Cummeennabuddoge Wind Farm

Bat Activity Survey Report

FuturEnergy Ireland

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Delivering a better world

Quality information

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Revision history

Revision	Revision date	Details	Authorised	Name	Position
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Table of contents

1. Introduction

1.1 Background

AECOM Ireland Limited ('AECOM') was appointed by FuturEnergy Ireland Development Designated Activity Company ('FuturEnergy Ireland') to carry out bat activity surveys for the proposed Cummeennabuddoge Wind Farm, Co. Kerry (herein referred to as the 'Proposed Development'). The location of the Proposed Development is shown on Figure 1 and is herein referred to as 'the Site'.

This Report documents the field surveys carried out for bats within the Site and surrounding lands too. The surveys were carried out between May and September 2024.

This Technical Report is structured as followed:

- **Section 1: Introduction**;
- **Section 2: Legislation, planning policy and guidance** provides an overview of relevant international and national nature conservation legislation and national and local planning policies related to biodiversity and nature conservation, and relevant guidance for report writing and field survey;
- **Section 3: Methods** describes the field survey methods used to assess the presence or likely absence of bat species, and the levels of activity of those species found to be present;
- **Section 4: Results** sets out the results of the field survey;
- **Section 5: Discussion and recommendations** sets out recommendations based on the findings of the field survey;
- **Section 6: References**; and,
- **Section 7: Figures.**

Throughout this Report, species are given their common and scientific names when first referred to and their common names only thereafter. All distances are cited as the shortest distance 'as the crow flies', unless otherwise specified.

1.2 Site description

The Site is situated approximately 5 km north of Ballyvourney and mainly lies within Coillte forestry plantation, dominated by Sitka spruce *Picea sitchensis* plantation. However, there are various localised strips and patches of open habitats, for example along watercourses, and forest rides. The Site is approximately orientated west to east, and there are existing wind farms close to the western part of the Site. The altitude range of the Site is approximately 250-500 m above sea level, with slopes ranging from flat to moderately steep. The local open habitat patches (excluding existing tracks) mainly comprise fragments of wet heath and degraded blanket bog, with smaller amounts of dry and wet grassland. For further information on the habitats present within the Site refer to the Cummeennabuddoge Wind Farm Habitat Report (AECOM, 2024).

1.3 Quality assurance and statement of authority

This Report, and the field survey described within, was completed in line with AECOM's Integrated Management System (IMS). AECOM's IMS places great emphasis on professionalism, technical excellence, quality as well as covering all aspects of environmental and Health and Safety management. All staff members are committed to establishing and maintaining our accreditation to the relevant international standards namely BS EN ISO 9001:2008 and 14001:2015.

All staff involved in the preparation of this Report, including the field survey described within, adhered to the Chartered Institute of Ecology and Environmental Management's (CIEEM) Code of Professional Conduct (CIEEM, 2022a).

Details of the qualifications and experience of the AECOM ecologists involved in preparing this Report, including in completing the desk study and field survey, are given in Table 1.1.

Table 1.1: Personnel and experience

Staff member and grade	Qualifications	Role in preparing this Report	Professional experience
Tony Marshall (Technical Director)	• BSc (Hons) in Biological Sciences (Ecology) (1st Class) • Chartered Ecologist • Member of CIEEM (MCIEEM)	Tony was responsible for ensuring that field survey followed good practice guidelines. He also provided technical verification of this Report.	Tony has fifteen years' experience as a professional ecologist on projects for private and public sector clients. He has extensive experience in Ecological Impact Assessment (EcIA) at all stages of the process, including screening/scoping, baseline data collection, assessment, and reporting. He has conducted many surveys for bats and used the results obtained to identify the impacts of infrastructure developments and to devise suitable mitigation/enhancement strategies.
Jenny Hunter (Principal Ecologist)	• BSc (Hons) in Biology (1st Class) • MSc in Ecological Management and Conservation Biology (Distinction) • MCIEEM • Member of the Royal Society of Biology (MRSB)	Jenny provided technical review of this Report.	Jenny Hunter has ten years' professional experience in ecological consultancy. Jenny has extensive experience in the survey of bats using a range of survey methods, techniques, and equipment, including acoustic call analysis. She has carried out bat surveys (roost assessment, emergence/re-entry, and activity surveys) for a range of small to large developments and infrastructure schemes, including under licence from the National Parks and Wildlife Service (NPWS). Jenny has assisted in licensed roost closures and has been involved in designing and prescribing specific mitigation for bats. She has provided in-house training to junior colleagues on bat surveys and is well versed in relevant legislation and survey guidance.
Emma Boston (Associate Director)	• BSc (Hons) degree in Zoology (2nd Class) • PhD in Conservation Biology from Queen's University, Belfast, plus ten years' post-doctoral research experience in conservation biology. • MCIEEM • Member of the Royal Society of Biology (MRSB)	Emma carried out the analysis of bat calls from the field surveys for this Report. Emma also provided technical review of this Report.	Emma has over eighteen years' professional experience in the survey of bats for research, conservation, and consultancy. Emma has expertise in the survey methods for bats using a range of techniques and equipment, including acoustic call analysis. She has carried out bat surveys for small and large developments, and infrastructure schemes. She has been involved in many projects where she has designed and prescribed specific mitigation for bats and has held licences in Northern Ireland, the Republic of Ireland and Scotland to disturb or catch bats for development, education, and research purposes; and holds a NatureScot and Natural England Level 4 licence.
Paul Donaghey (Consultant Ecologist)	• BSc (Hons) degree in Biology (2nd Class) • Merit MSc (Hons) in Ecological Management and Conservation Biology from Queen's University Belfast • ACIEEM	Paul carried out the analysis of bat calls from the field surveys for this Report.	Paul Donaghey is a Consultant Ecologist with over four years' professional experience in ecological consultancy. Paul has carried out numerous bat surveys, including activity transects and emergence/re-entry surveys for a range of large- and small-scale projects. Paul also has extensive experience in bat call analysis, and regularly assists colleagues in the United Kingdom with bat analysis. Paul is also proficient in the use of GIS.
Aoife Whyte (Graduate Ecologist)	• BSc (Hons) in Biomedical and Biological Sciences with a specialisation in Zoology (1st Class) • Qualifying Member of CIEEM	Aoife was one of the survey leads for the bat activity surveys and authored this Report.	Aoife has one year of experience as a professional ecologist on projects for private and public sector clients. She has experience in EcIA and has carried out several surveys for bats including preliminary roost assessments, bat activity and bat emergence surveys including the deployment of infrared cameras and thermal camera. Aoife also has experience in bat call analysis and data management.
Susanne Dunne (Senior Ecologist)	• BSc (Hons) in Ecology • ACIEEM	Susanne carried out the bat activity surveys.	Susanne is a former Senior Ecologist with AECOM. She has more than five years' experience in professional consultancy and has carried out several surveys for bats

Staff member and grade	Qualifications	Role in preparing this Report	Professional experience
			including preliminary roost assessments, bat activity and bat emergence surveys.

2. Legislation, planning policy, and guidance

2.1 Legislation and bat species in Ireland

All bats in the Republic of Ireland are listed on Annex IV of the Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (the 'Habitats Directive'). Listing under Annex IV requires Member States of the European Union (EU) to strictly protect these species wherever they occur. In addition, the lesser horseshoe bat *Rhinolophus hipposideros* is also listed under Annex II of the Habitats Directive, which means that Member States are required to designate Special Areas of Conservation (SAC) for the further protection of this species.

The Habitats Directive is transposed into Irish law by the European Communities (Bird and Natural Habitats) Regulations 2011 (the 'Habitats Regulations'), which provide national legislation for the protection of bats. Under the Habitats Regulations it is an offence to:

- deliberately capture, injure, or kill any bat;
- deliberately disturb a bat, particularly during the period of breeding, rearing, hibernation, and migration; and,
- damage or destroy a bat breeding site or resting place.

Bat species resident in Ireland, along with additional relevant information, are listed in Table 2.1 below.

Table 2.1: Bat species occurring in Ireland

Common name	Scientific name	Echolocation peak frequency (kHz)	Emergence times (minutes after sunset)*
Soprano pipistrelle	*Pipistrellus pygmaeus*	55.1	27 (mean)
Common pipistrelle	*Pipistrellus pipistrellus*	46.5	25 (mean)
Nathusius' pipistrelle	*Pipistrellus nathusii*	39.3	30 (mean)
Daubenton's bat	*Myotis daubentonii*	47.0	46 (mean)
Whiskered bat	*Myotis mystacinus*	47.5	32 (median)
Natterer's bat	*Myotis nattereri*	46.9	75 (median) 31 (mean)
Leisler's bat	*Nyctalus leisleri*	27.1	18 (median)
Brown long-eared bat	*Plecotus auritus*	33.1	54 (median) 61 (mean)

Source: Russ (2012), Collins (2023), Andrews and Pearson (2022), Jones and Rydell (1994), and Middleton *et al*. (2014).

* Emergence times can vary depending on the month during the active season, if bats are using trees or buildings/structures, and the level of habitat cover surrounding a roost.

2.2 Relevant planning policy

The following planning policies are also relevant to bats:

- Project Ireland 2040: National Planning Framework (NPF) (Department of Housing, Planning and Local Government (DHPLG), 2018);
- Ireland's 4th National Biodiversity Action Plan 2023-2030 (NPWS, 2023);
- Kerry County Development Plan 2022-2028 (Kerry County Council (KCC), 2022); and,
- Cork County Development Plan 2022-2028 (Cork County Council (CCC), 2022).

2.3 Guidance

The following guidelines were considered when designing and undertaking the field survey for bats:

- *Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation* (NatureScot, 2021);
- *Wind Turbine/Wind Farm Development Bat Survey Guidelines* (Bat Conservation Ireland, 2012);

- *Bat mitigation guidelines for Ireland – V2* (Marnell *et al*., 2022);
- *Guidance on Bat Surveys, Assessment & Mitigation for Onshore Wind Turbine Developments* (NIEA, Natural Environment Division, 2024).
- *Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes* (National Road Authority (NRA) (now known as Transport Infrastructure Ireland (TII[1]), 2009); and,
- *Bat Surveys for Professional Ecologists: Good Practice Guidelines* (Collins, 2023).

[1] Transport Infrastructure Ireland (TII) was established through a merger of the National Roads Authority and the Railway Procurement Agency.

3. Methods

3.1 Field survey

3.1.1 Static detector survey

The National Parks and Wildlife Service recently published the *Bat Mitigation Guidelines for Ireland – V2* (Marnell *et al*., 2022). While these don't provide detail of survey methods or mitigation strategies with regards wind energy developments, they refer to guidelines in multiple documents relating to wind energy published by Eurobats, Natural England, BCT and Bat Conservation Ireland (BCIreland). BCIreland published guidelines for the survey of bats at proposed wind farms in 2012 (Bat Conservation Ireland, 2012). These survey guidelines do not go into detail on mitigation strategies, however the BCIreland guidance document is currently in the process of being updated (due for publication in early-2025).

As such, bat activity surveys for the Proposed Development followed the most recent guidance for bats and onshore wind turbines published in the UK: *Bats and onshore wind turbines – survey, assessment and mitigation* (NatureScot, 2021). This guidance was published in 2021 jointly by the three British statutory nature conservation bodies (NatureScot, Natural England and Natural Resources Wales) in collaboration with partners, such as the Bat Conservation Trust (BCT) and the University of Exeter (hereafter this guidance is referred to simply as the 'NatureScot guidance). The NatureScot guidance are implemented across the UK as best practice, including in Northern Ireland, where the Northern Ireland Environment Agency (NIEA) prepared *Guidance on Bat Surveys, Assessment and Mitigation for Onshore Wind Turbine Developments in Northern Ireland* (NIEA, Natural Environment Division, 2024). The NatureScot guidelines recommend that for wind energy developments comprising up to ten turbines, static bat detectors be deployed at each proposed turbine location. For developments comprising more than ten turbines, the NatureScot guidance recommend that static bat detectors be deployed at ten turbine locations plus a third of other turbine locations, up to a maximum of 40 locations.

