



Appendix 6D – Bat Survey Report

Ballynisky Wind Farm

Ballynisky Green Energy Ltd.

December 2025



Environmental Consultants

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Ballynisky Windfarm

Co. Limerick.



DOCUMENT DETAILS

Client: Ballynisky Green Energy Ltd

Project Title: Construction of 6 turbine windfarm at Ballynisky, Co. Limerick

Document Title: Bat Survey Report

Prepared By: John Curtin – Consultant Ecologist

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Abstract: The following report details the results of the 2023 bat surveys undertaken for the proposed Ballynisky Wind Farm, Co. Limerick. This bat report is required to assess the impacts of the proposed development on bat species within and surrounding the proposed wind farm site. The proposed Wind farm consists of 6 no. wind turbines. Addendum 6D-1 provides the results of a follow up site walkover and PRA undertaken in December 2025.

EXECUTIVE SUMMARY

This document reports on the findings of bat surveys conducted in 2023 at the site of a proposed windfarm which lies approximately 9km north of Newcastle West and 6km northwest of Rathkeale. The site and surrounding area are in a rural setting with landcover comprising mainly agricultural land, farmsteads and one-off residential houses. Features of note in the surrounding area include Carrons Wind Farm to the west and Creeves Quarry to the north.

Surveys included pre-construction bat surveys focusing on proposed turbine locations, surrounding habitats and connectivity with the wider landscape.

Six static detectors (SNH 2021) were placed within the site at the proposed turbine locations for 10 nights in each of: spring (April-May), summer (June-mid-August) and autumn (mid-August-November). In accordance with NIEA NED guidance (NIEA, 2021) additional static monitoring was conducted in August and October. Dusk and dawn bat detector surveys were conducted examining habitats onsite alongside potential roost features of structures in the wider landscape. A further two static detectors were positioned in adjacent, high-quality habitats deemed most suitable for woodland bat species such as Lesser Horseshoe bats.

A wintering, preliminary tree roost survey was conducted for all trees within 268m of the proposed turbines and along access routes where trees may be affected.

During static surveys, a total of eight species of bats were recorded in 2023: Common Pipistrelle, Soprano Pipistrelle, Nathusius Pipistrelle, Leisler's bat, Natterer's bat, Daubenton's bat, Brown long-eared bat and Lesser Horseshoe. In addition, several unidentified *Myotis* species were recorded; several of which were likely whiskered bats.

The most frequently recorded species was Soprano Pipistrelle, followed by Common Pipistrelle and Leisler's bat, with lower levels of *Myotis* species, Brown long-eared bat and Lesser Horseshoe detected.

Results show that without mitigation there will be a high level of impact at four of the six turbine locations for either Leisler, Common or Soprano Pipistrelle (the main species affected by wind turbine collision). Impacts on Nathusius's Pipistrelle will be low to moderate.

All bats recorded during surveys are classified as 'Least Concern' on the Irish Red List No. 12 and protected under the EU Habitats Directive Annex IV and Wildlife Acts.

Robust mitigation is proposed in order to negate the potential for high casualty levels including feathering turbine blades in low wind conditions, curtailment of cut-in speeds, creating buffers surrounding the turbines and a post construction monitoring program designed to examine the effectiveness of these mitigation measures.

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1 INTRODUCTION

This document reports on the findings of bat surveys conducted in 2023 at the site of a proposed windfarm located some 6km to the northeast of Rathkeale, Co. Limerick. This report aims to:

- Identify species of bats using the site.
- Examine trees and buildings within and surrounding the site for roosting potential.
- Examine feeding and commuting routes.
- Identify potential impacts to bats by the proposed development.

In order to assess the presence and activity of bats within the proposed development grounds the following surveys were undertaken within and adjacent to the proposed planning boundary:

- Preliminary roost assessment;
- Bat activity (walked, driven transects and emergence surveys); and
- Static detector (five survey periods).

All surveys adhered to Collins (2023) and NatureScot (2021) while also taking on board aspects of (NIEA, 2021) guidance.

Static detector surveys were carried out between May and November 2023 in five rounds. The survey types were determined most appropriate to establish a baseline species assemblage, along with spatial and temporal distribution of species activity within the proposed planning boundary. Additional bat survey work was carried out in order to provide information on bat activity within the wider study area at Ballynisky. These surveys were carried out in July and August 2023 to ascertain the activity levels of bat species throughout the study area.

The bat surveys undertaken and described in this report have been completed with reference to the following guidelines:

- Aughney, T., Kelleher, C. & Mullen, D. (2008). Bat Survey Guidelines: Traditional Farm Buildings Scheme. The Heritage Council, Áras na hOidhreachta, Church Lane, Kilkenny.
- Bats and onshore wind turbines: Survey, Assessment and Mitigations. NatureScot (formerly Scottish Natural Heritage) January 2019.
- Bats and onshore wind turbines - Survey, Assessment and Mitigation. NatureScot (formerly Scottish Natural Heritage). August 2021.
- Bat Conservation Ireland (BCI) Guidelines for consideration of bats in wind farm projects - Revision 2014.
- BTHK (2018). Bat Roosts in Trees – A Guide to Identification and Assessment for Tree-Care and Ecology Professionals. Pelagic Publishing, Exeter UK.
- CIEEM (2021). Bat Mitigation Guidelines. A guide to impact assessment, mitigation and compensation for developments affecting bats. Beta version 1.0.
- Collins, J. (Editor) (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edition). Bat Conservation Trust, London.
- Collins, J. (2023). Bat Surveys for Professional Ecologists: Good Practice Guidelines (4th edition). Bat Conservation Trust.
- European Commission (2020). Guidance document on wind energy developments and EU nature legislation. Brussels, 18.11.2020 C(2020) 7730 final.
- European Commission (2021). Commission notice. Guidance document on the strict protection of animal species of Community interest under the Habitats Directive.
- Guide to Turbines and Wind Farms. Bat Conservation Ireland 2012.

- Kelleher, C. & Marnell, F. (2006) Bat Mitigation Guidelines for Ireland. Irish Wildlife Manuals, No. 25. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland.
- McAney, K. (2006) A conservation plan for Irish vesper bats, Irish Wildlife Manual No. 20 National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland.
- Marnell, F., Kelleher, C. & Mullen, E. (2022) Bat mitigation guidelines for Ireland v2. Irish Wildlife Manuals, No. 134. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage, Ireland.
- National Roads Authority (2006) Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes.
- NRA (2006). Guidelines for the Treatment of Bats during the Construction of National Road Schemes. National Roads Authority (now named Transport Infrastructure Ireland), Ireland.
- Natural England Technical Information Note TIN051: Bats and onshore wind turbines – Interim Report.
- NIEA (2011). Bat survey – specific requirements for wind farm proposals. Northern Ireland Environment Agency, Department of the Environment, Belfast.
- NIEA, Natural Environment Division (2021). Guidance on Bat Surveys, Assessment and Mitigation for Onshore Wind Turbine Developments in Northern Ireland.
- The status of EU protected habitats and species in Ireland: Conservation status in Ireland of habitats and species listed in the European Council Directive on the Conservation of Habitats, Flora and Fauna 92/43/EEC. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government.
- UNEP/EUROBATS: Guideline for consideration of bats in wind farm projects, Publication Series No. 3.
- Wind Turbine/Wind Farm Development Bat Survey Guidelines (BCI, 2012).

1.1.1 Surveyor Information

Bat surveys were designed by John Curtin BSc. John qualified in Environmental Science at NUI Galway in 2010 and has been working as an ecologist ever since. John has been conducting bat surveys at windfarm sites since 2012. He has also completed the Bat Conservation Ireland, Bat Detector Workshop and Bat Handling Workshop which are the standard training for the carrying out of bat surveys in Ireland. In addition, John is an active member of Bat Conservation Ireland, which monitor bat populations in Ireland, and facilitate the education of bat communities to the public.

John holds the following licences.

Description	Licence No
Licence to capture protected wild animals for educational, scientific or other purposes (bats)	C12/2023
Roost disturbance (bats)	Der/Bat 2023-07
Licence to photograph / film wild animals (bats)	23/2023

In addition, night-time detector surveys were supported by Ciara Morrin, Karolina Illien. Ciara has a degree in Wildlife Biology and has completed CPD courses on Fundamentals of Biodiversity Considerations for Engineering Projects, Bat License Training & Bat Sound Analysis. Karolina has a Masters in Environmental Leadership and has worked as an ecologist since 2022.

2 DESKTOP STUDY

2.1 BATS IN IRELAND – LEGISLATIVE PROTECTION

There are two main pieces of legislation which cover wildlife protection in Ireland – the Wildlife Act and the Habitats Regulations. These are outlined below, with particular reference to the protection afforded to bat species in Ireland.

The Wildlife Acts 1976 and 2000

The primary domestic legislation providing for the protection of wildlife in general, and the control of some activities adversely impacting upon wildlife is the Wildlife Act of 1976, as amended. The aims of the wildlife act according to the National Parks and Wildlife Service are "... to provide for the protection and conservation of wild fauna and flora, to conserve a representative sample of important ecosystems, to provide for the development and protection of game resources and to regulate their exploitation, and to provide the services necessary to accomplish such aims." All bat species are protected under the act. The Wildlife (Amendment) Act of 2000 amended the original Act to improve the effectiveness of the Act to achieve its aims.

It is an offence to:

- Intentionally kill, injure or take a bat;
- Possess or control any live or dead specimen or anything derived from a bat;
- Wilfully interfere with any structure or place used for breeding or resting by a bat;
- Wilfully interfere with a bat while it is occupying a structure or place which it uses for that purpose.

European Communities (Birds and Natural Habitats) Regulations 2011 to 2021

The EC (Birds and Natural Habitats) Regulations 2011-2021 provide strict protection for all of the Irish species listed on Annex IV of the EU's Habitats Directive. It does this by prohibiting certain activities which could impact on the conservation status of those species. Those activities may only be permitted by way of a derogation licence. All bat species found in Ireland are listed under Annex IV of the Directive, while the lesser horseshoe bat is afforded further protection under Annex II.

2.2 BAT SPECIES IN IRELAND AND ROOST TYPES.

There are nine species of bat which have been confirmed resident in Ireland. These belong to two families; eight species are in the family Vespertilionidae and one is in the Rhinolophidae family (BCIreland, 2022). The bat species resident in Ireland are:

Family Vespertilionidae

- 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*);
- Whiskered bat (*Myotis mystacinus*);
- Natterer's bat (*Myotis nattereri*).

Family Rhinolophidae

- Lesser horseshoe bat (*Rhinolophus hipposideros*).

For more details on each of these species please see Bat Conservation Ireland (<https://www.batconservationireland.org>). In addition to the aforementioned bats two other species may be considered vagrant or possible residents;

- Brandt's bat (*Myotis brandti*). A single dead Brandt's bat was found by Enda Mullin (NPWS) in Wicklow in 2003. No other confirmed records of this species have been found in Ireland since.
- Greater Horseshoe bat (*Rhinolophus ferrumequinum*). A single bat was recorded in Wexford by Paul Scott roosting in a disused cellar. In 2020 Nick Marchant identified a number of greater horseshoe recordings in Glendalough, Wicklow.

The Bat Mitigation Guidelines for Ireland (Marnell, 2022) describe bat roosts in the following broad categories;

- Maternity site, where pups are born and raised to independence;
- Hibernation site, where bats may be found during the winter;
- Mating site, where males and females gather during the autumn;
- Feeding site (night roost), where bats rest between feeding bouts during the night but are rarely present by day;
- Transitional (or swarming) site, where bats may be present during the spring or autumn;
- Satellite roost, used by males and non-breeding females.

2.3 HISTORICAL REVIEW OF BAT DATA TO ESTABLISH INITIAL RISK ASSESSMENT OF SITE

NIEA guidance states a desktop assessment is required in order to assign a risk level to the site and design future survey work. The appropriate level of survey effort for a site depends on the quality of habitat present and the scale and likely impact of the development. Consideration should be given to the presence of suitable commuting and foraging habitat and the likely presence of bat roosts near proposed turbines. An assessment was conducted for the proposed development by examining the BCI database, NBDC records, BCI landscape model for bat suitability, Ordnance survey, aerial photos and Google street view.

A data search was conducted in April 2023 and rechecked in October 2023 and December 2025 to revise existing information from the surrounds of the proposed planning boundary. The following information sources were examined:

- Known bat records within a 10 km radius of the proposed site from the Bat Conservation Ireland database;
- Adhoc and observational bat records from the National Bat Database held by the National Biodiversity Data Centre (www.biodiversityireland.ie);
- Review of Ordnance Survey mapping and aerial photography of the proposed wind farm boundaries and their environs (i.e. 200 m plus rotor radius of the boundary of the proposed development);
- Records of designated sites within a 15 km radius of the proposed site where bats form part or all of the reason for designation (<https://www.npws.ie/protected-sites>);

- Collation of data on known caves within a 4 km radius of the proposed site from the Cave Database for the Republic of Ireland, compiled by Trinity College (http://www.ubss.org.uk/search_irishcaves.php);
- Review of bat survey data from Ecological Impact Assessments from proposed and permitted developments within the wider environs of the site.

Bat Landscape

(Lundy, 2011) produced a landscape model by analysing data contained in the Irish National Bat Database, maintained by Bat Conservation Ireland and the National Lesser Horseshoe Bat database maintained by National Parks and Wildlife Service. The maps are a visualisation of the results of the analyses based on a 'habitat suitability' index. The index ranges from 0 to 100 with 0 being least favourable and 100 most favourable for bats.

Table 2-1 shows the BCI bat landscape model for the site. The BCI Landscape model states the site has overall moderate – high suitability for bats. The species with high suitability include Brown Long-eared, Common and Soprano Pipistrelle and Leisler's bats, three of these species being most susceptible to turbine collision.

Table 2-1 -: Landscape model for areas of the site (green is low suitability for bats, red is high)

---Ballynisky proposed turbine locations		Suitability
Overall Suitability; BCI		29.78
<i>Pipistrellus pygmaeus</i>	Soprano Pipistrelle	41
<i>Plecotus auritus</i>	Brown Long-eared bats	47
<i>Pipistrellus pipistrellus</i>	Common Pipistrelle	42
<i>Rhinolophus hipposideros</i>	Lesser Horseshoe	14
<i>Nyctalus leisleri</i>	Leisler's Bat	40
<i>Myotis mystacinus</i>	Whiskered Bat	17
<i>Myotis daubentonii</i>	Daubenton's Bat	28
<i>Pipistrellus nathusii</i>	Nathusius's Pipistrelle	5
<i>Myotis nattereri</i>	Natterer's Pipistrelle	34

The Ahacronane River flows to the north of T1 (within 200m), while the Rathnagore watercourse is located to the south of T3 (within 200m buffer). Scrub, treelines and hedgerows provide connective features to the wider landscape.

Lesser Horseshoe Bat *Rhinolophus hipposideros*

The subject site sits approximately 10.6km to the south-west of Curraghchase Woods SAC, a site designated for Lesser Horseshoe bats. The Lesser Horseshoe Bat: Wildlife Manuals No. 85 (Roche N. A., 2015) shows the subject site sits at the western edge of the Limerick population. The Lesser Horseshoe Bat Species Action Plan 2022-2026 (VWT, 2022) syntonises previous studies conducted in Ireland and states "Lyons (2014) assessed roost records supplied by BCIreland and found the species was no longer using the four most westerly roosts in Limerick. A gap of over 45km had opened between the still occupied roosts in Rathkeale (Limerick) and those at Castleisland and Tralee (north Kerry) and

this increased to 70km between roosts with more than 25 bats". "Despite these restrictions, the good river matrix in Limerick, a proposed greenway between the two counties and the expansion of conifer woodland in the uplands were considered possible pathways for bridging the gaps, along with the provision of new roosts."

VWT (Finch, 2020), have conducted Circuitscape analysis attempting to identify pathways for the connection of Lesser Horseshoe roosts with emphasis on bridging the gap between the Limerick and Kerry populations. Figure 2-1 below shows the subject site sits on a lesser pathway between these sites. The document makes the following recommendations which may aid connectivity for this species.

- Undertake a static detector study along the potential pathway highlighted between Rathkeale and Castleisland, with the help of landowners, community groups, local authorities, Local Authority Waters Programme (LAWPRO), etc.
- Commence a NPWS Lesser Horseshoe Bat Farm Plan Scheme targeted at the areas highlighted as potential corridors.
- Include actions for the lesser horseshoe bat in all relevant future landscape Agri-Environmental Schemes.
- Produce a briefing note on the impact of artificial lighting on the lesser horseshoe bat for the six local authorities.

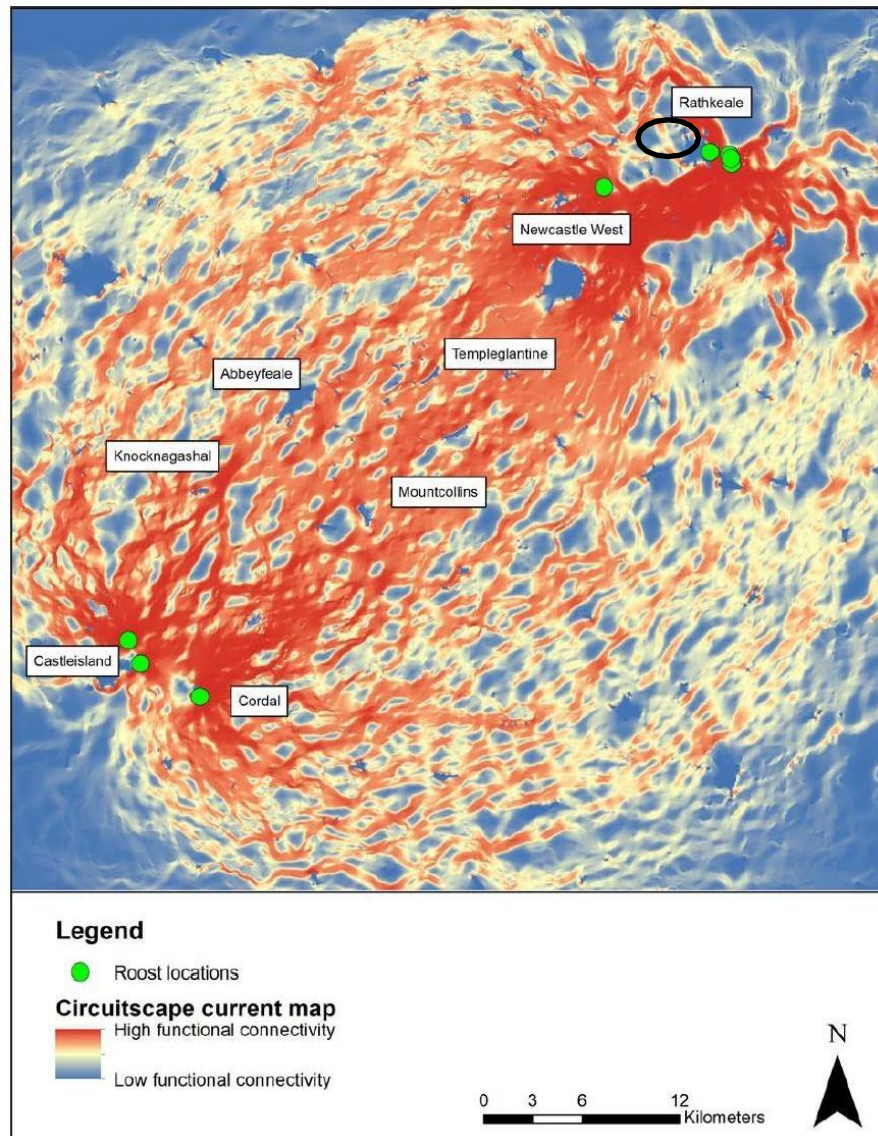


Figure 4.4 Scenario Four illustrating areas of high and low functional connectivity for the lesser horseshoe bat at a local scale between counties Kerry and Limerick.

Figure 2-1-- (Finch, 2020) results of pathway potential between Limerick and Kerry roosts. Ballynisky location is circled in black. This shows the site is on a lesser pathway between these sites.

2.3.1 Historical Bat Records from the vicinity of the site

The NBDC and Bat Conservation Ireland database was consulted for details on bat records held for the site and the surroundings. The database was consulted on the 21/04/2023 and again on the 28/10/2023 and 17/12/2025 for details on historical records from the site and the surrounding 10km. Results are outlined in Table 2-2. The review shows 37 roosts within 10km and 15 roosts within 5km of the site (site includes access route). Of these the most significant is a Natterers maternity roost that has been designated as a proposed Natura Heritage Area (pNHA); Ardagh Church (Site Code 000430). The subject site sits within the 4km core sustenance zone (CSZ) of this roost. A core sustenance zone (CSZ), as applied to bats, 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 (BCT, 2020). The species is commonly associated with trees, particularly broadleaved woodland, but also makes use of tree-lined river corridors, trees in parkland and hedgerows adjacent to pasture (Parsons and Jones, 2003; Smith and Racey, 2008; Zeale et al., 2016). In relation to the

subject proposal, the retention and enhancement of landscape features such as treelines, hedgerows and woodland is an important consideration for the sustenance of this roost.

The closest record is from an unidentified bat recorded at the golf course 1.1km from proposed turbine 3.

Table 2-2:- Historical roost records

No.	Species	Last record	Details	Distance from site
1	<i>Unidentified bat</i>	1997	Droppings. Old record.	Within 2km
2	<i>Pipistrellus spp. (45kHz/55kHz)</i>	1997	Droppings in ruin. Old record.	2 - 3km zone
3	<i>Plecotus auritus</i>	1997	Droppings. Old record.	2 - 3km zone
	<i>Pipistrellus spp. (45kHz/55kHz)</i>			
	<i>Unidentified bat</i>			
4	<i>Plecotus auritus</i>	2009	5 bats recorded. Subject site lies within the CSZ for this species however it is an old record and numbers were moderate to low.	2 - 3km zone
5	<i>Plecotus auritus</i>	1997	Droppings	2 - 3km zone
6	<i>Unidentified bat</i>	1997	Droppings	3-4 km zone
7	<i>Myotis nattereri</i>	1997	Droppings	3-4 km zone
8	<i>Pipistrellus pygmaeus</i>	2007	1 bat recorded outside its CSZ. The site lies within the CSZ for Soprano pipistrelle (1 bat) roost.	3-4 km zone
	<i>Pipistrellus pipistrellus</i>			
9	<i>Myotis nattereri</i>	1993	100 bats recorded. Site is designated as a pNHA. Not on BCI database.	3-4 km zone
10	<i>No information</i>	1997	No information provided	3-4 km zone
11	<i>Rhinolophus hipposideros</i>	2010 (2023)	Several checks with last in 2010 recorded in BCI database. Max observed is 2. The building has planning for demolition granted in 2023. A bat survey was conditioned and conducted in August 2023 by a Gerard Tobin. No Lesser Horseshoe bats were recorded during this survey. The survey found a Common Pipistrelle roost in a neighbouring bungalow. The subject site lies outside the CSZ for common pipistrelle.	3-4 km zone
12	<i>Myotis nattereri</i>	2007	Maternity Roost within CSZ of all proposed turbines	3-4 km zone
13	<i>Pipistrellus spp. (45kHz/55kHz)</i>	1997	Droppings noted. Old record.	3-4 km zone
	<i>Unidentified bat</i>			
14	<i>Pipistrellus spp. (45kHz/55kHz)</i>	1997	Visual record. No further details. Old record.	4 - 5km zone
15	<i>Myotis nattereri</i>	1997	Lots of Natterers droppings. Three dead pipistrelles noted.	5 - 6km zone
	<i>Pipistrellus spp. (45kHz/55kHz)</i>			

No.	Species	Last record	Details	Distance from site
16	<i>Plecotus auritus</i>	1997	Droppings. Old record.	5 - 6km zone
17	<i>Pipistrellus spp. (45kHz/55kHz)</i>	1997	Visual record of Pipistrelle and brown long-eared droppings	5 - 6km zone
	<i>Plecotus auritus</i>			
18	<i>Pipistrellus spp. (45kHz/55kHz)</i>	1997	Droppings. Old record.	5 - 6km zone
19	<i>Plecotus auritus</i>	1997	Old Cottage	6 - 7km zone
20	<i>Rhinolophus hipposideros</i>	1997	Old Church building	6 - 7km zone
21	<i>Plecotus auritus</i>	1997	Old dwelling	6 - 7km zone
22	<i>Plecotus auritus</i>	1997	Castle roost	6 - 7km zone
	<i>Myotis daubentonii</i>			
23	<i>Pipistrellus spp. (45kHz/55kHz)</i>	1997	Old Commercial Building	7 - 8km zone
24	<i>Rhinolophus hipposideros</i>	2010	Several checks between 1997 and 2010	7 - 8km zone
	<i>Myotis nattereri</i>			
25	<i>Pipistrellus spp. (45kHz/55kHz)</i>	1997	House	8 - 9km zone
	<i>Nyctalus leisleri</i>			
26	Unidentified bat	1997	Old Hous	8 - 9km zone
27	<i>Pipistrellus spp. (45kHz/55kHz)</i>	1997	House	
28	<i>Myotis daubentonii</i>	2023	Bridge	8 - 9km zone
29	<i>Rhinolophus hipposideros</i>	2010	Old farm house and sheds	8 - 9km zone
31	<i>Rhinolophus hipposideros</i>	2006	Stone Building with Slate roof	8 - 9km zone
	<i>Myotis nattereri</i>			
32	<i>Rhinolophus hipposideros</i>	1997	Farm buildings	8 - 9km zone
	<i>Plecotus auritus</i>			
33	<i>Pipistrellus pygmaeus</i>	1997	Tower	8 - 9km zone
	<i>Nyctalus leisleri</i>			
34	<i>Pipistrellus spp. (45kHz/55kHz)</i>	1997	Ruined Dwelling	8 - 9km zone
35	<i>Myotis daubentonii</i>	2011	Friary Building	9 - 10km zone
36	<i>Plecotus auritus</i>	1997	House	9 - 10km zone
37	<i>Pipistrellus spp. (45kHz/55kHz)</i>	1997	House	9 - 10km zone
	<i>Myotis nattereri</i>			

Ballykett Historical Roosts

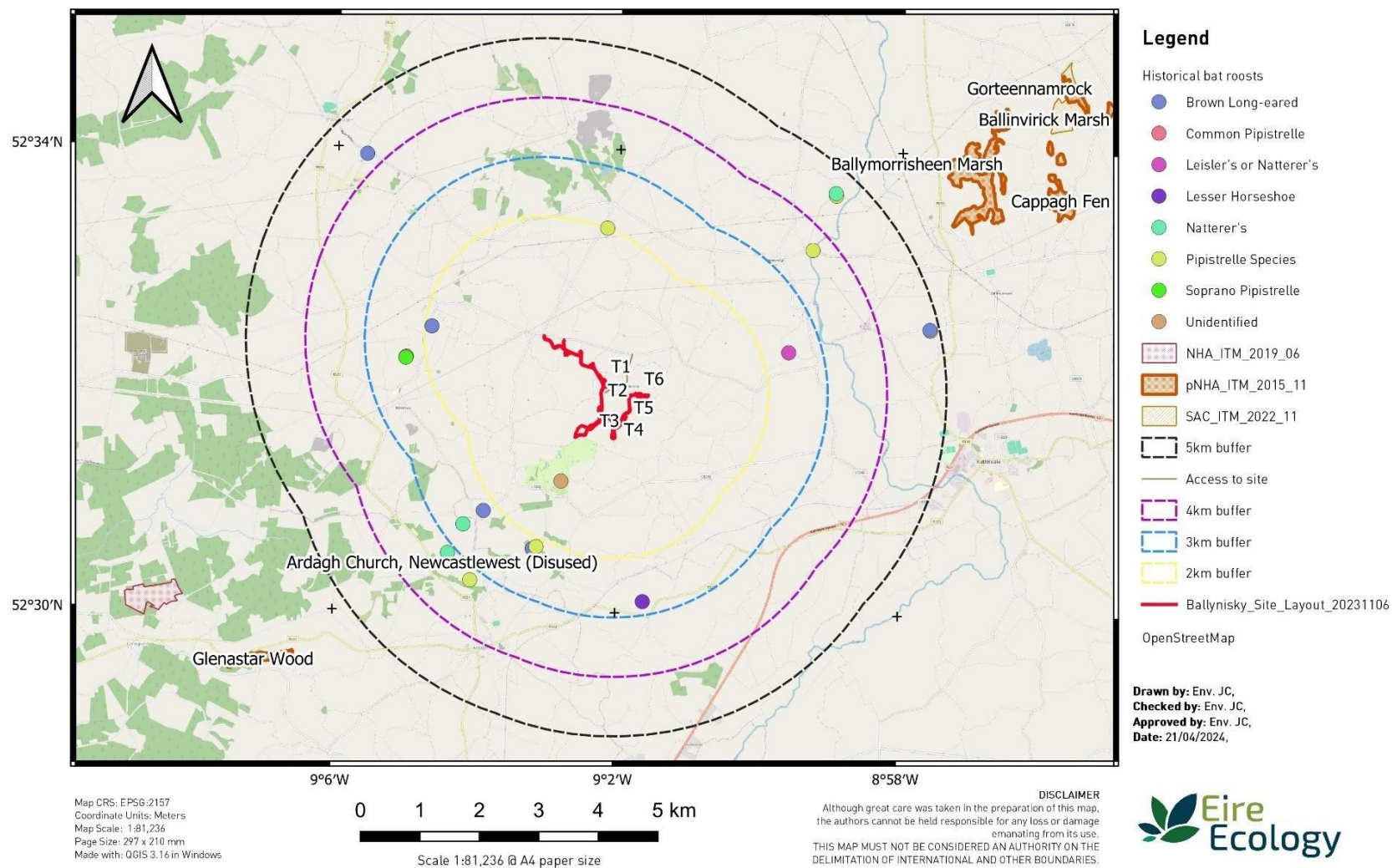


Figure 2-2--: Historical roosts surrounding proposed development.

