EARBA STORAGE

A GILKES ENERGY COMPANY

Earba Pumped Storage Hydro Scheme
EIA Report

Appendix 8.5: Bat Survey Report (2023)

February 2024

Quality Information

Prepared by	Checked by	Approved by
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Revision History

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8 OCTOBER 2023

EARBA STORAGE
A GILKES ENERGY COMPANY

Loch Earba Pump Storage Hydro

Earba Ltd

Bat Survey

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DOCUMENT DETAILS

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V1.1	8 October 2023	Draft for Client review

This report has been prepared by Tracks Ecology Ltd. for Earba Ltd.

Tracks Ecology Ltd. accepts no responsibility or liability for any use that is made of this document other than by Earba Ltd for the purposes for which it was originally commissioned and prepared. It should be noted that, whilst every effort is made to meet the client's brief, no site investigation can ensure complete assessment or prediction of the natural environment and temporal change must be taken into account.

The evidence presented and interpretation provided is true and has been prepared and provided in accordance with the guidance of The Chartered Institute of Ecology and Environmental Management's Code of Professional Conduct.

CONTENTS

EXECUTIVE SUMMARY

- Tracks Ecology Ltd. was commissioned by Cairneyhill Ltd to undertake bat surveys across the proposed Loch Earba Pump Storage Hydro site, located approximately 30km southwest of Kingussie, Highlands.
- The survey was identified as necessary to support an Environmental Statement for the proposed development.
- Habitat assessments and preliminary roost assessments were undertaken across the proposed infrastructure area extended to include a buffer of 250m with an emphasis on areas to be directly affected by infrastructure or areas of inundation.
- Preliminary Roost Assessments identified 11 trees that required further emergence/re-entry surveys to ascertain whether or not active bat roosts were present at the time of the survey.
- One tree was confirmed to support a small, summer, non-breeding roost of common pipistrelle.
- The other trees all offered suitable roosting features but at the time of the surveys were not in use.
- Static detector surveys identified that moderate to high activity levels from common and soprano pipistrelles were present along the southeast shore of Lochan na h-Earba, within the area of scattered trees, identified on the Ancient Woodland Inventory. Further moderate activity was present from common and soprano pipistrelle and *Myotis* sp. bats along the River Spean close to the position of the proposed new bridge. Very infrequent foraging from brown long-eared bat was also recorded.
- Static detector activity suggests that the earliest activity in relation to sunset was present at the northernmost static detector, close to the large areas of woodland to the north.
- During the emergence/re-entry surveys of the identified trees, anecdotal observations of foraging from a relatively small number of pipistrelle bats was recorded with occasional activity from *Myotis* sp. bats, with first bats on site recorded arriving either from the woodland to the north or northeast of Lochan na h-Earba.
- To enable the development to proceed, works that affect Tree 11 must be undertaken under the derogation remit of a suitably experienced ecologist who also holds a Bat Low Impact License (BLIMP) or through a European protected species license issued by NatureScot.
- A series of mitigation measures with respect to bats are outlined and it is recommended that a Species Protection plan is developed for the site. In addition to the need for a derogation license, key features of any Species Protection Plan are likely to include:
    - Sensitive timing of works which will impact on known roosts.
    - Pre-construction works on identified trees to confirm no change in status.
    - Toolbox talks to all relevant construction staff.
    - Erection of compensatory roosts at suitable locations.
    - Direct supervision of works at roost or potential roost locations.
    - Roost translocation where suitable.
    - Inclusion of enhancement features at key locations.
- In addition, the proposed new access track and bridge across the River Spean must be considered carefully with dark, free flight corridors maintained
- Bats should also be considered at an early stage within any proposed wider habitat management plans.

1 INTRODUCTION

1.1 TERMS OF REFERENCE

Tracks Ecology Ltd. was commissioned by Cairneyhill Ltd to undertake a series of bat surveys in relation to the proposed Loch Earba Pump Storage Hydro site, located approximately 30km southwest of Kingussie, Highlands. The proposal is to use Loch a' Bhealaich Leamhain as the upper reservoir and Lochan na h-Earba as the lower reservoir with interconnecting tunnels and associated infrastructure. Lochan na h-Earba is currently formed by two lochs separated by a short section of river which supports a dam.

These surveys were requested to provide baseline information to support an Environmental Statement for the proposed development across the infrastructure and a buffer of 250m, hereafter referred to as the 'Survey Area'. The Survey Area was dominated by a mix of upland habitats and had a significant altitudinal range from 250m at the proposed entrance off the A86 public road to the upper slopes of the local peaks including Creag Pitridh and Binnein Shuas of 850m above sea level. Several alterations to the design during the surveys resulted in additional areas being covered with a total surveyed area of over 1,650ha (Figure 1).

1.2 OBJECTIVES OF STUDY

This ecological survey and report seeks to establish the baseline ecological conditions of the Survey Area with a focus on bats.

The primary aim of the surveys is to obtain detailed information to assess:

- The level of activity of all bat species recorded across the Survey Area;
- Impact of any anticipated habitat alterations on use of the Survey Area by bats;
- The risk of any trees to be affected supporting active bat roosts; and
- The likely significant environmental effect on the relevant species' population status if predicted impacts are not mitigated.

1.3 SURVEY AREA DESCRIPTION

The Survey Area is located southwest of Kingussie, south of Loch Laggan. Access to the Survey Area is from the A86 public road close to Moy Bridge. Existing estate access tracks are present, which allowed access to the two lochs of Lochan na h-Earba which combined, extend for a distance of almost 6km. Lochan na h-Earba is located between the high peaks of Binnean Shuas to the north and Creag Pitridh, Creag a' Mhaigh and Creag a' Chur to the south. Lochan na h-Earba is proposed to act as the lower loch for the pump storage project with the higher loch, Loch a' Bhealaich Leamhain, located in a corrie 3km southeast.

The lowland sections of the Survey Area support areas of blanket bog, heath and grassland with scattered dwellings. Areas of semi-natural woodland are present along watercourses and sections of commercial and non-commercial planted conifer woodland cover small areas of land. The landscape rapidly develops into an upland environment to the south along the proposed access route with extensive open moorland including patches of blanket bog and significant sections of wet heath with smaller pockets of acid grassland.

The landscape adjacent to Lochan na h-Earba is steep and rugged with the valley sides rising quickly supporting wet heath and rocky outcrops. In the northern end of Lochan na h-Earba the slopes are somewhat gentler and increased semi-natural woodland, in the form of birch and Scot's pine dominated woodland, was present. Outwith the contiguous sections of woodland scattered trees remained, but many of these were in significant decline and regeneration was sparse in most areas. A narrow section of woodland identified on the Ancient Woodland Inventory was present, although remaining trees were sparse.

The Survey Area extended further southeast up to an altitude of approximately 750m through a narrow pass at Bealach Leamhain, before dropping down to Loch a' Bhealaich Leamhain which forms the upper loch of the pump storage project, located at around 640m. The habitats located through the pass, and higher up on the adjacent peaks, supported montane heath habitats, with wet heath and blanket bog further southeast on the lower slopes.

With respect to bats the key components of the Site were areas of scattered woodland, including the areas listed on the Ancient Woodland Inventory as well as the sections of woodland along the River Spean at the location of the proposed new crossing.

2 LEGISLATIVE CONTEXT

All bat species in Scotland are protected by the Conservation (Natural Habitats, &c.) Regulations 1994 as amended in Scotland and are commonly referred to as European Protected Species (EPS). The Regulations transpose into Scottish law the European Community's Habitats Directive (92/43/EEC).

It is an offence to deliberately or recklessly:

- capture, injure or kill a bat;
- harass an individual or group of bats;
- disturb a bat while it is occupying a structure or place used for shelter or protection;
- disturb a bat while it is rearing or otherwise caring for its young;
- obstruct access to a breeding site or resting place, or otherwise deny the animal use of the breeding site or resting place;
- disturb a bat in a manner that is, or in circumstances which are, likely to significantly affect the local distribution or abundance of the species to which it belongs;
- disturb a bat in a manner that is, or in circumstances which are, likely to impair its ability to survive, breed or reproduce, or rear or otherwise care for its young;
- disturb a bat while it is migrating or hibernating;

It is also an offence of strict liability to:

- damage or destroy a breeding site or resting place of a bat even if they are not in use at the time (i.e. a summer roost during the winter period).

Further protection is afforded to bats in Scotland under the Wildlife and Natural Environment (Scotland) Act 2011 and the Environment Act 2021.

Of the 18 UK bat species, ten occur in Scotland: common pipistrelle *Pipistrellus pipistrellus*, soprano pipistrelle *P. pygmaeus*, Nathusius' pipistrelle *P. nathusii*, Natterer's *Myotis nattereri*, Daubenton's *M. daubentonii*, noctule *Nyctalus noctula*, brown long-eared bats *Plecotus auritus*, Leisler's *N. leisleri* and whiskered/Brandt's *M. mystacinus/M. brandtii* bats.

In addition to the above a number of bat species are included within the Scottish Biodiversity List, including: Brandt's, Daubenton's, whiskered, Natterer's, noctule, Nathusius', common pipistrelle, soprano pipistrelle and brown long-eared.

Bats are also detailed within the UK BAP and highlighted within the Highland BAP.

3 METHODOLOGY

All methodology follows the guidance in relation to bats at the time of the surveys (Collins, 2016) unless otherwise specified. All surveys were undertaken by James Bunyan (NatureScot Survey License: 227739; Bat Low Impact License 224625) of Tracks Ecology Ltd.

3.1 DESK STUDY

To provide additional contextual information a data collection exercise with respect to bats was undertaken extended to include a 5km buffer to the Proposed Development. Where present a review of bat survey data from proposed large scale infrastructure projects within 10km of the Development was also undertaken.

Several other information sources were used to obtain ecological background information for the Survey Area. Information on statutory sites was obtained from the website of the statutory agency Scottish Natural Heritage (SNH) via the "Site Link Portal" (http://www.snh.org.uk/snhi/).

A review of information held on the National Biodiversity Network (NBN) Atlas website (www.nbnatlas.org) was also undertaken to provide contextual background information for the location.

3.2 HABITAT ASSESSMENT

Assessments of the Survey Area were undertaken to highlight key habitats likely to offer suitable foraging, commuting and roosting opportunities. This process was largely based on aerial photography, both publicly available (e.g. www.bingmaps.co.uk) and that supplied by the Client team. Areas of suitable foraging habitat was highlighted and potential commuting routes within and to/from the Survey Area were assessed. This process was then further supplemented by the walkover undertaken as part of the preliminary roost assessment.

3.3 PRELIMINARY ROOST ASSESSMENT

A walkover assessment of the Survey Area, guided by a review of aerial imagery and existing habitat survey data, was undertaken on 12th, 13th, 14th July 2023 by James Bunyan. The aim of this survey was to identify any potential or confirmed roost sites and to identify if further surveys, such as emergence/re-entry or detailed roost inspection surveys were required. All areas of the Survey Area were assessed with an emphasis on features located within areas of inundation and proposed infrastructure but extended to include a buffer of 250m to site infrastructure.

No buildings are to be directly affected and all proposed works are in excess of 100m from existing buildings. As a result, no detailed assessments of buildings were undertaken. Where trees were potentially to be directly affected by proposed infrastructure or inundation, full preliminary roost assessments were undertaken.

All methodology follows the guidance from the Bat Conservation Trust (BCT) current at the time of the surveys (Collins, 2016) unless otherwise specified. This initial assessment aimed to identify all potential roost features (PRFs) with the use of binoculars and torches. Potential PRFs include, but are not limited to, natural rot holes, woodpecker holes, cracks/splits within limbs, loose bark, dense epicormic growth or hollows and cavities within the trunks or major limbs (Andrews, 2013). Each PRF was categorized as detailed in Table 1.

The details of the main PRFs were recorded including, location and morphology of PRF with photographs taken. Where PRFs were lower than approximately 3m, these areas were investigated further using torches and a video endoscope from the ground.

Table 1: Tree categorization with respect to potential bat roosts.

PRF Category	Details
High	Confirmed roost – bats identified as being present Probable roost – definitive evidence of bats being present in recent past (droppings)
Moderate	Possible roost – feature supports other signs such as staining, grease marks, smooth wood at entrance but may not be active as a roost. Unknown – feature cannot be fully investigated as too extensive or has complex morphology, access restrictions etc. Feature must offer high suitability based on level of access achieved.
Low	Not suitable as a roost – feature is either completely unsuitable for use by bats or supports evidence confirming the feature has not be used for more than 1 year minimum.