Static bat detectors (Song Meter 4 ('SM4') and Song Meter Mini2 ('SM Mini') (both Wildlife Acoustics Inc.)) were deployed nearby the locations of twelve of the seventeen proposed wind turbines for the Proposed Development, as shown on Figure 1. The static detectors were distributed according to a system of stratified sampling based on the availability of different habitats and topographical features on the Site in line with NatureScot guidance (2021).

Detectors were timed to start recording 30 minutes before sunset and finish recording 30 minutes after sunrise for each day they were deployed. Static detectors were left remote for at least ten nights and were then collected and redeployed in the following season with fresh memory cards and batteries. As such, twelve static detectors were deployed for ten consecutive nights (selecting nights with the best weather) on three occasions between May and September 2024, as detailed in Table 3.1: Weather conditions during static detector monitoring periodsTable 3.1. The static detectors were deployed in May/June for the beginning of the spring monitoring period, in July for the summer monitoring period, and in September for the autumn monitoring.

3.1.2 Weather conditions

Temperature, windspeed, and rainfall were recorded during the bat activity monitoring. Temperature, and windspeed details were available on the 'time and date' website (time and date, undated) from the nearest weather station, which is in Macroom, County Cork. This website did not record rainfall and so rainfall data was taken from the Met Eireann website (Met Eireann, undated) from the nearest weather station, which is situated in Valentia, County Kerry. There is an existing windspeed meteorological ('met') mast present within the Site (longitude and latitude: 51.997639, -9.157956), and FuturEnergy Ireland can provide these measurements.

Autumn had optimal weather conditions in comparison to spring and summer, i.e. with temperature ranges more suitable for bat activity, lower rainfall and lower windspeeds. Notably rainfall was greatest in summer with only one night of no rainfall during the recording period, and average wind speeds ranged between 12 and 3 km per hour. During the autumn monitoring period, rainfall was only recorded on a single night and, on average, windspeeds were slower than in spring and summer, with most days recording average windspeeds between 5 and 9 km per hour. Temperature ranges were most extreme in spring with the greatest range of temperature recorded and the lowest temperatures recorded across the seasons. In spring there was rainfall on six nights of the recording period, and temperature ranges were colder in comparison to summer and autumn. Average wind speeds were fastest in spring, with a peak of 14 km per hour recorded during this season.

Survey dates and weather conditions from the spring, summer and autumn survey seasons are detailed in Table 3.1.

Table 3.1: Weather conditions during static detector monitoring periods

Survey season	Date	Rainfall (mm)	Temperature range (°C)	Average windspeed ranges (km per hour)	Sunset time (hrs of darkness)
Spring	29/05/2024	1.5	13-10	13-11	21:42 (8 hrs)
	30/05/2024	0.3	12-9	14-12	21:43 (8 hrs)
	31/05/2024	0	16-8	11-10	21:45 (8 hrs)
	01/06/2024	0	14-10	11-5	21:46 (8 hrs)
	02/06/2024	0	16-13	11	21:47 (8 hrs)
	03/06/2024	0.1	15-12	8-6	21:48 (8 hrs)
	04/06/2024	3.3	11-7	11-5	21:49 (8 hrs)
	05/06/2024	Trace	11-7	9-7	21:50 (8 hrs)
	06/06/2024	0.7	12-10	6	21:51 (8 hrs)
	07/06/2024	0.9	12-10	10-7	21:52 (8 hrs)
Summer	16/07/2024	0	16-11	5-3	21:47 (8 hrs)
	17/07/2024	6.7	15-14	11-10	21:46 (8 hrs)
	18/07/2024	6.8	14-13	6	21:44 (8 hrs)
	19/07/2024	4	15-13	7-6	21:43 (8 hrs)
	20/07/2024	9.4	13-10	12-6	21:42 (8 hrs)
	21/07/2024	4.1	15-14	9-6	21:41 (8 hrs)
	22/07/2024	1.6	15-13	11-5	21:39 (8 hrs)
	23/07/2024	0.6	15-12	5	21:38 (8 hrs)
	24/07/2024	8.8	16-14	8-6	21:37 (8 hrs)
	25/07/2024	0.6	15-9	9-5	21:35 (8 hrs)
Autumn	16/09/2024	0	16-13	5	19:47 (12 hrs)
	17/09/2024	0	15-11	6-5	19:44 (12 hrs)
	18/09/2024	0	15-10	6	19:42 (12 hrs)
	19/09/2024	0	17-11	7-8	19:40 (12 hrs)
	20/09/2024	0	14-11	7-8	19:37 (12 hrs)
	21/09/2024	0	16-13	7	19:35 (12 hrs)
	22/09/2024	0	15-13	11-10	19:33 (12 hrs)
	23/09/2024	0	12-10	9-5	19:30 (12 hrs)
	24/09/2024	0	13-10	4	19:28 (12 hrs)
	25/09/2024	1.3	10-8	13-10	19:26 (12 hrs)

Source: Rainfall from Valentia weather station - https://www.met.ie/climate/available-data/daily-data (Accessed 08 September 2024). Windspeed, sunset time and temperature from Macroom weather station - https://www.timeanddate.com/weather/@2962745/historic?month=6&year=202 (Accessed 08 September 2024). Hours of darkness were rounded to the nearest hour and averaged for each monitoring period.

3.1.3 Overview of static detectors

The locations of the twelve static detectors are presented in Figure 1. Locations of static detectors are described in Table 3.2 and photographs illustrating the surrounding landscape are presented in Plate 3.1. All static detectors were within 50 m of a linear feature such as a treeline, or woodland, or access track. Detectors S07 and S08 were located along watercourses and S02, S05, S06, S09, S10, S12 were all located within 200 m of a watercourse. Not all the static detectors were in the exact location of the proposed turbine locations due to the presence of dense conifer plantations obstructing access (see Table 3.2 for details).

Table 3.2: Static detector locations

Static detector reference	Location description	Closest proposed turbine to static detector	Approximate distance from proposed turbine to closest watercourse	Longitude, latitude
S01	Located in an open landscape within a recently felled (mostly conifer) woodland. There are conifer plantations within 50 m and closest watercourse is over 470 m distant.	Turbine 1 (approximately 57 m distant)	The unnamed watercourse is 408 m from T1	51.999617, -9.136789
S02	Located within (mostly conifer) immature woodland with small saplings, large tree stumps and bog drainage ditches present. Closest watercourse is approximately 146 m distant	Turbine 5 (approximately 36 m distant)	The unnamed watercourse is 120 m from T5	52.004399, -9.148247
S03	Located on edge of mature conifer plantation, adjacent to access track (approximately 14 m distant). Closest watercourse is over 400 m distant	Turbine 3 (approximately 92 m distant)	The unnamed watercourse is 345 m from T3	51.994649, -9.146531
S04	Located within (mostly conifer) immature woodland with small saplings present, and nearby access track (approximately 43 m distant). Closest watercourse is approximately 208 m distant	Turbine 6 (approximately 80 m distant)	The unnamed watercourse is 195 m from T6	51.995627, -9.158247
S05	Located within (mostly conifer) immature woodland, with small saplings present. Mature conifer plantation within 50 m. Closest watercourse is approximately 173 m distant	Turbine 8 (approximately 76 m distant	The unnamed watercourse is 160 m from T8	52.002972, -9.161251
S06	Located on edge of mature conifer plantation directly along access track. Closest watercourse is approximately 144 m distant	Turbine 10 (approximately 76 m distant)	The unnamed watercourse is 62 m from T10	51.998956, -9.167044
S07	Located in grassland clearing between mature conifer plantations, directly along the River Clydaghroe	Turbine 9 (approximately 205 m distant)	The River Clydaghroe 100 m from T9	51.994372, -9.171314
S08	Located in habitat mosaic of wet grassland, acid grassland/poor fen, and bog. Situated directly along an unnamed watercourse	Turbine 11 approximately 109 m distant)	The unnamed watercourse is 76 m from T11	51.990735, -9.180600
S09	Located on edge of mature conifer plantation nearby access track (approximately 17 m distant) with the River Flesk located 133 m to the north, beyond mature conifer plantation	Turbine 13 (approximately 163 m distant)	River Flesk is 166 m from T13	51.999283, -9.183411
S10	Located on edge of mature conifer plantation directly along access track. Closest watercourse is approximately 180 m distant	Turbine 15 (approximately 179 m distant)	The unnamed watercourse is 382 m from T15	51.993457, -9.186587
S11	Located on edge of conifer plantation with short saplings and tree stumps present. Closest watercourse is over 300 m distant	Turbine 14 (approximately 63 m distant)	The unnamed watercourse is 240 m from T14	51.988257, -9.189897
S12	Located within conifer plantation with short saplings and tree stumps present. Closest watercourse is approximately 130 distant	Turbine 17 (approximately 25 m distant)	The unnamed watercourse is 133 m from T17	51.988786, -9.198989

Plate 3.1: Photographs of static detector locations


S01


S02

S03

S04

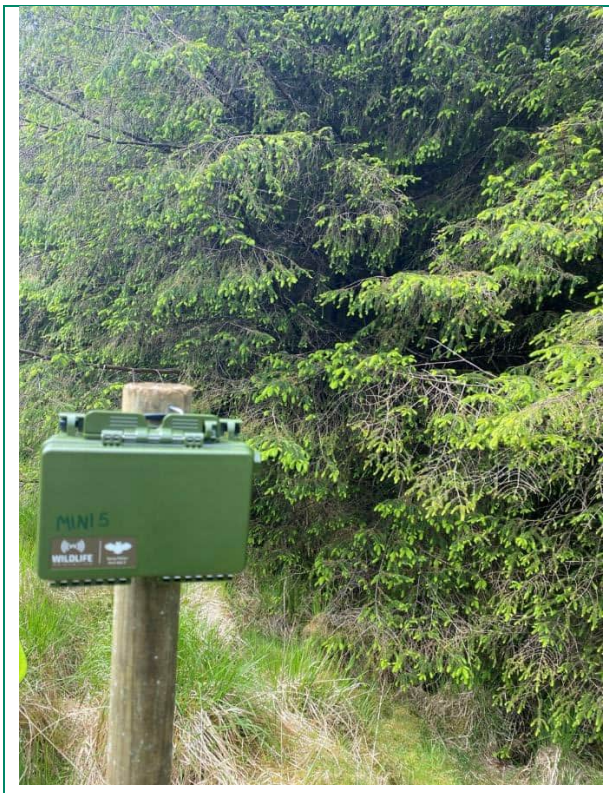
S05

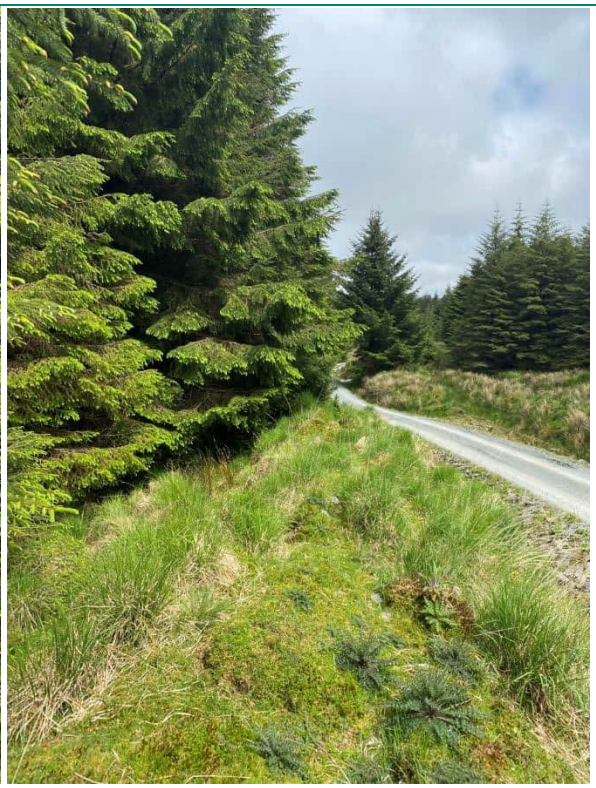
S06

S07

S08

S09





S10

S11

S12

3.1.4 Data collection and analysis

Static detectors (SM4 and SM Mini) recorded continuously throughout the survey period, in real-time (i.e. including all calls and gaps, allowing distinctive 'rhythms' to be ascertained) and in full spectrum (i.e. all frequencies are recorded). This results in a complete sonogram and allows detailed analysis of the audio recording.