3 SURVEY METHODOLOGY

3.1 BAT ACTIVITY AND EMERGENCE SURVEYS

The bat detectors used during the walked and driven surveys were Wildlife Acoustics Inc. (Massachusetts, USA) Echo Meter Touch Pro 2's which are triggered to record when a bat call is emitted louder than 18dB for 1sec. These detectors use full spectrum sampling; detecting all frequencies simultaneously, meaning that multiple bat calls can be recorded at the same time.

Night time surveys combined emergence surveys towards dusk and dawn and a combination of walked and driven transects of bat favourable habitats within and surrounding the study area were conducted between July and August 2023.

Transects targeted a range of foraging and commuting habitats present within and surrounding the study area, those associated with linear features such as roadside margins, woodland plantation edges, hedgerows, treelines and waterbodies. Details of transects are shown in Table 4-3 and Figure 4-4.

The following night vision devices were used to aid emergence surveys.

- 1 Canon XA10 night vision camcorder with two nightfox IR torches
- 2 Guide track 19mm thermal scope
- 3 Xinfrared T2 Pro thermal camera

A contact describes a bat observed by the surveyor. This contact can range from a commuter passing quickly to a foraging bat circling a feature lasting for several minutes. Some observations contain multiple bats. When several bats of the same species are encountered together, they are recorded under the one contact. A separate contact is recorded for each species. A contact finishes when the recorder assumes the bat is no longer present. It is likely that the same bat is recorded in several contacts throughout the night. This survey type cannot estimate abundance of bats, rather activity; *the amount of use bats make of an area / feature*.

Where possible, a positive identification to species level was made. Information on the behaviour was also recorded where available.

Bat activity is governed by the activity of their insect prey and insect abundance is in turn governed by weather conditions and climate. Insects, and therefore bats, are unlikely to be present at temperatures below 7°C or during periods of strong winds or heavy rainfall so surveying in such conditions is not suitable. All field surveys were undertaken within the active bat season and during good weather conditions (dry conditions and temperature at 8°C and greater). Bats were identified by their ultrasonic calls coupled with behavioural and flight observations and on computer by sound analysis of recorded echolocation and social calls with dedicated software (Wildlife Acoustic's Kaleidoscope Pro; version 2.1.0)¹.

3.2 STATIC BAT DETECTOR SURVEYS

Song Meter Mini and SM4BAT Full spectrum bat recorders SM4BAT were deployed within the study area at the site of the proposed turbines for ten nights in the spring, summer and autumn periods. Each bat pass does not correlate to an individual bat but is representative of bat activity levels. Some species

¹ Although there are later editions to this software the surveyor manually verified all calls rather than depending on auto identification. It is the surveyors opinion that auto-id features frequently misidentify bat 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.

Per SNH (2019) guidance, static units (Song Meter SM4BAT and SM-Mini) were programmed to commence half an hour before sunset and finish half an hour after sunrise to ensure that bat species that emerge early in the evening and return to roosts late are recorded. Detectors were left out for a minimum of 10 consecutive nights across three survey periods: spring (April - May), summer (July - early August) and autumn (September - November). See Table 3-1 below for further details.

NatureScot (2021) guidance states that "Detectors should be placed at all known turbine locations at wind farms containing less than ten proposed turbines. Where developments have more than ten turbines, detectors should be placed within the developable area at ten potential turbine locations plus a third of additional potential turbine sites up to a maximum of 40 detectors for the largest developments".

The data was analysed with Wildlife Acoustic's Kaleidoscope Pro; version 2.1.0)². This software identifies many of the calls made by Irish bats. All calls not labelled Soprano or Common Pipistrelle Bats were manually verified. Results presented below show that for some Myotis calls, the surveyor is confident the bat is a Natterer's bat. Distinguishing between Myotis species recordings is difficult (unless distinctive social calls are recorded thus several calls are recorded to genus level only). These could be either Whiskered, Daubenton's or Natterer's bat. Similarly, several Pipistrelle calls were recorded with a peak frequency of around 40kHz. These calls are lower than expected for Common Pipistrelle but higher than typical for Nathusius's. Following the precautionary approach these calls have been included in ECOBAT as Nathusius Pipistrelle although it is likely many were Common Pipistrelle.

3.2.1 Static Survey and Analysis Limitations

- It is not always possible to identify a bat call to species level due to the recorded call not being clear. Recorded files from automated detectors may contain only fragments of a call, or the bat may be calling from a distance (from the detector) in which case it may not be clear enough to assign the call to a specific species. In these cases, the call has been assigned to genus level;
- Some caution must be taken when comparing activity levels between species, as bias can be shown towards those species with 'louder' or 'lower frequency' echolocation calls. For example, *Nyctalus* species have louder and low frequency echolocation calls which carry further than the quieter and more broad-band brown long-eared bat echolocation calls;
- A bat contact (for static surveys) is defined as a single detector file which contains at least one bat call. Multiple contacts at any given detector location do not necessarily indicate the presence of more than one bat and should therefore be interpreted as a level of activity rather than the number of bats recorded;
- Guidelines in the use of Ecobat recommend a Reference Range of 200+ nights of bat data to be confident in the relative activity level. The reference range is the stratified dataset of bat results recorded in the same region, at the same time of year, by which percentile outputs can be generated. This comprises all records of nightly bat activity across Ireland. The dataset used for Ballynisky complies with this minimum standard.
- Following the conservative approach 40kHz activity was included with *Nathusius* Pipistrelle as this is a high collision risk, rare species in an Irish context.

² There have been several updates to Kaleidoscope and the auto ID; Bats of UK 2.0.7. The author however feels auto-ID software regularly misidentifies bat calls that are not ID'ed as Common or Soprano Pipistrelle. As such all calls not identified as Common or Soprano Pipistrelle were manually verified. The software version used is adequate for organising data.

- Table 4-1 provides information on length of static deployment. While some statics failed to record for the entire survey periods, all locations had a minimum of 49 nights of recordings thus substantially exceeding minimum requirements as set out in (SNH, 2021).

4 SURVEY FINDINGS

4.1.1 Habitats on site

The subject site is situated in a variety of habitats consisting primarily of improved agricultural grassland, and associated hedgerows, treelines and wetlands. In addition, two watercourses can be found to the north and south of the site. The surrounding area is serviced by a variety of roads from primary to tertiary. Table 4-1 details habitats within 268m of each proposed turbine.

Table 4-1--: Habitats surrounding proposed turbines with comments on static locations and landscape features suitable for bats

Turbine No	Detectors used for assessing impact	Approx. Distance between detector and turbine	Within 268m of proposed turbine								Comments on static locations and landscape features suitable for bats	Number of nights static deployed
			Habitat 1	%	Habitat 2	%	Habitat 3	%	Habitat 4	%		
1	D1	At turbine location	GA1	90	WL1 / WL2	5	BL3	5	FW	+	Turbine situated in grassland adjacent to hedge. Ahacronane stream found 200m to N and W. Sheds located to south.	57 ³
2	D2	At turbine location	GA1	52	GS4	37	WS1	10	WL1 / WL2	2	Turbine is situated in a peaty wet grassland with a hedge to the east and scrub to north-west.	67
3	D3	At turbine location	GA1	85	WS1	10	WL1 / WL2	5	-	-	Turbine is proposed to sit by treeline within improved grassland. The Rathnagore stream can be found 170m to the south with the treeline providing connectivity.	49
4	D4	At turbine location	GA1	95	WL1 / WL2	5	-	-	-	-	Proposed turbine is situated along a fence with drain set with improved grassland.	75
5	D5	At turbine location	GA1	95	WL1 / WL2	5	-	-	-	-	Proposed turbine is situated along a short cropped hedge set with improved grassland.	75
6	D6	At turbine location	GA1	70	GS4	20	WD5	8	WL1 / WL2	2	T6 is proposed within scattered hawthorn trees and grassland. To the south a wetland type habitat can be found while improved grassland is situated to the north and west. Treelines and hedgerows can also be found	66 ⁴

³ T1; No recordings after the 21st of October

⁴ June stopped recording after 4 days. September detector failed so reset.

Turbine No	Detectors used for assessing impact	Approx. Distance between detector and turbine	Within 268m of proposed turbine								Comments on static locations and landscape features suitable for bats	Number of nights static deployed
			Habitat 1	%	Habitat 2	%	Habitat 3	%	Habitat 4	%		
D7	A static was placed to the south of D6 within woodland to the edge of the site. The aim of this detector was to establish the presence of Lesser Horseshoe bats using woodland type habitats.										55 ⁵	
D8	A static was placed to the south west of D2 within scrubby woodland to the edge of the site. The aim of this detector was to establish the presence of Lesser Horseshoe bats using woodland type habitats along the western boundary of the site.										49 ⁶	

⁵ June detector failed so was reset. August SD card was corrupted. The attempt to retrieve data failed.

⁶ One day of August data was recorded before failing.

Ballinisky Turbine & Static Locations

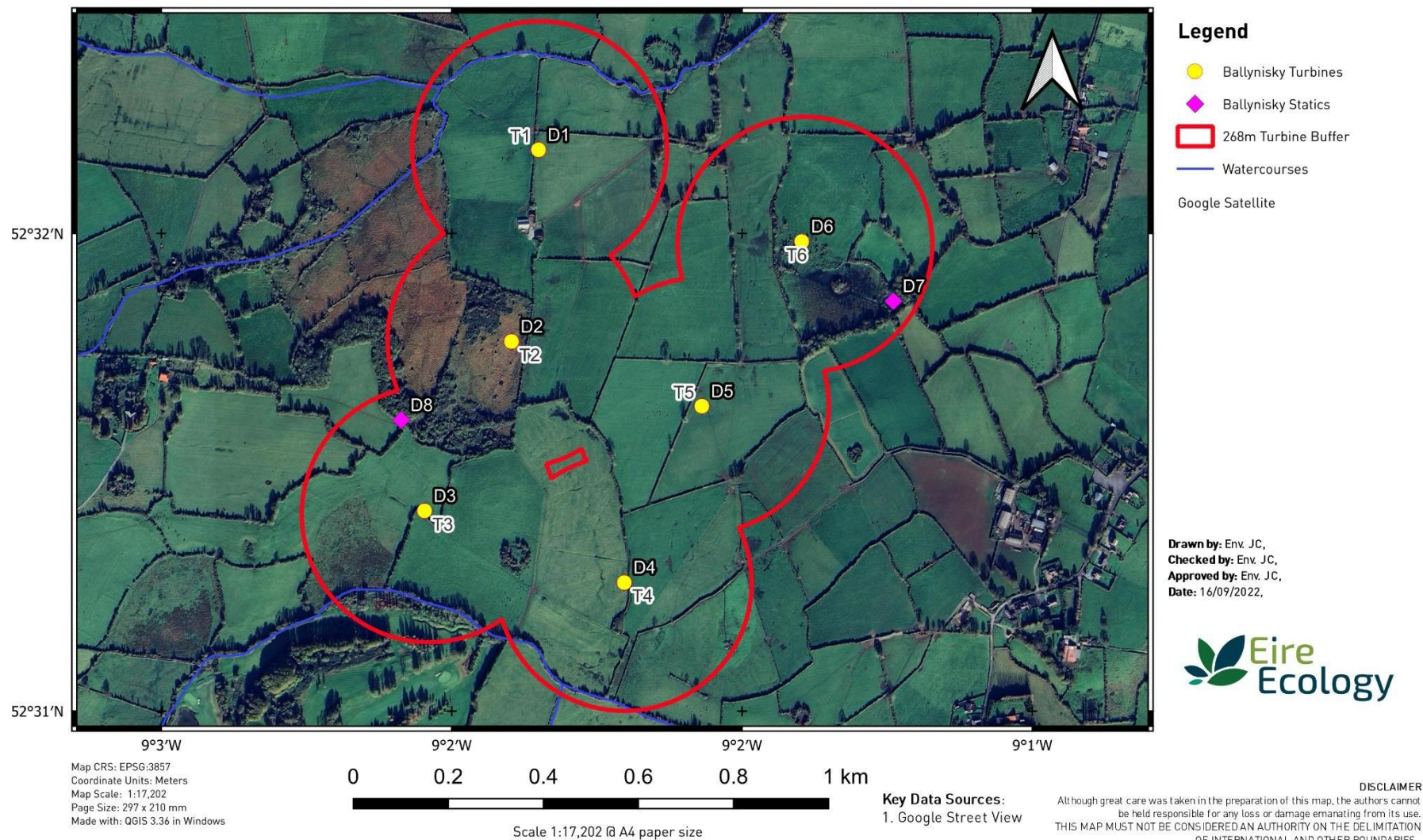


Figure 4-1--: Turbine and static locations

4.2 ASSESSMENT OF POTENTIAL ROOST HABITATS

4.2.1 Potential tree roosts

A Ground Level Tree Assessment (GLTA) was conducted at on the 30th of January 2024. Trees that were likely to contain Potential Roost Features (PRF's), or those that have been noted to contain PRF's were recorded within 268m of each turbine and along access routes (where the potential exists for felling) following guidelines set out in (Collins, 2023) with additional reference to the Bat Tree Habitat Key (Andrews, 2016) and BCT Guidelines ed 2 and 3 (Collins, 2016), (Collins, 2023) and (Hundt., 2012).

All trees were assessed from ground level using binoculars.

Examples of crevice features include:

- Natural holes;
- Cracks/splits in major limbs;
- Loose bark; and
- Hollows/cavities.

Each tree assessed was categorised according to Table 4-2 below. It should be noted that for the majority of trees surveyed from ground, it will remain unknown if a feature is either a PRF-I or PRF-M

Table 4-2: (Collins, 2023)

Suitability	Description	
None	Either no PRFs in the tree or highly unlikely to be any	
FAR	Further assessment required to establish if PRFs are present in the tree	
PRF	A tree with at least one PRF present	
	PRF-I	PRF is only suitable for individual bats or very small numbers of bats either due to size or lack of suitable surrounding habitats
	PRF-M	PRF is suitable for multiple bats and may therefore be used as a maternity colony

Ballynisky GLTA Results

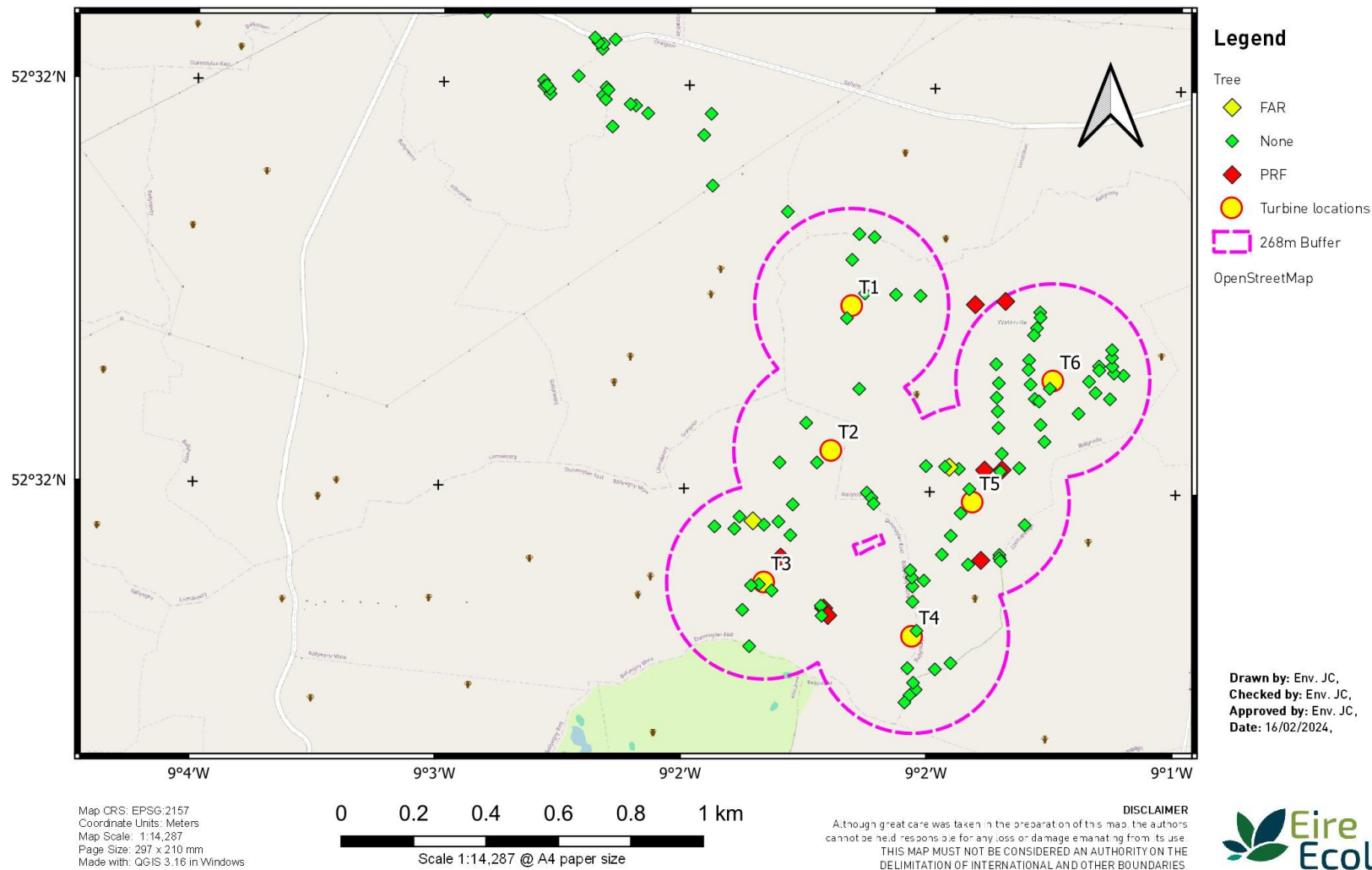


Figure 4-2--: Preliminary tree roost survey results

4.2.2 Structures

The primary focus of structures followed guidance outlined in (NIEA, 2021) which recommends concentrating on structures within 200m plus rotor diameter of turbines. There is only two buildings, a shed 200m south of proposed turbine i T1 and a ruin 250m from T2 within 268m buffer of the proposed project. In addition, potential roost structures outside this zone were also examined. Several derelict sheds and dwellings were examined in the wider landscape on the 9th of May 2023. A search was conducted of sheds and derelict dwellings of highest potential that were close to the site or showed connectivity. In situations where access was not possible, the surveyor conducted night time surveys from the public road examining bats and attempting to locate commuting routes and roosts. The location of the structures are outlined in Figure 4-3.

Table 4-31: Potential roost structures examined during daylight preliminary searches.

No.	Description	Distance to turbines	Lat	Long	Checked	Survey type
1	Farm buildings.	Within 200m of T1	52.533	-9.034	Yes	Daylight inspection and night time survey. Winter roost check also conducted on the 30th of January 2024. No bat roost found.
2	Ruin of manor house - no roof but mature trees with cavities.	250m to T2	52.534	-9.028	Yes	Daylight inspection and night time survey. Winter roost check also conducted on the 30th of January 2024. No bat roost found.
3	Derelict house with slated roof	550m to T1	52.539	-9.03	Yes	Dawn survey from road. No bat roost found.
4	Ruin	550m to T1	52.539	-9.03	Yes	Dawn survey from road. No bat roost found.
5	Shed	780m to T1	52.538	-9.044	Yes	Daylight inspection. No potential.
6	Farmstead	720m to T4	52.532	-9.044	Yes	Daylight inspection and night time survey. Natterer's bats roosting in dwelling and two sheds.
7	Farmstead	640m to T6	52.530	-9.044	Yes	Daylight inspection.
8	House with woodland	660m to T6	52.53	-9.046	Yes	Daylight inspection. Could not get access to complete night time survey.
9	Tree previously identified as having high potential (tree number 18 in Appendix 1)	90m from T3	52.5283	-9.036	Yes	Daylight inspection and night time survey. No bat roost found.

4.3 BAT DETECTOR SURVEYS

Weather conditions during night time surveys were acceptable. Details can be found in Appendix 2.

Figure 4-3 shows the locations of emergence surveys and displays the location of the roost identified in relation to the proposed development. Table 4-4 provides a summary of emergence results with full details located in Appendix 2.

Ballynisky Bat Roost Assessment Locations

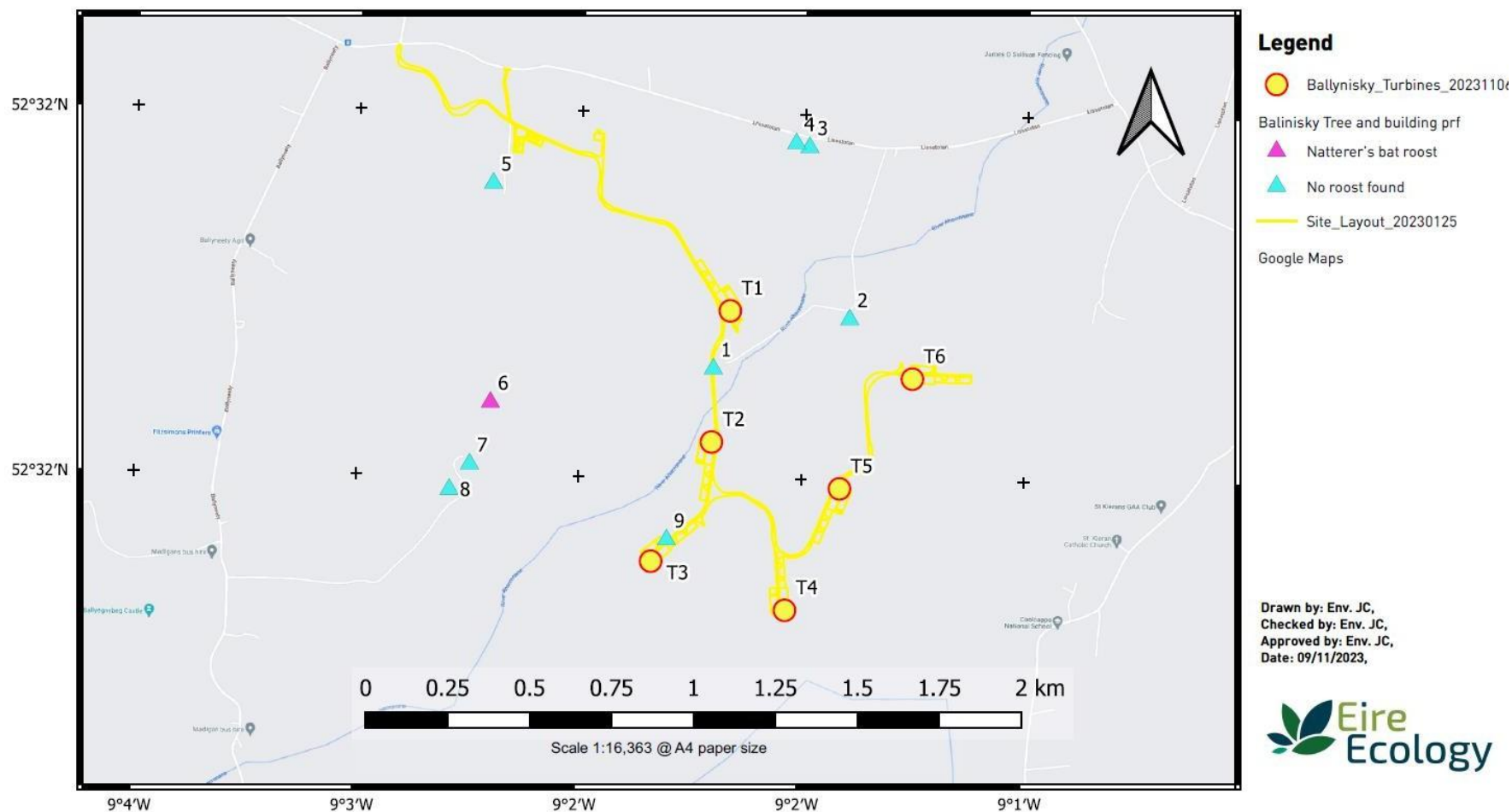


Figure 4-3: Structures examined during daylight and / or night time surveys

Table 4-4: Bat Survey Effort Summary 2023

Survey	Date	Survey type	Start Time	End Time	Location (Figure 4-3/4-4)	Details	Grid ref (ITM) Start / Finish		Sunset / sunrise	Surveyor
Static	9 th to the 20 th of May 2023					Spring static survey	Static survey 1			
Static	15 th to the 25 th of June 2023					Summer static survey	Static survey 2			
Dusk	29/07/2023	Dusk emergence	21:15	23:00	2	2 ash trees and 1 ruinous stone building. No roosts found here. Very little activity at first tree. More hunting activity at Tree 2 – Common and Soprano Pipistrelle bats using treeline running north to stream as commuting corridor.	52.53472	-9.02699	21:33	CM
		Walked transect	23:40	00:22	T1	Walked transit north to stream in field where ash trees are located. Treelines surrounding field. Most bat activity detected along eastern treeline and stream. At 23:50 Daubenton's bat observed hunting over stream alongside low level of Common and Soprano Pipistrelle activity.	52.5347, -9.0293	52.5368, -9.0262		
Dawn	30/07/2023	Walked transect	03:25	03:53	T2	Walked transect in field where sheds are located. Treelines surrounding field. Walked north to stream and around field back to shed. No bat activity detected.	52.5335, -9.0333	52.5362, -9.0329	05:53	CM
		Dawn roost	03:53	05:53	1	Dawn roost count at two old sheds, one large slatted shed with galvanised roof and one smaller stone storage shed. One Soprano Pipistrelle detected prior to re-entry period. No roosts in either shed.	52.53315	-9.03362		
Static	02 nd to the 17 th of August					August static survey	Static survey 3			
Dusk	30/08/2023	Dusk Emergence	19:28	22:20	6	Unused dwelling and accompanying sheds to W of site. Natterer's bats roosting in two sheds. Bats noted flying within house. Common and Soprano Pipistrelle and Leisler's bat recorded outside buildings.	52.53246	-9.0445	20:28	JC

Survey	Date	Survey type	Start Time	End Time	Location (Figure 4-3/4-4)	Details	Grid ref (ITM) Start / Finish		Sunset / sunrise	Surveyor
		Driven transect	22:20	22:40	T3	Driven transect along track to west of site, up to northern road before following track into site from NE. Common, Soprano Pipistrelle and Leisler’s bat activity recorded. Common Pip, most frequently recorded.	52.532, -9.044	52.534, -9.033		
Dawn	31/08/2023	Dawn re-entry	04:42	06:42	3 and 4	Sheds to north by ruin. Low activity from Common and Soprano Pipistrelle but not roosting behaviour.	52.53915	-9.02992	06:42	JC
Dusk	30/08/2023	Dusk Emergence	19:28	21:28	9	By tree no 18 previously identified as having bat roosting potential. No roosting bats found. Low level of passing Leisler’s bat, Common and Soprano Pipistrelle recorded.	52.5283	-9.0360	20:28	KI
		Walked transect	21:28	22:30	T4	Transect as far as stream to south. Bushes impede access to water. Common Pipistrelle was the only bat recorded along route.	52.5282, -9.0359	52.5263, -9.0378		
Dawn	31/08/2023	Dawn re-entry	04:42	06:42	4	Ruin to north. Very low activity (Common and Soprano Pipistrelle) with no roosting bats.	52.53925	-9.03050	06:42	JC
Static	22 nd September to 5 th of October					Autumn static survey	Static survey 4			
Static	18 th October to the 5 th of November					October static survey	Static survey 5			
PRF	30th of January 2024					Winter PRF survey of trees. Ground level assessment within 268m of each turbine and within site boundary where there is the potential for trees and shrubs to be impacted. Structures 1 and 2 also checked for hibernating bats.				

