020	Dusk surveys	Toilet block/Shed	22:00	23:40	TA
13	24/06/2020	Walking transects	Accessible tracks	23:40	02:23	TA
14	25/06/2020	Driving transect	Accessible tracks	02:30	03:30	TA
15	25/06/2020	Dawn survey	Interpretative centre	03:30	04:40	TA
16	26/06/2020	Static deployment	x10 units	09:00	18:00	TA, SB
17	26/06/2020	IR Camera Filming	Toilet block/Shed	22:00	23:40	EB
18	26/06/2020	Walking transects	Tracks only access on foot	22:00	00:45	TA
19	26/06/2020	Walking transects	Bog area (no tracks)	22:00	00:45	SB
20	26/06/2020	Walking transects	Existing turbines (BnaM)	23:40	01:00	EB
21	08/07/2020	Static collection	x10 units	09:00	18:00	TA, SB
22	29/08/2020	Dusk survey	Toilet block/Shed	20:25	22:05	TA, EB
23	29/08/2020	Dusk survey	BnaM buildings	20:25	22:05	SB
24	29/08/2020	Driving transect	Accessible tracks	22:30	23:30	TA, EB
25	05/09/2020	Static deployment	x12 units	09:00	18:00	TA, SB
26	16/09/2020	Dusk Survey	Interpretative centre	19:40	21:20	TA, SB
27	17/09/2020	Walking transects	Accessible tracks	20:35	23:00	TA, SB
28	28/09/2020	Static collection	x6 units	14:00	18:00	SB
29	29/09/2020	Static collection	x6 units	22:00	14:00	SB
30	04/11/2020	Collection of static on mast	x1 unit - weather mast	22:00	14:00	SB

9.7 Appendix 7 Static Surveillance Results

Table A: 2020 Spring Static Surveillance Results

Ppy – soprano pipistrelle, Ppip = common pipistrelle, Pna = Nathuius' pipistrelle, Nl = Leisler's bat, Md = Daubenton's bat, Mm = Whiskered bat, Mn = Natterer's bat, Myotis = *Myotis* species, Pa = brown long-eared bat.

EcoBat Tool Code	Ppy	Ppip	Nl	Md	Mm	Mn	Myotis	Pa	Total Passes	Duration
Spring 1	2	4	0	1	0	44	0	0	**51**	10 nights
Spring 2	3	4	1	6	0	10	9	0	**33**	10 nights
Spring 3	7	3	8	9	1	4	6	0	**38**	10 nights
Spring 4	0	3	0	0	0	0	1	0	**4**	10 nights
Spring 5	8	14	6	13	0	5	9	0	**55**	10 nights
Spring 6	39	35	39	4	1	4	3	1	**126**	10 nights
Spring 7	7	4	7	1	0	0	0	0	**19**	10 nights
Spring 8	4	6	6	2	0	0	1	0	**19**	10 nights
Spring 9	12	85	4	3	0	0	1	0	**105**	10 nights
Spring 10	4	10	12	1	0	3	1	1	**32**	10 nights
Spring 11	3	14	1	1	1	0	1	1	**22**	10 nights
Spring 12	19	46	24	2	0	0	7	7	**105**	10 nights
Spring 13	0	2	2	1	0	1	0	1	**7**	10 nights
Spring 14	3	5	4	0	0	1	0	0	**13**	10 nights
Spring 15	3	6	6	3	0	4	0	0	**22**	10 nights
Spring 16	1	3	0	0	0	3	0	0	**7**	10 nights
Spring 17	15	1	13	1	0	219	49	1	**299**	10 nights
Spring 18	4	0	0	0	0	0	1	0	**5**	10 nights
Spring 19	10	8	20	1	1	3	2	0	**45**	10 nights