All spatial survey data including the locations of static detectors were recorded onto a mobile mapper in the field using bespoke surveys maps on Esri Field Maps. By using the inbuilt device GPS and in context with

recognisable features on the ground visible from downloaded orthophotography, this allows for relatively accurate locational data to be recorded. Bat call data collected during surveys were stored and subsequently analysed using Kaleidoscope Pro (Wildlife Acoustics Inc.) for species identification. Static detectors were recording for more than ten nights, but only ten consecutive nights of bat call data with the most optimal weather for bats was analysed, in accordance with NatureScot guidance (2021). Auto-identification software was run initially to separate noise files from bat call files. Files were then manually checked, once to identify and once after to check (quality assure). 10% of the files auto-identified by Kaleidoscope software as noise were analysed.

Analysis of bat activity was used to determine bat passes per hour and passes per night. Passes refer to the number of bat call files (excluding noise sound files). Passes per hour were calculated by dividing the total number of passes by the hours of darkness (i.e. the bat active time) and number of nights of deployment for each season. Passes per night were calculated by dividing the total number of passes by the number of nights of deployment.

3.1.5 Limitations

It was not within AECOM's commissioned scope of works to complete a desk-based study, and a search for records of bat species within the zone of influence of the Proposed Development was not carried out.

Two of the static detectors (S01 and S03) did not record during the autumn deployment. This poses a minor constraint to the data gathering, as these detectors did record during the spring and summer survey seasons meaning only a small window of survey was missed for these two turbine locations, and the findings/conclusions of this Report are not significantly affected.

Due to the cryptic nature of the *Myotis* genus, not all bats were identified to species level. However, data were analysed by grouping this genus where necessary, as discussed in Section 0.

Due to the large amount of static detector data collected, only 10% of the files auto-identified by Kaleidoscope software as noise were analysed. This is not considered to pose a significant constraint. Kaleidoscope Pro software's auto-identification feature is designed to filter out noise files, however, there may a number of bat calls preset within noise files, hence, some bat calls may have been underrepresented, in particular *Myotis* species and brown long-eared bat.

The sole use of static detectors to record activity is also a limitation as they do not record bat behaviour in the context of bat passes. For example, one hundred bat passes could represent one bat passing 100 times or 100 bats each passing once. Thus, some species may be under- or over-represented.

Weather information and measurements, were not taken from an on-Site recording station and so weather conditions are only a proxy of the weather experienced on Site during the monitoring periods. However, given the relative proximity of the weather station from which data were gathered, it is highly likely that the weather information is representative of conditions on Site during the course of bat activity survey.

4. Results

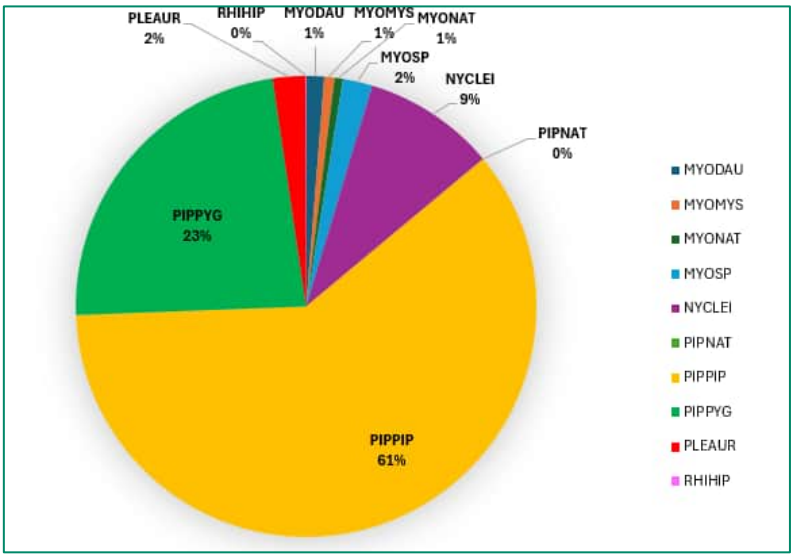
4.1.1 Analysis of bat activity

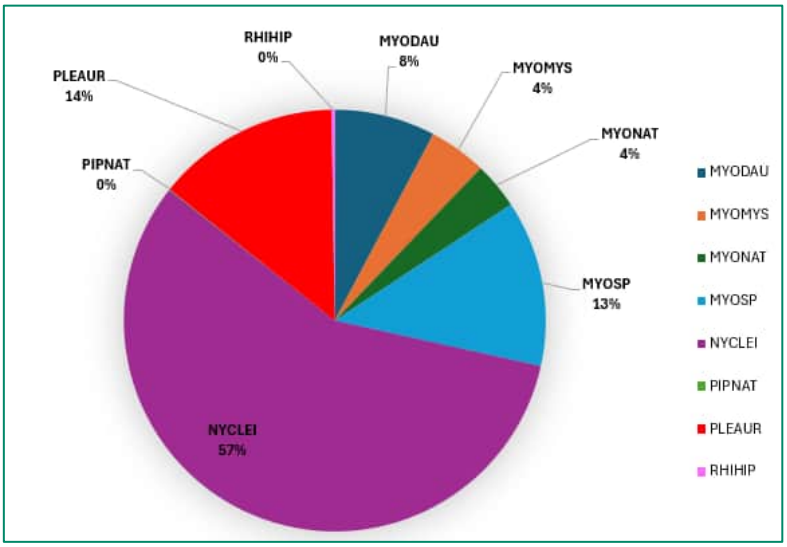
Across the twelve static detectors deployed within the Site, all nine bat species found in Ireland were recorded. The majority of bat passes were made by common pipistrelle (61%; 13,288 passes), followed by soprano pipistrelle (23%; 5,114 passes) and Leisler's bat (9%; 2,047 passes) in significantly lower numbers. Other species such as Daubenton's bat, whiskered bat, Natterer's bat and brown long-eared bat were recorded at around 1-2% of the total number of passes, however these numbers still represent a significant amount of activity.

Considering *Myotis* species exclusively, Daubenton's bat made up 27% of the species composition across the Site and was the most frequently recorded species (277 total passes), followed by whiskered bat representing 15.5% (158 total passes) and then Natterer's bat representing 12.6% (128 total passes). Unidentified *Myotis* species made up the remaining percent (456 total passes).

Lesser horseshoe bat and Nathusius' pipistrelle were recorded rarely, with only two passes recorded for Nathusius' pipistrelle and nine passes recorded for lesser horseshoe bat during the entire monitoring period. The proportion of species recorded are illustrated in Plate 4.1, firstly including all species, and then excluding soprano and common pipistrelles, for illustrative purposes. With soprano and common pipistrelle passes excluded, the diversity of the remaining seven species is more apparent.

Plate 4.1: Species composition across all static detectors S01-S12 (first chart showing all nine species recorded, second chart showing all species excluding soprano and common pipistrelle)





Key: RHIHIP = lesser horseshoe bat, PLEAUR = brown long-eared bat, PIPPYG = soprano pipistrelle, PIPPIP = common pipistrelle, PIPNAT = Nathusius' pipistrelle, NYCLEI = Leisler's bat, MYOSP = unidentified Myotis species, MYOMYS = whiskered bat, MYONAT = Natterer's bat, MYODAU = Daubenton's bat.

Figure 2 shows the composition of species recorded at each static detector location for all seasons combined. Common pipistrelle was recorded at every static detector location, with S10 and S03 recording the highest number of common pipistrelle total passes (3,232 and 2,056, respectively). Soprano pipistrelle was the second most dominant species recorded, with the highest levels of activity recorded at S08 and S03 (985 and 757 total passes, respectively).

Table 4.1 summarises the number of bat passes per night and passes per hour recorded at each static detector for the three monitoring seasons. The autumn monitoring season recorded the highest levels of activity (total of 14,234 passes) while the summer monitoring season recorded the lowest levels of activity (total of 1,931 passes).

Table 4.1: Summary of bat activity

Static detector	Season	Nights deployed	Total number of passes	Passes per night	Passes per hour	Species recorded (in order of abundance)
S01	Spring	10	6	1	<1	Common pipistrelle
	Summer	10	6	1	<1	Common pipistrelle, Leisler's bat and soprano pipistrelle
	Autumn	0*	*N/A*	*N/A*	*N/A*	*N/A*
S02	Spring	10	36	4	<1	Common pipistrelle, Daubenton's bat, Natterer's bat, *Myotis* species, Leisler's bat, soprano pipistrelle and Nathusius' pipistrelle
	Summer	10	8	1	<1	Common pipistrelle and Leisler's bat
	Autumn	10	678	68	9	Common pipistrelle, Leisler's bat, soprano pipistrelle, brown long-eared bat, *Myotis* species, Daubenton's bat, Natterer's bat, whiskered bat and lesser horseshoe bat
S03	Spring	10	2,887	289	36	Common pipistrelle, soprano pipistrelle, *Myotis* species, whiskered bat, Natterer's bat, brown long-eared bat, Leisler's bat and lesser horseshoe bat
	Summer	10	191	19	2	Soprano pipistrelle, common pipistrelle, Leisler's bat, *Myotis* species, Daubenton's bat, Natterer's bat, brown long-eared bat, whiskered bat
	Autumn	0*	*N/A*	*N/A*	*N/A*	*N/A*
S04	Spring	10	63	6	1	Common pipistrelle, Daubenton's bat, soprano pipistrelle, Leisler's bat, Natterer's bat, and brown long-eared bat.
	Summer	10	34	3	<1	Common pipistrelle, soprano pipistrelle, Leisler's bat, Daubenton's bat, whiskered bat, brown long-eared bat, *Myotis* species and Leisler's bat.
	Autumn	10	1,440	144	18	Common pipistrelle, Leisler's bat, soprano pipistrelle, brown long-eared bat, Daubenton's bat, *Myotis* species, Natterer's bat, and whiskered bat
S05	Spring	10	27	3	<1	Common pipistrelle, soprano pipistrelle, Leisler's bat, Natterer's bat, Daubenton's bat, *Myotis* species, and brown long-eared bat