Ballynisky Transect Results

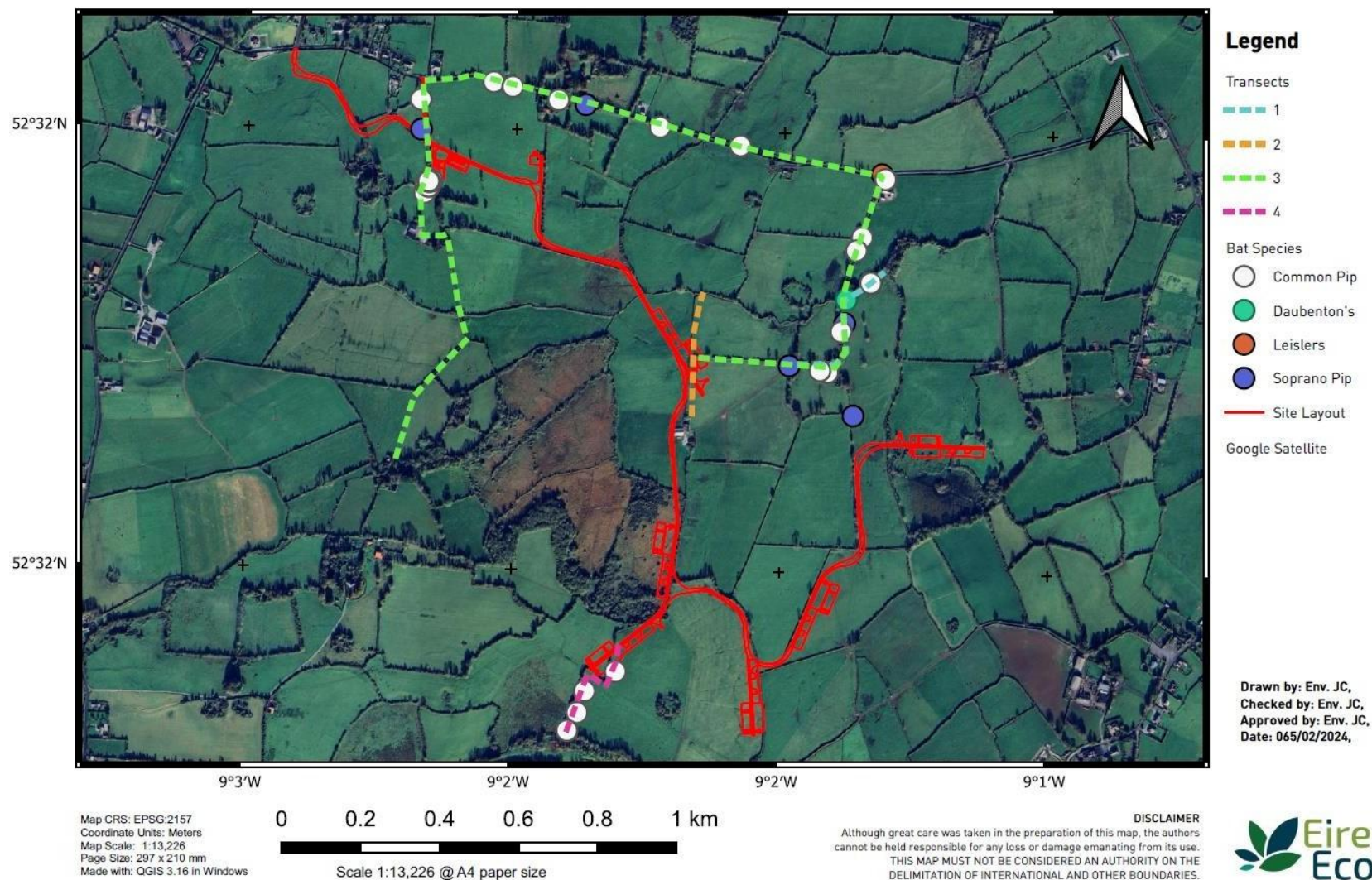


Figure 4-4: Bat Contacts during transects

4.4 STATIC DETECTOR RESULTS

The results of the static detector surveys deployed over five rounds (spring, summer, August, September, October to November) in 2023 are shown below. Overall, eight bat species were recorded (Common Pipistrelle, Soprano Pipistrelle, Nathusius' pipistrelle, Leisler's bat, Brown Long-eared bat, Natterer's bat, Lesser Horseshoe and Daubenton's bat). Where the call could not be identified to species, the identification was determined to the highest level possible. Several registrations were recorded with a peak frequency of 40 KHz. These bats will have been either common or Nathusius's Pipistrelle. Further Myotis calls were identified only to genus level. More detailed results are provided in Appendix 4.

Table 4-5 provides a breakdown of recording per species from all detectors and seasons. In total 44,196 registrations were recorded. Table 4-6 provides a breakdown per season and season. A bat passes per hour (BpHr) has also been provided. Figures 4-5 to 4-10 provide a visual representation of activity at each turbine by graduating the size of the turbine circle based on BpHr.

Table 4-52: Static Results

Common Name	Latin Name	No. of recordings
Brown Long-eared bat	<i>Plecotus auritus</i>	502
Common Pipistrelle	<i>Pipistrellus pipistrellus</i>	14,944
Daubenton's Bat	<i>Myotis daubentoniid</i>	7
Leisler's Bat	<i>Nyctalus leisleri</i>	8,339
Lesser Horseshoe bat	<i>Rhinolophus hipposideros</i>	10
Natterer's Bat	<i>Myotis nattereri</i>	70
Nathusius's Pipistrelle	<i>Pipistrellus nathusii</i>	68
Pipistrelle 40 KHz	<i>Pipistrellus nathusii</i> or <i>P. pipistrellus</i>	976
Soprano Pipistrelle	<i>Pipistrellus pygmaeus</i>	18,035
Unidentified Myotis species		1,245
Total registrations		44,196

Table 4--3: Static Results Per Season

Spring													
Detector	Leisler's Bat	Common Pipistrelle	Soprano Pipistrelle	Nathusius Pipistrelle	Pipistrelle 40 KHz	Brown Long-Eared	Lesser Horseshoe	Natterer's Bat	Daubenton's Bat	Unidentified Myotis	Total	Minutes Recorded	Bp/Hr
1	205	1008	352	3	63	3	1	2	0	19	1656	6176	16.1
2	617	823	266	1	119	1	1	3	0	59	1890	6176	18.4
3	431	317	288	42	123	21	0	3	0	9	1234	6176	12.0
4	130	998	484	19	152	0	0	2	0	9	1794	6176	17.4
5	124	732	598	0	62	5	0	0	0	3	1524	6176	14.8
6	216	208	182	0	21	1	0	0	0	3	631	6176	6.1
7	679	873	2280	0	46	3	0	0	0	5	3886	6176	37.8
8	722	404	71	0	139	14	0	0	0	6	1356	6176	13.2
Total	3124	5363	4521	65	725	48	2	10	0	113	13971	49408	17.0
Bp/Hr	3.8	6.5	5.5	0.08	0.9	0.06	0.002	0.01	0	0.14			
Summer													
Detector	Leisler's Bat	Common Pipistrelle	Soprano Pipistrelle	Nathusius Pipistrelle	Pipistrelle 40 KHz	Brown Long-Eared	Lesser Horseshoe	Natterer's Bat	Daubenton's Bat	Unidentified Myotis	Total	Minutes Recorded	Bp/Hr
1	26	40	35	0	1	0	0	0	0	2	104	5325	1.2
2	114	29	23	0	3	2	0	3	0	73	247	5325	2.8
3	126	107	160	0	16	6	0	11	0	16	442	5325	5.0
4	89	34	79	0	3	5	0	5	0	6	221	5325	2.5
5	568	154	162	0	2	13	0	1	0	2	902	5325	10.2
6	29	20	37	0	0	2	0	0	0	5	93	1938	2.9
7	436	1800	2481	2	75	3	0	0	0	558	5355	7508	42.8
8	40	53	63	0	7	2	0	0	0	11	176	5325	2.0
Total	1428	2237	3040	2	107	33	0	20	0	673	7540	41396	10.9
Bp/Hr	2.07	3.24	4.41	0.00	0.16	0.05	0.00	0.03	0.00	0.98			

August													
Detector	Leisler's Bat	Common Pipistrelle	Soprano Pipistrelle	Nathusius Pipistrelle	Pipistrelle 40 KHz	Brown Long-Eared	Lesser Horseshoe	Natterer's Bat	Daubenton's Bat	Unidentified Myotis	Total	Minutes Recorded	Bp/Hr
1	411	952	998	0	20	19	0	5	0	24	2429	9522	15.3
2	326	1421	617	0	12	13	0	0	0	75	2464	8898	16.6
3	0	1	0	0	0	1	0	0	0	0	2	568	0.2
4	809	1353	894	0	13	41	0	6	0	42	3158	11415	16.6
5	954	511	1420	0	6	30	0	1	0	25	2947	11415	15.5
6	463	157	278	0	1	9	0	4	0	10	922	11415	4.8
7	0	0	0	0	0	0	0	0	0	0	0	0	0.0
8	7	35	17	0	6	0	0	0	0	0	65	568	6.9
Total	2970	4430	4224	0	58	113	0	16	0	176	11987	53801	13.4
Bp/Hr	3.3	4.9	4.7	0.0	0.06	0.13	0.0	0.0	0.0	0.2			
September													
Detector	Leisler's Bat	Common Pipistrelle	Soprano Pipistrelle	Nathusius Pipistrelle	Pipistrelle 40 KHz	Brown Long-Eared	Lesser Horseshoe	Natterer's Bat	Daubenton's Bat	Unidentified Myotis	Total	Minutes Recorded	Bp/Hr
1	104	445	343	0	7	17	3	3	0	35	957	11154	5.1
2	64	99	112	0	0	13	0	2	0	55	345	11154	1.9
3	69	313	519	0	15	46	2	2	0	45	1011	11154	5.4
4	85	386	178	0	3	24	0	0	0	11	687	11154	3.7
5	192	825	2841	0	44	87	2	2	0	31	4024	11154	21.6
6	39	27	59	0	0	9	0	2	0	10	146	10206	0.9
7	71	62	902	0	0	1	0	0	0	0	1036	11154	5.6
8	91	130	213	0	10	90	1	0	7	29	571	11154	3.1
Total	715	2287	5167	0	79	287	8	11	7	216	8777	88284	6.0
Bp/Hr	0.5	1.6	3.5	0	0.05	0.2	0.005	0.007	0.005	0.15			

October													
Detector	Leisler's Bat	Common Pipistrelle	Soprano Pipistrelle	Nathusius Pipistrelle	Pipistrelle 40 KHz	Brown Long-Eared	Lesser Horseshoe	Natterer's Bat	Daubenton's Bat	Unidentified Myotis	Total	Minutes Recorded	Bp/Hr
1	1	4	30	0	0	1	0	0	0	6	42	3134	0.8
2	8	0	4	0	2	2	0	0	0	7	23	12638	0.1
3	7	263	159	0	3	6	0	1	0	16	455	9811	2.8
4	30	144	373	0	1	4	0	6	0	15	573	17276	2.0
5	30	144	373	0	1	4	0	6	0	15	573	17276	2.0
6	10	15	52	0	0	4	0	0	0	7	88	17276	0.3
7	11	38	54	0	0	0	0	0	0	0	103	12587	0.5
8	5	19	38	1	0	0	0	0	0	1	64	9811	0.4
Total	102	627	1083	1	7	21	0	13	0	67	1921	99809	1.2
Bp/Hr⁷	0.06	0.38	0.65	0.0006	0.004	0.013	0	0.0078	0	0.04			

⁷ Bat pass per hour

Ballynisky Spring Static Results

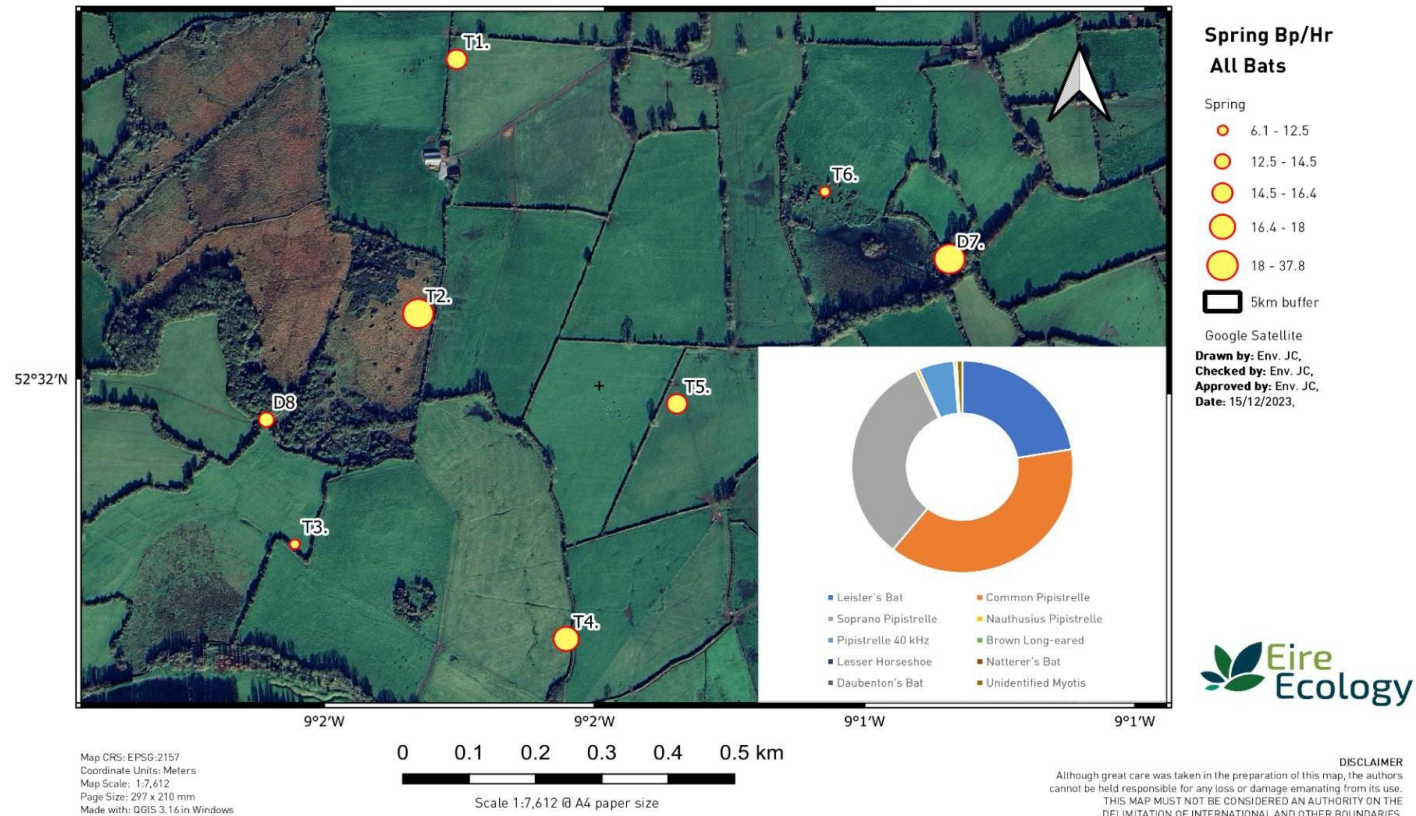


Figure 4-5: Combined Spring activity rates (Bp/Hr)

Ballynisky Summer Static Results

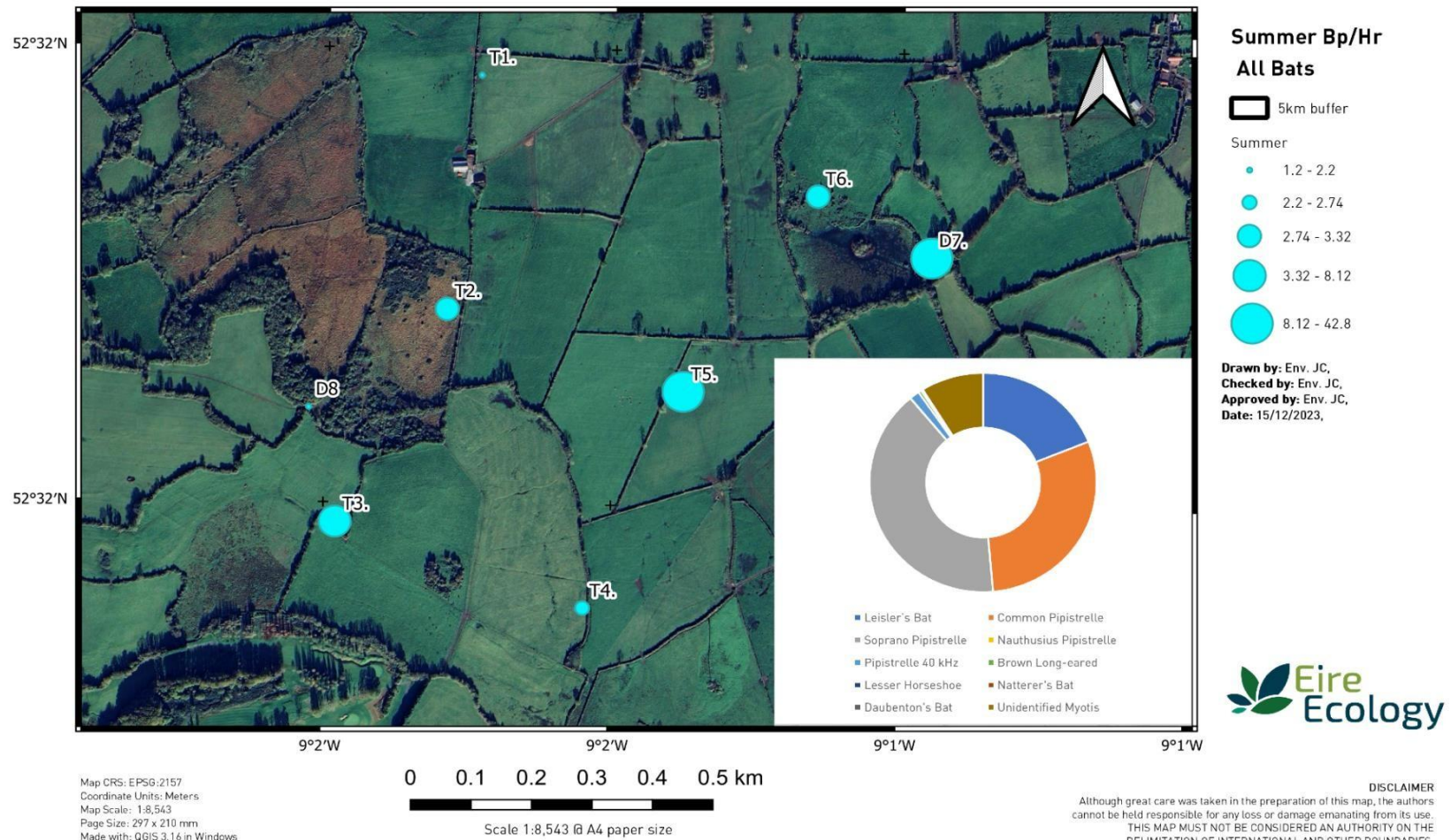


Figure 4-6: Combined Summer activity rates (Bp/Hr)

Ballynisky August Static Results

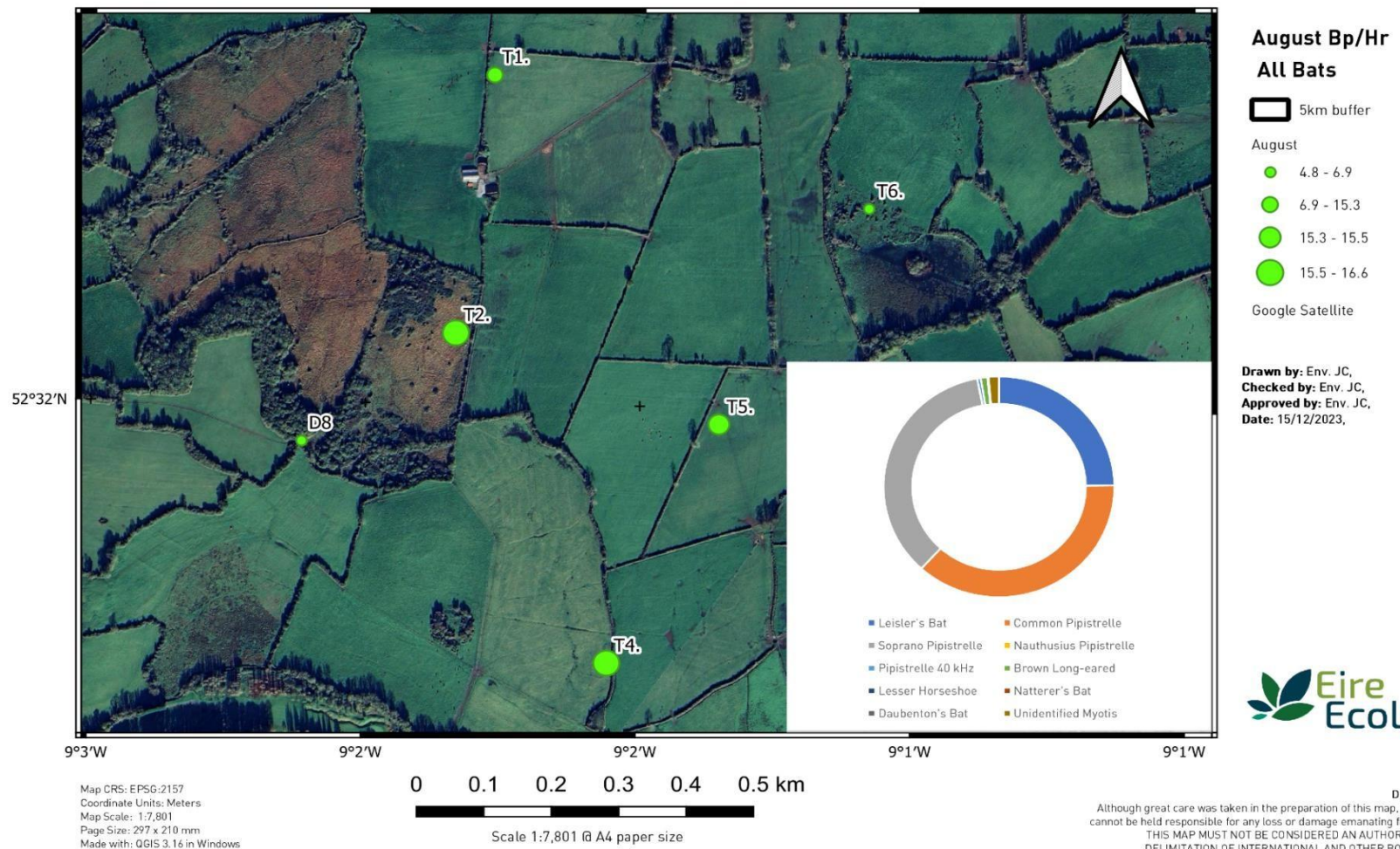


Figure 4-7: Combined August activity rates (Bp/Hr) (T7 failed to record and T3 only recorded for 1 night thus were excluded)