Table B: 2020 Summer Static Surveillance Results

EcoBat Tool Code	Ppy	Ppip	Nl	Md	Mm	Mn	Myotis	Pa	Total Passes	Duration
Summer 1	92	126	10	7	0	3	3	3	**244**	15 nights
Summer 2	28	31	8	0	0	0	0	0	**67**	15 nights
Summer 3	15	19	3	0	0	0	0	0	**37**	15 nights
Summer 4	0	0	0	0	0	0	0	0	**0**	15 nights
Summer 5	17	20	4	1	0	0	0	1	**43**	15 nights
Summer 6	38	42	1	1	0	0	2	1	**85**	15 nights
Summer 7	13	44	1	0	0	1	2	0	**61**	15 nights
Summer 8	36	46	4	2	1	0	0	1	**90**	15 nights
Summer 9	15	47	6	0	0	0	0	0	**68**	15 nights
Summer 10	101	142	13	7	0	3	7	1	**274**	15 nights
Summer 11	11	4	0	1	0	3	0	1	**20**	13 nights
Summer 12	20	11	1	2	0	2	1	0	**37**	13 nights
Summer 13	41	28	0	7	0	3	2	0	**81**	13 nights
Summer 14	0	0	0	0	0	0	0	0	**0**	13 nights
Summer 15	0	0	0	0	0	0	0	0	**0**	13 nights
Summer 16	933	592	1	13	1	14	6	1	**1561**	13 nights
Summer 17	8	15	9	15	1	2	0	0	**50**	13 nights
Summer 18	29	8	6	5	0	1	0	1	**50**	13 nights
Summer 19	3	3	2	1	0	0	0	2	**11**	13 nights
Summer 20	3	3	0	0	0	0	0	0	**6**	13 nights

Table C: 2020 Autumn Static Surveillance Results

EcoBat Tool Code	Ppy	Ppip	Pna	Nl	Md	Mm	Mn	Myotis	Pa	Total Passes	Duration
Autumn 1	13	15	0	3	2	0	0	1	1	**35**	10 nights
Autumn 2	15	25	0	0	0	0	0	0	0	**40**	10 nights
Autumn 3	16	15	0	0	0	0	0	0	0	**31**	10 nights
Autumn 4	8	13	0	0	3	0	0	3	1	**28**	10 nights
Autumn 5	14	19	0	2	1	0	2	1	0	**39**	10 nights
Autumn 6	13	15	0	2	2	0	0	2	1	**35**	10 nights
Autumn 7	51	51	0	4	7	0	1	5	4	**123**	10 nights
Autumn 8	22	25	0	0	3	0	14	5	8	**77**	10 nights
Autumn 9	16	32	0	1	2	0	0	8	3	**62**	10 nights
Autumn 10	692	41	0	0	1	0	0	0	0	**734**	10 nights
Autumn 11	7	1	0	0	0	0	3	0	7	**18**	10 nights
Autumn 12	0	0	0	0	0	0	0	0	0	**0**	10 nights
Autumn 13	10	2	0	4	5	0	12	0	7	**40**	10 nights
Autumn 14	92	2	0	4	11	0	7	1	5	**122**	10 nights
Autumn 15	24	6	0	2	4	0	12	2	3	**53**	10 nights
Autumn 16	55	7	0	1	10	1	22	7	12	**115**	10 nights
Autumn 17	34	14	0	1	9	0	24	7	4	**93**	10 nights
Autumn 18	29	26	0	1	12	0	33	4	7	**112**	10 nights
Autumn 19	19	9	0	1	1	0	5	0	3	**38**	10 nights
Autumn 20	18	8	1	0	10	0	20	3	8	**68**	10 nights
Autumn 21	0	0	0	0	0	0	0	0	0	**0**	44 nights

Note: Autumn 21 – is static located at height on the weather mast.

Table D: Total number of bat passes recorded on each static unit deployed during 2020 static surveillance.

EcoBat Tool Code	Total Passes	Duration	Average
Spring 1	**51**	10 nights	5.1
Spring 2	**33**	10 nights	3.3
Spring 3	**38**	10 nights	3.8
Spring 4	**4**	10 nights	0.4
Spring 5	**55**	10 nights	5.5
Spring 6	**126**	10 nights	12.6
Spring 7	**19**	10 nights	1.9
Spring 8	**19**	10 nights	1.9
Spring 9	**105**	10 nights	10.5
Spring 10	**32**	10 nights	3.2
Spring 11	**22**	10 nights	2.2
Spring 12	**105**	10 nights	10.5
Spring 13	**7**	10 nights	0.7
Spring 14	**13**	10 nights	1.3
Spring 15	**22**	10 nights	2.2
Spring 16	**7**	10 nights	0.7
Spring 17	**299**	10 nights	29.9
Spring 18	**5**	10 nights	0.5
Spring 19	**45**	10 nights	4.5
Summer 1	244	15 nights	16.3