Static detector	Season	Nights deployed	Total number of passes	Passes per night	Passes per hour	Species recorded (in order of abundance)
	Summer	10	24	2	<1	Common pipistrelle, Leisler's bat, soprano pipistrelle, brown long-eared bat, and *Myotis* species
	Autumn	10	981	98	12	Common pipistrelle, soprano pipistrelle, Leisler's bat, *Myotis* species, brown long-eared bat, Natterer's bat, Daubenton's bat, and whiskered bat
S06	Spring	10	289	29	4	Common pipistrelle, soprano pipistrelle, Leisler's bat, Daubenton's bat, brown long-eared bat, *Myotis* species, Natterer's bat, and lesser horseshoe bat
	Summer	10	61	6	1	Common pipistrelle, soprano pipistrelle, *Myotis* species, whiskered bat, brown long-eared bat, and Leisler's bat
	Autumn	10	987	99	12	Common pipistrelle, soprano pipistrelle, brown long-eared bat, Leisler's bat, *Myotis* species, Daubenton's bat, Natterer's bat, whiskered bat and lesser horseshoe bat
S07	Spring	10	114	11	2	Common pipistrelle, soprano pipistrelle, Leisler's bat, *Myotis* species, Daubenton's bat, and Natterer's bat
	Summer	10	258	26	3	Common pipistrelle, soprano pipistrelle, Daubenton's bat, *Myotis* species, Leisler's bat, whiskered bat and brown long-eared bat
	Autumn	10	1,052	105	13	Common pipistrelle, soprano pipistrelle, Leisler's bat, *Myotis* species, Daubenton's bat, brown long-eared bat, Natterer's bat and whiskered bat
S08	Spring	10	160	16	2	Common pipistrelle, soprano pipistrelle, Leisler's bat, *Myotis* species, Daubenton's bat, Natterer's bat, whiskered bat and brown long-eared bat
	Summer	10	761	76	10	Soprano pipistrelle, common pipistrelle and brown long-eared bat
	Autumn	10	917	92	12	Common pipistrelle, soprano pipistrelle, Leisler's bat, *Myotis* species, Daubenton's bat, brown long-eared bat, Natterer's bat, whiskered bat Nathusius' pipistrelle and lesser horseshoe bat
S09	Spring	10	862	86	11	Common pipistrelle, soprano pipistrelle, Daubenton's bat, *Myotis* species, Leisler's bat, brown long-eared bat, Natterer's bat, and whiskered bat
	Summer	10	109	11	1	Soprano pipistrelle, common pipistrelle, Leisler's bat, *Myotis* species, brown long-eared bat, Natterer's bat, Daubenton's bat and whiskered bat
	Autumn	10	1,071	107	13	Common pipistrelle, Leisler's bat, brown long-eared bat, soprano pipistrelle, *Myotis* species, Daubenton's bat, Natterer's bat,

Static detector	Season	Nights deployed	Total number of passes	Passes per night	Passes per hour	Species recorded (in order of abundance)
						whiskered bat and lesser horseshoe bat
S10	Spring	10	1,217	122	15	Common pipistrelle, soprano pipistrelle, Leisler's bat, whiskered bat, *Myotis* species, Natterer's bat, Daubenton's bat and brown long-eared bat
	Summer	10	287	29	4	Common pipistrelle, soprano pipistrelle, Leisler's bat, Daubenton's bat, Natterer's bat, whiskered bat, *Myotis* species and brown long-eared bat
	Autumn	10	2,640	264	33	Common pipistrelle, soprano pipistrelle, Leisler's bat, brown long-eared bat, Daubenton's bat, *Myotis* species, Natterer's bat and whiskered bat
S11	Spring	10	114	11	1	Common pipistrelle, soprano pipistrelle, Leisler's bat, brown long-eared bat, *Myotis* species, Daubenton's bat and Natterer's bat
	Summer	10	132	13	2	Soprano pipistrelle, common pipistrelle, Leisler's bat, brown long-eared bat, *Myotis* species, Daubenton's bat and Natterer's bat
	Autumn	10	2,518	252	32	Common pipistrelle, soprano pipistrelle, Leisler's bat, brown long-eared bat, Daubenton's bat, *Myotis* species, and Natterer's bat
S12	Spring	10	42	4	<1	Common pipistrelle, Leisler's bat, Daubenton's bat, Natterer's bat, soprano pipistrelle and brown long-eared bat
	Summer	10	60	6	1	Soprano pipistrelle, common pipistrelle, Leisler's bat, brown long-eared bat, and *Myotis* species
	Autumn	10	1,950	195	23	Common pipistrelle, Leisler's bat, soprano pipistrelle, brown long-eared bat, *Myotis* species, Daubenton's bat, and Natterer's bat

Passes are rounded to the nearest whole number.
* In instances where a static detector failed to record, the results are marked with 0's and N/A's for that monitoring period.

As shown in Table 4.1 and as illustrated in Figure 2, the static detectors which recorded the highest levels of bat activity were S10, S03, and S11, with a total of, 4,144 passes, 3,078 passes and 2,764 passes, respectively. Common pipistrelle made up most of the calls recorded at these locations, followed by soprano pipistrelle, with small numbers of other species. The statics which recorded the lowest levels of bat activity were S01, S02 and S05, with a total of 12 passes, 722 passes and 1,032 passes, respectively. S01 was also the least diverse for species, with only four species recorded (common pipistrelle, soprano pipistrelle, Daubenton's bat, and Leisler's bat), while S02 and S08 were the most diverse and all nine species of Irish bats were recorded at both of these locations in autumn.

Plate 4.2 is a visual representation of Table 4.1 showing passes per night for all species across the seasons at each static location.

Plate 4.2: Total number of passes per night at static detectors S01-S12 for each season

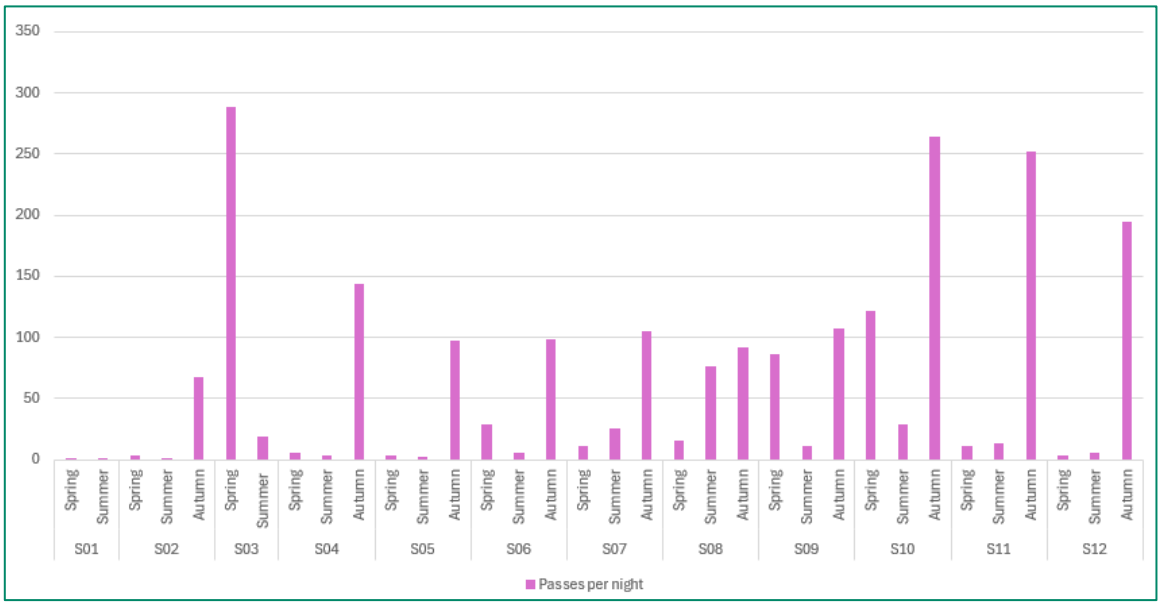
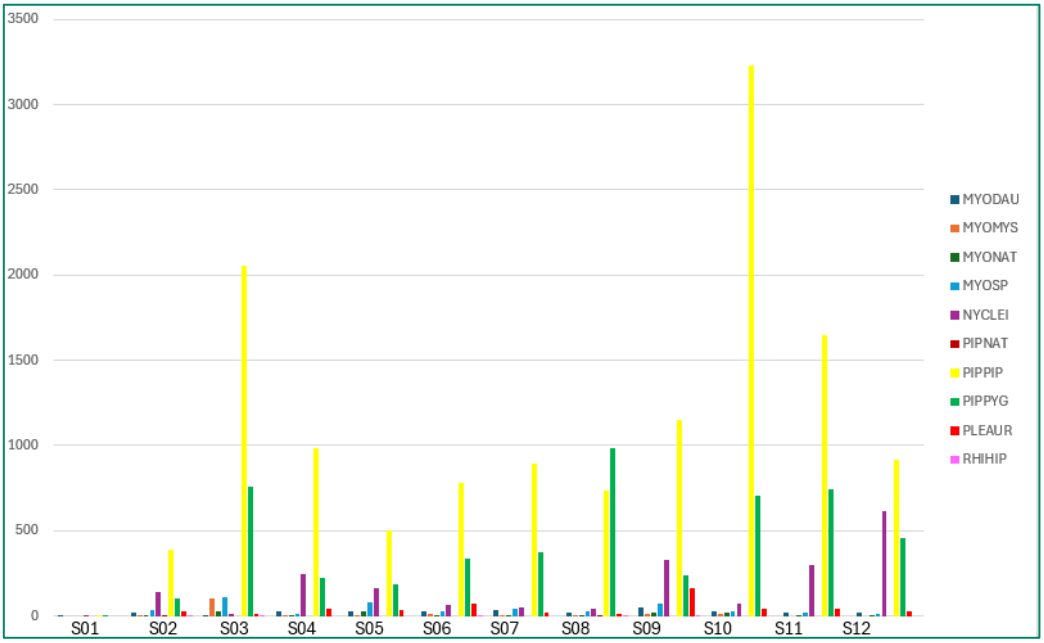
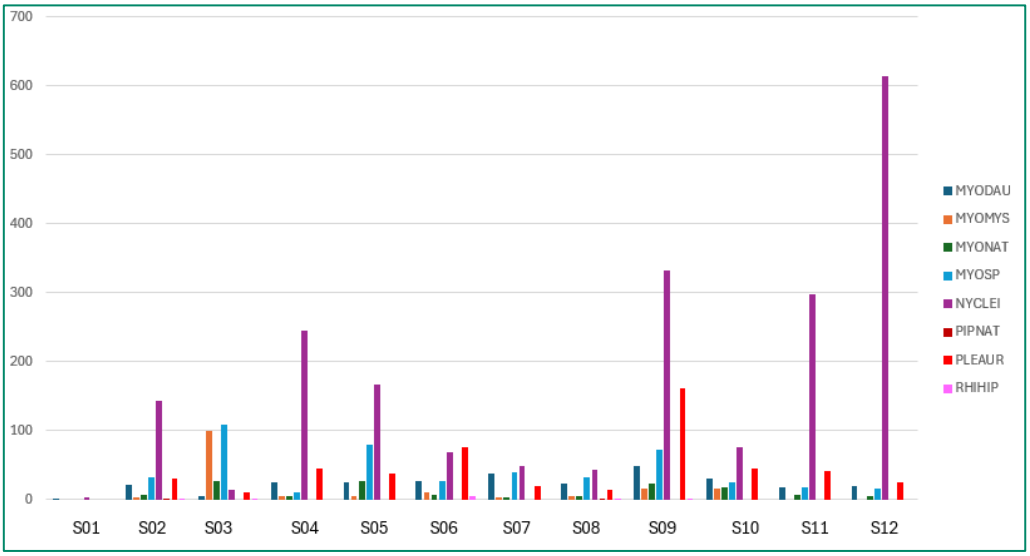


Plate 4.3 is a visual representation showing the total number of passes across the seasons at each static detector location, firstly with all species and then with all species excluding soprano and common pipistrelle.