Ballynisky Autumn Static Results

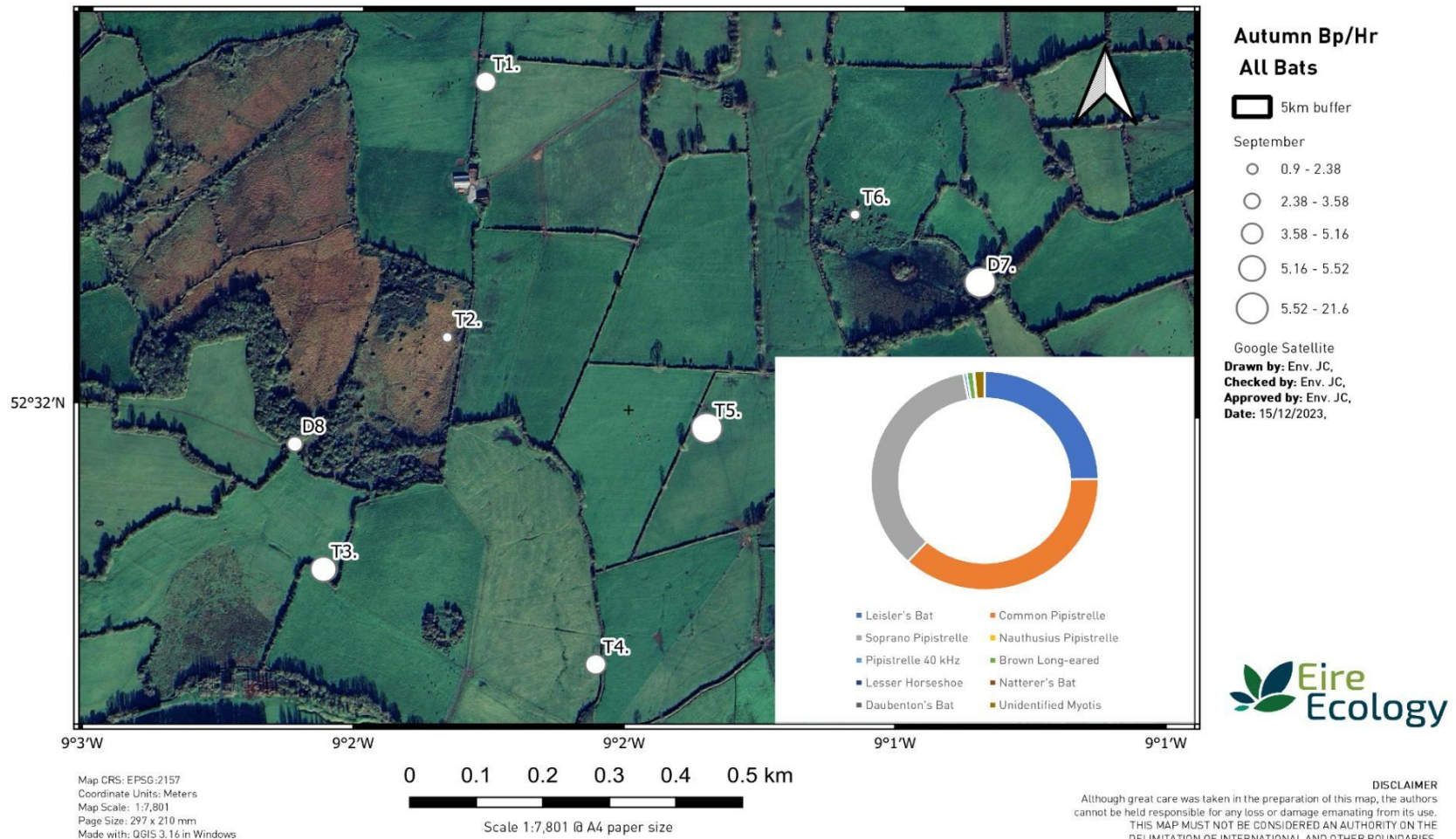


Figure 4-81: Combined Autumn activity rates (Bp/Hr)

Ballynisky October Static Results



Table 4-74: Static Results Combined data

Detector	Results	Leisler's Bat	Common Pipistrelle	Soprano Pipistrelle	Nathusius Pipistrelle	Pipistrelle 40 kHz	Brown Long-eared	Lesser Horseshoe	Natterer's Bat	Daubenton's Bat	Unidentified Myotis	Minutes recorded	Total
1	Passes	747	2449	1758	3	91	40	4	10	0	86	35311	5188
	BP/Hr	1.3	4.2	3.0	0.0	0.2	0.1	0.0	0.0	0.0	0.1		8.8
2	Passes	1129	2372	1022	1	136	31	1	8	0	269	44191	4969
	BP/Hr	1.5	3.2	1.4	0.0	0.2	0.0	0.0	0.0	0.0	0.4		6.7
3	Passes	633	1001	1126	42	157	80	2	17	0	86	33034	3144
	BP/Hr	1.1	1.8	2.0	0.1	0.3	0.1	0.0	0.0	0.0	0.2		5.7
4	Passes	1143	2915	2008	19	172	74	0	19	0	83	51346	6433
	BP/Hr	1.3	3.4	2.3	0.0	0.2	0.1	0.0	0.0	0.0	0.1		7.5
5	Passes	1868	2366	5394	0	115	139	2	10	0	76	51346	9970
	BP/Hr	2.2	2.8	6.3	0.0	0.1	0.2	0.0	0.0	0.0	0.1		11.7
6	Passes	757	427	608	0	22	25	0	6	0	35	47011	1880
	BP/Hr	1.0	0.5	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0		2.4
7	Passes	1197	2773	5717	2	121	7	0	0	0	563	37425	10380
	BP/Hr	1.9	4.4	9.2	0.0	0.2	0.0	0.0	0.0	0.0	0.9		16.6
8	Passes	865	641	402	1	162	106	1	0	7	47	33034	2232
	BP/Hr	1.6	1.2	0.7	0.0	0.3	0.2	0.0	0.0	0.0	0.1		4.1
Total	Passes	8339	14944	18035	68	976	502	10	70	7	1245	297387	44196
	Av. BP/Hr	1.7	3.0	3.6	0.01	0.2	0.1	0.002	0.01	0.001	0.3		8.9

Ballynisky Combined Static Results

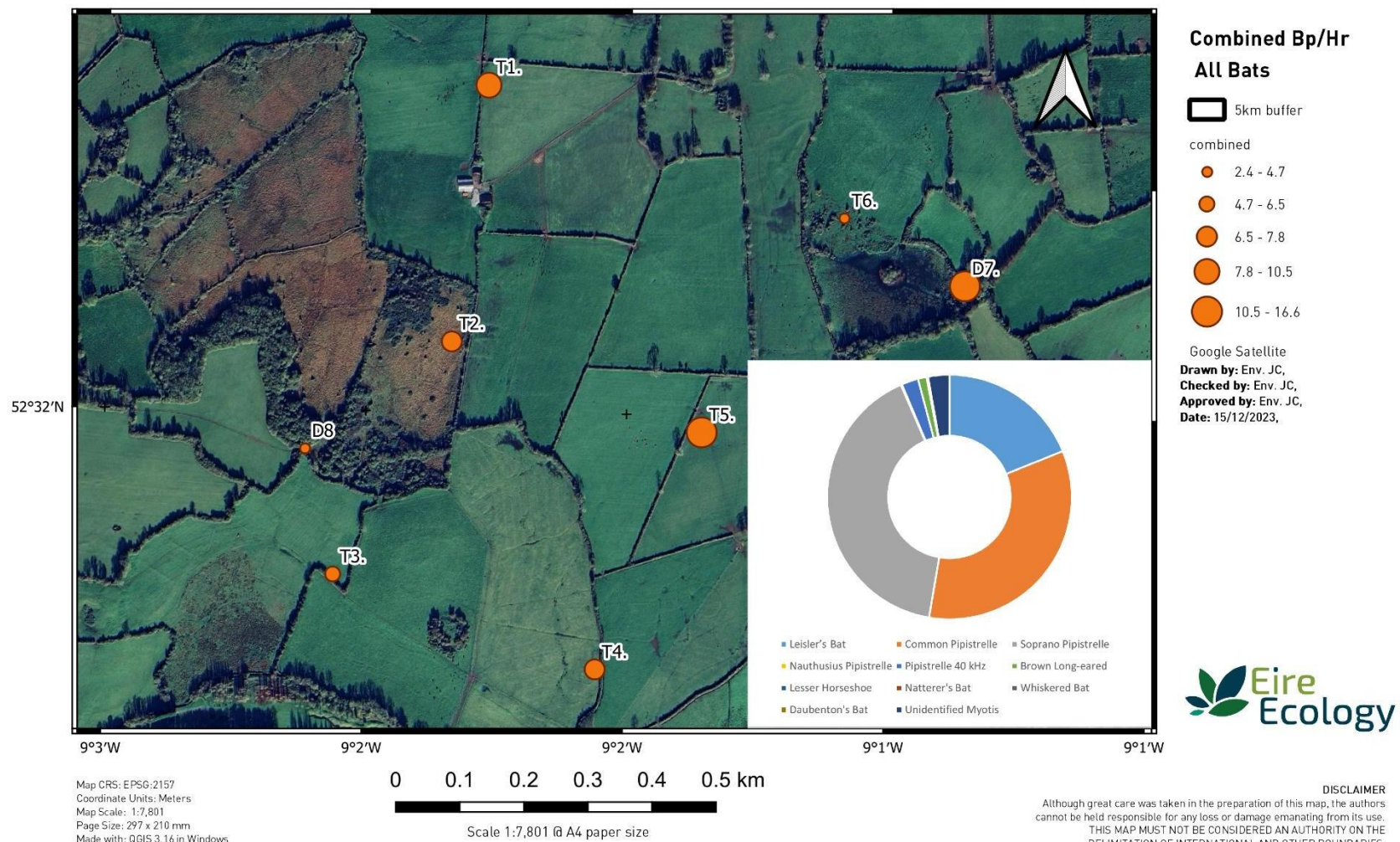


Figure 4-10: Total activity rates (Bp/Hr)

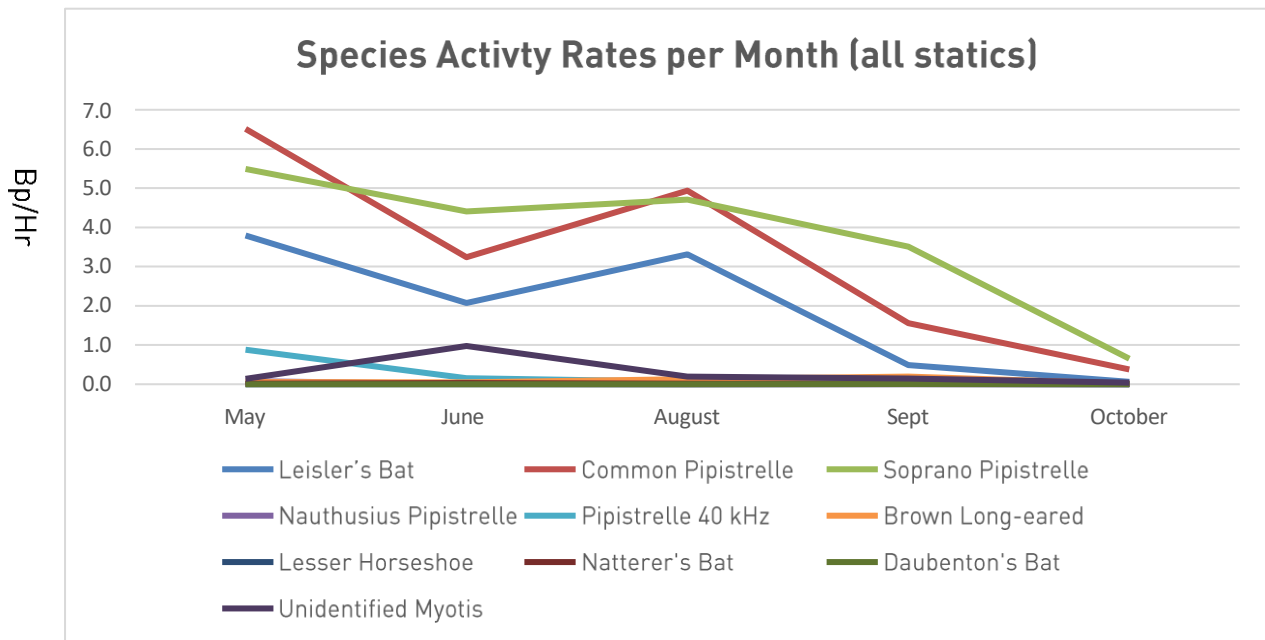


Figure 4-112: Species Activity Rates (BP/Hr) recorded per month; combined detectors.

Highest overall activity was recorded from Detector 7 set by a small woodland (Bp/Hr rate of 16.6), located close to wetlands and mature trees. Of the statics located at proposed turbine locations, detector 5 showed highest bat activity with an average Bp/Hr rate of 11.7. This detector was set by a hedge towards the south of the site with some connectivity to the southern stream. Detector 1 set to the north west showed next highest activity with 8.8 Bp/Hr. Lowest activity was recorded by D6 with a rate of 2.4 Bp/Hr. This detector was situated close to mature treelines to the west of D5 and has similar connectivity to the southern stream.

Highest activity was recorded from Soprano (41%) and Common Pipistrelle (34%), followed by Leisler bats (19%), with lower numbers from other species.

Figure 4-11 shows the seasonal activity rates per species. Overall, activity was highest in Spring with an average rate of 17Bp/Hr, dropping to 10.9 for Summer. The August survey showed a peak with 13.4 Bp/Hr before dropping off during September (6) and October (1.2).

Overall activity (based on BpHr and authors experience) for the turbine sites was relatively low. A rate of 5BpHr is akin to activity at an upland conifer plantation; a habitat of low bat favourability. Rates from 20 to 40 would be expected at a treelined edge in a lowland setting while activity by a substantial river or native woodland edge can reach to over 100BpHr. The ECOBAT analysis found in section 4.5 examines activity level more systematically and focuses on species with a high collision risk.

4.5 COMPARISON OF BAT DATA TO WEATHER

Weather data was recorded on site using an Ecowitt weather station recording data at 2 minute intervals Bat activity recorded during these periods were compared to temperature and wind (63 nights of data). The weather station was set recording attached to a pole by detector 5 set at a height of 2.5m (above the hedge) thus exposed to wind from all directions. Table 4-7 shows the maximum and minimum conditions where bats were recorded, while Table 4-8 shows the median weather conditions when high collision risk bat species were recorded. Finally, Table 4-10 shows the ranges of weather conditions when most bat activity occurred.

Table 4-8: Max and min weather values where bats were recorded

	Temperature (degrees Celsius)	Wind (m/s)
Max Value recorded	28.3	12.8
Maximum value with bat recording	20.1	11.8
Minimum value	3.6	0
Minimum value with bat recording	4	0

Table 4-9: Median wind and temperature per species

Species	Bat passes	Median Temp	Median windspeed
All bats	27508	11.4	1.1
Leisler's bat	5786	11.8	1.1
Common Pipistrelle	10137	11.4	1.1
Soprano Pipistrelle	9531	11.3	1.3
Nathusius and 40kHz Pipistrelle	1016	10.5	1.2

Table 4-10: Ranges of weather conditions when most bat activity occurs.

	Contacts below 3m/s (cut-in speed of Vestas V136)	Contacts above 10 degrees and below 5m/s
Bat passes	24498	19735
% of total bat activity	89.1%	97.9%

4.6 ECOBAT

Typically, results from the static detector surveys are analysed using Ecobat (University of Exeter); a software package that standardizes and performs interpretation of bat activity data. This software however has not been operational since November 2022, prior to the analysis of the Ballynisky dataset. In order to prepare a risk for the site, previous ECOBAT data the author has analysed was used to derive both an activity level and a median percentile. Data from two sites with similar habitat types were examined (detectors based within 25m of a hedgerow or treeline in lowland pasture setting). Given the similarity of habitats at each proposed turbine; improved grass with associated treelines and hedgerows (barring T2 which is situated in wet grassland with hedgerows) the comparison sites used are from Co. Cork c. 35km to the south-east and Tipperary (70km north-east). The reference range datasets can be found in Table 4-10 below. The percentile rating for each nights total passes per species from the comparison sites were ranked and averaged in order to derive a percentile score

for the Ballynisky detectors. Following (P. Lintott., 2017) a minimum range of 200 nights with at least one night of bat passes was compiled.

An assessment was conducted only for those species identified as being of high risk of turbine collision; Leisler's bat, Common, Soprano and Nathusius Pipistrelle (following the precautionary approach all 40kHz Pipistrelle recordings were added to Nathusius Pipistrelle data).

October's data was not added to the assessment. Activity was very low during October, thus adding this data would skew overall median results lower. The October data does demonstrate that activity significantly drops off and mitigation such as curtailment is not required at this time.

Table 4-11: Activity for detectors based on data from Cork and Tipperary detectors within 25m of hedgerow or treeline

Percentile	80-100	60-79	40 - 59	20 - 39	0 - 19	Range (nights with min of 1 bat call)
Activity level	High	Moderate High	Moderate	Moderate Low	Low	
<i>Pipistrellus pipistrellus</i>	26 plus	9 to 25	3 to 8	2	0 to 1	296
<i>Pipistrellus pygmaeus</i>	30 plus	10 to 29	3 to 9	2	0 to 1	296
<i>Pipistrellus nathusii</i>	28 plus	9 to 27	4 to 8	2 to 3	0 to 1	272 ⁸
<i>Nyctalus leisleri</i>	25 plus	10 to 24	4 to 9	2 to 3	0 to 1	293

All recordings were made in full spectrum, retaining all amplitude and harmonic information from the original bat call for subsequent analysis. Bat calls were analysed using Kaleidoscope Pro (2.1.0) Software. All files were split to a maximum duration of 15 seconds and automatically identified to species level, or genus level as appropriate, using auto-ID bat classifiers (Bats of UK 2.0.7)⁹.

In order to ensure quality, all bat calls were manually verified. In addition, 20% of noise files were also examined manually. The data was then interpreted through ECOBAT type analysis. Ecobat is an online tool which makes assessments of bat activity levels by comparing data entered by the user with bat survey information from similar areas. Specifically, a median bat activity level is calculated which corresponds to a bat activity category (Table 4-11).

Table 4-12: Median percentile range and corresponding bat activity

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

⁸ Data from detectors placed in the open had to be included to achieve a range of over 200 for Nathusius's Pipistrelle.

⁹ There have been several updates to Kaleidoscope and the auto ID; Bats of UK 2.0.7. The author however feels auto-ID software regularly misidentifies bat calls thus it is more accurate to manually verify all bat calls. The software version used is adequate for organising data.

Table 4-13: Bat activity within each activity band for each species – all seasons combined (baring October)

Detector	Species	Nights of High Activity	Nights of Moderate/ High Activity	Nights of Moderate Activity	Nights of Low/ Moderate Activity	Nights of Low Activity	Bat Activity Category Median	Bat Activity Category	Max Percentile	Bat Activity Category
1	Leisler's Bat	7	19	6	14	7	52	Moderate	89	High
2	Leisler's Bat	8	20	14	5	6	57	Moderate	95	High
3	Leisler's Bat	7	12	11	3	5	56	Moderate	90	High
4	Leisler's Bat	11	21	15	5	4	60	Moderate	95	High
5	Leisler's Bat	24	17	11	2	2	69	Moderate to High	95	High
6	Leisler's Bat	9	18	11	4	5	58	Moderate	88	High
7	Leisler's Bat	12	10	8	8	3	61	Moderate	96	High
8	Leisler's Bat	8	5	13	9	3	53	Moderate	96	High
1	Common Pipistrelle	24	10	10	3	6	66	Moderate to High	97	High
2	Common Pipistrelle	17	7	8	7	14	51	Moderate	98	High
3	Common Pipistrelle	8	19	5	4	2	63	Moderate to High	93	High
4	Common Pipistrelle	19	11	11	5	10	60	Moderate	98	High
5	Common Pipistrelle	21	14	12	4	5	65	Moderate to High	97	High
6	Common Pipistrelle	3	11	11	7	15	41	Low to Moderate	88	High
7	Common Pipistrelle	21	6	5	2	7	65	Moderate to High	98	High
8	Common Pipistrelle	5	11	11	4	7	51	Moderate	95	High
1	Soprano Pipistrelle	20	16	9	1	7	64	Moderate to High	94	High
2	Soprano Pipistrelle	12	12	8	7	14	48	Moderate	94	High
3	Soprano Pipistrelle	12	14	9	1	2	68	Moderate to High	94	High
4	Soprano Pipistrelle	21	12	14	4	5	62	Moderate to High	96	High
5	Soprano Pipistrelle	31	12	6	2	5	73	Moderate to High	99	High
6	Soprano Pipistrelle	6	16	5	9	11	48	Moderate	87	High

Detector	Species	Nights of High Activity	Nights of Moderate/ High Activity	Nights of Moderate Activity	Nights of Low/ Moderate Activity	Nights of Low Activity	Bat Activity Category Median	Bat Activity Category	Max Percentile	Bat Activity Category
7	Soprano Pipistrelle	27	4	4	5	1	78	Moderate to High	100	High
8	Soprano Pipistrelle	1	14	13	5	5	51	Moderate	83	High
1	Nathusius Pipistrelle	0	3	4	7	39	13	Low	77	Moderate to High
2	Nathusius Pipistrelle	1	4	1	6	41	13	Low	85	High
3	Nathusius Pipistrelle	3	3	8	6	18	28	Low to Moderate	82	High
4	Nathusius Pipistrelle	2	1	3	7	43	12	Low	91	High
5	Nathusius Pipistrelle	0	6	1	4	45	13	Low	79	Moderate to High
6	Nathusius Pipistrelle	0	0	1	2	44	3	Low	71	Moderate to High
7	Nathusius Pipistrelle	1	2	4	11	23	20	Low	86	High
8	Nathusius Pipistrelle	1	1	5	7	24	18	Low	91	High

5 ASSESSMENT OF POTENTIAL EFFECTS

Common, Nathusius's and Soprano Pipistrelle alongside Leisler's bats are high risk species for windfarm collisions; (SNH, 2019), (Fiona Mathews, 2015), (BCI, 2012). (NIEA, 2021) states that peaks of bat activity should be accounted for in addition to median levels to appropriately quantify risk. The report also noted that 'Leisler's bats, while fairly rare in Britain, are one of the commonest species found in Ireland. However, given their rarity in the rest of the UK, and indeed Europe, the Irish population is considered a global stronghold for the species and therefore we have an international responsibility for its protection'.

Table 2: Level of potential vulnerability of populations of British bat species.
(Adapted from Wray et al., 2010)

Yellow = low population vulnerability

Beige = medium population vulnerability

Red = high population vulnerability

	England	Collision risk		
		Low collision risk	Medium collision risk	High collision risk
	Common species	Brown long eared bat		Common pipistrelle Soprano pipistrelle
Relative abundance	Rarer species	Daubenton's bat Natterer's bat Whiskered bat Brandt's bat Lesser horseshoe	Serotine bat	Nathusius' pipistrelle Noctule bat Leisler's bat
	Rarest species	Alcathoe bat Bechstein's bat Greater horseshoe Grey long eared bat	Barbastelle bat	

Figure 5--1: Level of potential vulnerability of populations of British bats.

5.1 RISK ASSESSMENT

A risk assessment has been completed with reference to Table 3a and b; Bats and Onshore Wind Turbine report (SNH, 2021), (SNH, 2019).

5.1.1 Initial site risk assessment

An initial risk assessment is based on an assessment of habitats and the size of the development. Habitat suitability is ranked either low, moderate and high while project size is ranked from small, medium and large.

Habitats surrounding the subject turbines are ranked as High given connectivity to the wider landscape with the presence of hedgerows and treelines. Rivers border the site to the north and south and multiple bat roosts have been recorded in the wider area. Regarding project size; the project size is downgraded from Large to Medium as although turbines are over 100m in height, the development is of a low

number of turbines (6) with two other windfarms within a 5km radius; Carrons windfarm (2 turbines, approximately 2.4km to the NW) and Grouse Lodge (6 turbines, approximately 4.2km W)¹⁰.

The proposed Ballynisky windfarm thus derives an Initial Site Risk Assessment Value of 4; *high site risk*.

¹⁰ The author; John Curtin contacted Robb Reiner SNH (Reiner, personal communication, 14/04/2023) (an editor of the 2021 SNH guidance document) regarding the definition of **project size** given the document states all turbines over 100m are classified as large. As the majority of modern turbines are over this size the current classification system does not accurately proportion project size. Robb states this will be addressed in the next edition of the guidance document and suggests using personal interpretation in the meantime.

5.1.2 Overall risk assessment

The output from the initial site risk assessment is used in the below matrix to derive an overall risk assessment based on the activity level of high collision risk species, namely Common Pipistrelle, Soprano Pipistrelle, Nathusius's Pipistrelle and Leisler's bat. Ireland is considered the world stronghold for Leisler's bat with an estimated population of 73,000 – 130,000 (2007-2012) (Roche, 2014).

Table 5--1: Summary of bat survey data relevant to current project and assessment

Turbine No	Static Detector ID used for assessment	Leisler's bat		Common pipistrelle		Soprano pipistrelle		Nathusius's pipistrelle		Is location of static turbine at location?	Bat Habitat within 268m of turbine	If no mitigation is applied, what is the potential impact level?
		Maximum Percentile	Median Percentile	Maximum Percentile	Median Percentile	Maximum Percentile	Median Percentile	Maximum Percentile	Median Percentile			
1	D1	20	12	20	16	20	16	16	4	Yes	Yes; WL1, WL2, FW	High
2	D2	20	12	20	12	20	12	20	4	Yes	Yes; WS1, WL1, WL2	Medium
3	D3	20	12	20	16	20	16	20	8	Yes	Yes; WS1, WL1, WL2	High
4	D4	20	12	20	12	20	16	20	4	Yes	Yes; WL1, WL2	High
5	D5	20	16	20	16	20	16	16	4	Yes	Yes; WL1, WL2	High
6	D6	20	12	20	8	20	12	16	4	Yes	Yes; WL1, WL2, WD5	Medium
-	D7	20	12	20	16	20	16	20	4	N/A		
	D8	20	12	20	12	20	12	20	4			

WS1; Scrub, WL1; Hedgerow, WL2; Treeline, FW; Fresh water WD5; Scattered trees and parkland

6 DISCUSSION

The methodology for the 2023 bat surveys at the proposed Ballynisky wind farm site adhered to NatureScot 2019, and NatureScot 2021 guidance for assessing the impact of proposed wind farm developments on local bat species, while also following elements of the (NIEA, 2021) and Collins (2016 and 2023) guidance documents. Based on NIEA NED guidance an additional, fourth round of static monitoring was conducted based on an initial risk assessment. Roost assessment (structures and initial tree surveys), emergence surveys and activity surveys were undertaken between July to August 2023, with a preliminary tree assessment conducted in January 2024.