Based on the findings of the PRF inspections each tree was then evaluated on its potential to support bat roosts:

- Known or confirmed roost
- High Roost Potential: Multiple highly suitable PRFs capable of supporting large or significant roosts.
- Moderate Roost Potential: Trees with suitable PRFs although fewer in number, size or suitability than high roost potential trees.
- Low Roost Potential: Trees with no obvious PRFs, although tree is of age or size that further potential may be present high in canopy or supports some features with limited potential.
- No potential.

In line with guidance, where trees were evaluated as having moderate, high or a confirmed roost, they were subject to emergence/re-entry surveys.

3.4 EMERGENCE/RE-ENTRY SURVEYS - TREES

Any trees identified as requiring further surveys were subject to emergence of re-entry surveys in line with the current guidance at the time of the surveys. Surveys were undertaken during August and September 2023 with at least two weeks separation between surveys on the same tree. In most cases, where more than a single survey was required, surveys included a dusk and a dawn survey. During dusk surveys, the survey commenced 15 minutes prior to sunset and continued for at least 90 minutes after sunset. Dawn surveys commenced at least 90 minutes before sunrise and continued until 15 minutes after sunrise. The second surveys on some of the trees were delayed due to periods of unfavourable weather with surveys completed at the end of September 2023.

The surveys were led by James Bunyan and were undertaken either by a suitably qualified surveyor with the use of a full spectrum bat detector capable of recording or using high quality night vision aids couple with bat detectors in line with recent interim guidance (Bat Conservation Trust, 2022). Surveys utilising night vision aids only were undertaken on trees where PRFs were discrete and all areas of concern could be adequately covered by the night vision aid.

The majority of surveys were undertaken using the Wildlife Acoustics Echo Meter Touch detector connected to Apple iOS device. A bat box duet detector was used to provide additional acoustic information when using the infrared night vision aid. Recordings of the bat activity were undertaken with sonograms being identified to species level (where possible) on completion of the survey. Night vision aids used included the following:

- Tripod mounted DJI Mavic 2 Enterprise Advanced with an uncooled VOx Microbolometer with a sensor resolution of 640×512 @30Hz);
- FLIR E75 thermal camera with 320 x 240 resolution – only used where close up surveillance was possible due to low resolution; and
- Sony camcorder with 0-lux facility accompanied by a Nightfox XC5 850nm IR LED flashlight for additional illumination was used to monitor the roost location.

Upon completion of the survey, the thermal imaging and IR video were reviewed with emphasis on periods of bat activity.

3.5 STATIC DETECTOR SURVEYS

Guidance in relation to the potential disturbance to commuting and foraging habitat do not have prescriptive survey requirements, but an assessment of impacts is generally required where there is sufficient concern that direct or indirect impacts on roosts may occur, or significant impacts to foraging or commuting habitat may occur that could affect the conservation status of the bat species present in the area.

At the commencement of the surveys, the majority of the Survey Area was assessed to be of limited value to bats due to its largely open upland habitats and lack of buildings suitable for significant roosts. Based on this, static detector surveys targeted areas of greatest concern which include areas of woodland/scattered trees that are potentially to be directly affected by the proposed development and locations where habitat loss may impact on commuting/foraging routes. In total four static detectors were deployed on three occasions during late Spring, Summer and Autumn.

Each of the three survey deployment periods aimed for a minimum of ten days of suitable weather conditions which, for Scotland include temperatures at dusk in excess of 8°C, maximum ground level wind speed of 18km/h and no, or only very light, rainfall. Titley Anabat Swift full spectrum recorders were utilised for the survey with the detectors deployed on trees at approximately 3m in height.

The full detail of the locations and deployment is presented in Table 2. All detectors were set to commence recording 30mins before sunset and continue until 30mins after sunrise. Detectors were deployed with new batteries and blank memory cards of at least 32GB.

No weather station was deployed with weather data obtained from the nearest weather station within the Wunderground weather service. The nearest station was located at Roy Bridge, located RAF Lossiemouth, located 10km west of the Survey Area boundary (Ref: IROYBRID2).

Table 2: Summary of automated static detector deployment

Static	X,Y	Session 1		Session 2		Session 3 (12 active nights)		Min. Active Nights	Total nighttime hours
		Deploy Date	Collect Date	Deploy Date	Collect Date	Deploy Date	Collect Date		
1	317299, 868255	22/5/23	7/6/23	11/7/23	27/7/23	14/9/23	26/9/23	41	391.05
2	317413, 868462	22/5/23	7/6/23	11/7/23	27/7/23	14/9/23	26/9/23	41	391.05
3	317385, 868489	22/5/23	7/6/23	11/7/23	27/7/23	14/9/23	26/9/23	41	391.05
4	317500, 868505	22/5/23	7/6/23	11/7/23	17/7/23*	14/9/23	26/9/23	41	307.08

* During Survey 2, the detector at location 4 malfunctioned and ceased recording after the 17th July 2023.

3.6 SONOGRAM ANALYSIS

Analysis of full spectrum WAV files was undertaken using Anabat Insight v2.0.8.0-g4157d1f. All files were analysed with the assistance Bat Classify UK Auto ID, an auto identification tool designed for use within Anabat Insight. All calls were initially processed using Bat Classify utilising an 80% confidence limit. The results of which were manually checked for incorrect classifications and re-labelled if required. After the initial classification, all unclassified calls were re-run through Bat Classify with a 50% confidence limit, all of these calls were manually checked. The remaining calls with no species tags were manually checked and where confirmed as non-bat these were labelled as noise.

Where manual identification was required, species identification broadly followed that presented in Russ (Russ, 2012) taking into account the geographical location of the Survey Area, habitats present and ecologists own expertise and site knowledge.

Some species of bat are difficult to confidently identify from sonogram analysis alone. As a result, not all calls were identified to species level with all species from the *Myotis* genera identified to genera level only. At this location and taking into account the habitats present, *Myotis* bats are likely to be restricted to Daubenton's and Natterer's bat.

Absolute measures of bat activity are not possible to reliably calculate for automated field studies as during recording session it is not possible to differentiate between one bat passing the detector ten times or ten different bats passing the detector on a single occasion. As a result, relative measures are used and must be taken into consideration when interpreting results.

The index of bat activity was taken to be a sonogram file (maximum length of 15secs) recorded from the static detectors. Although this is to some degree an arbitrary measure, the activity levels are comparable across detectors and is a frequently used index. For this report, each file containing a call from a species is termed a 'pass'. For some portions of the analysis, data is then converted to passes per hour adjusting for location specific night-time duration (sunset to sunrise) and days of deployment (adjusted to each detectors period of functioning).

Sonogram data for each detector location during each of the survey sessions was organised and used for analysis of activity levels across static detector locations and across survey periods. The use of the comparative analysis feature of Ecobat was not possible due to the software being offline. Ecobat compares surveys submitted by the user with a national reference dataset and objectively quantifies bat activity levels by contrasting with a comparable reference range. The output can be used by ecologists to accurately quantify what bat activity means for use during ecological impact assessments. Due to the Eobat service being unavailable all data was analysed within Microsoft Excel and assessments of the relative activity levels between detector locations and also of the Survey Area in its entirety are made based on the surveyors knowledge of bat ecology and similar projects. In the absence of the Ecobat tool, quantitative relative assessments cannot be undertaken.

As night length varies throughout the survey period, rates of activity were calculated on a per night basis and corrected for variable night length with total number of passes during a survey night divided by the number of hours between sunset and sunrise on any particular night.

3.7 LIMITATIONS

A number of limitations were experienced during the bat surveys:

- It is difficult to ensure that acceptable weather conditions are experienced during bat survey work in northern Scotland. However, to compensate for this risk detector deployment sessions were extended beyond the five days recommended. Although some periods of sub-optimal weather were encountered the extended periods of monitoring provides an acceptable baseline for 'normal' bat activity at the site.
- Use of the Ecobat tool is recommended to enable a comparison of activity across the wider area and relies on data provision from multiple third parties. This tool was unavailable at the time of writing and no comparative analysis could be undertaken. This represents a significant limitation to some areas of the analysis, but based on surveyor experience robust assessments of activity in the context of the Site can be undertaken.
- Emergence and re-entry surveys were undertaken at the latter end of the survey season although the survey approach was in line with the guidance at the time of the surveys. It is important to understand that use of tree roosts can vary significantly over both short and long periods of time. Factors such as prevailing weather, seasons and variability in foraging areas are all likely to affect use of tree roosts.
- As stated, during Survey 2, the detector at location 4 malfunctioned and ceased recording after the 17th July 2023. Although this resulted in a shorter period of recording during this survey period, a period of 7 nights activity was captured and activity rates are adjusted for the period the detector was working only.

Although a number of limitations exist, the data obtained provides a clear picture of bat activity across the Survey Area and wider environs and as a result it is not anticipated that the limitations affect the robustness of the results to a significant degree.

4 RESULTS

4.1 DESK STUDY

Highland Biological Recording Group (HBRG) was consulted by SLR Consulting in relation to the Environmental Scoping Report. At the time of the request HBRG held no records of bats within 2km of the Survey Area. In addition, a review of the National Biodiversity Network (NBN) Atlas confirmed the absence of bat records within 5km of the Survey Area.

No large-scale wind farm applications are within 10km of the Survey Area(The Highland Council, 2023). Two large scale hydroelectric schemes have been constructed in recent years (The Highland Council, 2022).

- The River Pattack Hydro Scheme (Planning Reference: 15/03858/FUL) located 3km east of the Survey Area did not undertake any assessment of bats, based on available information.
- The Ghuilbinn Hydro (Planning Reference: 14/01646/FUL) located 2km southwest of the Survey Area undertook a preliminary roost assessment of trees but did not identify any supporting PRFs and no further bat surveys were undertaken.

4.2 HABITAT ASSESSMENT

The Survey Area is a large area extending to 1,650ha and ranging from 250m above sea level in the north up to 900m above sea level in the south. The vast majority of the Survey Area is comprised of very open upland habitats, including blanket bog, dry heath and wet heath which, generally are considered to offer low suitability for bats both for commuting and foraging, except during very calm conditions. Lochan na h-Earba is proposed to act as the lower loch for the pump storage project with the higher loch, Loch a' Bhealaich Leamhain,

located in a corrie 3km south east. Loch a' Bhealaich Leamhain does not support any trees or other significant vegetation and is surrounded by steep rocky slopes offering low suitability for bats and no suitable features for roosting. A small burn forms an outflow of Loch a' Bhealaich Leamhain and flows southeast to join Allt Cam which offers some connectivity, but again no trees are present for several kilometers and the area remains very exposed. It is possible that the Loch a' Bhealaich Leamhain provides some limited suitability for foraging during very calm conditions but prey abundance is considered to be relatively low.

The two lochs that form Lochan na h-Earba are flanked by a mix of wet heath, pockets of bog, scattered trees and more extensive areas of woodland. This area is considered more suitable for use by bats with many of the trees likely to offer suitable roosting features and the woodland and scattered trees assessed to offer suitability for both foraging and commuting across the wider landscape. Lochan na h-Earba itself is likely to offer some suitability for foraging, but aquatic invertebrates are likely to be limited due to the relatively low productivity of these lochs. Connectivity to the wider landscape is very good with extensive tracts of mixed and coniferous woodland present to the east outwith the Survey Area. In addition a number of small burns are present draining the upper slopes to the southeast of Lochan na h-Earba, especially along the northern loch. These burns often support scattered trees linking the loch edge habitat to the larger sections of woodland on the higher slopes.

It is worth noting that a narrow section of habitat along the southeastern shore of the northern loch of Lochan na h-Earba is identified as ancient woodland on the Ancient Woodland Inventory. This area now supports a small number of scattered broadleaved trees with a small copse of Scot's pine. Many of these trees are remnants of ancient woodland with mature specimens of alder and birch, many of which are in poor condition. Many of these trees will be directly impacted upon by the proposed raising of water levels.

The lower sections of the Survey Area in the north of the Site support scattered trees, scrub and sections of more continuous coniferous and broadleaved woodland around the margins of blanket bog and heath/grassland habitats. Perhaps the most suitable for bats is the riparian woodland corridor along the River Spean. This woodland supports a range of trees including alder, aspen, birch, larch and Scot's pine, some of which are mature specimens. The presence of woodland along the margins of the river is likely to provide suitable commuting and foraging for local bat populations. Further woodland habitats both semi-natural and planted commercial woodland are present in the northwest of the Survey Area and include sections along the Abhainn Ghuilbinn river. This river supports areas of slow-moving sheltered water which may provide suitable foraging for species such as Daubenton's. Both the River Spean and the Abhainn Ghuilbinn provide suitable connectivity to the wider landscape.