Summer 2	67	15 nights	4.5
Summer 3	37	15 nights	2.5
Summer 4	0	15 nights	0.0
Summer 5	43	15 nights	2.9
Summer 6	85	15 nights	5.7
Summer 7	61	15 nights	4.1
Summer 8	90	15 nights	6.0
Summer 9	68	15 nights	4.5
Summer 10	274	15 nights	18.3
Summer 11	20	13 nights	1.5
Summer 12	37	13 nights	2.8
Summer 13	81	13 nights	6.2
Summer 14	0	13 nights	0.0
Summer 15	0	13 nights	0.0
Summer 16	1561	13 nights	120.1
Summer 17	50	13 nights	3.8
Summer 18	50	13 nights	3.8
Summer 19	11	13 nights	0.8
Summer 20	6	13 nights	0.5
Autumn 1	35	10 nights	3.5
Autumn 2	40	10 nights	4.0
Autumn 3	31	10 nights	3.1
Autumn 4	28	10 nights	2.8
Autumn 5	39	10 nights	3.9
Autumn 6	35	10 nights	3.5
Autumn 7	123	10 nights	12.3
Autumn 8	77	10 nights	7.7
Autumn 9	62	10 nights	6.2
Autumn 10	734	10 nights	73.4
Autumn 11	18	10 nights	1.8
Autumn 12	0	10 nights	0.0
Autumn 13	40	10 nights	4.0
Autumn 14	122	10 nights	12.2
Autumn 15	53	10 nights	5.3
Autumn 16	115	10 nights	11.5
Autumn 17	93	10 nights	9.3
Autumn 18	112	10 nights	11.2
Autumn 19	38	10 nights	3.8
Autumn 20	68	10 nights	6.8

Table E: 2022 Spring Static Surveillance Results

EcoBat Tool Code	Ppy	Ppip	Pnath	Nl	Md	Mm	Mn	My	Pa	Total Passes	Duration
Spring 20	0	7	0	0	0	0	0	0	0	**7**	12 nights
Spring 21	0	0	0	0	0	0	0	0	0	**0**	12 nights
Spring 22	3	6	0	2	1	0	0	0	1	**13**	12 nights
Spring 23	9	2	0	0	2	0	1	0	5	**19**	12 nights
Spring 24	12	11	0	21	1	0	1	0	4	**50**	12 nights
Spring 25	8	11	0	1	4	0	1	0	3	**28**	12 nights
Spring 26	23	19	0	0	3	0	4	4	4	**57**	12 nights
Spring 27	7	3	0	0	8	0	19	10	7	**54**	12 nights
Spring 28	10	12	0	0	1	0	0	0	1	**24**	12 nights
Spring 29	0	0	0	0	0	0	0	0	0	**0**	12 nights
Spring 30	4	0	0	0	0	0	0	0	0	**4**	12 nights
Spring 31	4	2	0	1	1	1	11	4	2	**26**	12 nights
Spring 32	6	1	0	0	2	0	20	11	3	**43**	12 nights

Table F: 2022 Summer Static Surveillance Results

EcoBat Tool Code	Ppy	Ppip	Pnath	Nl	Md	Mm	Mn	My	Pa	Total Passes	Duration
Summer 21	29	24	0	12	1	0	0	0	1	**67**	10 nights
Summer 22	18	11	0	16	1	0	0	0	1	**47**	10 nights
Summer 23	0	1	0	0	0	0	0	0	0	**1**	10 nights
Summer 24	76	56	0	9	0	0	4	11	3	**159**	10 nights
Summer 25	14	11	0	11	0	0	0	1	1	**38**	10 nights
Summer 26	12	10	0	6	0	0	0	0	1	**29**	10 nights
Summer 27	16	16	0	7	0	0	0	1	0	**40**	10 nights
Summer 28	8	14	0	4	0	0	0	0	2	**28**	10 nights
Summer 29	18	9	0	12	1	0	0	0	1	**41**	10 nights
Summer 30	13	6	0	10	2	0	0	0	0	**31**	10 nights
Summer 31	163	83	0	15	5	0	5	4	0	**275**	10 nights
Summer 32	37	35	0	6	0	2	4	9	1	**94**	10 nights
Summer 33	36	24	0	2	28	2	43	26	1	**162**	10 nights