Plate 4.3: Total number of bat passes per species at static detectors S01-S12 (first chart across all seasons for all nine species recorded, second chart showing across all seasons for all species excluding soprano and common pipistrelle)





With soprano and common pipistrelle passes excluded, the diversity of the remaining seven species is more apparent, as shown in Plate 4.3. Notably, S09 and S03 recorded the greatest diversity of species in the highest levels of activity (i.e. greatest number of passes), although S08 and S02 also recorded all species but in lower number of passes. The greatest number of passes from *Myotis* species was recorded at S09 and S03, with Daubenton's bat recorded most regularly at S09 while whiskered bat and unidentified *Myotis* species were commonly recorded at S03. Natterer's bat did not show any preference for location, with similar number of passes recorded across the static detector locations. Brown long-eared bat were recorded more commonly at S09 and then S06, while Leisler's bat was recorded more commonly at S12 and then S09. Other rarer species including lesser horseshoe bat and Nathusius' pipistrelle were recorded in very small numbers and so no trends in a locational preference were observed.

There were only a small number of early calls (i.e. calls heard soon after sunset) recorded on the static detectors across the seasons. Common pipistrelle, soprano pipistrelle and Leisler's bat were typically recorded throughout the night, with calls heard as early as ten minutes after sunset for common pipistrelle, and as early as twenty minutes after sunset for soprano pipistrelle, however, these early calls were occasional, indicating pipistrelles are likely largely commuting to and foraging on Site. One Leisler's bat call was heard as early as six minutes before sunset in summer at S12. The majority of Leisler's bat early calls were recorded at S11 and S12 in autumn with approximately eighteen calls recorded 30 minutes before sunset, albeit most calls were heard later, at least 30 minutes after sunset, indicating this species is also likely using the Site for foraging and commuting.

Brown long-eared bat calls were heard as early as 35 minutes after sunset, with the majority of the small number of early calls recorded at S05 (one call), S06 (two calls) and S07 (one call) in autumn, indicating potential for roost(s) to be nearby these locations. No early calls were heard in spring and the earliest call recorded from this species in summer was 52 minutes after sunset. Early calls from whiskered bat and Natterer's bat were not common, with very few calls heard within an hour of sunset. A single Daubenton's bat was recorded 57 minutes after sunset at S07 in autumn, though the majority of calls from this species were recorded more than an hour after sunset. One unidentified *Myotis* species was recorded as early as 23 minutes after sunset in autumn at S05, indicating potential for a nearby roost. However, similar to other species recorded within the Site, early calls were not common for these species and *Myotis* species were typically recorded later in the night and in the early morning. The small number of lesser horseshoe bat calls recorded were mainly recorded in the middle of the night, indicating that the Site is not of particular importance to this species.

The following Sections presents details for each of the static detectors.

4.1.1.1 Static detector S01

S01 was located in open habitat within a recently felled (mostly conifer) woodland, approximately 57 m to the north of T1 as shown in Figure 1. Low levels of bat activity were recorded at S01 across all seasons, with a total of twelve passes. Passes per night (across all species) were less than one per night in spring and summer. S01 recorded the fewest number of species relative to all other static detectors, with only four species recorded: common pipistrelle (accounting for 67% of total passes), Leisler's bat (17%), soprano pipistrelle (8%), and Daubenton's bat (8%). Common pipistrelle was the only species recorded during the spring monitoring season, with less than one pass per night as detailed in Table 4.2.

Table 4.2: Species seasonal pass rates for S01

Species	Passes per night - spring	Passes per night - summer
Daubenton's bat	-	0.1
Leisler's bat	-	0.2
Common pipistrelle	0.6	0.2
Soprano pipistrelle	-	0.1

4.1.1.2 Static detector S02

S02 was located within (mostly conifer) immature woodland with small saplings, large tree stumps and bog drainage ditches present. S02 was located approximately 36 m to the west of T5 and the closest watercourse is approximately 120 m distant from T5, as shown in Figure 1. Similar to S01, low levels of bat activity were recorded at S02 across all seasons, with a total of 722 passes. Passes per night (across all species) were four passes per night in spring, one pass per night in summer and 68 passes per night in autumn. S02 recorded all nine species of bats in autumn, with nine passes per night across all species. The passes per night for species also differed across the seasons as shown in Table 4.3.

S02 was dominated by common pipistrelle (accounting for 54% of total passes), followed by Leisler's bat (20%) and soprano pipistrelle (14%). Leisler's bat passes peaked in autumn at 13.6 passes per night. *Myotis* species including Daubenton's bat, Natterer's bat and whiskered bat were also recorded at this location between 4% and less than 1% of total passes, and passes per night were less than one except in autumn when passes per night for unidentified *Myotis* species peaked at 2.9 passes per night and 1.5 passes per night for Daubenton's bat. Nathusius' pipistrelle was only recorded at two static locations across the Site of which a single pass was recorded once at S02. Brown long-eared bat were only recorded at S02 in autumn, with three passes per night.

Lesser horseshoe bat was recorded at S02, although only one pass was recorded. Brown long-eared bat was also recorded in low numbers at S02 with 30 total passes recorded across the entire monitoring period.

Table 4.3: Species seasonal pass rates for S02

Species	Passes per night - spring	Passes per night - summer	Passes per night – autumn
Lesser horseshoe bat	-	-	0.1
Daubenton's bat	0.6	-	1.5
Natterer's bat	0.3	-	0.3
Whiskered bat	-	-	0.3
Myotis species	0.3	-	2.9
Brown long-eared bat	-	-	3
Leisler's bat	0.2	0.4	13.6
Common pipistrelle	1.9	0.4	36.3
Soprano pipistrelle	0.2	-	9.8
Nathusius' pipistrelle	0.1	-	-

4.1.1.3 Static detector S03

S03 was located on the edge of mature conifer plantation near the access track approximately 14 m distant and was located 92 m to the south of T3, as shown in Figure 1. In contrast to S01 and S02, S03 was the static detector which recorded the second highest level of bat total activity (3,078 total passes), and the highest passes per night compared to other detector locations. Passes per night (across all species) were nineteen passes per night in spring and 289 passes per night in summer. The highest number of *Myotis* passes per night were at this location, perhaps highlighting the importance of edge habitat. The passes per night for species also differed across the seasons as shown in Table 4.4.

S03 was dominated by pipistrelle species including common pipistrelle (accounting for 67% of total passes) and soprano pipistrelle (25%). Common pipistrelle had 202 passes per night in spring but only 3.6 passes per night in summer. Leisler's bats were recorded rarely at this location, with passes per night ranging between 0.4 and 1.0 pass. The highest level of activity for *Myotis* species was recorded at S03 in comparison to the other static

detector locations, with a total of 240 passes recorded. Whiskered bat was recorded most frequently at S03, with 9.7 passes per night in spring and unidentified *Myotis* species were also recorded frequently at this location, with 9.9 passes per night in spring. Daubenton's bat and Natterer's bat were recorded much less frequently in comparison. Daubenton's bat was only recorded in spring and not in summer or autumn. Natterer's bat passes per night ranged between 0.4 and 2.3 passes and this species was recorded most frequently at S03 relative to all other static detectors.

Lesser horseshoe bat was recorded at S03, although only one pass was recorded. Low numbers of brown long-eared bat were also recorded at S03, with only ten total passes recorded across the entire monitoring period.

Table 4.4: Species seasonal pass rates for S03

Species	Passes per night - spring	Passes per night - summer
Lesser horseshoe bat	0.1	-
Daubenton's bat	-	0.5
Natterer's bat	2.3	0.4
Whiskered bat	9.7	0.3
Myotis species	9.9	0.9
Brown long-eared bat	0.6	0.4
Leisler's bat	0.4	1
Common pipistrelle	202	3.6
Soprano pipistrelle	63.7	12

4.1.1.4 Static detector S04

S04 was located in (mostly conifer) immature woodlands, and approximately 43 m distant from an access track. S04 was located approximately 80 m to the north of T6 and the closest watercourse is approximately 195 m distant from T6, as shown in Figure 1. S04 recorded a total of 1,537 passes for all species and passes per night (across all species) ranged between six passes per night in spring, three passes per night in summer and higher levels of activity noted in autumn with 144 passes per night. The passes per night for species also differed across the seasons as shown in Table 4.5.

S04 was dominated by common pipistrelle (accounting for 64% of total passes), followed by Leisler's bat (16%), soprano pipistrelle (14%) and brown long-eared bat (3%). Common pipistrelle passes per night ranged from as few as 1.4 passes per night in summer and peaking at 92.7 passes per night in autumn. Soprano pipistrelle passes per night also ranged significantly across the seasons with less than one pass per night in spring and 20.8 passes per night in autumn. Leisler's bat passes per night also peaked in autumn at 23.7 passes. Brown long-eared bat were recorded less regularly but this species was recorded in every season and passes per night peaked in autumn at 4.2 passes per night. *Myotis* species, including Daubenton's bat, Natterer's bat and whiskered bat, were also recorded at this location between 2% and less than 1% of total passes, and passes per night were less than one, except in spring and autumn when passes per night for Daubenton's bat were one or greater than one.

Table 4.5: Species seasonal pass rates for S04

Species	Passes per night - spring	Passes per night - summer	Passes per night – autumn
Daubenton's bat	1.2	0.2	1
Natterer's bat	0.1	-	0.4
Whiskered bat	-	0.1	0.3
Myotis species	-	0.1	0.9
Brown long-eared bat	0.1	0.2	4.2
Leisler's bat	0.2	0.6	23.7
Common pipistrelle	4.1	1.4	92.7
Soprano pipistrelle	0.6	0.8	20.8

4.1.1.5 Static detector S05

S05 was located within (mostly conifer) immature woodland with small saplings present and was within 50 m of a mature conifer plantation and approximately 26 m distant from an access track. S05 was located approximately 50 m to the west of T8 and the closest watercourse is approximately 160 m distant from T8, as shown in Figure 1. S05 had some of the lower levels of activity (passes per night) in comparison to the other static detectors, with a total of 1,032 passes. For all species, passes per night in spring and summer were low, between two to three passes but passes per night peaked at 98 passes in autumn for all species. The passes per night for species also differed across the seasons as shown in Table 4.6.

S05 was dominated by common pipistrelle (accounting for 49% of total passes), followed by soprano pipistrelle (18%), and Leisler's bat (16%). Common pipistrelle passes per night ranged across seasons with one pass per night in summer and 48.4 passes per night in autumn. Soprano pipistrelle passes per night increased from 0.4 passes in spring and summer to 18.1 passes in autumn. Leisler's bat passes per night increased from 0.2 passes in spring to 15.9 passes in autumn. *Myotis* species including Daubenton's bat, Natterer's bat and whiskered bat, were also recorded at this location between 8% and less than 1% of total passes. Passes per night for *Myotis* species were less than one in spring and summer but passes per night peaked in autumn at 2.1 passes per night for Daubenton's bat, 2.2 passes for Natterer's bat, and 7.7 passes for unidentified *Myotis* species. Whiskered bats were recorded rarely at this location with a total of four passes across all seasons. Brown long-eared bat were recorded occasionally across the seasons (4%) with a peak of 3.3 passes per night in autumn.

Table 4.6: Species seasonal pass rates for S05

Species	Passes per night - spring	Passes per night - summer	Passes per night – autumn
Daubenton's bat	0.4	-	2.1
Natterer's bat	0.4	-	2.2
Whiskered bat	-	-	0.4
Myotis species	0.1	0.1	7.7
Brown long-eared bat	0.1	0.3	3.3
Leisler's bat	0.2	0.6	15.9
Common pipistrelle	1.1	1	48.4
Soprano pipistrelle	0.4	0.4	18.1

4.1.1.6 Static detector S06

S06 was located on the edge of a mature conifer plantation and was also directly alongside an access track. S06 was located approximately 76 m to the north of T10, and the closest watercourse is approximately 62 m distant from T10, as shown in Figure 1. Similar to S05, S06 had some of the lower levels of bat activity (passes per night) compared to other statics, with a total of 1,337 passes. Passes per night for all species ranged between 29

passes per night in spring, six passes per night in summer, and 98 passes per night in autumn. The passes per night for species also differed across the seasons as shown in Table 4.7.