A brief description of all features of interest within the Survey Area is detailed in Table 3 and presented on Figure 2.

Table 3: Habitat Features of Interest.

TN	Feature Type	Notes	X	Y
1	Foraging	Area of commercial plantation woodland. Offers low suitability but supports pockets of boggy habitat and may provide sheltered foraging during poor weather.	243465	783276
2	Foraging	Open areas of blanket bog habitat likely to provide suitable foraging resource for generalist species during calm conditions.	243741	782923
3	Foraging	Slow moving sections of the Abhainn Ghuilbinn may be suitable for species such as Daubenton's to use for foraging.	243512	782676

4	Foraging	Patchy coniferous woodland offers limited suitability for foraging.	244463	782303
5	Foraging	Small reservoir may provide suitable foraging habitat for species such as Daubenton's bat.	245592	780818
6	Foraging	Steep fast flowing burns with only occasional trees are unlikely to provide high value resource for foraging or commuting.	246624	780593
7	Foraging	Exposed, high altitude habitats of . Loch a' Bhealaich Leamhain offers low suitability for foraging.	250288	779503
8	Foraging	The southern loch of Lochan na h-Earba offers limited suitability for foraging with no trees present along the loch edge.	247431	782401
9	Foraging	Connecting watercourse between the lochs of Lochan na h-Earba may provide some suitable foraging with slow flowing water present.	248546	783839
10	Foraging/Commuting	River Spean and riparian woodland is likely to provide moderate to high suitability for foraging and commuting through wider landscape.	243610	783099
11	Foraging/Commuting	Abhainn Ghuilbinn corridor will likely provide good foraging and commuting links to wider landscape.	243767	782235
12	Foraging/Commuting	Woodland and scattered trees along small fast flowing burns provides potential commuting links between loch edge and woodland habitats on upper slopes.	249766	784404
13	Foraging/Commuting	Outflow from loch is likely to provide commuting link from the woodland to the north and more open areas around the loch.	250216	785847
14	Foraging/Roosting	Scattered trees along loch edge and lower slopes may provide suitable foraging and roosting opportunities.	249141	784621
15	Foraging/Roosting	Scattered mature trees along loch edge and lower slopes may provide suitable foraging and roosting opportunities.	249896	785082
16	Foraging/Roosting	Small copse of Scot's pine may provide some sheltered foraging and roosting habitat.	249501	784550
17	Foraging/Roosting	Larger expanses of woodland on upper slopes are likely to provide suitable sheltered foraging habitats. Trees may also support PRFs.	249952	784770
18	Foraging/Roosting	Larger expanses of woodland on upper slopes are likely to provide suitable sheltered foraging habitats. Trees may also support PRFs.	249461	785342
19	Foraging/Roosting	Larger expanses of woodland on upper slopes are likely to provide suitable sheltered foraging habitats. Trees may also support PRFs.	249031	784855
20	Foraging/Roosting	Larger expanses of woodland on upper slopes are likely to provide suitable sheltered foraging habitats. Trees may also support PRFs.	250462	785500
21	Foraging/Roosting	Mature mixed woodland is has potential to provide highly suitable foraging habitat as well as PRFs within trees.	250383	786058
22	Roosting	Potential for mature trees on banks of river to support PRFs.	243553	783071
23	Roosting	Mature broadleaved woodland with potential to offer roost features.	243921	783119
24	Roosting	Small number of old trees present that may provide suitable PRFs.	248680	784068

4.3 PRELIMINARY ROOST ASSESSMENT

The preliminary roost assessment covered the entire Survey Area, although due to the large areas of woodland, an emphasis on identifying features with potential or confirmed roosts within locations to be directly affected by the proposed works was undertaken. Locations of greatest concern were areas to be impacted by proposed infrastructure and inundation.

At Loch a' Bhealaich Leamhain the areas of inundation and proposed dam do not include any features suitable to support roosting bats with no trees or buildings present in this area. The suitability of the foraging and commuting habitat within proximity to Loch a' Bhealaich Leamhain is also considered to be very low.

A small number of trees are present on the slopes between Loch a' Bhealaich Leamhain and Lochan na h-Earba but these are very isolated and exposed and did not offer any suitability for supporting roosting bats. Based on current proposals these trees will also remain unaffected.

The shoreline and areas within the proposed inundation zone around Lochan na h-Earba support a significant number of trees, both isolated individuals and small groups. This area also includes the area detailed on the Ancient Woodland Inventory, although currently this area supports only scattered mature trees and a small copse of Scot's pine. All trees within and adjacent to the areas to be impacted by the raised water levels or the associated infrastructure were assessed with a number supporting PRFs that offered suitability for supporting bats and presence of roost could not be ruled out.

Between Lochan na h-Earba and the northern edge of the Site, no further trees with PRFs were identified. The location of the proposed new bridge across the River Spean supports sections of riparian woodland with a number of mature trees but these did not appear to support any PRFs of moderate or high value for bats. A number of mature birch supported furrowed bark and minor damage, but these features were all assessed as being of low suitability to support roosts.

No buildings are to be directly or indirectly affected by the proposals.

In total, across the Survey Area ten trees which are to be directly affected by the proposals were identified as supporting moderate or moderate-high suitability to support roosting bats. No definitive evidence was identified during the preliminary roost assessment but the features offered significant suitability. These trees (Figure 3) are all affected by the increase in water levels around Lochan na h-Earba rather than directly by proposed infrastructure and were identified for further emergence/re-entry surveys (Table 4).

Table 4: Details of trees offering moderate or high suitability to support roosting bats within locations to be directly affected by proposals.

Ref	Details	Overall Assessment/ Recommendations	X	Y	Image
1	Suitable longitudinal crack within main trunk of alder in poor condition. Tree is relatively isolated, located on edge of small burn on small burn entering loch. No signs of use but offers moderate potential.	Moderate. Two bat activity surveys at dawn or dusk – manned or with use of high-quality night vision aid.	249543	784539	

2	Potential cavity at base of alder which is partly submerged at time of assessment. The tree supports a number of small rot holes at least 1m above water level. Due to location detailed inspections not possible.	Low-Moderate At least a single bat activity survey at dawn or dusk – manned or with use of high-quality night vision aid.	248634	783976	
3	Exposed damaged alder tree with the majority of the tree dead and decaying with some regrowth at base. Open main stem cavity, potential for features within the open stem which are less exposed. No signs of use identified.	Moderate Two bat activity surveys at dawn or dusk – manned or with use of high-quality night vision aid.	248919	784359	
4	Birch with feature of moderate suitability in main stem. Feature extends approximately 15cm but is suitable for use by a small number of bats. No signs of use at time of survey.	Moderate Two bat activity surveys at dawn or dusk – manned or with use of high-quality night vision aid.	249004	784453	
5	Large split in base of willow which is overhanging loch edge. Split leads to large central cavity extending up a significant distance. No signs around entrance or just inside. Full extent of cavity beyond endoscope reach. Exposed location.	Moderate Two bat activity surveys at dawn or dusk – manned or with use of high-quality night vision aid.	249298	784765	
6	Large crack at base leading to large open core which extends up at least 1.2m from base of tree. Tree is location of static bat detector. Relatively exposed and isolated location. No signs of bats identified but full extent of cavity	Moderate-High Two bat activity surveys at dawn or dusk – manned or with use of high-quality night vision aid.	250015	785311	

	beyond endoscope reach.				
7	Mature rowan in poor condition with cracks in main stem. Cracks allow access into large central cavity. No signs of bats identified but full extent of cavity beyond endoscope reach. Relatively exposed.	Moderate-High Two bat activity surveys at dawn or dusk – manned or with use of high quality night vision aid.	249787	784823	
8	Large mature birch with significant central cavity extending up a significant distance. Tree located on loch edge. No signs of bats identified but full extent of cavity beyond endoscope reach.	Moderate-High Two bat activity surveys at dawn or dusk – manned or with use of high quality night vision aid.	249786	784828	
9	Isolated rowan in poor condition with large rot hole at base with central cavity extending and connecting with further access point at 1.2m. No signs of use. Exposed location but still offers moderate potential for use by bats.	Moderate Two bat activity surveys at dawn or dusk – manned or with use of high quality night vision aid.	249648	784564	
10	Crack in limb of larch at 6m on NW side. Only visible through binoculars but appears to be a compression fracture and offers moderate suitability for bats.	Moderate Two bat activity surveys at dawn or dusk – manned or with use of high quality night vision aid.	249709	784527	

11	This tree was not initially identified as supporting PRFs. Activity surveys on nearby tree observed ingress of single pipistrelle bat	Confirmed Roost – single common pipistrelle, non-breeding summer roost within small rot hole at approximately 10m on north side of main stem.	249859	784923	

4.4 EMERGENCE/RE-ENTRY SURVEYS – TREES

Emergence or re-entry surveys were undertaken on the ten trees identified during the preliminary roost assessment during August and September. In addition, during a manned dawn survey at Tree 7 on 30th August 2023 pre-dawn activity of a common pipistrelle, which was foraging along the shoreline just north of Tree 7 and 8, was followed by the surveyor as it slowly headed north along the shoreline. Approximately 10 minutes before dawn the single common pipistrelle displayed re-entry swarming behaviour around an isolated semi-mature sycamore (Tree 11) and then entered a roost located high on the trees main stem. The roost appeared to be a small rot hole and had not previously been identified as a potential roost feature.

All other surveys identified no use of the identified trees as a roost for bats. During the surveys, frequent foraging was recorded from common and soprano pipistrelle as well as occasional foraging along the loch margins by *Myotis* sp. During the vast majority of surveys the first bats identified during the dusk surveys arrived on at the surveyor's location from a northerly direction and during dawn surveys activity of bats generally moved north towards the end of the surveys. This would suggest that bats using the area for foraging are roosting north of the surveyed trees. At any one time a maximum of three bats was observed, but foraging activity from this small number of bats often formed prolonged periods of localised foraging.

Table 5: Details of tree surveys

Tree	Survey	Date	Dusk/ Dawn	Surv-eyor	Detector	Sunset/ Sunrise	Start Time	Start Temp	End Time	End Temp	Weather Conditions
1	1	29/08/23	Dusk	TI	EMTouch	20:23	20:10	10°C	22:00	10°C	Overcast, light SW breeze
2	1	31/08/23	Dusk	TI	EMTouch	20:18	19:50	16°C	21:55	15°C	Scattered cloud, light breeze
3	1	31/08/23	Dusk	IR	EMTouch/ Duet	20:18	19:50	16°C	21:55	15°C	Scattered cloud, light breeze
4	1	31/08/23	Dusk	Flir	EMTouch	20:18	19:50	16°C	21:55	15°C	Scattered cloud, light breeze
5	1	31/08/23	Dusk	JB	EMTouch	20:18	19:50	16°C	21:55	15°C	Scattered cloud, light breeze

6	1	30/08/23	Dawn	TI	EMTouch	06:15	04:45	8°C	06:25	8°C	Scattered light cloud, light SW breeze
7	1	30/08/23	Dawn	JB	EMTouch	06:15	04:45	8°C	06:25	8°C	Scattered light cloud, light SW breeze
8	1	30/08/23	Dawn	IR	EMTouch	06:15	04:45	8°C	06:25	8°C	Scattered light cloud, light SW breeze
9	1	29/08/23	Dusk	IR	EMTouch	20:23	20:10	10°C	22:00	10°C	Overcast, light SW breeze
10	1	29/08/23	Dusk	JB	EMTouch	20:23	20:10	10°C	22:00	10°C	Overcast, light SW breeze
11	1	30/08/23	Dawn	Opportunistic observations of ingress of bat		06:15	N/A	8°C	06:25	8°C	Scattered light cloud, light SW breeze
1	2	15/09/23	Dawn	JB	EMTouch	06:48	05:20	8°C	07:00	8°C	Overcast, still
2	2	26/09/23	Dawn	TI	EMTouch	07:10	05:30	13°C	07:20	13°C	scattered cloud, gusty breeze
3	2	26/09/23	Dawn	IR + JB	EMTouch	07:10	05:30	13°C	07:20	13°C	scattered cloud, gusty breeze
4	2	25/09/23	Dusk	TI	EMTouch	19:10	18:53	12°C	20:45	12°C	scattered cloud, gusty breeze
5	2	25/09/23	Dusk	IR + JB	EMTouch	19:10	18:55	12°C	20:45	12°C	scattered cloud, gusty breeze
6	2	14/09/23	Dusk	IR	EMTouch	19:40	19:30	10°C	21:20	10°C	Light cloud, SW breeze
7	2	14/09/23	Dusk	JB	EMTouch	19:40	19:30	10°C	21:20	10°C	Light cloud, SW breeze
8	2	14/09/23	Dusk	Flir	EMTouch	19:40	19:30	10°C	21:20	10°C	Light cloud, SW breeze
9	2	15/09/23	Dawn	IR	Duet	06:48	05:20	8°C	07:00	8°C	Overcast, still
10	2	15/09/23	Dawn	Flir	EMTouch	06:48	05:20	8°C	07:00	8°C	Overcast, still
11	2	14/09/23	Dusk	TI	EMTouch	19:40	19:30	10°C	21:20	10°C	Light cloud, SW breeze

4.5 STATIC DETECTOR SURVEYS

Weather

Current guidance for undertaking static detector surveys in relation to wind farms surveys (NatureScot, 2021) stipulates that surveys should capture a sufficient number of nights with appropriate weather conditions for bat activity. Lower temperature requirements are identified for Scotland with a minimum recommended temperature of 8°C at dusk and wind speeds less than 18km/h. Although not in relation to wind farms a similar approach to the static detector surveys was undertaken.