Table G: 2022 Autumn Static Surveillance Results

EcoBat Tool Code	Ppy	Ppip	Pnath	Nl	Md	Mm	Mn	My	Pa	Total Passes	Duration
Autumn 22	1063	116	0	5	40	16	21	7	8	**1276**	12 nights
Autumn 23	102	33	0	3	31	3	33	34	52	**291**	12 nights
Autumn 24	101	28	1	3	47	5	66	36	21	**308**	12 nights
Autumn 25	77	35	0	4	22	3	170	33	21	**365**	12 nights
Autumn 26	128	90	0	5	21	6	25	11	19	**305**	12 nights
Autumn 27	24	25	0	3	5	0	13	0	29	**99**	12 nights
Autumn 28	39	31	0	1	4	0	9	1	26	**111**	12 nights
Autumn 29	52	76	0	6	14	0	11	0	13	**172**	12 nights
Autumn 30	62	87	0	7	3	0	13	1	15	**188**	12 nights
Autumn 31	54	75	0	10	6	0	8	3	14	**170**	12 nights
Autumn 32	70	69	0	16	16	1	10	2	19	**203**	12 nights
Autumn 33	100	59	0	9	0	0	13	50	42	**273**	12 nights
Autumn 34	16	20	0	1	2	0	1	2	4	**46**	12 nights

Table H: Total number of bat passes recorded on each static unit deployed during 2022 static surveillance.

EcoBat Tool Code	Total Passes	Duration	Average
Spring 20	7	12 nights	0.6
Spring 21	0	12 nights	0.0
Spring 22	13	12 nights	1.1
Spring 23	19	12 nights	1.6
Spring 24	50	12 nights	4.2
Spring 25	28	12 nights	2.3
Spring 26	57	12 nights	4.8
Spring 27	54	12 nights	4.5
Spring 28	24	12 nights	2.0
Spring 29	0	12 nights	0.0
Spring 30	4	12 nights	0.3
Spring 31	26	12 nights	2.2
Spring 32	43	12 nights	3.6
Summer 21	67	10 nights	6.7
Summer 22	47	10 nights	4.7
Summer 23	1	10 nights	0.1
Summer 24	159	10 nights	15.9
Summer 25	38	10 nights	3.8
Summer 26	29	10 nights	2.9
Summer 27	40	10 nights	4.0
Summer 28	28	10 nights	2.8
Summer 29	41	10 nights	4.1
Summer 30	31	10 nights	3.1
Summer 31	275	10 nights	27.5
Summer 32	94	10 nights	9.4
Summer 33	162	10 nights	16.2
Autumn 22	1276	10 nights	127.6
Autumn 23	291	10 nights	29.1
Autumn 24	308	10 nights	30.8
Autumn 25	365	10 nights	36.5
Autumn 26	305	10 nights	30.5
Autumn 27	99	10 nights	9.9
Autumn 28	111	10 nights	11.1
Autumn 29	172	10 nights	17.2
Autumn 30	188	10 nights	18.8
Autumn 31	170	10 nights	17.0
Autumn 32	203	10 nights	20.3
Autumn 33	273	10 nights	27.3
Autumn 34	46	10 nights	4.6

9.8 Appendix 8 EcoBat Tool 2020 Results Compared to 2022 Static Results

Table I: Total number of bat passes recorded for each bat species during static analysis – All 2020 and 2022 statics.

Notes: The 2020 statics were analysed using EcoBat Tool and each static was given a value in relation to activity level. In this table all of the 2020 statics are colour coded according to the highest EcoBat Tool level assigned. Yellow – High (EcoBat Tool Code); Orange – Moderate to High; Green – Moderate; Blue – Moderate to Low & Low.