S06 was dominated by common pipistrelle (accounting for 58% of total passes), followed by soprano pipistrelle (25%) then brown long-eared bat (6%) and Leisler's bat (5%). Brown long-eared bat were recorded frequently at S06 with a total of 76 passes recorded and a peak of seven passes per night in autumn. The greatest number of lesser horseshoe bats were recorded at S06, albeit only a total of five passes were recorded. *Myotis* species including Daubenton's bat, Natterer's bat and whiskered bat, were also recorded at this location between 2% and 1% of total passes. Passes per night were less than one for *Myotis* species, except in autumn when passes per night for Daubenton's bat and unidentified *Myotis* species peaked at 2.1 passes per night. Common pipistrelle passes per night ranged with as few as 3.1 passes per night in summer and as many as 51.1 passes per night in autumn. Soprano pipistrelle passes per night also ranged significantly across the seasons, with 2.1 passes per night in summer increasing to 28.8 passes per night in autumn. Leisler's bat passes per night also peaked in autumn at 6.3 passes.

Table 4.7: Species seasonal pass rates for S06

Species	Passes per night - spring	Passes per night - summer	Passes per night – autumn
Lesser horseshoe bat	0.1	-	0.4
Daubenton's bat	0.5	-	2.1
Natterer's bat	0.2	-	0.5
Whiskered bat	0.4	0.2	0.4
Myotis species	0.2	0.4	2.1
Brown long-eared bat	0.4	0.2	7
Leisler's bat	0.5	0.1	6.3
Common pipistrelle	23.8	3.1	51.1
Soprano pipistrelle	2.8	2.1	28.8

4.1.1.7 Static detector S07

S07 was located in open habitat in a grassland clearing between mature conifer plantations along the River Clydaghroe. S07 was located approximately 205 m to the north of T09 and approximately 505 m from T12's location as shown in Figure 1. The River Clydaghroe is located approximately 100 m from T9. Passes per night for all species at S07 ranged between eleven passes per night in spring, 26 passes per night in summer and 105 passes per night in autumn, similar to S05 and S06. The passes per night for each species also differed across the seasons as shown in Table 4.8.

S07 recorded all species of bat at least once, except for lesser horseshoe bat and Nathusius' pipistrelle. S07 had a total of 1,424 passes and activity at this location was dominated by common pipistrelle (accounting for 63% of total passes) followed by soprano pipistrelle (27%) and then Leisler's bat (3%). *Myotis* species including Daubenton's bat, Natterer's bat and whiskered bat were recorded infrequently varying between 3% and <1% of total passes. Passes per night were less than one for Natterer's bat, whiskered bat, and Daubenton's bat, except for Daubenton's bat when passes per night increased to one pass per hour in summer and peaked at 2.2 passes in autumn. Unidentified *Myotis* species peaked at 2.7 passes per night in autumn. Common pipistrelle passes per night ranged, with as few as 7.5 passes per night in spring and as many as 68.1 passes per night in autumn. Soprano pipistrelle passes per night also ranged significantly across the seasons, with only 2.3 passes per night in spring. Passes per night then increased to 26.1 passes in autumn. Leisler's bat passes also peaked in autumn at four passes per night. Brown long-eared bat was recorded occasionally (1% of total bat passes) at S07 with a peak of 1.9 passes per night in autumn.

Table 4.8: Species seasonal pass rates for S07

Species	Passes per night - spring	Passes per night - summer	Passes per night – autumn
Daubenton's bat	0.5	1	2.2
Natterer's bat	0.2	-	0.1
Whiskered bat	-	0.2	0.1
Myotis species	0.4	0.8	2.7
Brown long-eared bat	-	0.1	1.9
Leisler's bat	0.5	0.3	4
Common pipistrelle	7.5	14	68.1
Soprano pipistrelle	2.3	9.4	26.1

4.1.1.8 Static detector S08

S08 was located in a mosaic of open habitats comprising wet grassland, acid grassland/poor fen and bog, and was situated along an unnamed watercourse. S08 was located approximately 109 m to the north-west of T11, as shown in Figure 1, and the unnamed watercourse is approximately 76 m distant from T11. While activity levels at S08 were similar to S05, S06 and S07, activity was higher in summer and autumn in this location, with 76 passes per night for all species in summer and 92 passes per night in autumn. Passes per night for each species also differed across seasons as shown in Table 4.9.

S08 recorded all species of bat at least once, with a total of 1,838 passes recorded. Activity at this location was dominated by soprano pipistrelle (accounting for 54% of total passes), followed by common pipistrelle (40%) and then Leisler's bat (2%). Soprano pipistrelle had 64.6 passes per night in summer but only 2.4 passes per night in spring. Common pipistrelle passes per night increased across the seasons, ranging at 11.2 passes per night in spring, to 31.5 passes per night in autumn. Leisler's bat passes per night peaked in autumn at 3.3 passes. All *Myotis* species were also recorded at this static varying between 2% and <1% of total passes, and no *Myotis* species were recorded in summer. Passes per night were less than one for Natterer's bat, whiskered bat, and Daubenton's bat, except in autumn when passes increased to 1.8 passes per night for Daubenton's bat. Unidentified *Myotis* species passes per night peaked in autumn at 2.6 passes. Brown long-eared bat was recorded infrequently (1% of total bat passes) at S08, with passes per night less than one except when passes per night increased to 1.1 in autumn. Nathusius' pipistrelle was only recorded once at S08 as a single pass in autumn. Lesser horseshoe bat was recorded at S08, although only one pass was recorded.

Table 4.9: Species seasonal pass rates for S08

Species	Passes per night - spring	Passes per night - summer	Passes per night – autumn
Lesser horseshoe bat	-	-	0.1
Daubenton's bat	0.5	-	1.8
Natterer's bat	0.2	-	0.2
Whiskered bat	0.2	-	0.2
Myotis species	0.5	-	2.6
Brown long-eared bat	0.1	0.2	1.1
Leisler's bat	0.9	-	3.3
Common pipistrelle	11.2	11.3	50.8
Soprano pipistrelle	2.4	64.6	31.5
Nathusius' pipistrelle	-	-	0.1

4.1.1.9 Static detector S09

S09 was located on the edge of a mature conifer plantation and an access track was approximately 17 m distant. S09 was located approximately 163 m to the north of T13 and 540 m from T12's location, as shown in Figure 1, and the River Flesk is located approximately 166 m from T13. Passes per night for all species at S09 were again similar to S05-S08, but peaks in spring and autumn ranged between 86 and 107 passes per night. Passes per night (across all species) in summer were much lower with only 11 passes per night. Passes per night for each species also differed across seasons as shown in Table 4.10.

S09 recorded all species of bat except Nathusius' pipistrelle, with relatively higher proportions of *Myotis* and brown long-eared bats than at other locations. A total of 2,042 passes were recorded at S09, and activity at this location was dominated by common pipistrelle (accounting for 56% of total passes) followed by soprano pipistrelle (12%), then Leisler's bat (16%) and brown long-eared bat (8%) (the highest recorded number of passes of this species compared to other static detector locations). Common pipistrelle passes per night varied across the seasons, ranging from 75.3 passes per night in spring, to three passes per night in summer. Soprano pipistrelle passes per night also ranged significantly across the seasons with only 3.3 passes per night in summer, but 15 passes per night in autumn. Leisler's bat was recorded occasionally at S09 (332 total passes) and passes per night peaked in autumn at 29.3 passes. The greatest number of passes of brown long-eared bat were recorded on S09 (161 total passes), with passes per night peaking at 15.1 passes in autumn. The second highest level of activity originating from *Myotis* species was recorded at S09 (157 total passes) and Daubenton's bat was recorded most frequently at S09 with peak passes per night in autumn at 2.9 passes. Natterer's bat and whiskered bat were recorded less frequently at S09 (approximately 1% of total bat passes) and passes per night ranged between 0.3 to 1.3 for Natterer's bat and less than one pass per night for whiskered bat. Unidentified *Myotis* species passes per night peaked in autumn at 5.6 passes. Lesser horseshoe bat was recorded at S09, although only one pass was recorded.

Table 4.10: Species seasonal pass rates for S09

Species	Passes per night - spring	Passes per night - summer	Passes per night – autumn
Lesser horseshoe bat	-	-	0.1
Daubenton's bat	1.8	0.1	2.9
Natterer's bat	0.6	0.3	1.3
Whiskered bat	0.5	0.1	0.9
Myotis species	1.1	0.5	5.6
Brown long-eared bat	0.6	0.4	15.1
Leisler's bat	0.7	3.2	29.3
Common pipistrelle	75.3	3	36.9
Soprano pipistrelle	5.6	3.3	15

4.1.1.10 Static detector S10

S10 was located on the edge of mature conifer plantation, directly alongside an access track, and S10 was located approximately 179 m to the north-east of T15 as shown in Figure 1. S10 recorded the highest total activity, and the second highest bat passes per night across all detectors, largely driven by a large number of common pipistrelle passes. Passes per night for all species ranged between 29 passes to 264 passes. The passes per night for each species also differed across the seasons as shown in Table 4.11.

S10 recorded the highest level of common pipistrelle activity across the Site with a total 4,144 passes of which 3,232 were common pipistrelle passes. As such, activity at this location was dominated by common pipistrelle (accounting for 78% of total passes) followed by soprano pipistrelle (17%), then Leisler's bat (2%), and brown long-eared bat (1%). Brown long-eared bat was recorded occasionally across the seasons, peaking at 4.1 passes per night in autumn. *Myotis* species including Daubenton's bat, whiskered bat, and Natterer's bat represented less than 1% of the activity levels at this location. Passes per night were less than one for Natterer's bat for all seasons. Whiskered bat passes per night were less than one for all seasons and Daubenton's bat passes ranged between 0.3 passes per night in spring and peaked in autumn at 1.7 passes per night. Common pipistrelle passes per night varied across the seasons with 200.6 passes per night in autumn but only 14.6 passes per night

in summer. Soprano pipistrelle passes per night also ranged significantly across the seasons, with 9.4 passes per night in summer increasing to 51.1 passes per night in autumn. A total of 76 passes of Leisler's bat were recorded at S10 and passes per night peaked in autumn at 4.4 passes.

Table 4.11: Species seasonal pass rates for S10

Species	Passes per night - spring	Passes per night - summer	Passes per night – autumn
Daubenton's bat	0.3	1	1.7
Natterer's bat	0.7	0.7	0.3
Whiskered bat	0.9	0.4	0.2
Myotis species	0.7	-	-
Brown long-eared bat	0.1	0.2	4.1
Leisler's bat	1.1	2.1	4.4
Common pipistrelle	107.9	14.6	200.7
Soprano pipistrelle	10	9.4	51.1

4.1.1.11 Static detector S11

S11 was located on edge of a conifer plantation with short saplings and tree stumps present. S11 was located approximately 62 m to the north of T14 and T16 was in between S11 and S12, as shown in Figure 1. The closest watercourse is approximately 240 m distant from T14. S11 recorded the third highest total bat activity and passes per night (across all species) ranged between eleven passes per night in spring to 252 passes per night in autumn, when the majority of this activity was recorded. The passes per night for each species also differed across the seasons as shown in Table 4.12.