Survey 1 (Chart 1a) was undertaken in late May, early June with the early part of the survey period experiencing low temperatures, often less than the recommended 8°C at dusk. The temperatures on site are also likely to be slightly lower than that recorded at the nearby weather station due to an increase in altitude. However, the latter part of the survey supported suitable temperatures with at least five nights with dusk temperatures above 8°C. It should be noted that the Survey Area is located on exposed ground in the north of Scotland with a moderate altitude (approximately 350m above sea level) and the local bat population regularly experience such temperatures throughout the early part of the field season. During this period the wind speeds were generally low with the recommended limit of 18km/h. No significant rainfall was experienced during this survey period.

Survey 2 (Chart 1b) in late July continued to experience relatively low temperatures, with the later period of the survey struggling to provide dusk temperatures above 8°C at dusk. Several days during the early part of the survey supported suitable temperatures and wind throughout the survey were low. Occasional significant rainfall events were experienced during this period, but these events were predominantly during daylight hours.

Survey 3 (Chart 1c) was relatively cool and unsettled with several days with low dusk temperatures, periods of high wind and occasional rainfall events. This period generally was suboptimal weather conditions for 'normal' bat activity and interpretations of activity levels must take this into account.

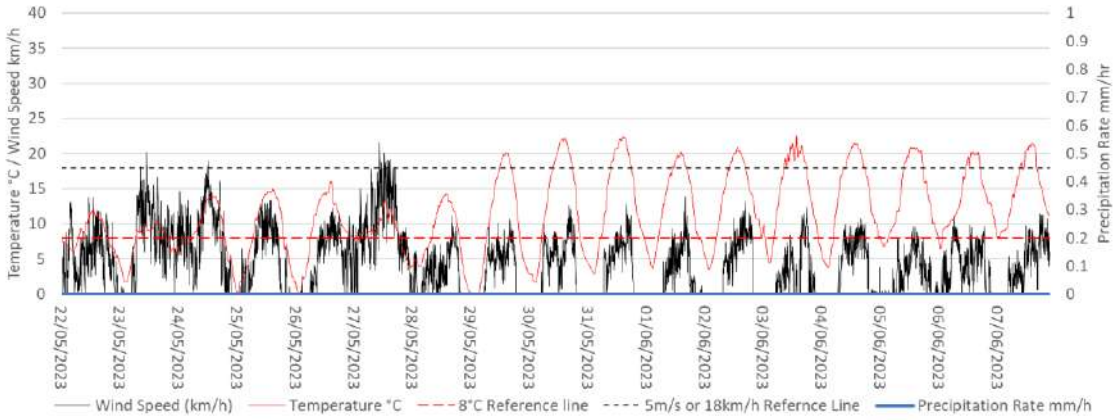

Chart 1a: Survey 1 weather data.

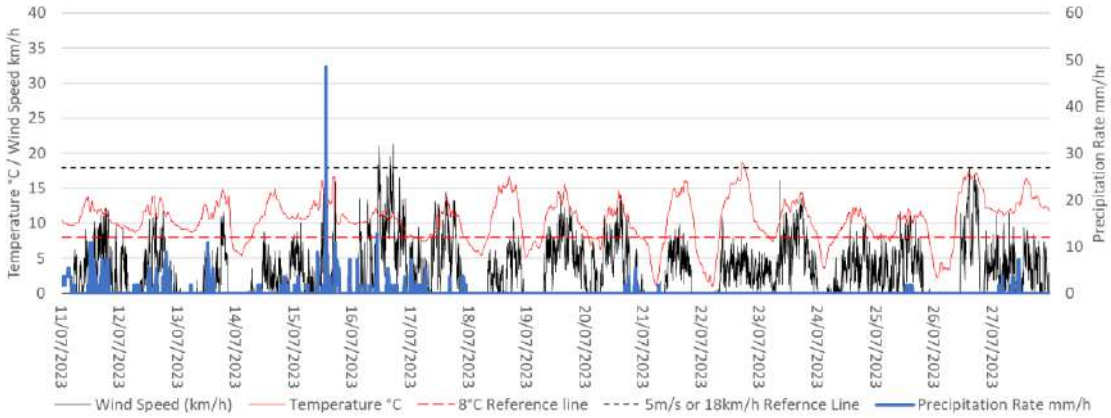

Chart 1b: Survey 2 weather data.

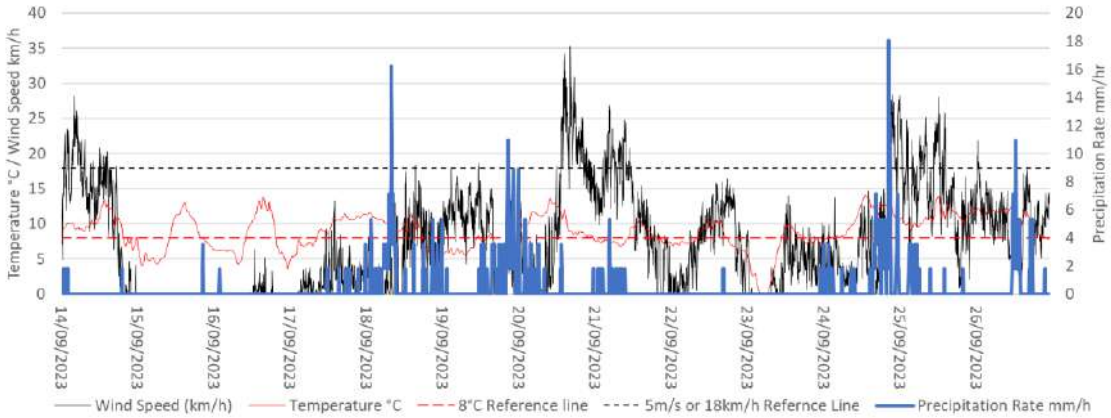

Chart 1c: Survey 3 weather data.

Overall, the weather conditions were assessed as being broadly acceptable during Survey 1 and 2 taking into account the northern latitude and moderate altitude of the Survey Area. However, some caution with respect to interpreting low activity rates during the third survey period and on a number of days during the first and second survey periods is required due, primarily to the low temperatures.

Overall Activity

The results of the static detector deployment (Figure 4) surveys identified the presence of at least four species; common pipistrelle, soprano pipistrelle, Myotis sp. and brown long-eared bat. In total, 66,907 passes were identified across the four detectors over three survey periods with the mean, median and distribution of calls across the locations and survey periods detailed in Table 5. Common and soprano pipistrelle were recorded at approximately the same frequency totalling approximately 79% of all calls combined, with Myotis bats forming 21% and a small number of brown long-eared bats forming less than 1%.

Pass rates were not evenly distributed across the detector locations with location 3 supporting almost half of the activity from pipistrelle and Myotis sp. bats. Activity was also high at location 4 on the River Spean with locations 1 and 2 markedly lower.

Table 5: Summary of bat passes across surveys at detector locations showing mean and median nightly pass rates over the entire survey period (excluding zero data nights).

Detector Location	Common pipistrelle			Soprano pipistrelle			Myotis sp.			Brown long-eared		
	No. of passes	Median nightly pass rate	Mean nightly pass rate	No. of passes	Median nightly pass rate	Mean nightly pass rate	No. of passes	Median nightly pass rate	Mean nightly pass rate	No. of passes	Median nightly pass rate	Mean nightly pass rate
1	2394	7.80	9.08	1234	1.99	4.24	688	1.81	2.78	3	0.15	0.15
2	3086	7.63	10.78	9911	11.90	23.96	1153	1.01	4.22	0	0.00	0.00
3	10236	23.61	33.32	13054	21.78	40.70	6254	2.18	21.43	6	0.15	0.17
4	8939	31.98	40.61	3864	2.12	16.72	6074	13.77	32.43	11	0.29	0.33
Total	**24,655**			**28,063**			**14,169**			**20**		

Bat pass rates are often highly variable between nights, with some nights supporting limited passes and other nights supporting high activity. This is particularly pronounced on sites within northern Scotland. In these circumstances, the median is likely to be a more useful summary of the typical activity than the mean (Lintott & Mathews, 2018). As a result, median pass rates per hour are primarily the presented data, along with an indication of mean pass rates where relevant (Table 5).

When assessing activity based on median rates locations 3 and 4 supported similar levels of activity across all species (Chart 2) with location 4 supporting the highest level of activity for common pipistrelle, *Myotis* sp. and brown long-eared bats and location 3 for soprano pipistrelle. Common pipistrelle median activity rates ranged from 7.6 passes per hour at location 1 to a peak of 31.98 at location 4. Soprano pipistrelle bats were slightly lower with a peak of 21.78 bat passes per hour at location 3. Despite total number of passes being broadly similar at locations 3 and 4, median rates for *Myotis* sp. were highest by some margin at location 4 when adjusting for number of nights detectors were functional.

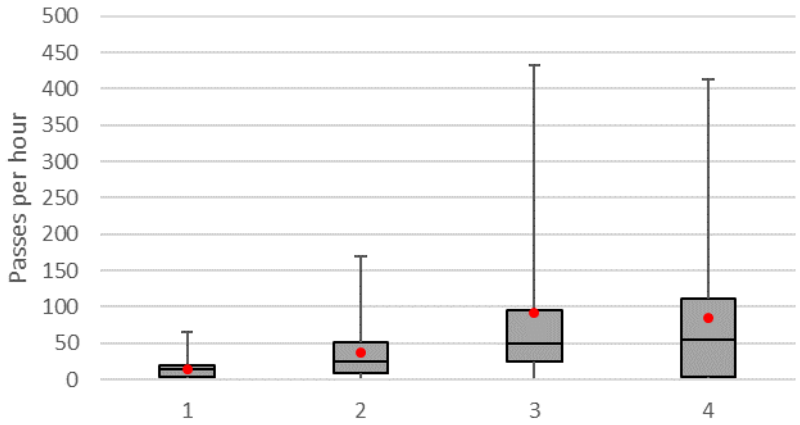

Chart 2: Boxplot for the number of bat passes (all species) per hour across detector locations over all survey periods. The 'box' shows the interquartile range, with median (central line) and upper and lower 25% ranges. The mean is also shown (red circle).

With respect to overall activity across the survey periods, Survey 2 supported the greatest level of activity, although this period supported highly variable activity (Chart 3) which is also displayed in the variation in interquartile ranges (Chart 2). These rates may be linked to a combination of temperatures and rainfall, although the links are not obvious.