This was then compared to the 2022 static results using the Total Number of Bat Passes Recorded / No. of Nights (Duration) to give the Average number of bat passes per night. The table was then sorted from LOW to HIGHEST to see the range of figures and compare to EcoBat colour codes from 2020.

Using this Table, an EcoBat Tool code is assigned to the 2022 table according to position relative to the 2020 results to assist with the Risk Assessment.

EcoBat Tool Code	Turbine No.	Ppy	Ppip	Pnath	Nl	Md	Mm	Mn	Myotis	Pa	Total Passes	Duration	Average
Spring 21	T10	0	0	0	0	0	0	0	0	0	**0**	12	0.0
Spring 29	T2	0	0	0	0	0	0	0	0	0	**0**	12	0.0
Autumn 12	2020	0	0	0	0	0	0	0	0	0	**0**	10	0.0
Summer 14	2020	0	0	0	0	0	0	0	0	0	**0**	13	0.0
Summer 15	2020	0	0	0	0	0	0	0	0	0	**0**	13	0.0
Summer 4	2020	0	0	0	0	0	0	0	0	0	**0**	15	0.0
Summer 23	T15	0	1	0	0	0	0	0	0	0	**1**	10	0.1
Spring 30	T5	4	0	0	0	0	0	0	0	0	**4**	12	0.3
Spring 4	2020	0	3	0	0	0	0	0	1	0	**4**	10	0.4
Summer 20	2020	3	3	0	0	0	0	0	0	0	**6**	13	0.5
Spring 18	2020	4	0	0	0	0	0	0	1	0	**5**	10	0.5
Spring 20	T16	0	7	0	0	0	0	0	0	0	**7**	12	0.6
Spring 17	2020	1	3	0	0	0	0	2	0	0	**6**	10	0.6
Spring 13	2020	0	2	0	2	1	0	1	0	1	**7**	10	0.7
Summer 19	2020	3	3	0	2	1	0	0	0	2	**11**	13	0.8
Spring 22	T12	3	6	0	2	1	0	0	0	1	**13**	12	1.1
Spring 14	2020	3	5	0	4	0	0	1	0	0	**13**	10	1.3
Summer 11	2020	11	4	0	0	1	0	3	0	1	**20**	13	1.5
Spring 23	T8	9	2	0	0	2	0	1	0	5	**19**	12	1.6
Autumn 11	2020	7	1	0	0	0	0	3	0	7	**18**	10	1.8
Spring 7	2020	7	4	0	7	1	0	0	0	0	**19**	10	1.9
Spring 8	2020	4	6	0	6	2	0	0	1	0	**19**	10	1.9
Spring 28	T15	10	12	0	0	1	0	0	0	1	**24**	12	2.0
Spring 31	T1	4	2	0	1	1	1	11	4	2	**26**	12	2.2
Spring 11	2020	3	14	0	1	1	1	0	1	1	**22**	10	2.2
Spring 15	2020	3	6	0	6	3	0	4	0	0	**22**	10	2.2
Spring 25	T11	8	11	0	1	4	0	1	0	3	**28**	12	2.3
Summer 3	2020	15	19	0	3	0	0	0	0	0	**37**	15	2.5
Summer 28	T10	8	14	0	4	0	0	0	0	2	**28**	10	2.8
Autumn 4	2020	8	13	0	0	3	0	0	3	1	**28**	10	2.8
Summer 12	2020	20	11	0	1	2	0	2	1	0	**37**	13	2.8
Summer 5	2020	17	20	0	4	1	0	0	0	1	**43**	15	2.9
Summer 26	T8	12	10	0	6	0	0	0	0	1	**29**	10	2.9
Autumn 3	2020	16	15	0	0	0	0	0	0	0	**31**	10	3.1
Summer 30	T6	13	6	0	10	2	0	0	0	0	**31**	10	3.1
Spring 10	2020	4	10	0	12	1	0	3	1	1	**32**	10	3.2
Spring 2	2020	3	4	0	1	6	0	10	9	0	**33**	10	3.3
Autumn 1	2020	13	15	0	3	2	0	0	1	1	**35**	10	3.5
Autumn 6	2020	13	15	0	2	2	0	0	2	1	**35**	10	3.5
Spring 32	T6	6	1	0	0	2	0	20	11	3	**43**	12	3.6
Autumn 19	2020	19	9	0	1	1	0	5	0	3	**38**	10	3.8
Spring 3	2020	7	3	0	8	9	1	4	6	0	**38**	10	3.8
Summer 25	T11	14	11	0	11	0	0	0	1	1	**38**	10	3.8