During walked surveys, a total of five species of bats were recorded: Common Pipistrelle, Soprano Pipistrelle, Leisler's bat, Natterer's bat and Daubenton's bat. In addition, a non-echolocating bat recorded was probably a Brown Long-eared bat. The most commonly recorded species was Common and Soprano Pipistrelle (50.5% and 40% respectively), with lower levels from other species. No roosts were recorded within 268m of the proposed turbine locations. In the wider landscape, Natterers roosts were found at an unoccupied dwelling and sheds 730m to the west of turbine 2.

During static surveys, a total of eight species of bats were recorded: Common Pipistrelle, Soprano Pipistrelle, Nathusius's Pipistrelle, Leisler's bat, Brown Long-eared bat, Lesser Horseshoe bat, Natterer's bat and Daubenton's bat. Where the call could not be identified to species, the identification was determined to the highest possible level. The most commonly recorded species was Soprano and Common Pipistrelle, followed by Leisler's, with lower levels from other species.

All bats recorded are classified as 'Least Concern' on the Irish Red List (2019) and protected under the EU Habitats Directive Annex IV and Wildlife Acts.

Due to the levels of nightly bat activity (with regard to median values as determined by Ecobat type analysis) at each of the static locations, turbines 2 and 6 are considered medium risk (or lower) for all at risk bat species. T1, 3, 4 and 5 are high risk for at least one species.

6.1 POTENTIAL IMPACTS

As outlined by NatureScot (2021), wind farms can affect bats in the following ways:

- Collision mortality, barotrauma and other injuries
- Loss or damage to commuting and foraging habitat
- Loss of, or damage to roosts
- Displacement of individuals or populations.

Furthermore, as indicated in Richardson et al (2021) Common Pipistrelle bats may be attracted to wind turbines. The study showed Common Pipistrelle activity was 37% higher at turbines than at control locations. The study further discussed, the observed higher levels of activity could be because there are more bats around turbines, or because animals spend more time in these locations relative to controls, even if the number of individual bats remains the same. We cannot distinguish between these possibilities using acoustic data. However, either way, higher levels of activity around turbines is likely to increase fatality risks and help to explain why fatality rates are often not predicted by acoustic surveys for bat activity conducted prior to facility construction.

6.1.1 Roost located 730m west of T2

A natterer's roost was found to the west of the site within the CSZ for this species. Natterer's bats typically forage at heights of less than 5m, but occasionally may reach 15m in the tree canopy (BCT,

2010). This species typically flies close to vegetation such as trees and have a preference for semi-natural woodlands. (Smith, 2008) shows that while semi-natural woodland and river corridors are the most favoured feeding habitats for this species, they also utilise improved grassland. Key to negating the impact on bats using this roost is the retention of scrub and woodlands.

Table 2 of (SNH, 2021) states that Natterer's bats are a low turbine collision risk species, likely due to this species flying below the turbine blade height. The removal of landscape features leading to the turbines should be sufficient mitigation (see 7.1.1 below) to direct this species away from the wind turbines, while the compensatory planting will ensure (see 7.1.4 below) no net loss of feeding or commuting features.

6.1.2 Lesser Horseshoe bats

No Lesser horseshoe bat roosts were found during the night-time surveys. Of the 44, 196 registrations, 10 Lesser horseshoe bat registrations were recorded during the static surveys (representing 0.002 Bp/Hr over the entire survey period across the proposed site). These recordings were during Spring (May) and Autumn (September to early October). D1 had 4 recordings followed by D3 and D5 with 2 registrations each and D2 (1 registration).

Detectors 7 and 8 were specifically placed in locations the author assumed would be of highest potential for Lesser Horseshoe bats. Interestingly, while D7 showed highest overall bat activity, no Lesser Horseshoe bats were recorded here, while only a single registration was recorded from D8. Table 6-1 shows details of each recording including the time after typical emergence this species was recorded at (30 minutes after sunset). If this figure was low, it could indicate a close by roost. The average time after sunset (or before sunrise if closer) this species was recorded at was 2 hours and 2 minutes, **indicating the site is not situated close to a Lesser Horseshoe roost**. The earliest recording was 28 minutes after typical emergence. Given the dates of recordings it is possible this species was recorded passing through the site during periods moving from between winter and summer roosts. All recordings were of single bats.

The site lies on the periphery of the Lesser Horseshoe Limerick bat range. As mentioned in Section 2.3 the Lesser Horseshoe Bat Species Action Plan 2022 shows the site is located where a historical commuting route between the Kerry and Limerick ranges sits and improvements to the landscape could aid reconnecting these regions.

Lesser Horseshoe rarely fly more than five metres above the ground (BCT, 2024). The proposed turbine blades at Ballynisky are 22m from the ground thus collision impacts will be unlikely. The site lies outside the core substance zone (2.5km) for designated roosts for this species. Given the very low Lesser Horseshoe activity recorded on the site, the low risk of collision, measures to limit treeline removal and the significant habitat enhancement proposed particularly for this species the likelihood of significant effects on Lesser horseshoe bat from the proposed development will be negligible.

Table 6--1: Lesser Horseshoe bat recordings

Detector	Date	Recorded	Recorded after typical emergence	Detector	Date	Recorded	Recorded after typical emergence
1	17 th May	23:16	00:53	1	1 st October	01:17	05:35
2	19 th May	03:51	01:14	3	1 st October	01:55	06:13
1	22 nd September	20:55	00:51	8	1 st October	04:10	02:58
1	26 th September	20:47	00:53	5	2 nd October	20:08	00:28
3	29 th September	20:36	00:49	5	3 rd October	20:07	00:30

7 MITIGATION, COMPENSATION & ENHANCEMENT

7.1 MITIGATION DURING CONSTRUCTION PHASE

7.1.1 Buffer Zone

Bats typically use woodland edge habitats for commuting and feeding purposes. Various publications provide guidelines on buffer zones surrounding turbines to reduce the favourability of the site for bat activity. Eurobats 'Guidelines for consideration of bats in wind farm projects' (Rodrigues, et al., 2015) recommend buffer zones of 200m from turbine base to high potential features whilst Natural England Bats (England, 2014) recommend 50m buffers from blade tip to tree. (NIEA, 2021) recommends a minimum buffer of 100m between the turbines at the edge of commercial forestry where wind farms are proposed to be key-holed.

The proposed Ballynisky windfarm is situated within habitats dominated, primarily by improved grassland with accompanying treelines and hedgerows (with the exception of T2). The proposed wind turbines; Vestas V-136 have a hub height of 90m and has a blade length of 68m. Should the typical 50m buffer be put in place at the proposed development, it would require a buffer of 98.4m from the turbine base where treelines are affected and 91m buffer when hedgerows are impacted.

The following formula is used to calculate the distance required from the turbine base.

Table 7--1: Buffer calculations

Buffer for treelines	$\sqrt{[(50+68)^2-(90-25)^2]}$
	98.4m buffer zone for treelines
Buffer for hedgerows	$\sqrt{[(50+68)^2-(90-15)^2]}$
	91m buffer zone for treelines

Where: bl = blade length, hh = hub height, fh = feature height (all in metres).

Based on a review of aerial photographs, a review of the habitat map and ground truthing, turbines 1, 2, 4, 5 and 6 should have a clearing of 91m given these are surrounded by hedgerows, while turbines 3 requires a 98.4m buffer (see Table 7-2 below).

Table 7-2: Portions of hedge / treelines to be felled and retained within buffer of turbines.

Turbine no	Buffer Size	Notes	Length of hedgerows to be removed (m).
1	91	While hedge provides N-S connectivity towards the Ahacronane stream, this will be compensated for to the west.	275
2	91	Eastern hedge will be removed but gorse scrub to west will be retained. Although within buffer, this semi-natural habitat has somewhat higher value for Natterer's bat (roost located to west). In order	170

Turbine no	Buffer Size	Notes	Length of hedgerows to be removed (m).
		to prevent bat collisions here alternative mitigation will be applied (curtailment).	
3	98.4	Hedge being removed provides connectivity N-S between southern Rathnagore stream and scrubby semi-natural woodland. Compensatory woodland will be planted both to the west and east retaining this link.	255
4	91	This hedge is less developed than others and is quite gappy. Nevertheless, the hedge again provides connectivity N-S between southern Rathnagore stream and scrubby semi-natural woodland. Compensatory woodland will be planted to the west retaining this link.	191
5	91	Hedge to the west of proposed turbine to be removed.	174
6	91	Western hedge to be removed. This area also has scattered hawthorn trees that will also be removed. In addition, a section of hedge will be removed outside the buffer to the east.	180
Additional hedgerow / treelines to be removed (access route etc)			356
Total length			1601

Construction operations within the wind farm site will take place during the hours of daylight.

The following specific mitigation measures for bats are recommended:

7.1.2 Retention of trees

Any trees and treelines along approach roads and planned site access tracks will be retained unless felling is unavoidable. Retained trees will be protected from root damage by an exclusion zone of at least 7 metres or equivalent to canopy height. Such protected trees will be fenced off by adequate temporary fencing prior to other works commencing.

7.1.3 Compensation for loss of commuting routes

Linear features such as hedgerows and treelines serve as commuting corridors for bats (and other wildlife). Measures are recommended in Appendix 6F – BEMP to compensate for the loss of features that are used by bats as commuting routes. These measures will also compensate for habitat loss and provide continuity in the landscape.

One such measure to be implemented is to reconnect hedgerows to compensate for the loss of hedgerows currently used by bats. Native species of Irish provenance will be used as they support more insect life than non-native varieties.

7.1.4 Habitat retention, replacement and landscaping

Habitat replacement and landscaping could compensate for or add to the wildlife value of the area and also provide areas of aesthetic as well as wildlife interest. In general, best practice design should aim to retain the quality of the landscape and ensure its protection within the landscaping programme. Existing hedgerows and semi-natural scrub or semi-natural grasslands within the study area outside of the footprint of the development will be retained and incorporated into the landscaping. Disturbed areas will be allowed to recolonise naturally.

In total, it is proposed to plant 3.864 km of linear habitats in the form of hedgerows and riparian buffer zones, in addition to 3.267ha of woodland. Four sections of woodland are proposed with the main purpose being to increase connectivity between the northern and southern woodlands along with connecting the western woodland. In conjunction with hedgerow planting, this will offset the loss of connectivity caused by turbine buffers and access tracks.

The BEMP for the proposed project draws on the Lesser Horseshoe Bat Species Action Plan 2022-2026 (VWT, 2022) where the good river network in Limerick is acknowledged. A section of existing hedge located along the boundary of the Ahacronane river to the north of the site will be strengthened by planting an adjacent 2m wide strip with the aim of increasing favourability for Lesser Horseshoe usage. This measure aligns with Appendix 6H: Limerick City & County Council Biodiversity Objectives (Council, 2022) which states *"It is an objective of the Council to require all developments in areas where there may be Lesser Horseshoe Bats, to submit an ecological assessment of the effects of the development on the species. The assessment shall include mitigation measures to ensure that feeding, roosting or hibernation sites for the species are maintained. The assessment shall also include measures to ensure that landscape features are retained and that the development itself will not cause a barrier or deterrent effect on the species."*

The following measures on hedgerow and woodland planting will be followed:

- As soon as all required approvals are in place for the proposed development, the first step of construction will be the planting of new hedgerows and woodlands. This will allow time for these features to establish prior to the loss of existing features.
- Given, hedgerows take several years to fully establish into usable landscape features by bats, plywood backed hoarding will be placed along routes where no existing feature exists. (see Figure 7-2).
- Hedgerow and woodland will consist of native Irish species from Irish genetic stock.
- Hedgerows will be planted in double row strips 1.5m wide with a spacing of 20-30cm of 60—90cm high 'whips'. Hedgerows will consist of a variety of species including 50% Hawthorn, 20% holly, 10% Hazel, 10% Elder, 2% Wild Privet, 2% Spindle, 2% guelder rose, 2 % dog rose and 2% Alder buckthorn.
- Tall trees will be planted at 15-30m intervals and consist of sessile oak, whitebeam with alder and willows where close to streams.

Ballynisky Bat Landscaping

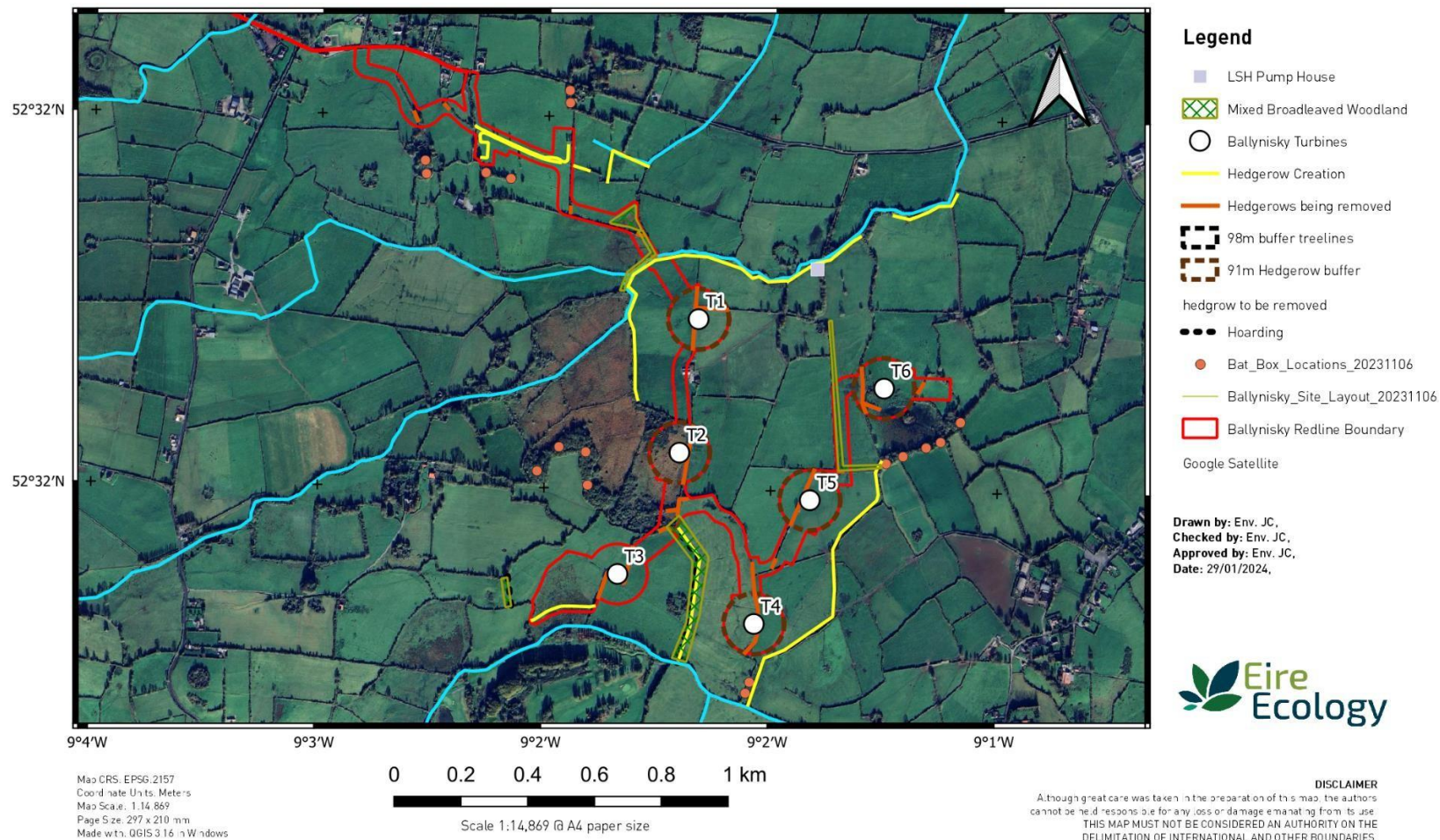


Figure 7--1: Compensation hedgerow and woodland and enhancement features (bat boxes and Lesser Horseshoe pumphouse)

Ballynisky Hoarding as Landscape Feature

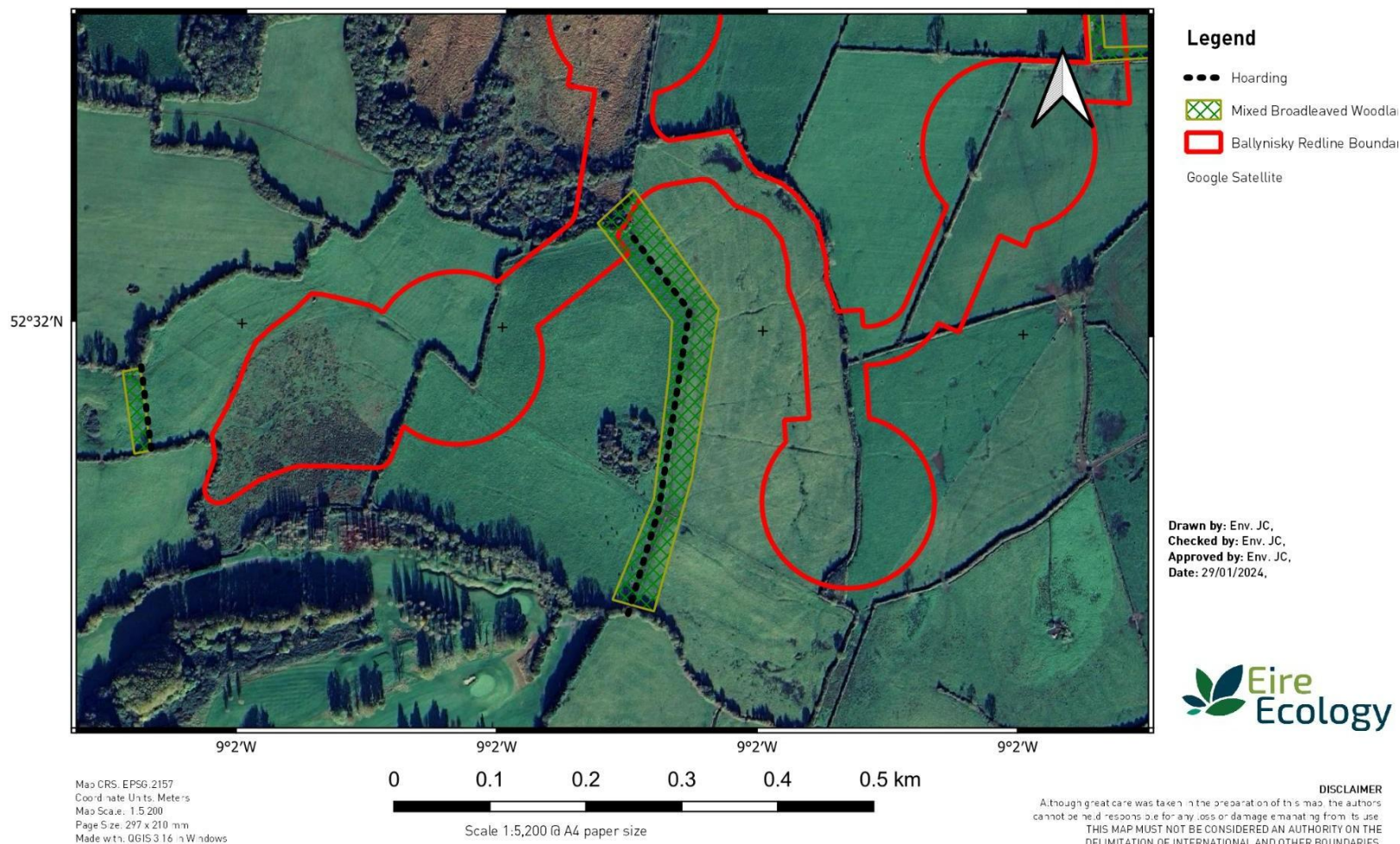


Figure 7--2: Hoarding to be placed until hedges / woodland reaches 5m in height

7.1.5 Lighting restrictions

In general, artificial light creates a barrier to bats so lighting will be avoided where possible. Construction operations within the wind farm site will take place during the hours of daylight predominantly therefore minimal, if any, disturbances to faunal species at night.

Where lighting is required, directional lighting (i.e. lighting which only shines on work areas and not nearby sensitive features (e.g. mature treelines). will be used to prevent overspill. This can be achieved by the design of the luminaire and by using accessories such as hoods, cowls, louvers and shields to direct the light to the intended area only.

The proposed lighting around the Site shall be designed in accordance with the Institute of Lighting Professionals Guidance Note 08/23¹¹ Bats and artificial lighting at night.

7.1.6 Enhancement Bat Box Scheme.

Figure 7-2 shows the location of proposed bat boxes, rocket boxes and a Lesser Horseshoe Pump House to be placed at locations at least 1 season before construction start. These shall be examined by a licensed bat specialist according to NPWS recommendations. Records will be submitted to Bat Conservation Ireland for inclusion in its bat distribution database.

If the boxes / tubes are not used within the first three years of deployment, they will be re-sited if necessary. Annual cleaning will be required if they are well used by bats or if used by birds. They will be replaced if damaged/lost.

The Pump house design is based on the VWT Mulkear EIP design but will also include a facing stone wall with integrated cavities suitable for Natterers bats. The entrance to each roost will be 25mm wide and 30 mm high with entrance sloping upwards to avoid rain ingress. The cavity will widen inside (50mm x 50mm in vertical section) and include vertical sections. Cavities will be positioned at a minimum of 2m high. (see drawing in Appendix 5).

7.2 MONITORING DURING CONSTRUCTION PHASE

7.2.1 Pre-construction Surveys

If three or more years lapse between pre-planning stage surveys and commencement of construction / installation of the wind turbines, it will be necessary to repeat one season of surveys during the activity period (EUROBATS, 2014). Future survey work will be completed according to best practice guidelines available at that time (Hundt, 2012; Collins, 2023; NatureScot, 2019; 2021) and include static detector, transect activity and roost inspection surveys.

7.2.2 Pre-felling survey of trees

Trees will be felled where they occur in line with the infrastructure footprint and/or for bat buffer purposes. Eight trees were identified as supporting PRFs (see Figure 4-2). Emergence surveys were undertaken in summer 2023 and no bat tree roosts were confirmed. As per Marnell *et al.* (2022), a pre-commencement survey will be carried out by a suitably qualified ecologist on trees with PRFs proposed for felling.

Best practice measures will be undertaken in the felling of any trees with PRFs as follows.

¹¹ Guidance Note 8 Bats and Artificial Lighting | Institution of Lighting Professionals

- Trees with low potential roost features will be 'soft' felled via section or limbs being cut and lowered to the ground or the tree shall be felled and left in situ for 24 hours prior to sectioning;
- Trees with negligible potential can be felled without consideration; and
- Trees with high or moderate potential, not found to support bats when surveyed would be 'soft felled' as per the methods presented on trees of low roost suitability.

7.3 MITIGATION DURING OPERATIONAL PHASE

This section refers to ongoing mitigation once turbines are operational. Various measures will be implemented which lower the risk of bat fatalities throughout the lifespan of the windfarm. Buffer zones surrounding each turbine will dissuade woodland bats that depend on landscape features for guidance from flying near turbines (as discussed in section above). Two further methods are proven to reduce bat fatalities; feathering (reduced rotation speed when turbines are idling) and curtailment (keeping turbines turned off when conditions are good for bat activity). All turbines barring T6 in the windfarm will be curtailed during the entire bat active season (April to September inclusive).

7.3.1 Feathering of Blades

Turbines should operate in a manner which restricts the rotation of the blades as far as is practicably possible below the manufacturer's specified cut-in speed. This is usually achieved by feathering the blades during low wind speeds; the angle of the blades is rotated to present the slimmest profile possible towards the wind, ensuring they do not rotate or 'idle' when not generating power. Automatic 'feathering' of idling blades will be implemented (through SCADA) to reduce rotation speed of blades to below 1 RPM while idling (as recommended in (Mathews, 2016)).

Turbine blades spinning in low wind can kill bats, however bats cannot be killed by feathered blades which are not spinning (Horn *et al.*, 2008). The feathering of turbine blades combined with increased cut-in speeds have been shown to reduce bat fatalities from 30% to 90% (NIEA, 2021), (SNH, Bats and Onshore Wind Turbines – Survey, Assessment and Mitigation., 2021), (Wellig S.D., 2018), (Rydell J., 2010), (Arnett, 2011) and (Baerwald, 2009).

As such, the feathering of blades to prevent 'idling' during low wind speeds is recommended for all turbines.

7.3.2 Cut-in Speeds/Curtailment

7.3.2.1 Curtailment definition

Increasing the cut-in speed above that set by the manufacturer can reduce the potential for bat/turbine collisions. A study by Arnett *et al.*, (2011) showed a 50% decrease in bat fatality can be achieved by increasing the cut-in speed by 1.5 m/s.

The feathering of turbine blades combined with increased cut-in speeds have been shown to reduce bat fatalities from 30% to 90% (Adams *et al.*, 2021, Arnett *et al.*, 2008, 2011, 2013; Baerwald *et al.*, 2009). The most recent of studies showed a 63% decrease in fatalities (Adams *et al.*, 2021).

Species with elevated risk of collision (Leisler's bat, Soprano and Common Pipistrelle) in particular would benefit from increasing the cut-in speed of turbines, as dictated on a case-by case basis depending on the activity levels recorded at each turbine (Richardson S. L., 2021).

7.3.2.2 Ballynisky Curtailment Strategy

SNH *et al.* (2019) acknowledge that it is difficult to predict how bat behaviour will change post-construction. Therefore, a two-step smart curtailment strategy is proposed that will protect bats while minimizing the curtailment periods and will be informed by post-construction monitoring.

I. Step 1; Operational Curtailment - Year 1

Smart curtailment will commence prior to the final close out of construction, as long as the turbine (s) are erected and turning i.e., posing a collision risk. Year 1 monitoring will be in line with the start of the bat active season (April) and will continue until the end of September. Static surveys reveal very low October activity thus curtailment is not necessary at this time.

Cut-in speeds will be increased during the bat activity season (April-September inclusive) where weather conditions are optimal for bat activity (see below) from 30 minutes prior to sunset and to 30 minutes after sunrise at all turbines.

The risk assessment concludes no curtailment is required at T2 or T6. In order to retain scrub located within the 91m buffer of T2, curtailment will be enacted. A weather meter erected on site shows that when read from a height of 2.5m, 89% of bat activity occurred when wind speed was less than 3m/s the typical cut-in speed of Vestas V136 turbines. Cut-in speeds restrictions will be operated according to specific weather conditions:

- 1 When the air temperature is above 10.0°C at nacelle height.
- 2 Wind speeds below 5.0m/s (at 2.5m).

This rate should see turbines turned off for 97.9% of times when bats are active.

II. Step 2; Operational Curtailment - Year 2 onwards

Smart curtailment must be guided by a coherent and comprehensive post-construction monitoring methodology, which will clarify the bat usage of the site at turbine locations post construction.

Year 1 fatality monitoring together with information from static deployment at height and at feature level on temporal usage of the site at specific turbine locations post-construction (including usage over each season (i.e., Spring, Summer & Autumn) and over night-time periods within specific seasons) will be utilised to provide a highly effective mitigation approach by implementing smart curtailment during the periods and environmental parameters that are known to be preferred by at risk-species.