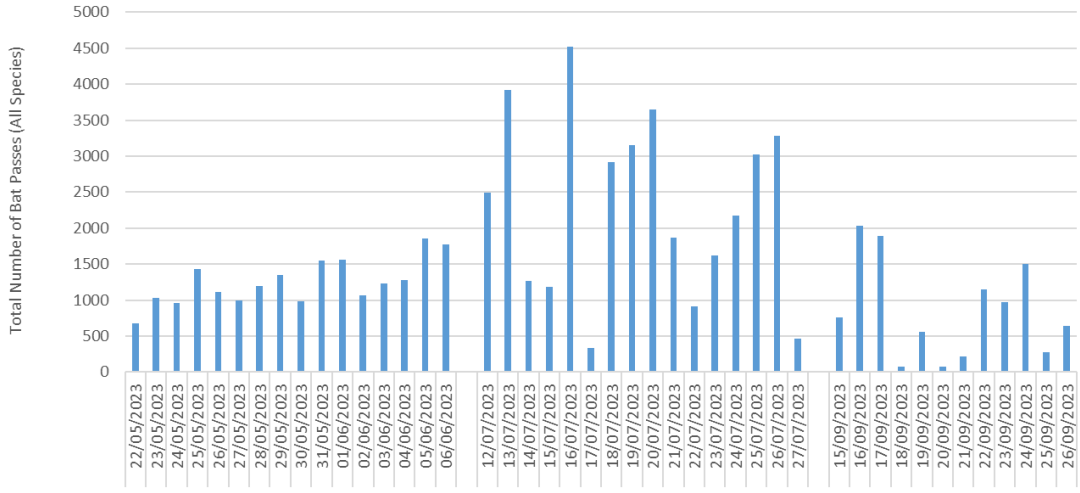

Chart 3: Activity from all species across survey periods across all locations.

Common Pipistrelle

Passes from common pipistrelle totalled 24,655 across all surveys and locations, forming 36% of the total bat calls. The distribution of common pipistrelle calls across the survey area was similar to that of all species with the highest rates of activity at locations 4 and 3 (Figure 5). This distinction was clear during the first and second survey seasons (Chart 4a and 4b) with the majority of calls recorded at these two locations. During the autumn survey session (Chart 4c) activity levels were markedly reduced across all locations with location 3 the only location supporting any significant activity.

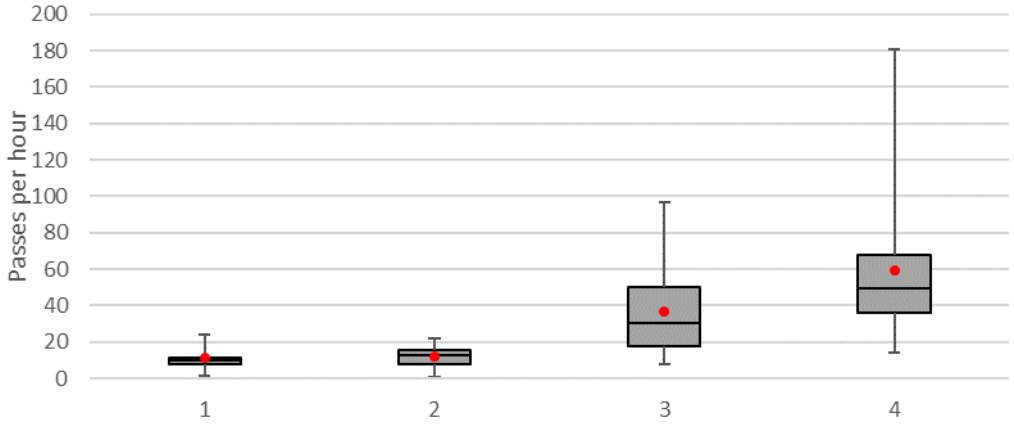

Chart 4a: Boxplot showing the median nightly pass rate (bat passes per hour) and mean (circles) of common pipistrelle bats during Survey 1.

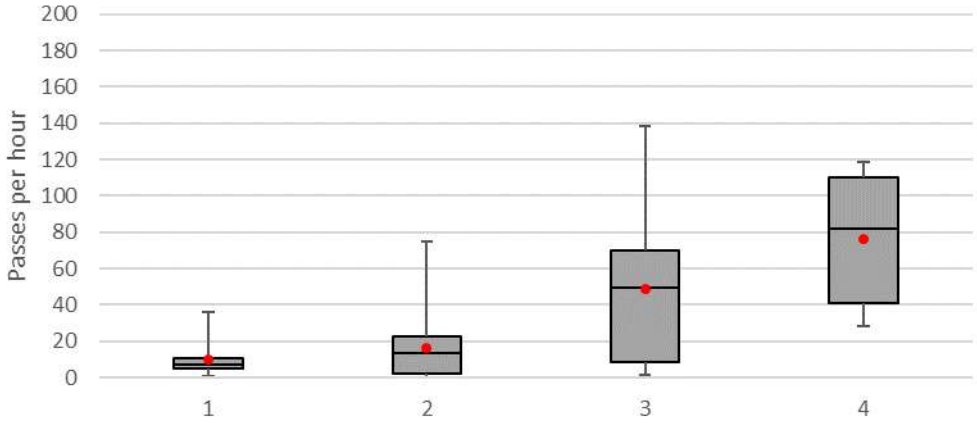

Chart 4b: Boxplot showing the median nightly pass rate (bat passes per hour) and mean (circles) of common pipistrelle bats during Survey 2.

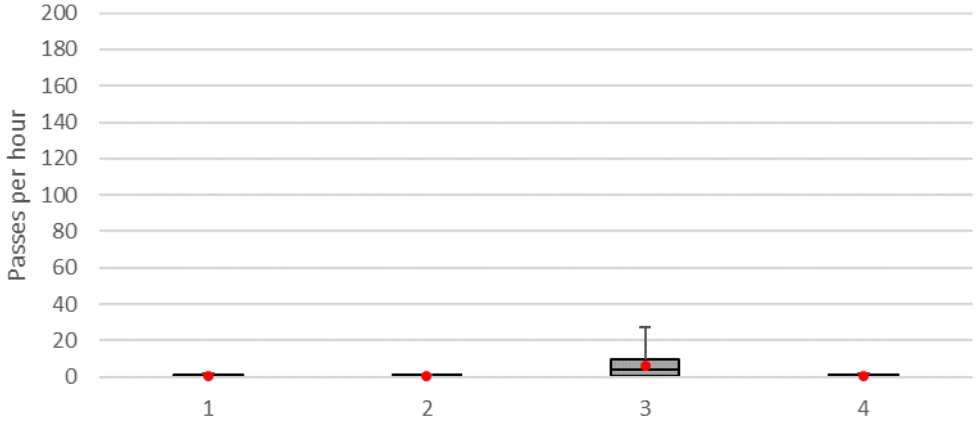

Chart 4c: Boxplot showing the median nightly pass rate (bat passes per hour) and mean (circles) of common pipistrelle bats during Survey 3.

With respect to the temporal distribution of common pipistrelle activity in relation to sunset activity levels at location 1 supported frequent activity within the emergence window of the species and several records of common pipistrelle were recorded well before sunset (Chart 5). The time of recorded bat passes in relation to sunset can provide an indication of whether a roost is likely to be nearby. Where bats are recorded close to sunset, especially during or before the recognised emergence time (Russ, 2012) of any particular species, this indicates that bats are likely to be using roosting sites close to the detector. The frequency of common pipistrelle records within or before the recognised emergence times would suggest that a roost is close to location 1. Frequent activity of common pipistrelle was also recorded within the recognised emergence window at location 4. At locations 2 and 3, activity was generally only recorded outwith the emergence window, suggesting these locations are utilised predominantly for foraging with roosts less likely to be present close by.

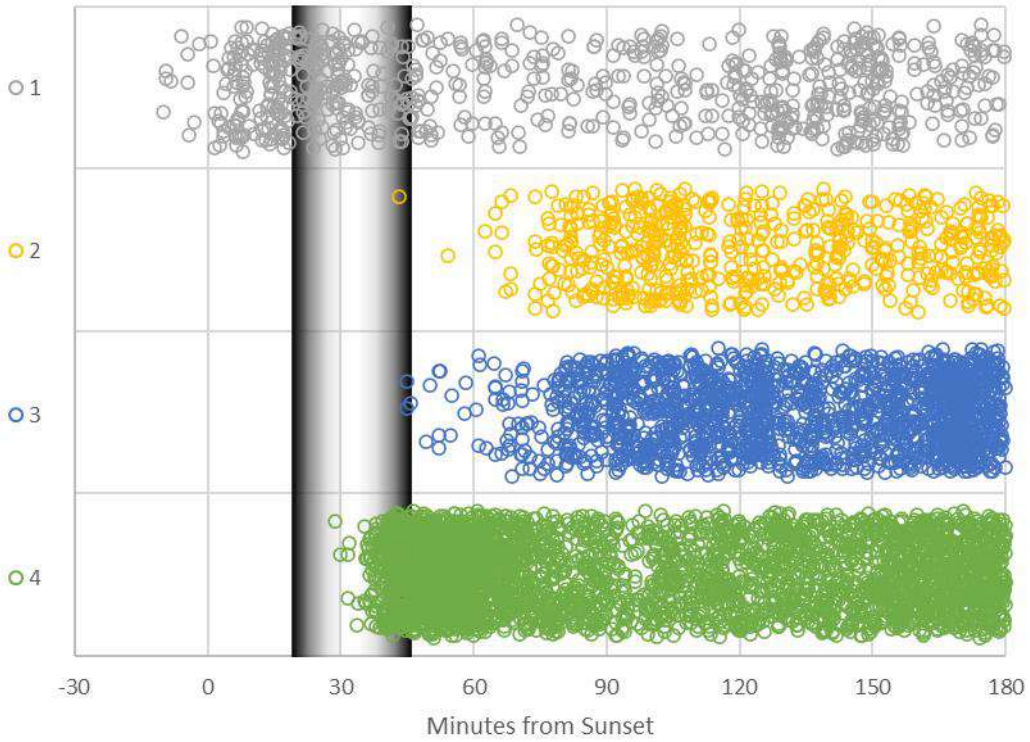

Chart 5: Temporal distribution of all common pipistrelle calls recorded within 3 hours after sunset in relation to time of sunset across detector locations.

Soprano Pipistrelle

Passes from common pipistrelle totalled 28,603 across all surveys and locations, forming 43% of the total bat calls. The distribution of soprano pipistrelle calls across the survey area was similar to that of common pipistrelle (Figure 6) although more variable with the first survey period in spring supporting most activity at location 3 (Chart 6a), then during summer locations 3 and 4 were broadly equal (Chart 6b) with autumn activity greatest at location 2 (Chart 6c).

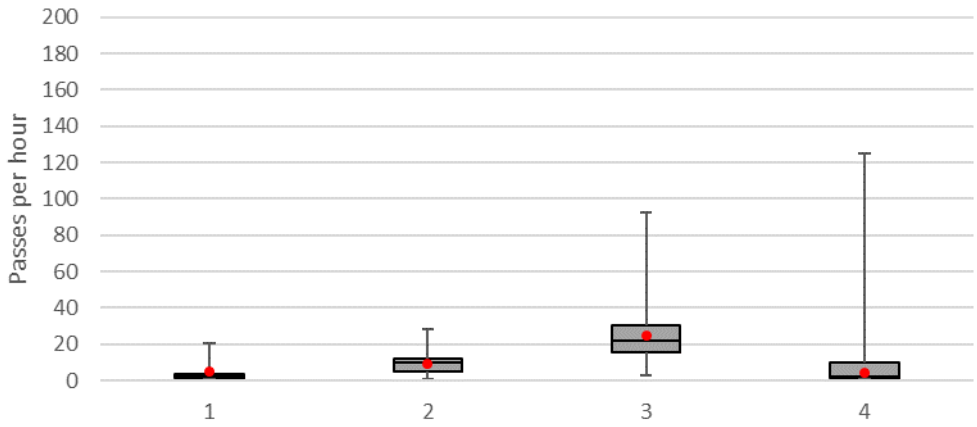

Chart 6a: Boxplot showing the median nightly pass rate (bat passes per hour) and mean (circles) of soprano pipistrelle bats during Survey 1.