Summer 17	2020	8	15	0	9	15	1	2	0	0	**50**	13	3.8
Summer 18	2020	29	8	0	6	5	0	1	0	1	**50**	13	3.8
Autumn 5	2020	14	19	0	2	1	0	2	1	0	**39**	10	3.9
Summer 27	T9	16	16	0	7	0	0	0	1	0	**40**	10	4.0
Autumn 13	2020	10	2	0	4	5	0	12	0	7	**40**	10	4.0
Autumn 2	2020	15	25	0	0	0	0	0	0	0	**40**	10	4.0
Summer 7	2020	13	44	0	1	0	0	1	2	0	**61**	15	4.1
Summer 29	T7	18	9	0	12	1	0	0	0	1	**41**	10	4.1
Spring 24	T13	12	11	0	21	1	0	1	0	4	**50**	12	4.2
Summer 2	2020	28	31	0	8	0	0	0	0	0	**67**	15	4.5
Spring 19	2020	10	8	0	20	1	1	3	2	0	**45**	10	4.5
Spring 27	T7	7	3	0	0	8	0	19	10	7	**54**	12	4.5
Summer 9	2020	15	47	0	6	0	0	0	0	0	**68**	15	4.5
Autumn 34	T12	16	20	0	1	2	0	1	2	4	**46**	10	4.6
Summer 22	T13	18	11	0	16	1	0	0	0	1	**47**	10	4.7
Spring 26	T9	23	19	0	0	3	0	4	4	4	**57**	12	4.8
Spring 1	2020	2	4	0	0	1	0	44	0	0	**51**	10	5.1
Autumn 15	2020	24	6	0	2	4	0	12	2	3	**53**	10	5.3
Spring 5	2020	8	14	0	6	13	0	5	9	0	**55**	10	5.5
Summer 6	2020	38	42	0	1	1	0	0	2	1	**85**	15	5.7
Summer 8	2020	36	46	0	4	2	1	0	0	1	**90**	15	6.0
Autumn 9	2020	16	32	0	1	2	0	0	8	3	**62**	10	6.2
Summer 13	2020	41	28	0	0	7	0	3	2	0	**81**	13	6.2
Summer 21	T12	29	24	0	12	1	0	0	0	1	**67**	10	6.7
Autumn 20	2020	18	8	1	0	10	0	20	3	8	**68**	10	6.8
Autumn 8	2020	22	25	0	0	3	0	14	5	8	**77**	10	7.7
Autumn 17	2020	34	14	0	1	9	0	24	7	4	**93**	10	9.3
Summer 32	T5	37	35	0	6	0	2	4	9	1	**94**	10	9.4
Autumn 27	T8	24	25	0	3	5	0	13	0	29	**99**	10	9.9
Spring 12	2020	19	46	0	24	2	0	0	7	7	**105**	10	10.5
Spring 9	2020	12	85	0	4	3	0	0	1	0	**105**	10	10.5
Autumn 28	T9	39	31	0	1	4	0	9	1	26	**111**	10	11.1
Autumn 18	2020	29	26	0	1	12	0	33	4	7	**112**	10	11.2
Autumn 16	2020	55	7	0	1	10	1	22	7	12	**115**	10	11.5
Autumn 14	2020	92	2	0	4	11	0	7	1	5	**122**	10	12.2
Autumn 7	2020	51	51	0	4	7	0	1	5	4	**123**	10	12.3
Spring 6	2020	39	35	0	39	4	1	4	3	1	**126**	10	12.6
Summer 24	T16	76	56	0	9	0	0	4	11	3	**159**	10	15.9
Summer 33	T1	36	24	0	2	28	2	43	26	1	**162**	10	16.2
Summer 1	2020	92	126	0	10	7	0	3	3	3	**244**	15	16.3
Autumn 31	T14	54	75	0	10	6	0	8	3	14	**170**	10	17.0
Autumn 29	T11	52	76	0	6	14	0	11	0	13	**172**	10	17.2
Summer 10	2020	101	142	0	13	7	0	3	7	1	**274**	15	18.3
Autumn 30	T13	62	87	0	7	3	0	13	1	15	**188**	10	18.8
Autumn 32	T17	70	69	0	16	16	1	10	2	19	**203**	10	20.3
Autumn 33	T18	100	59	0	9	0	0	13	50	42	**273**	10	27.3
Summer 31	T2	163	83	0	15	5	0	5	4	0	**275**	10	27.5
Autumn 23	T2	102	33	0	3	31	3	33	34	52	**291**	10	29.1
Spring 16	2020	15	1	0	13	1	0	219	49	1	**299**	10	29.9
Autumn 26	T7	128	90	0	5	21	6	25	11	19	**305**	10	30.5
Autumn 24	T3	101	28	1	3	47	5	66	36	21	**308**	10	30.8
Autumn 25	T4	77	35	0	4	22	3	170	33	21	**365**	10	36.5
Autumn 10	2020	692	41	0	0	1	0	0	0	0	**734**	10	73.4
Summer 16	2020	933	592	0	1	13	1	14	6	1	**1561**	13	120.1
Autumn 22	T1	1063	116	0	5	40	16	21	7	8	**1276**	10	127.6