Activity levels at S11 were dominated by common pipistrelle (accounting for 60% of total passes), followed by soprano pipistrelle (27%) then Leisler's bat (11%) and brown long-eared bat (1.5%), with a total of 2,764 bat passes recorded at this location. *Myotis* species including Daubenton's bat, and Natterer's bat represented less than 1% of the bat activity levels at this location. Passes per night were less than one for Natterer's bat and unidentified *Myotis* species for all seasons. Daubenton's bat passes ranged between 0.3 passes per night in spring and summer and increased to 1.1 passes per night in autumn. Common pipistrelle passes per night increased across the seasons ranging between 4.1 passes per night in summer to 154.2 passes per night in autumn. Soprano pipistrelle passes per night ranged significantly across the seasons with 2.4 passes per night in spring increasing to 6.5 passes per hour in summer and peaking in autumn at 154.2 passes per night. A total of 297 Leisler's bat passes were recorded at S11 and passes per night peaked in autumn at 26.9 passes. Brown long-eared bat had a total of 41 passes at S11 and a peak passes per night in autumn of 3.3 passes.

Table 4.12: Species seasonal pass rates for S11

Species	Passes per night - spring	Passes per night - summer	Passes per night – autumn
Daubenton's bat	0.3	0.3	1.1
Natterer's bat	0.2	0.2	0.2
Myotis species	0.4	0.4	0.9
Brown long-eared bat	0.4	0.4	3.3
Leisler's bat	1.5	1.3	26.9
Common pipistrelle	6.2	4.1	154.2
Soprano pipistrelle	2.4	6.5	65.2

4.1.1.12 Static detector S12

S12 was located within a conifer plantation with short saplings and tree stumps present. S12 was located approximately 25 m to the north of T17, and T16 was between S11 and S12, as shown in Figure 1. The closest

watercourse is located 133 m distant from T17. Passes per night (across all species) were relatively high for autumn with 195 passes per night in autumn in comparison to four passes per night in spring and six passes per night in summer. The passes per night for each species also differed across the seasons as shown in Table 4.13.

Overall, activity levels at S12 were moderate in comparison to other static detector locations, with a total of 2,052 passes. Activity was dominated by common pipistrelle (accounting for 45% of total passes), Leisler's bat (30%) and soprano pipistrelle (22%). Common pipistrelle passes per night increased across the seasons ranging from 1.3 passes per night in spring, to 88.1 passes per night in autumn. Soprano pipistrelle passes per night also ranged significantly across the seasons, with 0.3 passes per night in spring, increasing to 42.6 passes per night in autumn. The greatest number of Leisler's bat passes were recorded at S12, relative to other static detector locations, with a total of 613 passes. Leisler's bat passes per night peaked in autumn at 59.4 passes. Brown long-eared bat was recorded occasionally, with a peak passes per night in autumn of 2.2 passes. *Myotis* species including Daubenton's bat, and Natterer's bat represented less than 1% of the bat activity levels at this location. Passes per night were less than one for Natterer's bat for all seasons. Daubenton's bat had one pass per night in spring and autumn. Unidentified *Myotis* species passes per night ranged between 0.1 passes in summer and increased to 1.5 passes per night in autumn.

Table 4.13: Species seasonal pass rates for S12

Species	Passes per night - spring	Passes per night - summer	Passes per night – autumn
Daubenton's bat	1	-	1
Natterer's bat	0.3	-	0.2
Myotis species	-	0.1	1.5
Brown long-eared bat	0.1	0.2	2.2
Leisler's bat	1.2	0.7	59.4
Common pipistrelle	1.3	1.9	88.1
Soprano pipistrelle	0.3	3.1	42.6

4.1.2 Summary of results

Table 4.14 below provides a summary of the activity of bat species at each static detector location (ranked by static detector location, from detector which recorded highest levels of bat activity to detector which recorded lowest levels of activity).

Table 4.14: Summary of bat activity per static location

Static detector	Activity levels
S10	• Located directly alongside access track on edge of mature conifer plantation and closest watercourse is approximately 180 m distant from S10 • Recorded highest level of bat activity (4,144 total passes) and greatest number of common pipistrelle activity recorded here • Other species recorded in significantly lower numbers including brown long-eared bat, Daubenton's bat, Leisler's bat, Natterer's bat, soprano pipistrelle, and whiskered bat • High species diversity with all species recorded here except lesser horseshoe bat and Nathusius' pipistrelle
S03	• Located on edge of mature conifer plantation nearby access track (approximately 14 m distant) and closest watercourse is over 400 m distant from S03 • Recorded the second highest level of bat activity (3,078 total passes) and all species recorded here except Nathusius' pipistrelle • The majority of calls from common pipistrelle, and soprano pipistrelle • The highest level of activity for *Myotis* species was recorded here, dominated by unidentified *Myotis* species and whiskered bat, with lower number of passes for Natterer's bat and Daubenton's bat • Greatest number of whiskered bat and Natterer's bat passes recorded here • Small numbers of Leisler's bat and brown long-eared bat also recorded here
S11	• Located on edge of conifer plantation with short saplings and tree stumps present and closest watercourse is over 300 m distant from S11 • Recorded the third highest level of bat activity (2,764 total passes) • Dominated by common pipistrelle, followed by soprano pipistrelle then Leisler's bat and brown long-eared bat • *Myotis* species including Daubenton's bat, and Natterer's bat recorded in small numbers
S12	• Located within recently felled conifer plantation and closest watercourse is approximately 130 m distant • Fourth highest level of bat activity recorded here (2,052 total passes) and was dominated by common pipistrelle, Leisler's bat and soprano pipistrelle in smaller numbers • The greatest number of Leisler's bat passes were recorded at S12 • *Myotis* species including Daubenton's bat, and Natterer's bat recorded in small numbers
S09	• Located on edge of mature conifer plantation along access track (17 m distant) and the River Flesk is approximately 133 m distant from S09 • Recorded fifth highest level of activity (2,042 total passes) and all species recorded at this location, expect for Nathusius' pipistrelle • Activity dominated by common pipistrelle • Brown long-eared bat and Daubenton's bat were recorded most frequently at this static detector location and the second highest level of Leisler's bat activity recorded here
S08	• Located in habitat mosaic of wet grassland, acid grassland/poor fen, and bog, directly along unnamed watercourse (watercourse approximately 76 m distant from T11) • Moderate level of activity in comparison to other static detector locations on Site (1,838 total passes) and one of the most diverse static detector location with all species recorded • Highest number of soprano pipistrelle recorded here • Nathusius' pipistrelle and lesser horseshoe bat recorded once at this location
S04	• Located within (mostly conifer) immature woodland with small saplings present and nearby access track (approximately 43 m distant) and closest watercourse is approximately 208 m distant from S04 • Moderate levels of bat activity in comparison to other static detectors on Site (1,537 total passes) and all species recorded here except lesser horseshoe bat and Nathusius' pipistrelle • The majority of calls originated from common pipistrelle, Leisler's bat and soprano pipistrelle • Small numbers of brown long-eared bat and *Myotis* species including Daubenton's bat, whiskered bat, and Natterer's bat also recorded here
S07	• Located in grassland clearing between mature conifer plantations directly along the River Clydaghroe (watercourse approximately 110 m from T9) • Moderate levels of bat activity in comparison to other static detectors on Site (1,424 total passes) and all species recorded here except lesser horseshoe bat and Nathusius' pipistrelle • The majority of calls originated from common pipistrelle and soprano pipistrelle • *Myotis* species including Daubenton's bat, Natterer's bat and whiskered bat were also recorded here, with the second most Daubenton's bat passes recorded here
S06	• Located on edge of mature conifer plantation directly along access track and closest watercourse is approximately 144 m distant from S06 • Recorded the fourth lowest level of bat activity in comparison to the other static detector locations on Site (1,337 total passes) • All species recorded here except Nathusius' pipistrelle • Dominated by common pipistrelle then soprano pipistrelle

Static detector	Activity levels
	• Second highest level of brown long-eared bat activity recorded here • Leisler's bat recorded in small numbers • Highest number of lesser horseshoe bat recorded here, but still in very small numbers • Small numbers of *Myotis* species including Daubenton's bat, Natterer's bat and whiskered bat were recorded at this location
S05	• Located within (mostly conifer) immature woodland with small saplings present and closest watercourse is approximately 173 m distant from S05. Mature conifer plantation within 50 m • Recorded the third lowest level of bat activity in comparison to the other static detector locations on Site (1,032 total passes) and all species recorded here except lesser horseshoe bat and Nathusius' pipistrelle • The majority of calls originated from common pipistrelle, soprano pipistrelle and Leisler's bat • Significant levels of activity originating from *Myotis* species including unidentified *Myotis* species and whiskered bat with the second highest number of passes recorded for these species and lower number of passes for Natterer's bat and Daubenton's bat
S02	• Located within (mostly conifer) immature woodland with small saplings, large tree stumps and bog drainage ditches present and closest watercourse is approximately 146 m distant from S02 • Recorded the second lowest level of bat activity (722 total passes) but all bat species recorded at this location • The majority of calls originated from common pipistrelle, Leisler's bat and soprano pipistrelle • Small numbers of *Myotis* species including Daubenton's bat, whiskered bat, and Natterer's bat also recorded • Only one pass from Nathusius' pipistrelle and lesser horseshoe bat recorded here
S01	• Located within recently felled (mostly conifer) woodland and closest watercourse is over 470 m distant from S01. Mature conifer plantation within 50 m • Recorded the lowest level of bat activity (twelve total passes) • Least diverse location, with only four bat species recorded (common pipistrelle, soprano pipistrelle, Leisler's bat and Daubenton's bat) • Majority of calls originated from common pipistrelle and soprano pipistrelle

5. Discussion and recommendations

Of the nine bat species resident in Ireland, four are considered as high-risk species in relation to collision risk at wind turbines. These are the three pipistrelle species and Leisler's bat. Leisler's bat are considered a high-risk species as they are high flying, and known to travel considerable distances over open ground between roosts and foraging sites (Boston *et al.,* 2020). The three pipistrelle species are considered high-risk as they are known to fly in open spaces and to investigate new landscape features. In particular, Nathusius' pipistrelle is considered to be at risk due to its migratory behaviour observed across the rest of Europe. The other bat species not forementioned are considered to be low flying species, usually flying below 10 m above ground level. As such, they are thought to be at a lower mortality risk from wind turbines, however these species are still vulnerable to disturbance and displacement due to the presence of operational wind turbines.

Considering collision risk, static detectors S12, S11, S10, S09 and S03 had the highest levels of activity of high-risk species on Site (i.e. greater than 2,000 total passes across all seasons). In particular, this included high numbers of common pipistrelle and soprano pipistrelle species. Leisler's bats were recorded at levels of more than 59 passes per night at S12 in autumn, with the highest level of Leisler's bat activity recorded here. As such, there is potentially a higher collision risk for this species at this proposed turbine (T17). A total of 332 and 297 Leisler's bat passes were recorded at S09 and S11, respectively, and passes per night peaked in autumn at 29.3 at S09, and 26.9 at S11, with potentially higher collision risks for Leisler's bat at these proposed turbines (T13 and T14) too. The timing of the calls suggests that these species travel to the Site to forage, and no indication of nearby roosting was observed.

All proposed turbines are located in an upland location and in/near conifer plantation or near watercourses, with statics S10, S09 and S03 located within 50 m of vegetation and as such, the inclusion of a minimum 50 m vegetation clearance buffer will likely reduce the bat activity in these areas. In general, it is recommended that a buffer is applied around all turbines as it is standard practice in the UK, and in Ireland (BCIreland *pers. comm.*), to adopt a 50 m buffer between turbine blade tip and woodland or other habitat edge under the most recent NatureScot guidance. The clearance of vegetation within 50 m to minimise risk to bat mortality does have the potential create a rich foraging area for bats in the immediate time post-clear felling, and the extent of increased bat activity which may correspondingly occur will depend on the size of the area cleared and the bat species in question. Therefore, it is recommended that a minimum of 6–12 months should lapse after clear felling before the installation of turbines, and that all vegetation should be cleared from these buffer zones.