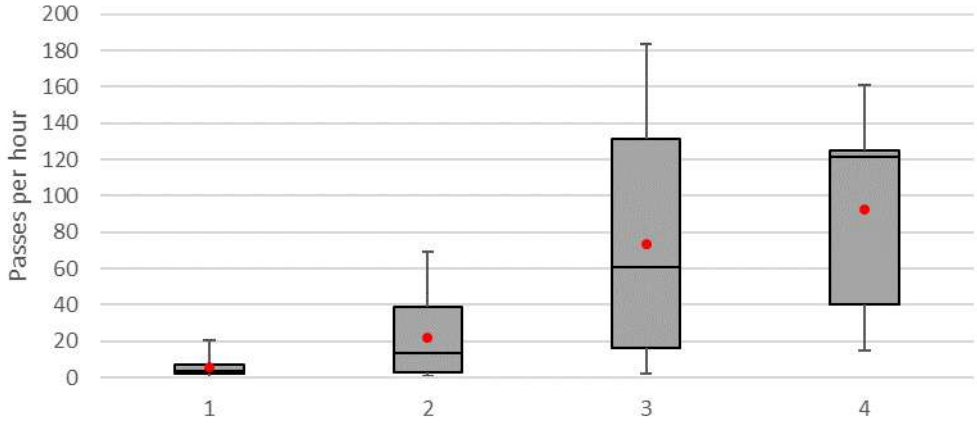

Chart 6b: Boxplot showing the median nightly pass rate (bat passes per hour) and mean (circles) of soprano pipistrelle bats during Survey 2.

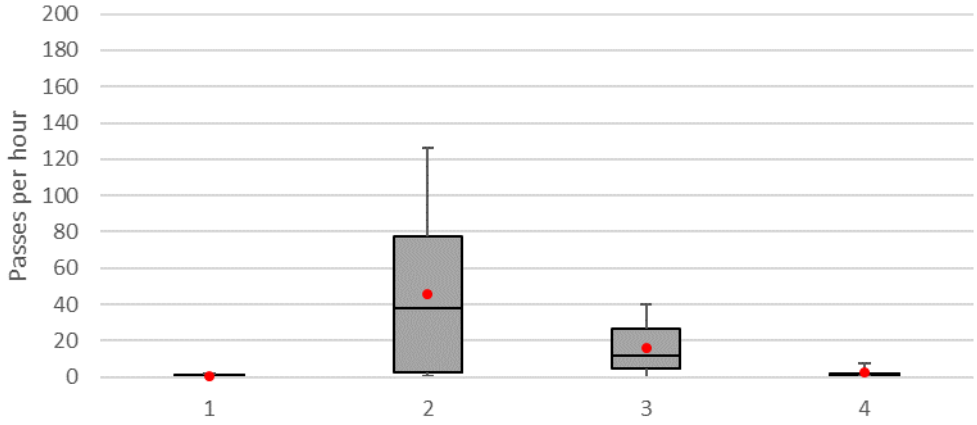

Chart 6c: Boxplot showing the median nightly pass rate (bat passes per hour) and mean (circles) of soprano pipistrelle bats during Survey 3.

The temporal distribution of soprano pipistrelle activity in relation to sunset was very similar to that of common pipistrelle with the earliest activity in relation to sunset recorded at location 1 with location 4 also supporting early activity suggesting roosts nearby. Once again, early activity at locations 2 and 3 was limited to just a few occasions (Chart 7).

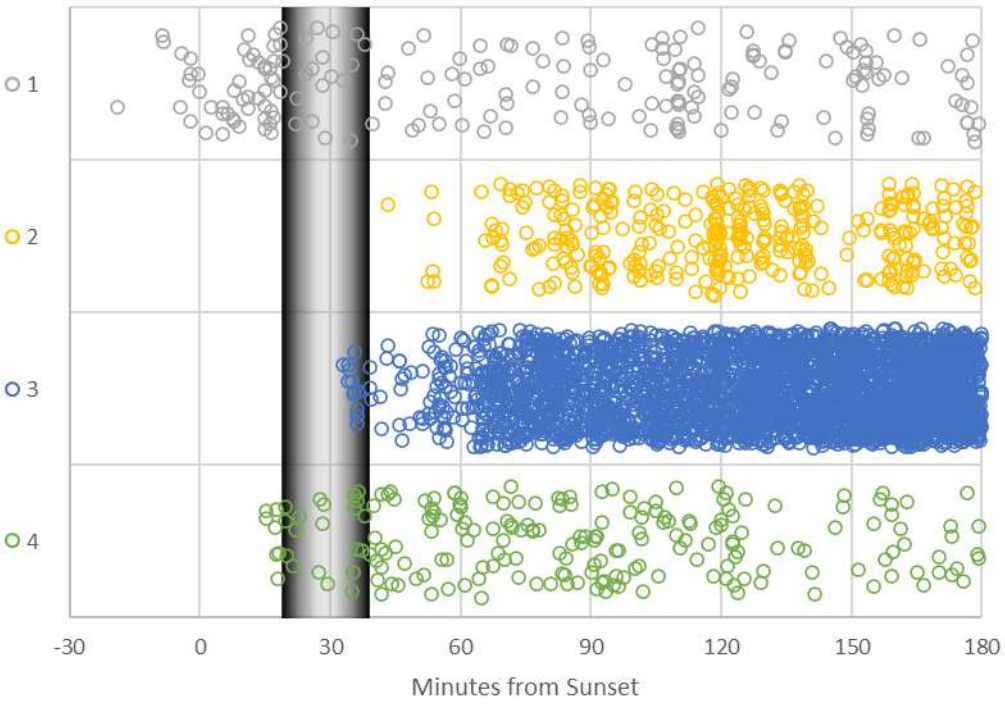

Chart 7: Temporal distribution of all soprano pipistrelle calls recorded within 3 hours after sunset in relation to time of sunset across detector locations.

Myotis Species

Passes from *Myotis* sp. totalled 14,169 across all surveys and locations, forming 21% of the total bat calls. The distribution of *Myotis* sp. calls across the survey area was slightly different to that of the pipistrelle species (Figure 7) with location 4 generally supporting the greatest activity during spring (Chart 8a) and summer (Chart 8b) survey periods. During the autumn survey (Chart 8c) period activity was low, especially at location 4 with slightly higher activity rates at locations 2 and 3 during this period.

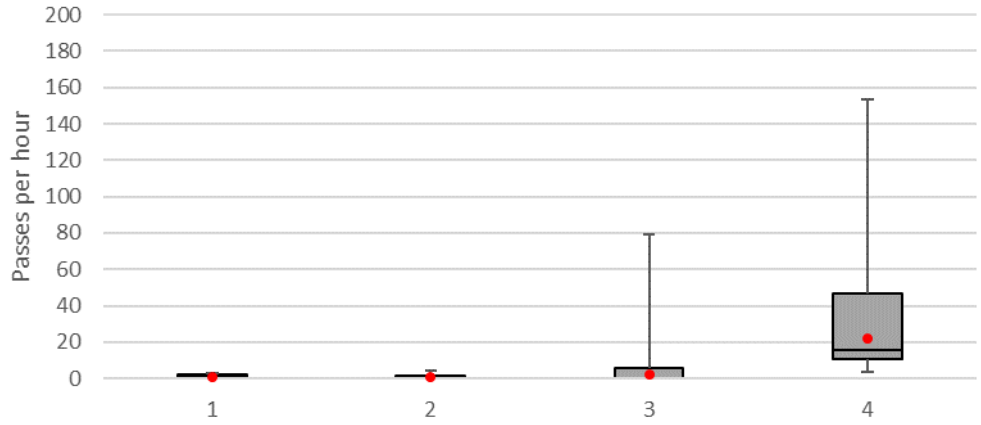

Chart 8a: Boxplot showing the median nightly pass rate (bat passes per hour) and mean (circles) of *Myotis* sp. bats during Survey 1.

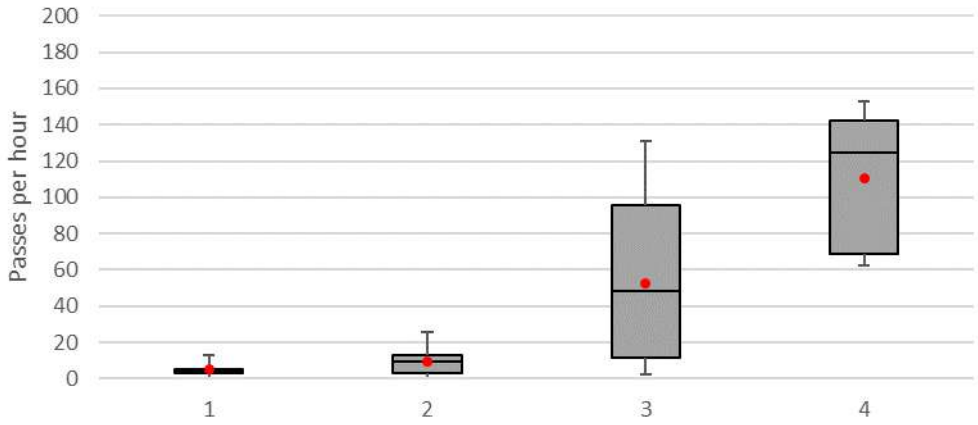

Chart 8b: Boxplot showing the median nightly pass rate (bat passes per hour) and mean (circles) of *Myotis* sp. bats during Survey 2.

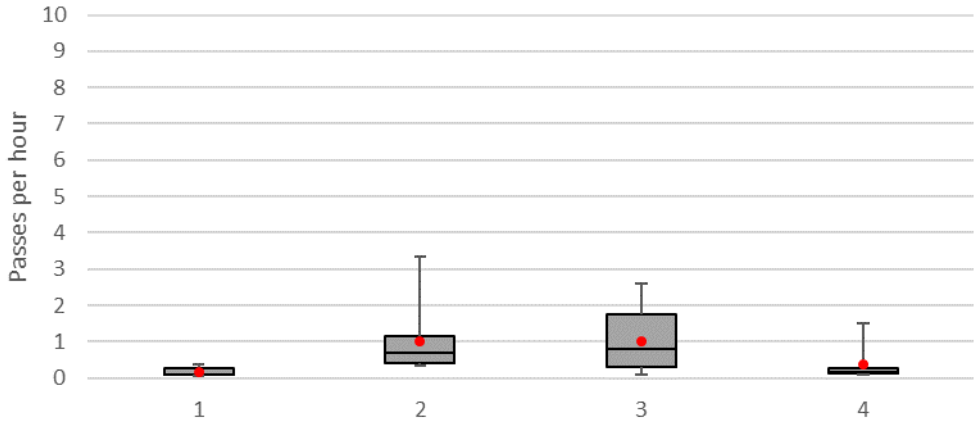

Chart 8c: Boxplot showing the median nightly pass rate (bat passes per hour) and mean (circles) of *Myotis* sp. bats during Survey 3.

The temporal distribution of *Myotis* sp. activity in relation to sunset was very similar to that of the pipistrelle bats with the earliest activity in relation to sunset recorded again at location 1 with location 4 also supporting early activity suggesting roosts nearby. A single early record of *Myotis* sp. was also recorded at location 2 (Chart 9). Although the *Myotis* sp. bats were not identified to species level, based on the known distribution of bat species in Scotland, the habitats present and the distribution of activity, it is likely that both Daubenton's bat and Natterer's bat would be present. Activity from Duabenton's bat likely formed the majority of the activity at location 4 along the Rover Spean with activity on Lochan na h-Earba likely to support increased activity form Natterer's bat with occasional Daubentons during very calm conditions. This is based on the water surface of Lochan na h-Earba rarely forming the preferred flat calm conditions preferred by Daubentons. During emergence and re-entry surveys on trees close to the shores of Lochan na h-Earba, *Myotis* sp. bats were recorded flying at 1-2m above the surface of the water along the shoreline, which is also more consistent with activity from Natterer's bat.