A risk assessment will be produced based on the Year 1 data which will be used to inform a curtailment strategy from Year 2 onwards, where required. Static deployment data will be compared with weather stations based at nacelle height to inform cut-in speeds restrictions according to specific weather conditions. The post construction surveys (static deployment, transects, fatality monitoring) will be used to refine the Year 1 curtailment regime designed around the values for the key weather parameters and other factors that are known to influence collision risk. This will include all the following:

- Wind speed in m/s (measured at nacelle height)
- Time after sunset
- Month of the year

Temperature (°C)

Precipitation (mm/hr)

Should it be found that the results of the bat activity surveys and fatality searches confirm that the level of bat activity at turbine locations post construction is low, the cessation in the requirement for curtailment measures, or a reduction on the timing restrictions for these measures will be implemented. This will subsequently be monitored in Years 5, 7, 10, 15, 20, 25 and 30 with further review after each monitoring period.

If bat activity increases above the baseline and/or remains consistently high and fatality monitoring indicates fatalities are occurring, increased cut-in speeds will be considered combined with increased buffer zones (see Section 7.4.2.2 below).

Acoustic monitoring will be supplemented with thermal imaging cameras etc. to provide more detailed information on bat activity in the vicinity of turbines.

An assessment of static data gathered during operational surveillance will be completed using Ecobat type analysis as recommended by SNH (2021) as a minimum, or other equivalent guidance as dictated by up-to date standards and practices.

7.3.3 Buffer zones

The vegetation-free buffer zones (refer to section 7.1.1 above) around the identified turbines will be managed and maintained during the operational life of the development.

The immediate surroundings of individual turbines will be managed and maintained so that they do not attract insects (i.e. the concentration of insects in the wind turbine vicinity should be reduced as much as possible, but not such that insect abundancies affected elsewhere on the site). This will be achieved through physical management of habitats without the use of toxic substances.

7.4 POST CONSTRUCTION MONITORING

Monitoring will take place for at least 3 years after construction, providing sufficient data to detect any significant change in bat activity relative to pre-construction levels. It will assess changes in bat activity patterns and the efficacy of mitigation to inform any changes to curtailment.

During years one to three of operation (under blanket curtailment restrictions) bat activity will be measured at each turbine location, in combination with carcass surveys. In addition, wind speed and temperature data will be continuously recorded at the nacelle height of each turbine.

Modern remotely operated wind turbines as proposed here allow cut-in speeds to be controlled centrally/automatically, facilitating an operation regime designed to minimise harmful impacts to bats.

7.4.1 Monitoring Curtailment

If, following the initial 3 years of post-construction surveys, bat activity increases above the baseline and/or remains consistently high and carcass searches indicate fatalities are occurring (refer below), increased cut-in speeds will continue. This will subsequently be monitored in years 5, 7, 10, 15, 20, 25 and 30 with further review after each monitoring period.

Alternatively, if it is found that the results of bat activity surveys and fatality searches confirm that the level of bat activity at turbine locations is low then consent will be sought from Limerick City and County

Council (in consultation with NPWS) for the cessation in the requirement for these cut-in speeds / curtailment measures, or a reduction on the timing restrictions for these measures.

Where post construction acoustic surveys are undertaken, they will utilise full spectrum automatic detectors deployed, as a minimum, for one complete bat activity season.

Acoustic monitoring will be supplemented with thermal imaging cameras etc. to provide more detailed information on bat activity in the vicinity of turbines.

An assessment of static data gathered during operational surveillance will be completed using Ecobat type analysis as recommended by SNH (2021) as a minimum, or other equivalent guidance as dictated by up-to date standards and practices.

7.4.2 Monitoring of mitigation measures

The success of the implemented mitigation measures for bats on the project will be monitored for a period of three years after construction and appropriate measures taken to enhance these if and where required. Should bat fatalities be found within the first three years of surveys additional mitigation measures will be implemented in order to prevent this from reoccurring. Buffer zones surrounding the turbines will be increased from 50m to 65m from the blade tip and or curtailment parameters will be tweaked to increase cut-off of activity times. The increase in buffer zone equates to T 1, 2, 4, 5 and 6 needing a 116m buffer, while turbine 3 would need a 110m buffer.

A schedule for monitoring is given in Table 7-3 below.

7.4.2.1 Bat fatality monitoring

Although curtailment is a mitigation proven to lower bat fatalities, the development will be monitored for bat fatalities for the first three years of operation (post construction surveys) and subsequently in years 5, 7, 10, 15, 20, 25 and 30 as part of the additional curtailment monitoring schedule. A comprehensive onsite fatality monitoring programme will be undertaken following published best practice (e.g. SNH 2021 or equivalent at the time of operation).

- a) Carcass removal trials will be carried out to establish levels of predator removal of possible fatalities. This will be done following best recommended practice and with due cognisance of published effects such as predator swamping, whereby excessive placement of carcasses increases predator presence and consequently skews results. At the time of writing (2024), predation trials set using trail cameras following guidance set out in (Smallwood, 2010) provides the most accurate results.
- b) Turbine searches for fatalities will be undertaken with the use of conservation dogs following best practice in terms of search area (minimum radius hub height) and at intervals selected to effectively sample fatality rates as determined by carcass removal trials in (a) above. At the time of writing (2024), the typical search area surrounding the turbine bases follow (Edkins, 2014) Impacts Of Wind Energy Developments On Birds And Bats: Looking Into The Problem, who recommends the "search width should be equal to the maximum rotor tip height", e.g. turbines at Ballynisky have a max tip height of 158m thus the spread of searched area, as a rectangle, square or circle, should be 79m in either direction from the turbine base."
- c) Search intervals will follow (SNH, 2021) - Appendix 4.
- d) Recorded fatalities will be calibrated against known predator removal rates to provide an estimate of overall fatality rates.
- e) Monitoring report will be submitted annually to Limerick County Council and the NPWS.

Table 7--3: Monitoring schedule for bat mitigation measures

Mitigation measure	Monitoring required	Description	Duration
Bat boxes, tubes and LSH Pump House	Monitor bat use	Bat boxes, rocket boxes and tubes to be placed at locations as determined by project ecologist/ECOW at least 1 season before construction start. These shall be examined by a licensed bat specialist according to NPWS recommendations. Records will be submitted to <i>Bat Conservation Ireland</i> for inclusion in its bat distribution database. If the boxes / tubes are not used within the first three years of deployment, re-site if necessary. Annual cleaning required if well used by bats or if used by birds. Replacement if damaged/lost.	From mounting to 3 years post construction.
Mortality study	Fatality monitoring	Corpse searches beneath turbines to assess the impact of operation on bats.	From initial operation conducted during years 1, 2, 3, 5, 7, 10, 15, 20, 25 and 30 post construction.

8 RESIDUAL IMPACTS AFTER MITIGATION

Following extensive surveys within and surrounding the site, it is evident that the landscape in which the proposed wind farm is situated is of high suitability for Soprano and Common Pipistrelle, moderate to high suitability for Leisler's bat and lower suitability for Nathusius Pipistrelle.

With the implementation of the mitigation outlined above the potential risk of fatality from collision and/or barotrauma events to foraging and/or commuting high risk species such as pipistrelle and Leisler have been significantly reduced and the surveyor's professional opinion is that the development will not have a long-term negative impact on the local bat populations.

Impacts on other bat species, particularly Natterer's and Lesser Horseshoe bat have also been assessed. While these species are not at height risk from collision, they can be impacted by loss of connectivity features and loss of roosting sites.

The proposed development will result in significant net gain in terms of hedgerow enhancement and replanting and creation of over 3ha of new native woodland and the installation of bat boxes (see Appendix 6G, Figure 2.1 for location of proposed mitigation measures, bat box deployment and enhancement measures).

While minimal recordings of Lesser Horseshoe bat were noted during the survey period, the range of the Lesser horseshoe bat in Ireland is, for the most part, limited to six western counties – Clare, Cork, Galway, Kerry, Limerick and Mayo. The Vincent Wildlife Trust launched the Lesser Horseshoe Bat Conservation Project, an EIP (European Innovation Partnership) that was administered by Mulcair Catchment Ltd which is known as the 'Farm and Community Biodiversity Initiative'. This initiative sought proposals for the development and implementation of actions to enhance local on-farm biodiversity. While acknowledging that all nine Irish bat species are found on farms, the lesser horseshoe bat is probably the one most dependent on the structures and habitats usually found on agricultural land¹². In line with the aims of Lesser Horseshoe project, a Lesser Horseshoe bat house will be constructed south of the Ahacronane river, to the north of the Site (see **Figure 7.1** above for location and **Appendix 5** attached to this report Pump House Design). This riparian corridor will also be strengthened by planting an adjacent 2m wide strip with the aim of increasing favourability for Lesser Horseshoe usage. This measure is one of pure enhancement, given the clear lack of records of Lesser Horseshoe bat throughout the survey period. These measures are designed to aid both bats in the locality as well as promoting principles in the Lesser Horseshoe action plan (VWT, 2022).

Section 4 of the action plan suggests the following practical measures.

- Section 4.2c "incentivise farmers to plant suitable hedgerows habitat creation"
- Section 4.2d "Promote appropriate planting along watercourses"
- Section 4.2f "Provide night roosting facilities"
- 4.3c Implement a programme to enhance landscape connectivity between lesser horseshoe bat roosts and foraging grounds

These measures also correspond with Limerick City & Councils Biodiversity Action Plan 2025-2030. Objective E. which seeks to promote and enhance habitat for species scarce to Limerick where appropriate.

¹² [Vincent Wildlife Trust Ireland | Mulkear Lesser Horseshoe...](#)

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APPENDIXES

1 INITIAL TREE ROOST INSPECTION

Table 1--1: PRF Results

Tree no:	Lat	Lon	Category	Species	Roost potential
1	52.53573	-9.03328	None	Hedgerow	No potential
2	52.53637	-9.033	None	Ash	No potential
3	52.5363	-9.03238	None	Hedgerow	No potential
4	52.53486	-9.03048	None	Ash	No potential
5	52.53488	-9.03148	None	Hedgerow	No potential
6	52.5349	-9.03274	None	Ash	No potential
7	52.53428	-9.03346	None	Hedgerow	No potential
8	52.53167	-9.03506	None	Mix of Ash, gorse and hedge species	No potential
9	52.53068	-9.03612	None	Hedgerow with small ash	No potential
10	52.52964	-9.03556	None	Mix of Willow and ash	No potential
11	52.52921	-9.03613	None	Mix of Willow, Ash and whitethorn	No potential
12	52.52922	-9.03717	FAR	Ash	Possible potential due to crevice
13	52.52932	-9.03772	None	Whitethorn/blackthorn	No potential
14	52.52902	-9.03792	None	Ash	No potential
15	52.52907	-9.03873	None	Elder and ash	No potential
16	52.52913	-9.03672	None	Ash	No potential
17	52.52888	-9.03564	None	Scrub	No potential
18	52.52833	-9.03602	PRF	Ash	Good potential
19	52.5275	-9.03637	None	Hedgerow	No potential
20	52.52765	-9.03689	None	Hedgerow	No potential
21	52.52762	-9.03721	None	Ash x 3	No potential
22	52.52701	-9.03755	None	Hedgerow	No potential
23	52.52611	-9.03725	None	Mix of ash, hazel and Willow	No potential
24	52.52708	-9.03424	PRF	Whitethorn	Good potential due to deep crevice
25	52.5269	-9.03407	PRF	Whitethorn	Good potential due to deep cavity
26	52.52714	-9.03436	None	Mix hedge species	Rest of area no potential
27	52.52689	-9.03432	None	Mix of hedge species	No potential
28	52.52996	-9.03255	None	Ash x 3, sycamore x 1	No potential
29	52.52983	-9.03236	None	Ash	No potential
30	52.52969	-9.03227	None	Ash	No potential
31	52.53069	-9.0346	None	Scrub	No potential
32	52.53253	-9.03292	None	Hedgerow	No potential
33	52.53161	-9.02723	None	Sycamore	No potential
34	52.53202	-9.02727	None	Hedgerow	No potential
35	52.53236	-9.02732	None	Ash	No potential

Tree no:	Lat	Lon	Category	Species	Roost potential
36	52.53272	-9.02724	None	Line of ash, sycamore and willow	No potential
37	52.53319	-9.02736	None	Hedgerow	No potential
38	52.53449	-9.0256	None	Scrub	No potential
39	52.53436	-9.02558	None	Ash and sycamore	No potential
40	52.5341	-9.02572	None	Ash	No potential
41	52.53392	-9.02584	None	Ash	No potential
42	52.5333	-9.02602	None	Ash	No potential
43	52.53306	-9.02604	None	Ash x 2	No potential
44	52.5326	-9.02516	None	Ash and whitethorn area	No potential
45	52.5327	-9.02595	None	Ash x 2	No potential
46	52.53234	-9.02577	None	Ash	No potential
47	52.53228	-9.02559	None	Area of immature ash and whitethorn	No potential
48	52.5317	-9.02552	None	Ash	No potential
49	52.53128	-9.02535	None	Ash	No potential
50	52.53199	-9.02398	None	Scots pine	No potential
51	52.53279	-9.02357	None	Hedgerow	No potential
52	52.53317	-9.02317	None	Ash	No potential
53	52.53307	-9.02316	None	Ash	No potential
54	52.53251	-9.0233	None	Ash x 2	No potential
55	52.53236	-9.02271	None	Hedgerow	No potential
56	52.53295	-9.02217	None	Ash	No potential
57	52.533	-9.02256	None	Ash x 3	No potential
58	52.53317	-9.02263	None	Ash	No potential
59	52.53339	-9.02265	None	Ash	No potential
60	52.53358	-9.02265	None	Hedgerow	No potential
61	52.53062	-9.02636	None	Hedgerow	No potential
62	52.53057	-9.02706	PRF	Sycamore	Good potential due to cavity
63	52.53053	-9.02713	None	Ash x 2	No potential
64	52.53097	-9.02708	None	Line of ash	No potential
65	52.53056	-9.02777	PRF	Ash	Good potential due to crevice
66	52.53008	-9.02838	None	Hedgerow	No potential
67	52.53058	-9.02882	None	2 whitethorn	No potential
68	52.53062	-9.02921	FAR	Whitethorn	Possible potential due to cavity
69	52.53063	-9.02938	None	Ash	No potential
70	52.53064	-9.03016	None	Hedgerow	No potential
71	52.52948	-9.02872	None	Ash	No potential
72	52.52892	-9.02911	None	Ash	No potential
73	52.52845	-9.02946	None	Hedgerow	No potential
74	52.52821	-9.02839	None	Hedgerow	No potential

Tree no:	Lat	Lon	Category	Species	Roost potential
75	52.52832	-9.02787	PRF	Sycamore	Possible potential due to a number of cavities
76	52.52846	-9.02712	None	Sycamore	No potential
77	52.52838	-9.02712	None	Ash	No potential
78	52.52831	-9.02707	None	Sycamore x 2	No potential
79	52.52921	-9.02611	None	Hedgerow	No potential
80	52.52576	-9.02905	None	Hedgerow	No potential
81	52.5256	-9.02968	None	Ash	No potential
82	52.52509	-9.03045	None	Hedgerow	No potential
83	52.52495	-9.0307	None	Willow	No potential
84	52.52477	-9.0309	None	Hedgerow	No potential
85	52.52526	-9.03056	None	Ash	No potential
86	52.52562	-9.0308	None	Stand of immature ash	No potential
87	52.52655	-9.03045	None	Hedgerow	No potential
88	52.52727	-9.03063	None	Ash	No potential
89	52.5278	-9.03018	None	Hedgerow	No potential
90	52.52765	-9.03064	None	Willow	No potential
91	52.52787	-9.03067	None	Willow	No potential
92	52.52805	-9.03074	None	Ash	No potential
93	52.54176	-9.04827	None	Hedgerow, immature ash	No potential
94	52.54007	-9.04593	None	Sycamore	No potential
95	52.53974	-9.04566	None	Sycamore	No potential
96	52.53986	-9.04569	None	Beech	No potential
97	52.53993	-9.0459	None	Ash	No potential
98	52.53995	-9.0458	None	Ash x 2, immature	No potential
99	52.54019	-9.04452	None	Hedgerow	No potential
100	52.53972	-9.04352	None	Ash x 2	No potential
101	52.53962	-9.0434	None	Ash	No potential
102	52.53895	-9.04311	None	Group of ash	No potential
103	52.53992	-9.04338	None	Sycamore	No potential
104	52.53986	-9.0433	None	Hedgerow	No potential
105	52.53948	-9.04217	None	Ash	No potential
106	52.53951	-9.04239	None	Ash	No potential
107	52.53929	-9.04167	None	Ash	No potential
108	52.53877	-9.03938	None	Whitethorn/blackthorn	No potential
109	52.5393	-9.03909	None	Ash x 2	No potential
110	52.53752	-9.039	None	Hedgerow with whitethorn	No potential
111	52.5369	-9.03593	None	Hedgerow	No potential
112	52.54087	-9.04356	None	Hedgerow	No potential
113	52.541	-9.04352	None	Sycamore	No potential
114	52.54103	-9.04373	None	Sycamore	No potential
115	52.54115	-9.04387	None	Hedgerow	No potential
116	52.54111	-9.04304	None	Hedgerow	No potential
117	52.53466	-9.02824	PRF	Ash	Cavity cat 1

Tree no:	Lat	Lon	Category	Species	Roost potential
118	52.53475	-9.02701	PRF	Ash	On its own. High potential cavity

2 NIGHT TIME BAT DETECTOR DATA.

Table 2--1: Weather data for walked surveys

Date	Sunset / sunrise	Start / finish	Temp	Wind speed m/s	Wind direction	Rain
29/07/2023	21:33	21:15	14.7	1.1	W	Dry
		00:22	13.5	1	W	Dry
30/07/2023	05:53	03:25	13	1	SW	Dry
		05:53	13.3	0.9	SW	Mostly dry with light drizzle for fifteen minutes
30/08/2023	20:28	20:00	17	0.4	E	Dry
		22:40	12	1.1	E	Dry
31/08/2023	06:42	04:42	12	0.9	E	Drizzle
		06:42	13	1	E	Drizzle

3 EMERGENCE / RE-ENTRY ROOST SURVEYS

Contact number	Date	Time	Location	Species	Details	Lat	Long	Surveyor
1	29/07/2023	22:06	2	Soprano Pip		52.53466	-9.02694	CM
2	29/07/2023	22:27	2	Soprano Pip	Using treeline as commuting corridor	52.53475	-9.02827	CM
3	29/07/2023	22:32	2	Common Pip		52.53455	-9.02803	CM
4	29/07/2023	22:35	2	Daubenton's	Using treeline as commuting corridor	52.53449	-9.02771	CM
5	29/07/2023	22:35	2	Common Pip		52.53449	-9.02771	CM
6	29/07/2023	22:55	2	Common Pip		52.53479	-9.02774	CM
7	29/07/2023	22:57	2	Soprano Pip		52.5349	-9.02765	CM
8	29/07/2023	22:59	2	Common Pip		52.53472	-9.02804	CM
1	29/07/2023	23:45	T1	Common Pip		52.53569	-9.02767	CM
2	29/07/2023	23:45	T1	Soprano Pip		52.53569	-9.02767	CM
3	29/07/2023	23:50	T1	Daubenton's	Using river as commuting corridor	52.53623	-9.02762	CM
4	29/07/2023	23:54	T1	Soprano Pip		52.53662	-9.02672	CM
5	29/07/2023	23:54	T1	Common Pip		52.53662	-9.02672	CM
6	29/07/2023	00:22	T1	Soprano Pip		52.53359	-9.02731	CM
1	30/07/2023	04:09	1	Soprano Pip		52.53317	-9.03347	CM
1	30/08/2023	21:04	6	Common Pip	flew from lane over derelict dwelling and behind it	52.53253	-9.04442	JC
2	30/08/2023	21:05	6	Soprano Pip	Unseen	52.53254	-9.04444	JC
3	30/08/2023	21:07	6	Soprano Pip		52.53231	-9.04451	JC
4	30/08/2023	21:12	6	Leisler's		52.53252	-9.04439	JC
5	31/08/2023	21:19	6	Natterer's bat	Roosting in shed adjacent to dwelling	52.53231	-9.04471	JC
6	30/08/2023	21:22	6	Soprano Pip		52.53193	-9.04434	JC
7	30/08/2023	21:22	6	Soprano Pip		52.53202	-9.04445	JC
8	30/08/2023	21:22	6	Soprano Pip		52.53203	-9.04448	JC
9	30/08/2023	21:28	6	Soprano Pip		52.53256	-9.04463	JC

Contact number	Date	Time	Location	Species	Details	Lat	Long	Surveyor
10	30/08/2023	21:29	6	Soprano Pip		52.53255	-9.04451	JC
11	30/08/2023	21:29	6	Soprano Pip		52.53254	-9.04443	JC
12	30/08/2023	21:30	6	Soprano Pip		52.53256	-9.04441	JC
13	30/08/2023	21:32	6	Unidentified bat	flying within house	52.53255	-9.04442	JC
14	30/08/2023	21:34	6	Soprano Pip		52.53254	-9.04442	JC
15	30/08/2023	21:35	6	Soprano Pip	hunting	52.53249	-9.04445	JC
16	30/08/2023	21:37	6	Common Pip		52.53247	-9.04444	JC
17	30/08/2023	21:38	6	Soprano Pip		52.53253	-9.04452	JC
18	30/08/2023	21:40	6	Soprano Pip	hunting	52.53251	-9.04451	JC
19	30/08/2023	21:41	6	Soprano Pip		52.53251	-9.04451	JC
20	30/08/2023	21:43	6	Soprano Pip		52.53248	-9.04447	JC
21	30/08/2023	21:44	6	Soprano Pip		52.53248	-9.04447	JC
22	30/08/2023	21:47	6	Soprano Pip		52.53247	-9.04447	JC
23	30/08/2023	21:49	6	Common Pip		52.53246	-9.04446	JC
24	30/08/2023	21:52	6	Soprano Pip		52.53246	-9.04445	JC
25	30/08/2023	21:53	6	Common Pip		52.53248	-9.04445	JC
26	30/08/2023	21:54	6	Leisler's		52.53244	-9.04466	JC
27	30/08/2023	21:57	6	Soprano Pip		52.53227	-9.04453	JC
28	30/08/2023	21:58	6	Natterer's bat	In shed to rear of farmstead. Different bat to other.	52.53217	-9.04465	JC
29	30/08/2023	22:00	6	Soprano Pip		52.53197	-9.04472	JC
30	30/08/2023	22:00	6	Common Pip		52.53207	-9.04467	JC
31	30/08/2023	22:07	6	Common Pip		52.53241	-9.04452	JC
32	30/08/2023	22:07	6	Soprano Pip		52.53254	-9.04444	JC
33	30/08/2023	22:09	6	Soprano Pip		52.53252	-9.04486	JC
34	30/08/2023	22:10	6	Common Pip		52.53244	-9.04448	JC
35	30/08/2023	22:21	6	Common Pip	Occasional passes	52.53768	-9.04357	JC
1	30/08/2023	22:22	T3	Common Pip		52.53854	-9.04342	JC
2	30/08/2023	22:22	T3	Common Pip		52.53872	-9.04337	JC

Contact number	Date	Time	Location	Species	Details	Lat	Long	Surveyor
3	30/08/2023	22:23	T3	Common Pip		52.53874	-9.04335	JC
4	30/08/2023	22:23	T3	Common Pip		52.53868	-9.04326	JC
5	30/08/2023	22:23	T3	Common Pip		52.53868	-9.04327	JC
6	30/08/2023	22:23	T3	Common Pip		52.5388	-9.04316	JC
7	30/08/2023	22:24	T3	Common Pip	Good hunting activity occurring by mature trees.	52.53883	-9.04317	JC
8	30/08/2023	22:24	T3	Common Pip		52.53879	-9.04325	JC
9	30/08/2023	22:24	T3	Common Pip		52.53881	-9.04328	JC
10	30/08/2023	22:24	T3	Common Pip		52.53882	-9.04327	JC
11	30/08/2023	22:25	T3	Common Pip		52.5388	-9.04327	JC
12	30/08/2023	22:25	T3	Common Pip		52.5388	-9.04327	JC
13	30/08/2023	22:25	T3	Soprano Pip		52.53998	-9.04357	JC
14	30/08/2023	22:26	T3	Common Pip		52.54066	-9.0436	JC
15	30/08/2023	22:27	T3	Common Pip		52.54108	-9.04089	JC
16	30/08/2023	22:27	T3	Common Pip		52.54098	-9.04018	JC
17	30/08/2023	22:27	T3	Common Pip		52.54069	-9.03846	JC
18	30/08/2023	22:27	T3	Soprano Pip		52.54059	-9.03744	JC
19	30/08/2023	22:28	T3	Common Pip		52.5401	-9.03466	JC
20	30/08/2023	22:28	T3	Common Pip		52.5397	-9.03165	JC
21	30/08/2023	22:29	T3	Leisler's		52.53909	-9.02635	JC
22	30/08/2023	22:30	T3	Common Pip		52.53898	-9.02622	JC
23	30/08/2023	22:32	T3	Common Pip		52.53765	-9.02706	JC
24	30/08/2023	22:32	T3	Common Pip		52.53735	-9.02727	JC
25	30/08/2023	22:35	T3	Common Pip		52.5355	-9.0278	JC
26	30/08/2023	22:35	T3	Common Pip		52.53457	-9.02828	JC
27	30/08/2023	22:35	T3	Common Pip		52.53461	-9.02857	JC
28	30/08/2023	22:37	T3	Soprano Pip		52.53471	-9.02972	JC
1	31/08/2023	05:26	3 and 4	Soprano Pip		52.53932	-9.02948	JC
2	31/08/2023	05:27	3 and 4	Soprano Pip	Brief contact	52.53932	-9.02948	JC