Table J: Total number of bat passes recorded for each bat species during 2022 static analysis arrange according to Turbine No. Notes: Shaded to show which static units were in vicinity of which proposed turbine number.

Explanation: The Risk Value is divided by the number of static surveillance periods results (e.g. T1 – has 3 static surveillance periods. Therefore the total Risk Value of 11 is divided by 3 to get a Risk Value of 4 for this proposed turbine location.

EcoBat Tool Code	Turbine No.	Total Passes	Duration (Nights)	Average No. of Bat Passes	Risk Value
Spring 31	T1	26	12	2.2	3
Summer 33	T1	162	10	16.2	3
Autumn 22	T1	1276	10	127.6	5
Spring 29	T2	0	12	0.0	1
Summer 31	T2	275	10	27.5	5
Autumn 23	T2	291	10	29.1	5
Autumn 24	T3	308	10	30.8	5
Autumn 25	T4	365	10	36.5	5
Spring 30	T5	4	12	0.3	1
Summer 32	T5	94	10	9.4	3
Summer 30	T6	31	10	3.1	3
Spring 32	T6	43	12	3.6	3
Summer 29	T7	41	10	4.1	3
Spring 27	T7	54	12	4.5	3
Autumn 26	T7	305	10	30.5	5
Spring 23	T8	19	12	1.6	3
Summer 26	T8	29	10	2.9	3
Autumn 27	T8	99	10	9.9	3
Summer 27	T9	40	10	4.0	3
Spring 26	T9	57	12	4.8	3
Autumn 28	T9	111	10	11.1	3
Spring 21	T10	0	12	0.0	1
Summer 28	T10	28	10	2.8	3
Spring 25	T11	28	12	2.3	3
Summer 25	T11	38	10	3.8	3
Autumn 29	T11	172	10	17.2	3
Spring 22	T12	13	12	1.1	1
Autumn 34	T12	46	10	4.6	3
Summer 21	T12	67	10	6.7	3
Spring 24	T13	50	12	4.2	3
Summer 22	T13	47	10	4.7	3
Autumn 30	T13	188	10	18.8	3
Autumn 31	T14	170	10	17.0	3
Summer 23	T15	1	10	0.1	1
Spring 28	T15	24	12	2.0	3
Spring 20	T16	7	12	0.6	1
Summer 24	T16	159	10	15.9	3

Autumn 32	T17	203	10	20.3	3
Autumn 33	T18	273	10	27.3	5

10. Bat Species Profile

10.1 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.

10.2 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)

10.3 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 (km^2) (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).

10.4 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	km^2

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.

10.5 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).

10.6 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 (km²) (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.

10.7 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

10.8 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.