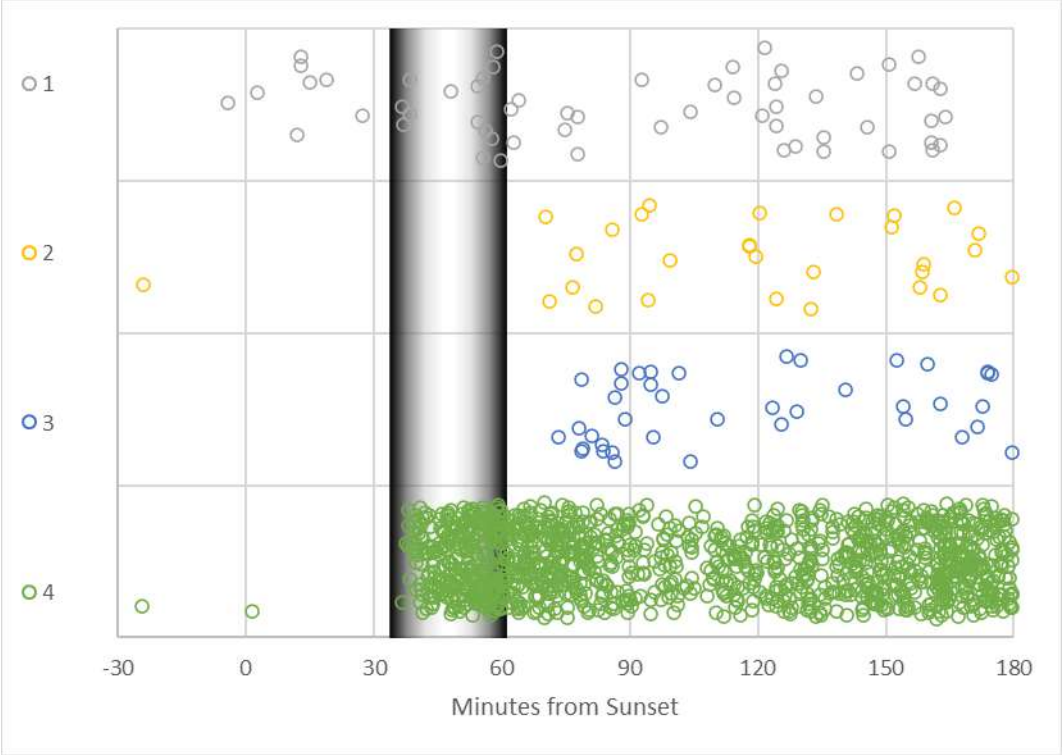

Chart 9: Temporal distribution of all *Myotis* sp. calls recorded within 3 hours after sunset in relation to time of sunset across detector locations.

Brown long-eared bat

Only 20 passes of brown long-eared bat were recorded during all survey periods and as a result analysing the distribution of activity does not provide particularly useful insight. At all locations throughout the three survey periods, activity levels remained below 0.4 passes per hour (recorded during the summer period), with an overall pass rate of less than 0.2 passes per hour.

5 DISCUSSION

The species present across the Survey Area are largely restricted to common and soprano pipistrelle with frequent *Myotis* sp. calls and a low number of passes from brown long-eared bats. This species assemblage reflects the northern latitude of the Survey Area and is in line with the anticipated species assemblage considering the habitats present and known species distribution.

In the absence of the Ecobat tool or nearby developments with comparable surveys, comparisons to other surveys within the region cannot be undertaken. Based on the results of the static detector surveys and the surveyors experience it is likely that overall the Survey Area supports Moderate activity at locations 1 and 2 with Moderate-High activity at locations 3 and 4 for the region. Approximately 80% of activity was form either common or soprano pipistrelle with Myotis sp. bats forming the majority of the rest of the activity.

Common and soprano pipistrelle bats are common and widespread throughout Scotland and their broadly generalist nature allows them to take advantage of habitats including cluttered woodland edges, scattered trees, open wet moorland and loch edges, all of which will provide valuable foraging resources for the local populations.

Although the *Myotis* sp. bats were not identified to species level, it is likely that activity along the River Spean is dominated by Daubenton's bat and activity on Lochan na h-Earba by

Natterer's bat. Very low activity form brown long eared is likely to be from an occasional pass of a commuting bat, although brown long-eared bats can be under-recorded due to their quite calls being missed by static detectors. All the species identified within the Survey Area are relatively common and widespread.

The habitat assessment identified that the Survey Area offered suitable habitat for foraging and commuting including the River Spean woodland corridor, sections of woodland and scattered trees in the north around Lochan na h-Earba as well as the large areas of open wetland and bog habitats. The latter habitats are likely to be utilised extensively during calm conditions as invertebrate prey will be abundant and based on anecdotal observations of bat activity during emergence and re-entry surveys, this was confirmed as the case. In addition the scattered trees, small copses and larger tracts of woodland are all likely to provide suitable foraging habitat during more blustery conditions.

No buildings or other structures suitable to support roosting bats were present within the areas to be affected by either the proposed infrastructure or the resulting inundation form the raising of loch water levels. However, a number of trees supporting PRFs will be impacted upon. Emergence and re-entry surveys confirmed a single common pipistrelle roost supporting a small non-breeding roost was present within a rot hole of a large sycamore (Tree 11). The other trees identified as offering PRFs did not support roosting bats at the time of the surveys. It should be noted, however, that use of trees by bats can vary considerably both within and between years, and the potential for these identified trees to support roosting bats in future years should not be ruled out.

The potential for bats to hibernate within the Survey Area to be impacted upon cannot be entirely ruled out but no indication of hibernation roosts was identified, and opportunities are limited to the small number of trees. Due to the exposed location of the Survey Area, it is assessed that PRFs are unlikely to provide optimal hibernation conditions as trees are exposed and are unlikely to retain the stable cool but frost-free conditions suitable for hibernating bats.

As a single roost has been identified, which will be directly impacted upon by the proposal, in the absence of mitigation, it is likely that the disturbance and possible destruction of the identified roost would occur along with the potential for killing or injury of bats during the process. As a result, the proposed development would result in an offence under the Conservation (Natural Habitats, &c.) Regulations 1994 as amended in Scotland in the absence of a derogation license.

To enable the development to proceed, works must be undertaken under the derogation remit of a suitably experienced ecologist who also holds a Bat Low Impact License (BLIMP) or through a European protected species license issued by NatureScot. Licensable activities can only be carried out under a BLIMP where the species present are common (common or soprano pipistrelle) and the Site is confirmed to only support summer, non-breeding roosts of less than five individuals. In both cases a Species Protection Plan will need to be developed to ensure that the bat roost is managed in a legal manner with the aim of maintaining the favourable conservations status of bats on the site.

The Species Protection Plan can only be developed once the full details of the project, and the associated timeline has been confirmed but it is likely to include the following aspects:

- Sensitive timing of works which will impact on known roosts.
- Pre-construction works on identified trees to confirm no change in status.
- Toolbox talks to all relevant construction staff.
- Erection of compensatory roosts at suitable locations.
- Direct supervision of works at roost or potential roost locations.

- Where possible, trees that currently support PRFs that will be lost due to the inundation, suitable sections of the tree should be considered for translocation. Where trunks or major limbs support suitable fissures, rot holes or other features these can, in many circumstances be carefully removed (under supervision of both an ecologist and an arborist) and relocated to new locations which will remain unaffected. If suitable the section of tree can rest on the ground and be secured in an upright position to the trunk of a large existing tree. This approach is not suitable for all identified trees.
- Enhancements to improve the roosting opportunities for bats within the landscape, potentially including within new structures, through the inclusion of integral bat roost features such as bat tubes and bat lofts. The provision of robust (woodcrete) tree mounted bat boxes may also be suitable at key locations.

Although wider impacts on foraging and commuting habitats are more challenging to assess, the loss of existing trees and wetland habitats around Lochan na h-Earba may have a low level impact. The upland habitats of heath and bog are extensive throughout the immediate area and the loss of habitat in itself is unlikely to have a significant impact on the conservation status of bats in the area around Lochan na h-Earba. However, if a significant draw down zone is to be present due to fluctuating water levels within Lochan na h-Earba, it is unclear how this may affect the suitability of the area to support foraging bats. During periods when significant draw down zones are present this may, to some extent, sever the links between the foraging resources above the terrestrial and aquatic habitats resulting in less favourable foraging habitat.

In addition, the proposed new access track and bridge across the River Spean must be considered carefully. The river corridor supports regular use by pipistrelle and *Myotis* sp. bats for both foraging and also commuting and the design of the new crossing must take this into account. At the time of writing, no information on the design of the proposed crossing is available, but a number of factors must be taken into consideration:

- Maintenance of free flight at 2m above water level to allow free movement and foraging from *Myotis* sp. bats.
- Minimise gaps in the tree canopy at the bridge location to ensure that pipistrelle bats and potentially brown long-eared bats can still use the riparian woodland zone to forage and commute through the site. Additional planting along the track away from the river may aid maintaining this connectivity offering multiple crossing points.
- Minimise lighting. Ideally no lighting should be present on the bridge and adjacent areas. If there is an overriding need for lighting due to confirmed health and safety concerns, then lighting should be low level and light spill reduced to a minimum with no significant light spill on to water surface or surrounding riparian woodland. All lighting in areas of likely bat activity should be in line with current guidance (Institution of Lighting Professionals, 2023).
- Tree felling should be reduced to a minimum through carful design and construction planning with the aim of minmising tree removal identified at the outset of the design process.
- The potential to integrate roosting provisions within any new bridge structure should be considered at the design stage with input from a suitable experienced ecologist.

It is not known whether habitat management proposals are included within the project and the details of any such plans. It is recommended that at suitable locations additional tree planting is considered. Currently there is not extensive tree recruitment present with many of the old trees being lost and not replaced. Any woodland creation should ideally emulate the variable tree density with both denser woodland blocks, isolated copses and scattered

isolated trees. Any such proposals should be developed by experienced woodland managers with input from bat ecologists.

6 REFERENCES

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APPENDIX A – PHOTOGRAPHS

Plate 1: View northeast over blanket bog towards southern end of Lochan na h-Earba.

Plate 2: View looking east over Loch a' Bhealaich Leamhain showing sparse upland environment.

Plate 3: View north along woodland track within woodland area north of Lochan na h-Earba.

Plate 4: View south along outflow watercourse from northern end of Lochan na h-Earba.

Plate 5: View across the northern end of Lochan na h-Earba showing scattered trees on shoreline which form remnant of ancient woodland as detailed on Ancient Woodland Inventory.

Plate 6: Static Location 2 with static deployed on Tree 6, large open trunk visible at base.

Plate 7: Small Scot's pine copse close to the southern end of northern section of Lochan na h-Earba, Static Location 3.

Plate 8: View along northwestern shoreline of Lochan na h-Earba with small number of scattered trees.

Plate 9: Further example of mature scattered tree located on southeastern shore of Lochan na h-Earba.

Plate 10: View up slopes on southern side of Lochan na h-Earba showing more significant blocks of semi-natural woodland.

Plate11: View along typical section of River Spean in northwest of Survey Area.

APPENDIX B – FIGURES

Loch Earba Pump Storage Hydro

Figure 1: Site Location

Survey Area

240000 242000 244000 246000 248000 250000 252000 254000

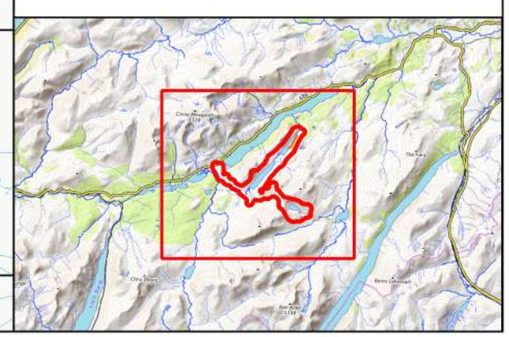
788000 786000 784000 782000 780000 778000 776000

Crom Loathad
Stob Poite Coire Ardair
Na Cnapanan
Aberarder Forest
Srón A' Choire
Creag Meagaidh
Puist Coire Ardair
Creag Mhòr
Meall Coire Choille-Rais
Am Meall
Binnein Shios
An Cearcallach
Creag a' Chuir
Creag na Caillliche
Loch Laggan
Srón Nan Tarmachan
Ardverikie Forest
Meall Bhàideanach
Binnean Shuas
Meall Buidhe
Meall na Brachdlach
Creag Pitridh
Geal Charn or Mullach Coire an Iubhair
Srón Garbh
Meallan Odhar
Beinn A' Chlachair
Meall Cos Chàrnan
Ruigh Dubh Cloinne Chatnach
Càrn Dearg
Diollaid a' Chairn

Drawing number: 23/022/CAI/046
Revision: 1
Date of production: 2023-10-06
Drawn by: JB - Tracks Ecology
Projection: British National Grid EPSG:27700

0 800 1,600 m

Scale @ A3 - 1:50,000



Loch Earba Pump Storage Hydro

Figure 2: Habitat Assessment

Survey Area
Bat Habitat Features
OS Contours 10m
Ancient Woodland Inventory
Ancient (of semi-natural origin)
Long-Established (of plantation origin)
Other (on Roy map)

244000
246000
248000
250000
786000
784000
782000
780000

Meall Coire Choilie Rais
Am Meall
Binnein Shios
An Cearcallach
Moy Forest
Creag a' Chuir
Loch Laggan
Tom Ban
An Geurachadh
Moy Lodge
A86
Sròn Nan Tarmachan
Binnein Shuas
Meall Buidhe
Lochan na h-Earba
Torr a' Ghuilbinn
Creag Pitridh
Geal Charn or Mullach Coire an Iubhair
Sron Garbh
Meall Arcruighe