Contact number	Date	Time	Location	Species	Details	Lat	Long	Surveyor
3	31/08/2023	06:00	3 and 4	Common Pip	Brief contact	52.53929	-9.02948	JC
4	31/08/2023	06:05	3 and 4	Soprano Pip	Brief contact	52.53929	-9.02948	JC
1	30/08/2023	20:59	9	Soprano Pip	Unseen brief	52.52834	-9.03623	KI
2	30/08/2023	21:02	9	Soprano Pip	heading SW - along treeline	52.52834	-9.03623	KI
3	30/08/2023	21:09	9	Soprano Pip		52.52834	-9.03623	KI
4	30/08/2023	21:12	9	Soprano Pip		52.52834	-9.03623	KI
5	30/08/2023	21:14	9	Soprano Pip	Brief unseen registration	52.52834	-9.03623	KI
6	30/08/2023	21:18	9	Common Pip		52.52834	-9.03623	KI
7	30/08/2023	21:25	9	Soprano Pip		52.52834	-9.03623	KI
8	30/08/2023	21:27	9	Common Pip		52.52834	-9.03623	KI
9	30/08/2023	21:28	9	Common Pip		52.52834	-9.03623	KI
10	30/08/2023	21:31	9	Common Pip		52.52834	-9.03623	KI
11	30/08/2023	21:37	9	Common Pip		52.52834	-9.03623	KI
12	30/08/2023	21:38	9	Common Pip		52.52834	-9.03623	KI
13	30/08/2023	21:41	9	Unidentified bat	Non-echolocating bat passed. Probably Brown Long-eared.	52.52834	-9.03623	KI
14	30/08/2023	21:42	9	Common Pip		52.52834	-9.03623	KI
15	30/08/2023	21:45	9	Soprano Pip		52.52834	-9.03623	KI
16	30/08/2023	21:49	9	Leisler's		52.52834	-9.03623	KI
17	30/08/2023	21:52	9	Common Pip		52.52834	-9.03623	KI
18	30/08/2023	21:53	9	Common Pip		52.52834	-9.03623	KI
19	30/08/2023	21:57	9	Common Pip		52.52834	-9.03623	KI
1	30/08/2023	22:02	T4	Common Pip	Brief Contact	52.5277	-9.03604	KI
2	30/08/2023	22:05	T4	Common Pip	Flying S along hedgerow	52.52725	-9.03719	KI
3	30/08/2023	22:09	T4	Common Pip	Brief Contact	52.52675	-9.03746	KI
4	30/08/2023	22:12	T4	Common Pip	Close to stream	52.52634	-9.03782	KI

4 STATIC DETECTOR RESULTS

Table 4--1: All static results combined

Detector	Date	Leisler's Bat	Common Pipistrelle	Soprano Pipistrelle	Nathusius Pipistrelle	Pipistrelle 40 kHz	Brown Long-eared	Lesser Horseshoe	Natterer's Bat	Daubenton's Bat	Unidentified Myotis	Total
1	9th May	13	4	6	0	1	0	0	0	0	0	24
1	10th May	29	109	34	0	4	0	0	0	0	0	176
1	11th May	17	25	19	0	17	1	0	0	0	0	79
1	12th May	19	192	118	0	3	1	0	0	0	1	334
1	13th May	47	126	36	0	9	0	0	0	0	5	223
1	14th May	3	8	5	0	0	1	0	0	0	4	21
1	15th May	3	7	6	0	0	0	0	0	0	0	16
1	16th May	23	34	21	0	3	0	0	2	0	5	88
1	17th May	9	11	15	0	1	0	1	0	0	0	37
1	18th May	31	280	72	3	19	0	0	0	0	4	409
1	19th May	8	87	11	0	6	0	0	0	0	0	112
1	20th May	3	125	9	0	0	0	0	0	0	0	137
1	15th June	1	4	0	0	1	0	0	0	0	0	6
1	16th June	0	2	3	0	0	0	0	0	0	0	5
1	17th June	0	0	0	0	0	0	0	0	0	0	0
1	18th June	2	0	0	0	0	0	0	0	0	0	2
1	19th June	2	0	0	0	0	0	0	0	0	0	2

Detector	Date	Leisler's Bat	Common Pipistrelle	Soprano Pipistrelle	Nathusius Pipistrelle	Pipistrelle 40 kHz	Brown Long-eared	Lesser Horseshoe	Natterer's Bat	Daubenton's Bat	Unidentified Myotis	Total
1	20th June	8	9	10	0	0	0	0	0	0	1	28
1	21st June	3	15	14	0	0	0	0	0	0	0	32
1	22nd June	2	0	0	0	0	0	0	0	0	0	2
1	23rd June	2	4	4	0	0	0	0	0	0	1	11
1	24th June	3	0	0	0	0	0	0	0	0	0	3
1	25th June	3	6	4	0	0	0	0	0	0	0	13
1	2nd August	47	38	95	0	1	2	0	0	0	0	183
1	3rd August	57	28	39	0	0	1	0	0	0	3	128
1	4th August	14	3	8	0	0	0	0	0	0	0	25
1	5th August	24	47	73	0	2	0	0	1	0	4	151
1	6th August	34	34	90	0	0	2	0	0	0	2	162
1	7th August	18	124	79	0	0	2	0	1	0	1	225
1	8th August	29	116	63	0	1	1	0	0	0	3	213
1	9th August	14	33	31	0	0	1	0	0	0	0	79
1	10th August	13	35	57	0	1	1	0	0	0	2	109
1	11th August	12	5	10	0	0	1	0	0	0	0	28
1	12th August	28	16	48	0	0	1	0	0	0	1	94
1	13th August	33	43	79	0	2	0	0	1	0	3	161
1	14th August	24	113	85	0	7	0	0	1	0	2	232
1	15th August	23	73	71	0	6	3	0	1	0	2	179

Detector	Date	Leisler's Bat	Common Pipistrelle	Soprano Pipistrelle	Nathusius Pipistrelle	Pipistrelle 40 kHz	Brown Long-eared	Lesser Horseshoe	Natterer's Bat	Daubenton's Bat	Unidentified Myotis	Total
1	16th August	15	150	70	0	0	4	0	0	0	0	239
1	17th August	26	94	100	0	0	0	0	0	0	1	221
1	22 nd September	1	4	7	0	0	1	1	1	0	12	27
1	23 rd September	3	18	12	0	2	0	0	0	0	0	35
1	24th September	8	12	25	0	3	4	0	0	0	0	52
1	25th September	8	33	20	0	0	0	0	0	0	0	61
1	26th September	12	22	11	0	0	4	1	0	0	4	54
1	27th September	3	34	15	0	0	0	0	0	0	0	52
1	28th September	2	18	11	0	0	0	0	0	0	0	31
1	29th September	13	97	22	0	2	0	0	1	0	2	137
1	30th September	42	135	117	0	0	2	0	0	0	1	297
1	1st October	9	50	53	0	0	5	1	1	0	7	126
1	2nd October	0	11	19	0	0	0	0	0	0	6	36
1	3rd October	2	3	25	0	0	1	0	0	0	3	34
1	4th October	1	7	5	0	0	0	0	0	0	0	13
1	5th October	0	1	1	0	0	0	0	0	0	0	2
1	18th October	0	0	0	0	0	0	0	0	0	0	0
1	19th October	0	0	0	0	0	0	0	0	0	0	0
1	20th October	1	0	25	0	0	0	0	0	0	5	31
1	21st October	0	4	5	0	0	1	0	0	0	1	11

Detector	Date	Leisler's Bat	Common Pipistrelle	Soprano Pipistrelle	Nathusius Pipistrelle	Pipistrelle 40 kHz	Brown Long-eared	Lesser Horseshoe	Natterer's Bat	Daubenton's Bat	Unidentified Myotis	Total
2	9th May	8	2	2	0	0	0	0	0	0	0	12
2	10th May	13	1	0	0	0	0	0	0	0	1	15
2	11th May	29	55	13	0	14	0	0	0	0	7	118
2	12th May	27	67	22	0	3	0	0	0	0	7	126
2	13th May	50	129	52	0	18	1	0	0	0	15	265
2	14th May	3	2	2	0	0	0	0	0	0	1	8
2	15th May	4	2	2	0	1	0	0	0	0	1	10
2	16th May	73	43	7	0	4	0	0	2	0	4	133
2	17th May	20	10	13	0	0	0	0	0	0	1	44
2	18th May	143	173	56	0	41	0	0	0	0	8	421
2	19th May	149	241	51	0	17	0	1	1	0	10	470
2	20th May	98	98	46	1	21	0	0	0	0	4	268
2	15th June	22	5	5	0	0	0	0	1	0	12	45
2	16th June	8	3	9	0	2	0	0	0	0	10	32
2	17th June	13	1	0	0	0	0	0	0	0	5	19
2	18th June	3	0	0	0	0	0	0	0	0	0	3
2	19th June	0	0	0	0	0	0	0	0	0	0	0
2	20th June	22	5	0	0	0	0	0	0	0	8	35
2	21st June	12	1	2	0	1	1	0	0	0	17	34
2	22nd June	16	1	1	0	0	0	0	0	0	2	20

Detector	Date	Leisler's Bat	Common Pipistrelle	Soprano Pipistrelle	Nathusius Pipistrelle	Pipistrelle 40 kHz	Brown Long-eared	Lesser Horseshoe	Natterer's Bat	Daubenton's Bat	Unidentified Myotis	Total
2	23rd June	5	6	5	0	0	0	0	1	0	6	23
2	24th June	3	2	0	0	0	0	0	0	0	2	7
2	25th June	10	5	1	0	0	1	0	1	0	11	29
2	2nd August	36	162	36	0	1	0	0	0	0	7	242
2	3rd August	18	57	10	0	0	0	0	0	0	5	90
2	4th August	9	2	3	0	0	0	0	0	0	2	16
2	5th August	23	136	24	0	2	1	0	0	0	9	195
2	6th August	13	161	110	0	2	0	0	0	0	10	296
2	7th August	52	23	32	0	0	0	0	0	0	8	115
2	8th August	23	54	58	0	3	2	0	0	0	2	142
2	9th August	22	14	16	0	0	1	0	0	0	2	55
2	10th August	18	52	35	0	0	3	0	0	0	0	108
2	11th August	4	5	6	0	0	0	0	0	0	3	18
2	12th August	28	11	11	0	0	0	0	0	0	2	52
2	13th August	28	77	57	0	1	4	0	0	0	8	175
2	14th August	35	503	138	0	0	1	0	0	0	11	688
2	15th August	13	164	76	0	3	1	0	0	0	6	263
2	16th August	4	0	5	0	0	0	0	0	0	0	9
2	22nd September	1	0	0	0	0	2	0	0	0	8	11
2	23rd September	1	1	1	0	0	0	0	0	0	0	3

Detector	Date	Leisler's Bat	Common Pipistrelle	Soprano Pipistrelle	Nathusius Pipistrelle	Pipistrelle 40 kHz	Brown Long-eared	Lesser Horseshoe	Natterer's Bat	Daubenton's Bat	Unidentified Myotis	Total
2	24th September	8	1	7	0	0	1	0	1	0	12	30
2	25th September	4	8	13	0	0	0	0	0	0	1	26
2	26th September	4	4	13	0	0	3	0	0	0	12	36
2	27th September	2	6	2	0	0	0	0	0	0	0	10
2	28th September	1	0	0	0	0	0	0	0	0	0	1
2	29th September	2	15	16	0	0	5	0	0	0	4	42
2	30th September	19	17	27	0	0	0	0	0	0	9	72
2	1st October	4	34	24	0	0	1	0	0	0	5	68
2	2nd October	5	10	6	0	0	0	0	1	0	1	23
2	3rd October	4	2	1	0	0	1	0	0	0	2	10
2	4th October	1	0	0	0	0	0	0	0	0	0	1
2	5th October	0	1	0	0	0	0	0	0	0	0	1
2	18th October	8	0	2	0	0	0	0	0	0	1	11
2	19th October	3	0	1	0	1	1	0	0	0	2	8
2	20th October	0	0	1	0	0	1	0	0	0	0	2
2	21st October	3	0	0	0	0	0	0	0	0	5	8
2	22nd October	0	0	0	0	0	0	0	0	0	0	0
2	23rd October	2	0	0	0	0	0	0	0	0	0	2
2	24th October	0	0	0	0	0	0	0	0	0	0	0
2	25th October	0	0	0	0	0	0	0	0	0	0	0

Detector	Date	Leisler's Bat	Common Pipistrelle	Soprano Pipistrelle	Nathusius Pipistrelle	Pipistrelle 40 kHz	Brown Long-eared	Lesser Horseshoe	Natterer's Bat	Daubenton's Bat	Unidentified Myotis	Total
2	26th October	0	0	1	0	0	0	0	0	0	0	1
2	27th October	0	0	0	0	0	0	0	0	0	0	0
2	28th October	0	0	0	0	0	0	0	0	0	0	0
2	29th October	0	0	0	0	0	0	0	0	0	0	0
2	30th October	0	0	0	0	0	0	0	0	0	0	0
2	31st October	0	0	0	0	0	0	0	0	0	0	0
2	1st November	0	0	1	0	1	0	0	0	0	0	2
3	9th May	25	13	9	0	4	6	0	0	0	0	57
3	10th May	16	18	9	1	1	1	0	0	0	0	46
3	11th May	32	34	46	6	25	0	0	0	0	0	143
3	12th May	29	47	56	3	12	2	0	2	0	0	151
3	13th May	74	46	36	0	12	2	0	0	0	2	172
3	14th May	17	5	7	0	7	1	0	0	0	1	38
3	15th May	8	5	4	1	5	2	0	0	0	0	25
3	16th May	59	48	28	12	18	1	0	0	0	0	166
3	17th May	30	15	19	4	0	1	0	0	0	2	71
3	18th May	40	40	35	10	18	1	0	0	0	1	145
3	19th May	70	43	33	4	20	4	0	1	0	3	178
3	20th May	31	3	6	1	1	0	0	0	0	0	42
3	15th June	20	18	39	0	5	2	0	2	0	0	86

Detector	Date	Leisler's Bat	Common Pipistrelle	Soprano Pipistrelle	Nathusius Pipistrelle	Pipistrelle 40 kHz	Brown Long-eared	Lesser Horseshoe	Natterer's Bat	Daubenton's Bat	Unidentified Myotis	Total
3	16th June	6	16	25	0	4	1	0	2	0	5	59
3	17th June	1	2	0	0	0	0	0	0	0	0	3
3	18th June	4	4	3	0	0	0	0	0	0	0	11
3	19th June	1	3	5	0	0	0	0	0	0	0	9
3	20th June	11	14	6	0	0	0	0	0	0	3	34
3	21st June	11	12	11	0	3	1	0	2	0	1	41
3	22nd June	12	4	14	0	1	0	0	0	0	1	32
3	23rd June	33	14	18	0	2	1	0	3	0	5	76
3	24th June	16	10	6	0	0	0	0	0	0	0	32
3	25th June	11	10	33	0	1	1	0	2	0	1	59
3	2nd August	0	1	0	0	0	1	0	0	0	0	2
3	22nd September	4	22	28	0	0	7	0	1	0	10	72
3	23rd September	6	19	52	0	0	1	0	0	0	6	84
3	24th September	16	9	13	0	0	3	0	0	0	1	42
3	25th September	5	21	5	0	2	0	0	0	0	2	35
3	26th September	7	10	17	0	0	7	0	0	0	3	44
3	27th September	1	16	21	0	0	3	0	0	0	1	42
3	28th September	4	2	24	0	0	8	0	0	0	1	39
3	29th September	7	14	15	0	0	3	1	0	0	3	43
3	30th September	3	99	117	0	6	2	0	0	0	1	228

Detector	Date	Leisler's Bat	Common Pipistrelle	Soprano Pipistrelle	Nathusius Pipistrelle	Pipistrelle 40 kHz	Brown Long-eared	Lesser Horseshoe	Natterer's Bat	Daubenton's Bat	Unidentified Myotis	Total
3	1st October	6	21	43	0	0	7	1	0	0	4	82
3	2nd October	2	25	66	0	0	0	0	1	0	5	99
3	3rd October	4	0	30	0	0	0	0	0	0	5	39
3	4th October	3	43	67	0	5	2	0	0	0	1	121
3	5th October	1	12	21	0	2	3	0	0	0	2	41
3	18th October	4	2	10	0	0	2	0	0	0	1	19
3	19th October	0	257	79	0	3	2	0	1	0	4	346
3	20th October	1	0	23	0	0	0	0	0	0	5	29
3	21st October	0	0	4	0	0	1	0	0	0	4	9
3	22nd October	0	0	1	0	0	0	0	0	0	0	1
3	23rd October	0	2	4	0	0	1	0	0	0	2	9
3	24th October	2	0	0	0	0	0	0	0	0	0	2
3	25th October	0	0	1	0	0	0	0	0	0	0	1
3	26th October	0	1	2	0	0	0	0	0	0	0	3
3	27th October	0	0	30	0	0	0	0	0	0	0	30
3	28th October	0	1	5	0	0	0	0	0	0	0	6
4	9th May	2	0	2	0	0	0	0	0	0	0	4
4	10th May	10	0	1	0	0	0	0	0	0	0	11
4	11th May	11	15	18	0	3	0	0	1	0	1	49
4	12th May	11	134	33	0	5	0	0	0	0	1	184

Detector	Date	Leisler's Bat	Common Pipistrelle	Soprano Pipistrelle	Nathusius Pipistrelle	Pipistrelle 40 kHz	Brown Long-eared	Lesser Horseshoe	Natterer's Bat	Daubenton's Bat	Unidentified Myotis	Total
4	13th May	37	116	115	1	16	0	0	0	0	0	285
4	14th May	3	5	7	0	2	0	0	0	0	0	17
4	15th May	4	6	5	0	2	0	0	0	0	4	21
4	16th May	9	52	11	0	3	0	0	0	0	1	76
4	17th May	4	16	12	0	4	0	0	0	0	0	36
4	18th May	10	202	60	18	35	0	0	0	0	0	325
4	19th May	25	434	194	0	82	0	0	1	0	1	737
4	20th May	4	18	26	0	0	0	0	0	0	1	49
4	15th June	15	6	9	0	0	1	0	1	0	1	33
4	16th June	8	3	32	0	1	1	0	0	0	2	47
4	17th June	8	2	3	0	0	0	0	2	0	0	15
4	18th June	7	3	0	0	0	0	0	0	0	0	10
4	19th June	1	0	5	0	0	0	0	0	0	0	6
4	20th June	11	1	6	0	2	1	0	1	0	1	23
4	21st June	7	9	2	0	0	1	0	0	0	1	20
4	22nd June	10	1	4	0	0	0	0	0	0	0	15
4	23rd June	11	6	10	0	0	1	0	1	0	0	29
4	24th June	4	1	4	0	0	0	0	0	0	0	9
4	25th June	7	2	4	0	0	0	0	0	0	1	14
4	2nd August	168	31	52	0	1	1	0	0	0	1	254

Detector	Date	Leisler's Bat	Common Pipistrelle	Soprano Pipistrelle	Nathusius Pipistrelle	Pipistrelle 40 kHz	Brown Long-eared	Lesser Horseshoe	Natterer's Bat	Daubenton's Bat	Unidentified Myotis	Total
4	3rd August	38	6	14	0	0	0	0	0	0	0	58
4	4th August	15	1	4	0	0	0	0	0	0	0	20
4	5th August	20	328	105	0	6	2	0	0	0	3	464
4	6th August	26	389	49	0	1	2	0	0	0	2	469
4	7th August	52	47	44	0	0	0	0	1	0	0	144
4	8th August	38	34	41	0	1	1	0	0	0	5	120
4	9th August	39	21	45	0	0	1	0	0	0	2	108
4	10th August	33	23	38	0	0	2	0	1	0	5	102
4	11th August	20	4	4	0	0	0	0	0	0	0	28
4	12th August	25	14	13	0	0	0	0	0	0	1	53
4	13th August	26	91	180	0	2	0	0	0	0	3	302
4	14th August	42	106	68	0	0	3	0	0	0	7	226
4	15th August	73	55	42	0	2	3	0	2	0	0	177
4	16th August	30	47	47	0	0	2	0	0	0	8	134
4	17th August	27	52	41	0	0	3	0	0	0	0	123
4	18th August	57	60	39	0	0	4	0	0	0	2	162
4	19th August	25	24	44	0	0	14	0	1	0	3	111
4	20th August	55	20	24	0	0	3	0	1	0	0	103
4	22 nd September	7	1	0	0	0	4	0	0	0	0	12
4	23 rd September	3	36	18	0	0	5	0	0	0	4	66

Detector	Date	Leisler's Bat	Common Pipistrelle	Soprano Pipistrelle	Nathusius Pipistrelle	Pipistrelle 40 kHz	Brown Long-eared	Lesser Horseshoe	Natterer's Bat	Daubenton's Bat	Unidentified Myotis	Total
4	24th September	16	6	6	0	0	1	0	0	0	0	29
4	25th September	6	29	31	0	0	0	0	0	0	0	66
4	26th September	4	9	13	0	0	1	0	0	0	3	30
4	27th September	4	1	6	0	0	0	0	0	0	0	11
4	28th September	10	1	0	0	0	0	0	0	0	0	11
4	29th September	1	35	17	0	1	0	0	0	0	0	54
4	30th September	21	171	43	0	1	7	0	0	0	0	243
4	1st October	5	46	25	0	0	4	0	0	0	3	83
4	2nd October	3	31	7	0	1	2	0	0	0	0	44
4	3rd October	1	9	2	0	0	0	0	0	0	1	13
4	4th October	1	8	9	0	0	0	0	0	0	0	18
4	5th October	3	3	1	0	0	0	0	0	0	0	7
4	18th October	6	37	185	0	1	0	0	2	0	3	234
4	19th October	5	23	10	0	0	1	0	1	0	2	42
4	20th October	1	1	1	0	0	1	0	0	0	0	4
4	21st October	2	0	5	0	0	1	0	0	0	1	9
4	22nd October	11	56	94	0	0	0	0	2	0	1	164
4	23rd October	3	2	12	0	0	0	0	0	0	3	20
4	24th October	1	0	0	0	0	0	0	0	0	0	1
4	25th October	0	0	7	0	0	0	0	0	0	0	7

Detector	Date	Leisler's Bat	Common Pipistrelle	Soprano Pipistrelle	Nathusius Pipistrelle	Pipistrelle 40 kHz	Brown Long-eared	Lesser Horseshoe	Natterer's Bat	Daubenton's Bat	Unidentified Myotis	Total
4	26th October	0	0	0	0	0	1	0	0	0	2	3
4	27th October	0	2	5	0	0	0	0	0	0	0	7
4	28th October	0	11	23	0	0	0	0	0	0	0	34
4	29th October	0	0	0	0	0	0	0	0	0	0	0
4	30th October	1	4	9	0	0	0	0	0	0	1	15
4	31st October	0	7	17	0	0	0	0	1	0	0	25
4	1st November	0	0	1	0	0	0	0	0	0	1	2
4	2nd November	0	0	0	0	0	0	0	0	0	0	0
4	3rd November	0	0	0	0	0	0	0	0	0	0	0
4	4th November	0	1	4	0	0	0	0	0	0	1	6
4	5th November	0	0	0	0	0	0	0	0	0	0	0
5	9th May	9	4	5	0	2	0	0	0	0	0	20
5	10th May	17	6	8	0	0	0	0	0	0	0	31
5	11th May	13	18	13	0	1	1	0	0	0	0	46
5	12th May	6	36	47	0	13	1	0	0	0	0	103
5	13th May	17	178	367	0	9	0	0	0	0	0	571
5	14th May	5	4	5	0	0	0	0	0	0	1	15
5	15th May	5	7	2	0	1	0	0	0	0	0	15
5	16th May	22	34	28	0	3	1	0	0	0	1	89
5	17th May	10	8	5	0	0	1	0	0	0	1	25

Detector	Date	Leisler's Bat	Common Pipistrelle	Soprano Pipistrelle	Nathusius Pipistrelle	Pipistrelle 40 kHz	Brown Long-eared	Lesser Horseshoe	Natterer's Bat	Daubenton's Bat	Unidentified Myotis	Total
5	18th May	10	372	104	0	23	1	0	0	0	0	510
5	19th May	10	65	14	0	10	0	0	0	0	0	99
5	20th May	0	0	0	0	0	0	0	0	0	0	0
5	15th June	86	16	23	0	0	1	0	0	0	0	126
5	16th June	49	17	46	0	1	1	0	0	0	0	114
5	17th June	55	22	11	0	0	0	0	0	0	0	88
5	18th June	88	25	13	0	0	7	0	0	0	0	133
5	19th June	10	1	0	0	0	0	0	0	0	0	11
5	20th June	71	26	11	0	0	1	0	0	0	2	111
5	21st June	58	8	32	0	0	2	0	1	0	0	101
5	22nd June	30	0	1	0	0	0	0	0	0	0	31
5	23rd June	34	12	17	0	0	1	0	0	0	0	64
5	24th June	43	3	3	0	1	0	0	0	0	0	50
5	25th June	44	24	5	0	0	0	0	0	0	0	73
5	2nd August	66	48	82	0	0	1	0	0	0	3	200
5	3rd August	59	32	87	0	0	0	0	0	0	6	184
5	4th August	8	4	4	0	0	0	0	0	0	2	18
5	5th August	67	27	28	0	1	1	0	0	0	1	125
5	6th August	39	39	149	0	3	3	0	1	0	3	237
5	7th August	23	14	62	0	0	0	0	0	0	2	101

Detector	Date	Leisler's Bat	Common Pipistrelle	Soprano Pipistrelle	Nathusius Pipistrelle	Pipistrelle 40 kHz	Brown Long-eared	Lesser Horseshoe	Natterer's Bat	Daubenton's Bat	Unidentified Myotis	Total
5	8th August	51	50	91	0	0	3	0	0	0	0	195
5	9th August	95	16	47	0	0	0	0	0	0	0	158
5	10th August	28	26	80	0	0	0	0	0	0	1	135
5	11th August	32	7	102	0	0	7	0	0	0	0	148
5	12th August	20	36	70	0	1	1	0	0	0	0	128
5	13th August	71	33	39	0	1	2	0	0	0	5	151
5	14th August	122	68	222	0	0	5	0	0	0	1	418
5	15th August	36	32	55	0	0	3	0	0	0	1	127
5	16th August	38	8	57	0	0	1	0	0	0	0	104
5	17th August	36	69	233	0	0	3	0	0	0	0	341
5	18th August	152	2	11	0	0	0	0	0	0	0	165
5	19th August	10	0	0	0	0	0	0	0	0	0	10
5	20th August	1	0	1	0	0	0	0	0	0	0	2
5	22 nd September	7	3	22	0	0	5	0	0	0	4	41
5	23 rd September	13	182	455	0	6	13	0	0	0	2	671
5	24th September	61	54	428	0	0	14	0	0	0	1	558
5	25th September	37	103	372	0	23	3	0	0	0	1	539
5	26th September	11	8	184	0	0	11	0	0	0	2	216
5	27th September	3	5	197	0	0	2	0	1	0	1	209
5	28th September	2	5	76	0	0	10	0	0	0	3	96

Detector	Date	Leisler's Bat	Common Pipistrelle	Soprano Pipistrelle	Nathusius Pipistrelle	Pipistrelle 40 kHz	Brown Long-eared	Lesser Horseshoe	Natterer's Bat	Daubenton's Bat	Unidentified Myotis	Total
5	29th September	5	56	86	0	1	7	0	0	0	2	157
5	30th September	23	276	411	0	11	6	0	0	0	3	730
5	1st October	11	39	122	0	3	6	0	0	0	2	183
5	2nd October	4	55	183	0	0	4	1	1	0	6	254
5	3rd October	6	2	96	0	0	2	1	0	0	2	109
5	4th October	4	26	183	0	0	1	0	0	0	1	215
5	5th October	5	11	26	0	0	3	0	0	0	1	46
5	18th October	6	37	185	0	1	0	0	2	0	3	234
5	19th October	5	23	10	0	0	1	0	1	0	2	42
5	20th October	1	1	1	0	0	1	0	0	0	0	4
5	21st October	2	0	5	0	0	1	0	0	0	1	9
5	22nd October	11	56	94	0	0	0	0	2	0	1	164
5	23rd October	3	2	12	0	0	0	0	0	0	3	20
5	24th October	1	0	0	0	0	0	0	0	0	0	1
5	25th October	0	0	7	0	0	0	0	0	0	0	7
5	26th October	0	0	0	0	0	1	0	0	0	2	3
5	27th October	0	2	5	0	0	0	0	0	0	0	7
5	28th October	0	11	23	0	0	0	0	0	0	0	34
5	29th October	0	0	0	0	0	0	0	0	0	0	0
5	30th October	1	4	9	0	0	0	0	0	0	1	15