S12 and S11 were within 50 m of vegetation but they were situated in an already open landscape surrounded by conifer plantations. Therefore, additional measures may need to be considered as well as buffering. Where micro-siting of the turbines is not possible, as per the NatureScot guidance, it is recommended that curtailment occurs in these high-risk areas (i.e. areas in which the risk of bat collision is high); proposed turbines T17 and T14 as well as T13, T15, T3 are considered to be in areas in which relatively high levels of bat activity were recorded. The proposed operating regime should specify, and be designed around, the values for the key weather parameters and other factors that are known to influence collision risk. Curtailment may also be necessary in other locations and this baseline assessment along with post-construction monitoring of fatalities (for a minimum of three years) should be used to assess that risk and act/amend approach accordingly.

Nine static detectors (S08, S10, S09, S02, S07, S05, S04, S06 and S03) recorded greater than seven species, while the overall greatest levels of activity (total number of passes) by the most species was recorded at static detectors S09 and S03, both located on the edge of conifer plantations. Static detectors S09, S06, S05, and S02 were located within 200 m of watercourses which are important ecological features for bats although the location of the proposed turbines at these locations would be separated from these watercourses by intervening woodland. S08 and S07 were located directly adjacent to watercourses, although S08 and S07 were not located in the exact position of proposed turbines T9 and T11. These watercourses would be approximately 76 m from T11 and approximately 100 m from T9. Bat activity at these locations was also relatively low compared to others.

As discussed above, *Myotis* species*,* brown long-eared bat and lesser horseshoe bat are considered to be at low risk of mortality from operational wind turbines but are still at risk of disturbance and displacement. The placement of turbines adjacent to important ecological features is therefore discouraged not just to reduce mortality risk but also to reduce the impact of disturbance and displacement of bats from habitats adjacent to the wind turbine sites. As such, the micro-siting of turbines should be carefully considered given the presence of potentially important ecological features and the baseline data.

Daubenton's bat was recorded most frequently at S09, with a peak of 2.9 passes per night in autumn, while whiskered bat were recorded most frequently at S03, with a peak of 9.7 passes per night in spring. Natterer's bat was recorded most frequently at S03, with a peak of 2.3 passes per night in spring. Based on the timing of the activity, the presence of roosts of these species in the vicinity of the Proposed Development is not considered likely. However, *Myotis* species at S03 and S09 would be vulnerable to displacement from foraging habitats at these locations, though their presence will likely be impacted by the inclusion of the 50 m vegetation clearance buffer around these turbines.

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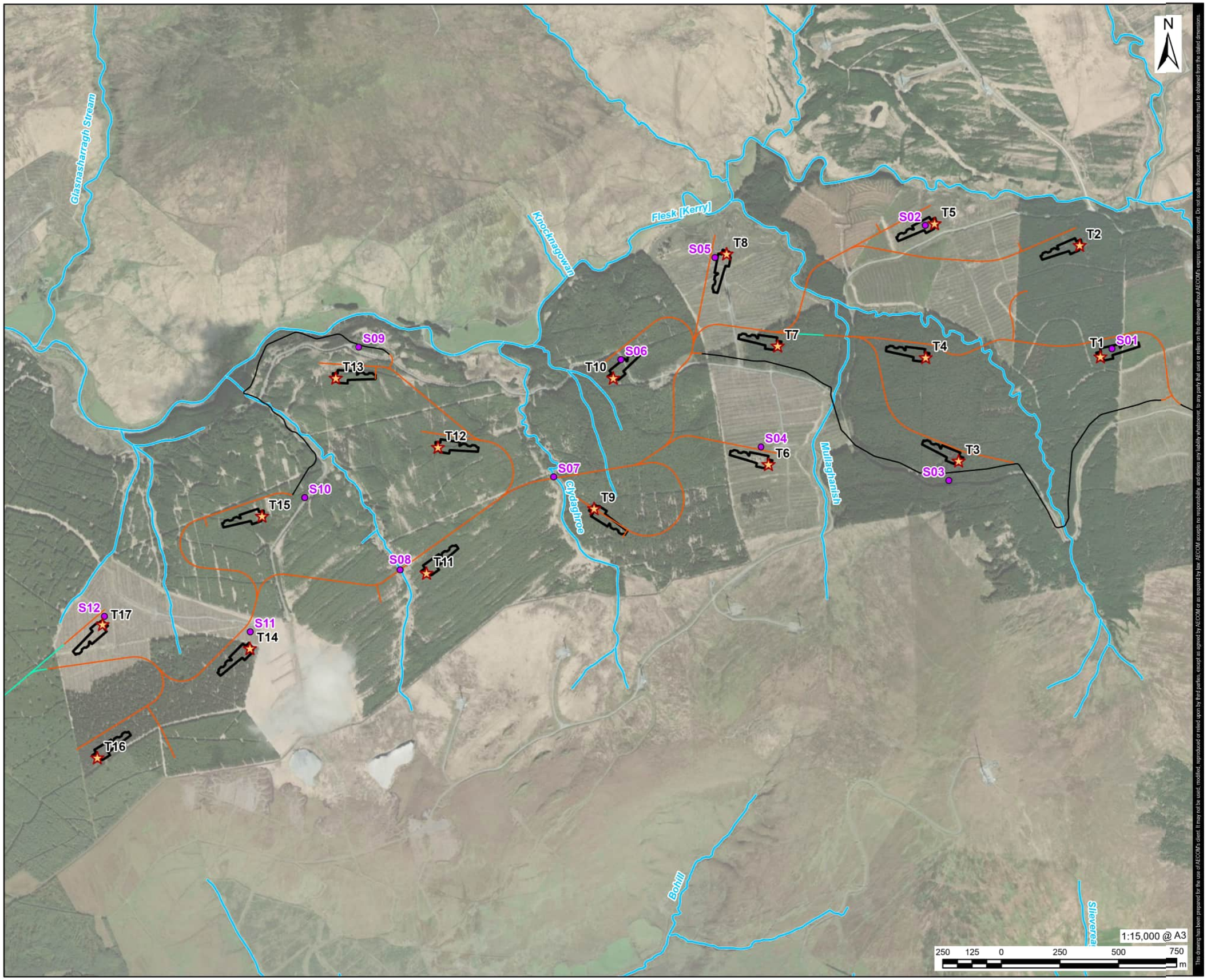
7. Figures

Revision: Drawn: AR Checked: JB Approved: AW Date: 2025-01-03



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CLIENT

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LEGEND

- Static Detector
- Proposed Turbine Layout
- Proposed Hardstanding

Access Tracks

- Existing
- Founded
- Floated
- Watercourses

NOTES

Maxar, Microsoft

ISSUE PURPOSE

FOR INFORMATION

PROJECT NUMBER

60728407

FIGURE TITLE

Bat Activity Survey Static Detector Survey Areas, Nearby Watercourses and Proposed Turbine Locations

FIGURE NUMBER

Figure 1

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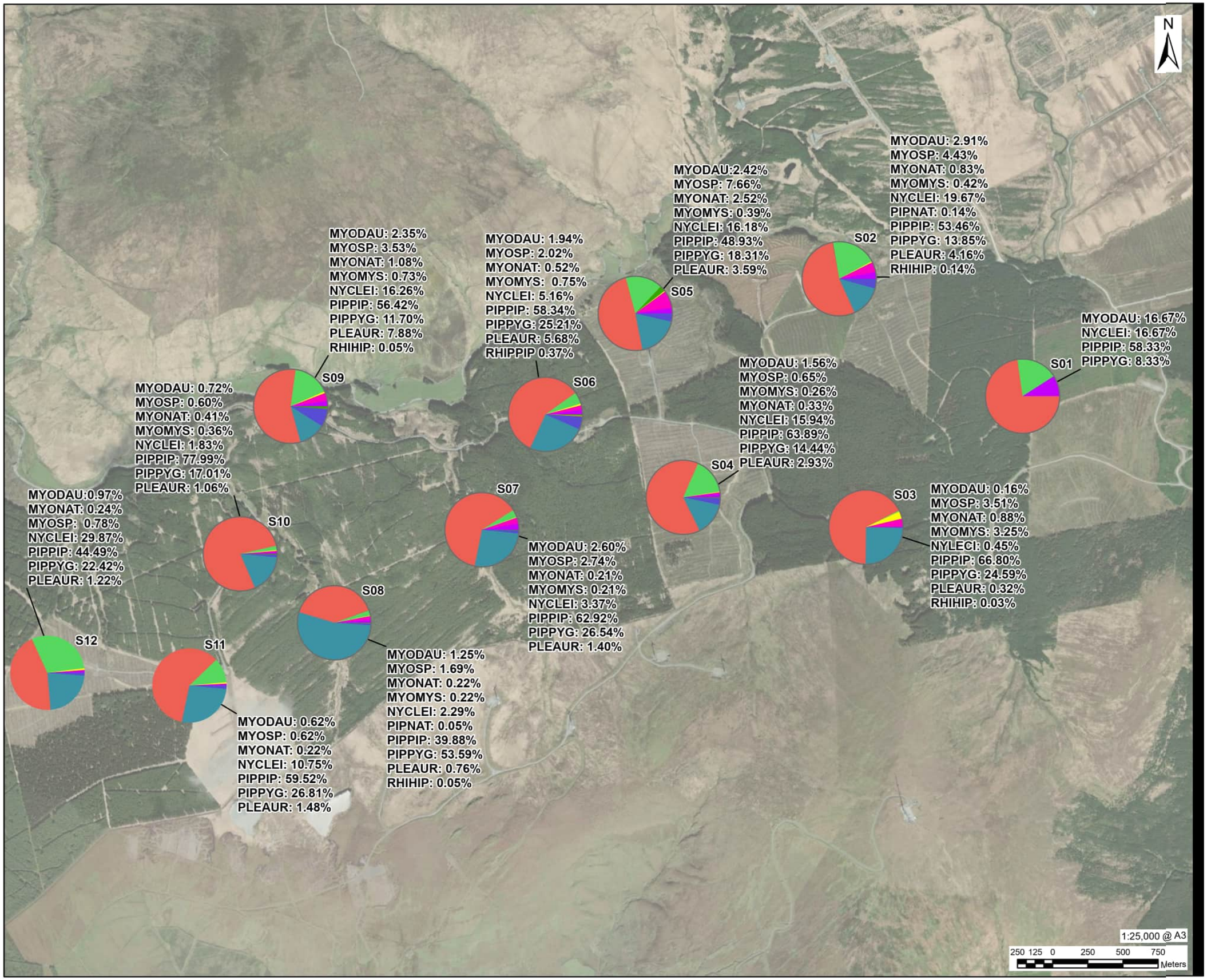

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LEGEND

Proportion (%) of each species found at each static detector location

- Daubenton's Bat (MYODAU)
- Myotis Species (MYOSP)
- Natterer's Bat (MYONAT)
- Whiskered Bat (MYOMYS)
- Leisler's Bat (NYCLEI)
- Nathusius's Pipistrelle (PIPNAT)
- Common Pipistrelle (PIPPIP)
- Soprano Pipistrelle (PIPPYG)
- Brown Long-Eared Bat (PLEAUR)
- Lesser Horseshoe Bat (RHIHIP)

NOTES

Maxar, Microsoft

ISSUE PURPOSE

FOR INFORMATION

PROJECT NUMBER

60728407

FIGURE TITLE

Bat Activity Survey Static Detector Results

FIGURE NUMBER

Figure 2