Drawing number: 23/022/CAI/047
Revision: 1
Date of production: 2023-10-06
Drawn by: JB - Tracks Ecology
Projection: British National Grid EPSG:27700

0 500 1,000 m

Scale @ A3 - 1:30,000

Loch Earba Pump Storage Hydro

Figure 3: Preliminary Roost Assessment Results

- Survey Area
- Trees supporting PRFs within inundation zone
- Inundation
- OS Contours 10m

Ancient Woodland Inventory

- Ancient (of semi-natural origin)
- Long-Established (of plantation origin)
- Other (on Roy map)

244000 246000 248000 250000

786000 784000 782000 780000

Meall Coire Choillie Rais
Am Meall
Binnein Shios
An Cearcallach
Moy Forest
Creag a' Chuir
Loch Laggan
Tom Ban
Moy Lodge
A86
River Spean
Sròn Nan Tarmachan
Binnein Shuas
Meall Buidhe
Lochan na h-Earba
Torr a' Ghuilbinn
Creag Pitridh
Geal Charn or Mullach Coire an Iubhair
Sròn Garbh
Meall Arcruighe
Loch a' Bhealaich Leamhain

1 2 3 4 5 6 7 8 9 10 11

Drawing number: 23/022/CAI/048
Revision: 1
Date of production: 2023-10-06
Drawn by: JB - Tracks Ecology
Projection: British National Grid EPSG:27700

0 500 1,000 m

Scale @ A3 - 1:30,000

Loch Earba Pump Storage Hydro

Figure 4: Static Detector Locations

- Survey Area
- Static Detector Locations
- Inundation
- OS Contours 10m

Ancient Woodland Inventory

- Ancient (of semi-natural origin)
- Long-Established (of plantation origin)
- Other (on Roy map)

244000 246000 248000 250000

786000 784000 782000 780000

Meall Coire Choillie Rais
Am Meall
Binnein Shios
An Cearcallach
Moy Forest
Creag a' Chuir
Loch Laggan
Tom Ban
Moy Lodge
A86
River Spean
Sròn Nan Tarmachan
Binnein Shuas
Meall Buidhe
Lochan na h-Earba
Torr a' Chuilbinn
Creag Pitridh
Geal Charn or Mullach Coire an Iubhair
Sròn Garbh
Meall Arcruighe

1 2 3 4

Drawing number: 23/022/CAI/049
Revision: 1
Date of production: 2023-10-06
Drawn by: JB - Tracks Ecology
Projection: British National Grid EPSG:27700

0 500 1,000 m

Scale @ A3 - 1:30,000

Loch Earba Pump Storage Hydro

Figure 5: Static Detector Activity Survey Results - Common Pipistrelle

244000 246000 248000 250000

786000 784000 782000 780000

Meall Coire Choillie Rais
Am Meall
Binnein Shios
An Cearcallach
Moy Forest
Allt Coire Choille-rais
Allt nan Cearcall
Coire Garbh
An Geurachadh
Coille-fas
Loch Laggan
Tom Ban
A86
Moy Lodge
River Spean
Creag a' Chuir
Loch Doire nan Sgiath
Loch Coire Shuas
Lochan na h-Earba
Sròn Nan Tarmachan
Binnein Shuas
Meall Buidhe
Torr a' Ghuilbinn
Lochan an Turc
Allt Meall Ardruighe
Meall Ardruighe
Creag Pitridh
Geal Charn or Mullach Coire an Iubhair
Sròn Garbh
Loch a' Bhealaich Leamhain
Allt Coire a' Bhealaich Leamhain

1 2 3 4

Survey Area
Static Detector Locations
Median bat passes per hour
Survey 1
0.01 - 2
2 - 5
5-10
10 -20
>20
Survey 2
0.01 - 2
2 - 5
5-10
10 -20
>20
Survey 3
0.01 - 2
2 - 5
5-10
10 -20
>20
Inundation
OS Contours 10m
Ancient Woodland Inventory
Ancient (of semi-natural origin)
Long-Established (of plantation origin)
Other (on Roy map)

Drawing number: 23/022/CAI/050
Revision: 1
Date of production: 2023-10-06
Drawn by: JB - Tracks Ecology
Projection: British National Grid EPSG:27700

0 500 1,000 m

Scale @ A3 - 1:30,000

Loch Earba Pump Storage Hydro

Figure 6: Static Detector Activity Survey Results - Soprano Pipistrelle

244000 246000 248000 250000

786000 784000 782000 780000

Meall Coire Choillie Rais
Am Meall
Binnein Shios
An Cearcallach
Moy Forest
Allt Coire Choillie-rais
Allt nan Cearcall
Coire Garbh
An Geurachadh
Coille-fas
Loch Laggan
Tom Ban
A86
Moy Lodge
River Spean
Creag a' Chuir
Loch Doire nan Sgiath
Loch Coire Shuas
Lochan na h-Earba
Sròn Nan Tarmachan
Binnein Shuas
Meall Buidhe
Torr a' Ghuilbinn
Lochan an Turc
Allt Meall Ardruighe
Meall Ardruighe
Creag Pitridh
Geal Charn or Mullach Coire an Iubhair
Sròn Garbh
Loch a' Bhealaich Leamhain
Allt Coire a' Bhealaich Leamhain

1 2 3 4

Survey Area
Static Detector Locations
Median bat passes per hour
Survey 1
0.01 - 2
2 - 5
5-10
10 -20
>20
Survey 2
0.01 - 2
2 - 5
5-10
10 -20
>20
Survey 3
0.01 - 2
2 - 5
5-10
10 -20
>20
Inundation
OS Contours 10m
Ancient Woodland Inventory
Ancient (of semi-natural origin)
Long-Established (of plantation origin)
Other (on Roy map)

Drawing number: 23/022/CAI/051
Revision: 1
Date of production: 2023-10-06
Drawn by: JB - Tracks Ecology
Projection: British National Grid EPSG:27700

0 500 1,000 m

Scale @ A3 - 1:30,000

Loch Earba Pump Storage Hydro

Figure 6: Static Detector Activity Survey Results - Soprano Pipistrelle

244000 246000 248000 250000

786000 784000 782000 780000

Meall Coire Choillie Rais
Am Meall
Binnein Shios
An Cearcallach
Moy Forest
Allt Coire Choillie-rais
Allt nan Cearcall
Coire Garoh
An Geurachadh
Coille-fas
Loch Laggan
Tom Ban
A86
Moy Lodge
River Spean
Creag a' Chuir
Loch Doire nan Sgiath
Loch Coire Shuas
Lochan na h-Earba
Sròn Nan Tarmachan
Binnein Shuas
Meall Buidhe
Orguibin
Torr a' Ghuilbinn
Lochan an Turc
Allt Meall Ardruighe
Meall Ardruighe
Creag Pitridh
Geal Charn or Mullach Coire an Iubhair
Sròn Garbh
Loch a' Bhealaich Leamhain
Allt Coire a' Bhealaich Leamhain
1
2
3
4

Survey Area
Static Detector Locations

Median bat passes per hour

Survey 1
0.01 - 2
2 - 5
5-10
10 -20
>20

Survey 2
0.01 - 2
2 - 5
5-10
10 -20
>20

Survey 3
0.01 - 2
2 - 5
5-10
10 -20
>20

Inundation
OS Contours 10m

Ancient Woodland Inventory
Ancient (of semi-natural origin)
Long-Established (of plantation origin)
Other (on Roy map)

Drawing number: 23/022/CAI/051
Revision: 1
Date of production: 2023-10-06
Drawn by: JB - Tracks Ecology
Projection: British National Grid EPSG:27700

0 500 1,000 m

Scale @ A3 - 1:30,000

APPENDIX C – LEAD SURVEYOR – JAMES BUNYAN CV

JAMES BUNYAN

DIRECTOR – TRACKS ECOLOGY LTD

TRACKS ECOLOGY
ECO - GIS - UAV

PHONE 07528 865557

EMAIL info@tracksecology.com

LINKEDIN /in/jamesbunyan

TWITTER @TracksEcology

PROFILE

I have over 20 years' experience working in the ecological sector, both in academia and commercial consultancies. In 2014 I set up Tracks Ecology Ltd to enable me to focus on a number of interests around the integration of technology in ecological consultancy and research. Today I provide a bespoke consultancy service incorporating a wide array of surveys for developments, forestry and nature recovery projects with a focus on using GIS, UAVs and wider technological applications.

EDUCATION

Biodiversity and Conservation, M.Sc.

University of Leeds, UK

Grade: Distinction. 2001 - 2002

Environmental Science B.Sc (Hons)

University of Birmingham, UK

Grade: 2:1 Hons. 1995 - 1998

EXPERTISE

- Ecological Survey & Assessment
- QGIS – data analytics & cartography
- UAVs for ecological applications
- Environmental applications of AI
- Integration of remote sensing data
- Harnessing emerging technology
- Clear and concise reporting

WORK EXPERIENCE

DIRECTOR

Tracks Ecology Ltd

2014 - Present

Provision of high quality bespoke ecological and GIS services for projects of all sizes. Tracks Ecology Ltd offers pragmatic and ecologically responsible solutions to a range of sectors including construction, forestry and rewilding. Harnessing technological advances and novel approaches combined with traditional field techniques Tracks Ecology Ltd aims to provide a comprehensive range of services efficiently and effectively.

SENIOR CONSULTANT

Atmos Consulting Ltd

2010 - 2014

Management of ecological inputs for planning applications in relation to a large number of renewable energy schemes (wind and hydro) both large (Section 36) and small (FiT) across Scotland, Projects included ecological input to screening, scoping, EcIA, Habitat Regulations Appraisal and Environmental Appraisal documents. Development of habitat and post construction management plans, peat restoration plans and licensed mitigation strategies.

SENIOR ECOLOGIST

Worcestershire Wildlife Consultancy

2008 - 2010

All aspects of ecological survey work were undertaken with the preparation, submission and implementation of numerous EPS licence applications (bats, great crested newts) along with a number of badger development licences. Production of tenders, client liaison, project management, marketing and administration along with providing training and support for colleagues.

KEY SKILLS

- Protected Species Surveys
- Ecological Impact Assessments
- CAA Approved UAV Pilot
- NatureScot EPS Licenses – Bats
- NatureScot EPS Licenses – GCN
- Skilled in QGIS
- Proficient in MS Office applications
- Qualified and insured UAV pilot
- Budget management (> £100K)
- Client liaison and management

INTERESTS

MEMBERSHIPS

Chartered Institute of Ecology and Environmental Management (Full membership)

ARPAS-UK

The Association for Geographic Information

WORK EXPERIENCE (CONTINUED)

POSTGRADUATE RESEARCH

2007 - 2008

University of Bristol

Research project focusing on predator-prey interactions within wildlife corridors in north eastern Belize. Project involved various tropical field research techniques including camera trapping, scat collection, surveys for signs of prey and carnivore species and small mammal trapping. All work was carried out within the remote tropical forests of NE Belize.

ECOLOGICAL CONSULTANT

2006 - 2007

Land Care Associates, Birmingham

Ecological surveys across both urban and rural landscapes involving Phase 1 and protected species surveys. Involvement in large-scale urban development focusing on regeneration and urban biodiversity improvement schemes across the UK.

RESEARCH ASSISTANT

2004 - 2006

Wildlife Conservation Research Unit, Oxford University

Research assistant working on a number of projects including behavioural ecology of badgers and population monitoring of small mammals. Position also involved extensive administrative and project management work.

PROJECTS

- **WILDCAT SURVEYS** – Survey design and implementation using over 80 camera traps within the Cairngorm Connect landscape to assess baseline populations of the Scottish Wildcat. (Client: Saving Wildcats partnership)
- **UAV MAPPING** – Acquisition and processing of over 5000 high resolution images for production of detailed 3D model as baseline model for seabird research, Orkney. (Client: School of Biological Sciences, University of Aberdeen)
- **DETAILED HABITAT MAPPING** – Use of UAV acquired aerial imagery and ground based habitat surveys to provide detailed 3D models of habitats. Outputs guided native woodland creation plans. (Client: Bidwells)
- **BAT SURVEYS, WIND FARM** – Survey design and data collection of bat activity with the use of 12 static detectors at proposed wind farm site in remote location in Scottish Highlands. (Client: ITPEnergised)

MORE PROJECT EXAMPLES CAN BE PROVIDED ON REQUEST

REFERENCES

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END OF DOCUMENT