Detector	Date	Leisler's Bat	Common Pipistrelle	Soprano Pipistrelle	Nathusius Pipistrelle	Pipistrelle 40 kHz	Brown Long-eared	Lesser Horseshoe	Natterer's Bat	Daubenton's Bat	Unidentified Myotis	Total
5	31st October	0	7	17	0	0	0	0	1	0	0	25
5	1st November	0	0	1	0	0	0	0	0	0	1	2
5	2nd November	0	0	0	0	0	0	0	0	0	0	0
5	3rd November	0	0	0	0	0	0	0	0	0	0	0
5	4th November	0	1	4	0	0	0	0	0	0	1	6
5	5th November	0	0	0	0	0	0	0	0	0	0	0
6	9th May	11	3	1	0	0	0	0	0	0	0	15
6	10th May	7	5	1	0	0	0	0	0	0	0	13
6	11th May	10	9	11	0	0	0	0	0	0	0	30
6	12th May	20	15	13	0	0	0	0	0	0	1	49
6	13th May	32	30	57	0	2	0	0	0	0	1	122
6	14th May	7	6	5	0	0	1	0	0	0	0	19
6	15th May	13	9	2	0	0	0	0	0	0	0	24
6	16th May	19	17	15	0	1	0	0	0	0	0	52
6	17th May	27	26	16	0	2	0	0	0	0	1	72
6	18th May	24	51	22	0	15	0	0	0	0	0	112
6	19th May	36	33	39	0	1	0	0	0	0	0	109
6	20th May	10	4	0	0	0	0	0	0	0	0	14
6	15th June	12	3	14	0	0	1	0	0	0	2	32
6	16th June	9	16	20	0	0	1	0	0	0	3	49

Detector	Date	Leisler's Bat	Common Pipistrelle	Soprano Pipistrelle	Nathusius Pipistrelle	Pipistrelle 40 kHz	Brown Long-eared	Lesser Horseshoe	Natterer's Bat	Daubenton's Bat	Unidentified Myotis	Total
6	17th June	7	1	3	0	0	0	0	0	0	0	11
6	18th June	1	0	0	0	0	0	0	0	0	0	1
6	2nd August	37	24	41	0	0	0	0	0	0	3	105
6	3rd August	30	10	19	0	0	2	0	1	0	1	63
6	4th August	17	4	5	0	0	0	0	0	0	0	26
6	5th August	38	16	28	0	0	1	0	0	0	2	85
6	6th August	25	1	6	0	0	0	0	0	0	0	32
6	7th August	12	5	11	0	0	1	0	0	0	2	31
6	8th August	34	3	1	0	0	1	0	0	0	0	39
6	9th August	37	9	32	0	0	0	0	0	0	0	78
6	10th August	11	2	2	0	0	0	0	0	0	0	15
6	11th August	5	3	5	0	0	0	0	0	0	0	13
6	12th August	12	0	0	0	0	0	0	0	0	0	12
6	13th August	38	32	31	0	1	0	0	1	0	0	103
6	14th August	13	0	1	0	0	0	0	0	0	0	14
6	15th August	52	20	27	0	0	1	0	2	0	0	102
6	16th August	40	7	18	0	0	1	0	0	0	0	66
6	17th August	22	6	14	0	0	0	0	0	0	2	44
6	18th August	8	0	1	0	0	0	0	0	0	0	9
6	19th August	23	14	33	0	0	2	0	0	0	0	72

Detector	Date	Leisler's Bat	Common Pipistrelle	Soprano Pipistrelle	Nathusius Pipistrelle	Pipistrelle 40 kHz	Brown Long-eared	Lesser Horseshoe	Natterer's Bat	Daubenton's Bat	Unidentified Myotis	Total
6	20th August	9	1	3	0	0	0	0	0	0	0	13
6	6th October	3	11	14	0	0	4	0	1	0	3	36
6	7th October	6	3	6	0	0	0	0	1	0	2	18
6	8th October	9	3	10	0	0	0	0	0	0	1	23
6	9th October	7	8	14	0	0	3	0	0	0	0	32
6	10th October	8	0	2	0	0	0	0	0	0	0	10
6	11th October	0	0	3	0	0	0	0	0	0	0	3
6	12th October	2	0	1	0	0	1	0	0	0	0	4
6	13th October	0	1	2	0	0	0	0	0	0	0	3
6	14th October	2	0	1	0	0	1	0	0	0	3	7
6	15th October	0	0	2	0	0	0	0	0	0	1	3
6	16th October	2	1	1	0	0	0	0	0	0	0	4
6	17th October	0	0	3	0	0	0	0	0	0	0	3
6	18th October	0	2	5	0	0	2	0	0	0	1	10
6	19th October	0	7	16	0	0	0	0	0	0	1	24
6	20th October	2	0	0	0	0	0	0	0	0	0	2
6	21st October	0	1	7	0	0	1	0	0	0	3	12
6	22nd October	0	0	3	0	0	0	0	0	0	0	3
6	23rd October	2	0	3	0	0	1	0	0	0	1	7
6	24th October	0	0	0	0	0	0	0	0	0	0	0

Detector	Date	Leisler's Bat	Common Pipistrelle	Soprano Pipistrelle	Nathusius Pipistrelle	Pipistrelle 40 kHz	Brown Long-eared	Lesser Horseshoe	Natterer's Bat	Daubenton's Bat	Unidentified Myotis	Total
6	25th October	0	1	0	0	0	0	0	0	0	0	1
6	26th October	0	1	2	0	0	0	0	0	0	0	3
6	27th October	0	0	0	0	0	0	0	0	0	0	0
6	28th October	0	1	8	0	0	0	0	0	0	0	9
6	29th October	0	0	0	0	0	0	0	0	0	0	0
6	30th October	0	0	3	0	0	0	0	0	0	0	3
6	31st October	0	1	0	0	0	0	0	0	0	0	1
6	1st November	0	0	4	0	0	0	0	0	0	0	4
6	2nd November	0	0	0	0	0	0	0	0	0	0	0
6	3rd November	1	0	0	0	0	0	0	0	0	0	1
6	4th November	5	0	1	0	0	0	0	0	0	1	7
6	5th November	0	1	0	0	0	0	0	0	0	0	1
7	9th May	18	27	300	0	0	1	0	0	0	0	346
7	10th May	54	35	164	0	3	0	0	0	0	0	256
7	11th May	33	61	108	0	3	0	0	0	0	0	205
7	12th May	78	65	420	0	2	0	0	0	0	1	566
7	13th May	94	110	164	0	2	0	0	0	0	1	371
7	14th May	53	41	57	0	0	0	0	0	0	0	151
7	15th May	22	31	48	0	2	0	0	0	0	0	103
7	16th May	62	104	165	0	6	1	0	0	0	1	339

Detector	Date	Leisler's Bat	Common Pipistrelle	Soprano Pipistrelle	Nathusius Pipistrelle	Pipistrelle 40 kHz	Brown Long-eared	Lesser Horseshoe	Natterer's Bat	Daubenton's Bat	Unidentified Myotis	Total
7	17th May	65	166	491	0	5	0	0	0	0	0	727
7	18th May	79	35	124	0	8	0	0	0	0	0	246
7	19th May	59	149	147	0	12	1	0	0	0	2	370
7	20th May	62	49	92	0	3	0	0	0	0	0	206
7	1st July	4	35	40	0	0	0	0	0	0	0	79
7	2nd July	7	43	44	0	2	0	0	0	0	1	97
7	3rd July	9	115	67	0	4	0	0	0	0	1	196
7	4th July	2	19	15	0	1	1	0	0	0	1	39
7	5th July	54	301	264	0	3	0	0	0	0	2	624
7	6th July	24	339	470	0	12	0	0	0	0	48	893
7	7th July	196	561	1188	0	45	1	0	0	0	503	2494
7	8th July	30	98	94	0	3	1	0	0	0	1	227
7	9th July	28	62	52	0	2	0	0	0	0	0	144
7	10th July	3	0	0	0	0	0	0	0	0	0	3
7	11th July	14	10	9	0	0	0	0	0	0	0	33
7	12th July	18	53	51	0	1	0	0	0	0	0	123
7	13th July	27	120	162	2	1	0	0	0	0	1	313
7	14th July	18	40	22	0	0	0	0	0	0	0	80
7	15th July	2	4	3	0	1	0	0	0	0	0	10
7	22nd September	1	0	3	0	0	0	0	0	0	0	4

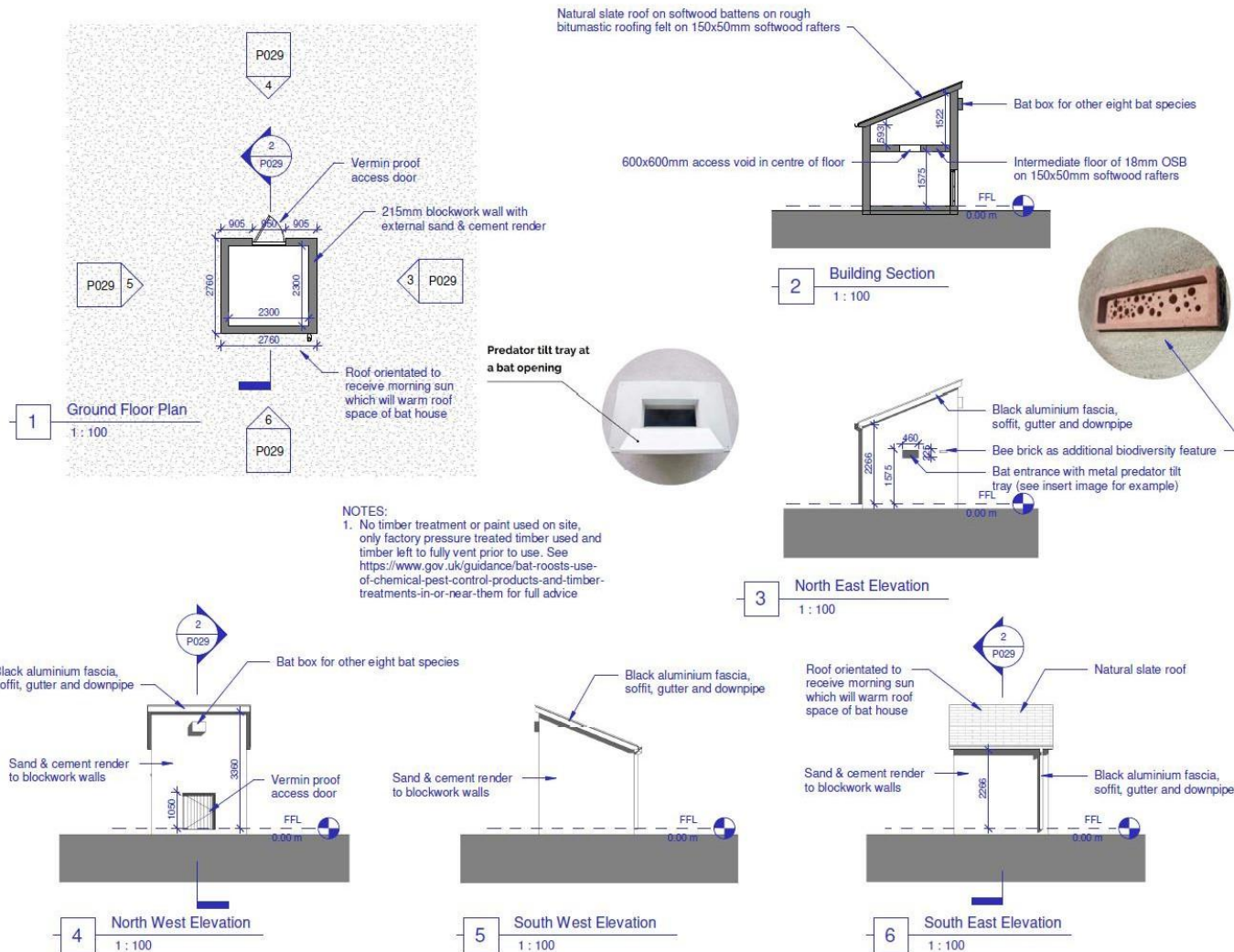
Detector	Date	Leisler's Bat	Common Pipistrelle	Soprano Pipistrelle	Nathusius Pipistrelle	Pipistrelle 40 kHz	Brown Long-eared	Lesser Horseshoe	Natterer's Bat	Daubenton's Bat	Unidentified Myotis	Total
7	23rd September	2	18	256	0	0	0	0	0	0	0	276
7	24th September	6	11	107	0	0	1	0	0	0	0	125
7	25th September	1	5	302	0	0	0	0	0	0	0	308
7	26th September	25	1	25	0	0	0	0	0	0	0	51
7	27th September	2	1	6	0	0	0	0	0	0	0	9
7	28th September	5	2	3	0	0	0	0	0	0	0	10
7	29th September	7	1	7	0	0	0	0	0	0	0	15
7	30th September	9	7	120	0	0	0	0	0	0	0	136
7	1st October	2	2	3	0	0	0	0	0	0	0	7
7	2nd October	1	1	2	0	0	0	0	0	0	0	4
7	3rd October	3	1	6	0	0	0	0	0	0	0	10
7	4th October	4	5	10	0	0	0	0	0	0	0	19
7	5th October	3	7	52	0	0	0	0	0	0	0	62
7	18th October	5	6	9	0	0	0	0	0	0	0	20
7	19th October	4	7	34	0	0	0	0	0	0	0	45
7	20th October	0	0	2	0	0	0	0	0	0	0	2
7	21st October	0	0	2	0	0	0	0	0	0	0	2
7	22nd October	0	4	3	0	0	0	0	0	0	0	7
7	23rd October	0	0	0	0	0	0	0	0	0	0	0
7	24th October	0	0	1	0	0	0	0	0	0	0	1

Detector	Date	Leisler's Bat	Common Pipistrelle	Soprano Pipistrelle	Nathusius Pipistrelle	Pipistrelle 40 kHz	Brown Long-eared	Lesser Horseshoe	Natterer's Bat	Daubenton's Bat	Unidentified Myotis	Total
7	25th October	0	2	1	0	0	0	0	0	0	0	3
7	26th October	1	10	0	0	0	0	0	0	0	0	11
7	27th October	0	0	0	0	0	0	0	0	0	0	0
7	28th October	0	0	1	0	0	0	0	0	0	0	1
7	29th October	0	0	0	0	0	0	0	0	0	0	0
7	30th October	1	2	1	0	0	0	0	0	0	0	4
7	31st October	0	7	0	0	0	0	0	0	0	0	7
8	9th May	12	2	1	0	1	0	0	0	0	0	16
8	10th May	36	6	1	0	2	0	0	0	0	0	45
8	11th May	34	162	15	0	98	3	0	0	0	1	313
8	12th May	26	26	6	0	3	0	0	0	0	1	62
8	13th May	119	71	15	0	16	1	0	0	0	1	223
8	14th May	3	2	2	0	0	1	0	0	0	0	8
8	15th May	4	3	3	0	0	1	0	0	0	0	11
8	16th May	75	38	3	0	4	3	0	0	0	0	123
8	17th May	43	12	6	0	1	0	0	0	0	0	62
8	18th May	32	23	7	0	6	4	0	0	0	0	72
8	19th May	176	33	5	0	3	1	0	0	0	2	220
8	20th May	162	26	7	0	5	0	0	0	0	1	201
8	15th June	11	5	11	0	2	0	0	0	0	0	29

Detector	Date	Leisler's Bat	Common Pipistrelle	Soprano Pipistrelle	Nathusius Pipistrelle	Pipistrelle 40 kHz	Brown Long-eared	Lesser Horseshoe	Natterer's Bat	Daubenton's Bat	Unidentified Myotis	Total
8	16th June	2	8	16	0	2	1	0	0	0	3	32
8	17th June	1	4	5	0	0	0	0	0	0	0	10
8	18th June	2	0	0	0	0	0	0	0	0	0	2
8	19th June	0	0	0	0	1	0	0	0	0	0	1
8	20th June	2	0	0	0	0	0	0	0	0	0	2
8	21st June	4	4	2	0	2	1	0	0	0	1	14
8	22nd June	4	2	5	0	0	0	0	0	0	0	11
8	23rd June	4	12	13	0	0	0	0	0	0	3	32
8	24th June	8	8	4	0	0	0	0	0	0	1	21
8	25th June	2	10	7	0	0	0	0	0	0	3	22
8	2nd August	7	35	17	0	6	0	0	0	0	0	65
8	22 nd September	9	1	3	0	0	2	0	0	3	1	19
8	23rd September	21	14	24	0	1	12	0	0	1	7	80
8	24th September	6	7	14	0	0	14	0	0	0	1	42
8	25th September	3	10	14	0	0	6	0	0	1	0	34
8	26th September	5	4	8	0	0	7	0	0	0	4	28
8	27th September	6	7	6	0	0	2	0	0	0	0	21
8	28th September	2	1	9	0	0	16	0	0	0	3	31
8	29th September	4	27	26	0	2	2	0	0	0	2	63
8	30th September	3	26	39	0	5	14	0	0	0	4	91

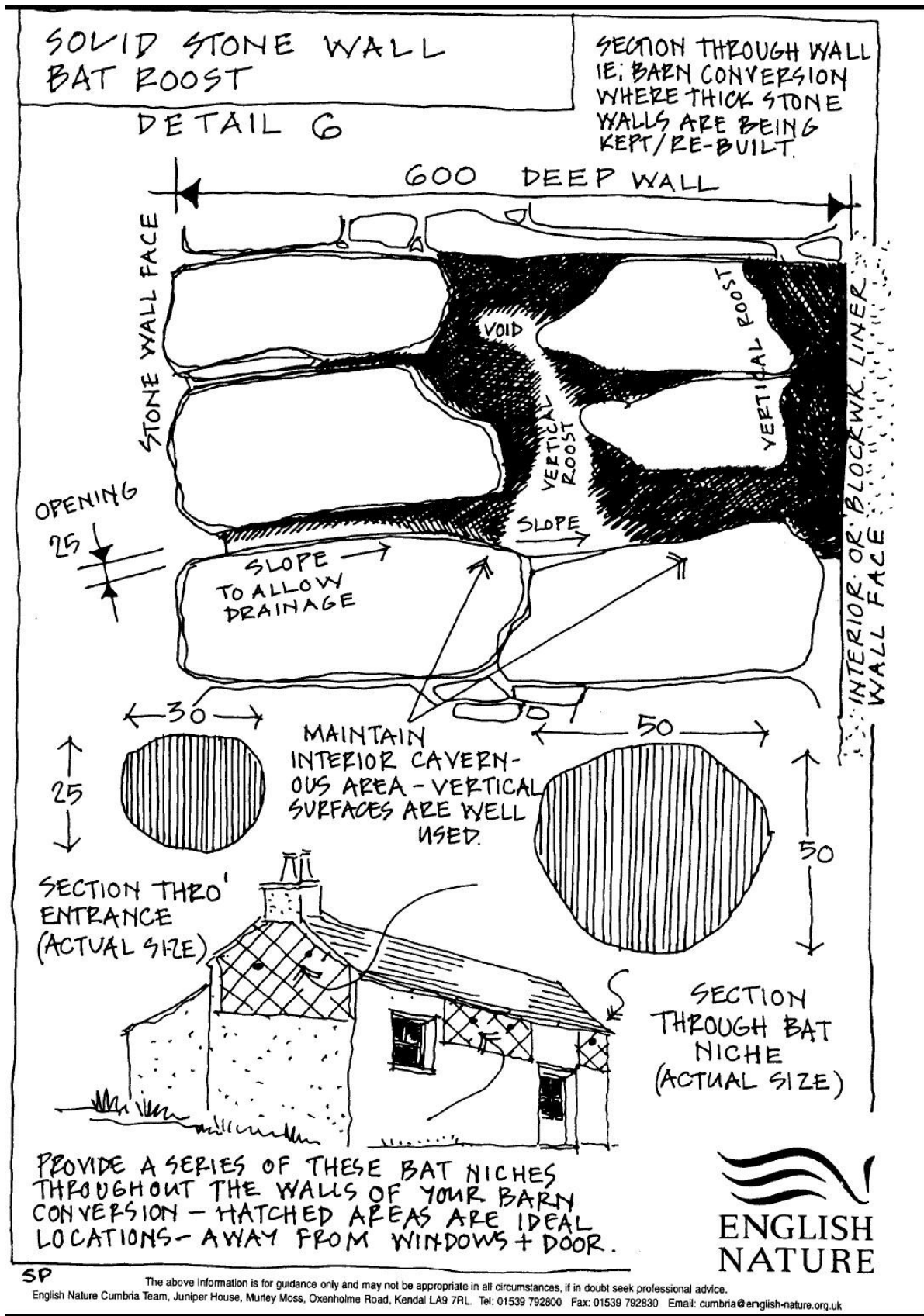
Detector	Date	Leisler's Bat	Common Pipistrelle	Soprano Pipistrelle	Nathusius Pipistrelle	Pipistrelle 40 kHz	Brown Long-eared	Lesser Horseshoe	Natterer's Bat	Daubenton's Bat	Unidentified Myotis	Total
8	1st October	9	19	26	0	1	4	1	0	0	2	62
8	2nd October	7	7	14	0	1	6	0	0	1	2	38
8	3rd October	12	1	11	0	0	1	0	0	1	2	28
8	4th October	1	1	6	0	0	2	0	0	0	0	10
8	5th October	3	5	13	0	0	2	0	0	0	1	24
8	18th October	1	4	5	0	0	0	0	0	0	0	10
8	19th October	1	9	13	1	0	0	0	0	0	0	24
8	20th October	0	2	0	0	0	0	0	0	0	0	2
8	21st October	1	3	8	0	0	0	0	0	0	0	12
8	22nd October	0	0	3	0	0	0	0	0	0	0	3
8	23rd October	1	0	6	0	0	0	0	0	0	0	7
8	24th October	0	0	0	0	0	0	0	0	0	0	0
8	25th October	0	0	1	0	0	0	0	0	0	0	1
8	26th October	1	1	0	0	0	0	0	0	0	1	3
8	27th October	0	0	0	0	0	0	0	0	0	0	0
8	28th October	0	0	2	0	0	0	0	0	0	0	2

5 PUMP HOUSE DESIGN



Important features of a bat house







Environmental Consultants

Addendum 6D-1

Habitat and Bat Roost Assessment December 2025

John Curtin | Director
Eire Ecology
8a Saint Patrick Street
Portumna,
Co. Galway
18th of December 2025

Re: Verification of habitats

Planning Application Ref: 2561003

Site Address: Ballynisky, Co. Limerick

To whom it may concern.

This letter provides an addendum to the Bat Survey Report submitted with the original EIAR for the proposed Ballynisky Wind farm development. It provides the results of a recent site visit undertaken to assess whether any substantive habitat alteration or land use change has occurred since the original surveys undertaken by MWP Ecologists (January, 2025), Eire Ecology (January 2024) and RSK Biocensus Ecologists (August 2025) occurred.

On the 16th of December 2025, Eire Ecology completed another site visit to undertake a repeat preliminary roost assessment (PRA) to confirm the initial findings of the PRA undertaken in 2023 had not changed in the intervening period and to verify no change in habitat features.

The proposed site consists primarily of improved agricultural grassland, and associated hedgerows, and treelines. The habitats on site remain unchanged since the original surveys undertaken in 2023, 2024 and early 2025, the specific dates of which are summarised in Chapter 6, Section 6.2.3 field Surveys, Table 6-3.

It was noted that a tree has been felled as a result of storm damage that was previously identified as having roosting potential (see Plate 1. Tree no. 118) located 250 metres from proposed turbine 6. Another tree found outside the 268m buffer¹ was also lost to storm damage (Plate 2).

¹ 200m plus rotor diameter of turbines (NIEA, 2021 and SNH 2021)

A detailed inspection in accordance with Collins (2023²) of four previously identified potential roost structures two of which are within 268m radius to the proposed turbines T1 and T2 was undertaken and no evidence of bat occupancy was found (Structures No. 1, No.2, No. 6 and No.7 as detailed within Appendix 6D Bat Report, Section 4.2.2 Table 4-31).

No modifications to land use, habitat structure, or ecological features were observed.

The validity of bat survey data is based on professional guidance and the bat data supplied to inform Chapter 6 of the EIAR for the proposed Ballynisky Wind farm planning application is compliant with all relevant guidelines as follows:

- NatureScot Guidance (2024), pre-application surveys for species with restricted survey periods, including bats, remain valid for two further survey periods. Surveys should only be repeated if the application is delayed beyond the start of a third survey period, provided no significant habitat or land use changes have occurred. Therefore, the bat survey data remains valid until **April 2026**.
- CIEEM (2019): which states that the Age of Data in the range of
 - 12-18 months: remains valid unless site conditions have changed significantly
 - 18 months to 3 years: a repeat site walkover **OR** a Preliminary Roost Assessment (PRA) is *usually required*

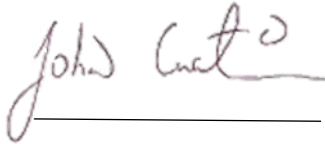
A repeat site walkover was undertaken in December 2025 supplementing the site walkover undertaken in January 2025 by MWP and the site visit undertaken in January 2024 by Eire Ecology. A repeat PRA was also undertaken in December 2025 confirming no change in status of the features identified in the 2023 and early 2024 PRA assessment. Therefore the bat survey data is fully compliant with CIEEM (2019) guidelines.

I am satisfied that the bat surveys were undertaken in line with published best practice guidelines and at the optimum seasonal periods providing a robust and comprehensive baseline for the impact appraisal as part of the EIAR Chapter 6 Biodiversity. Accordingly, I confirm that the bat survey data submitted remains valid and applicable to the current planning application.

² Collins, J. (ed.) (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn). The Bat Conservation Trust, London

Please do not hesitate to contact me should you require any further clarification.

Yours Sincerely,

A handwritten signature in dark ink, appearing to read 'John Curtin', with a horizontal line underneath.

John Curtin. Principal Ecologist.



Plate 1: Tree No. 118 (previous identified as having good potential)



Plate 2: Tree outside 268 buffer.

References

NatureScot. (2024). *Pre-application guidance for onshore wind farms*.

SNH. (2021). *Bats and Onshore Wind Turbines – Survey, Assessment and Mitigation*.

