



**BORALEX**

## Loch Toftingall BESS

### Appendix 7.1 – Bat Survey Report

August 2023

Project No: 0669684

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## 1. INTRODUCTION

This Appendix describes the methods and results of bat surveys undertaken to obtain baseline ecological information, to inform the Loch Toftingall Battery Energy Storage System (BESS) (hereafter referred to as ‘the Proposed Development’). The surveys were undertaken for a proposed wind farm, however since the date of the surveys, the two turbines have been removed from the Proposed Development and the development will just consist of a BESS.

### 1.1 The Site and Surrounds

The Site is approximately 39 ha and the footprint of the Battery Energy Storage System (BESS) is approximately 1 ha. It is located approximately 17 kilometres (km) west of Wick, 1.6 km south-east of Spittal (at its nearest point) and 5.6 km to the west of Watten in Caithness, The Highlands (see Chapter 2, Figure 2.1). It is accessed via a new road off the existing Halsary Wind Farm access road.

The northern half of the Site comprises mature commercial conifer plantation (predominantly Sitka spruce), some of which has been felled recently, with blanket bog along the rides. Allt Eireannaich runs across the eastern part of the Site and drains into the Loch of Toftingall. It is heavily vegetated with little water flow and areas of marshy grassland along the margins. Areas of wet modified bog (following felling of conifers) lie to the west, including areas of acid flush, and to the south, where the access road will be located.

## 2. METHODS

### 2.1 Desk Study

As part of a data request from the Highland Biological Recording Group (HBRG) in August 2022, bat records over the previous 20 years were sought in a 10 km for species of high population vulnerability to wind turbines (as the Proposed Development at that time included wind turbines), such as Leisler’s bat (*Nyctalus leisleri*), noctule bat (*Nyctalus noctula*) and Nathusius’ pipistrelle (*Pipistrellus nathusii*) and a 5 km radius for other species. Information on designated sites where bats are a qualifying feature was sought from the NatureScot Site Link website<sup>1</sup>, based on the criteria in Table 1.

**Table 1: Search Criteria for Designated Sites**

Level of Protection	Designation	Search Radius from Site
Non-Statutory	Ancient Woodland Inventory (AWI)	2 km
	Scottish Wildlife Trust (SWT) Reserves	
	Site of Interest for Nature Conservation (SINC)	
	Local Nature Reserve (LNR)	
Statutory	Ramsar	5 km
	Special Area of Conservation (SAC)	
	National Nature Reserve (NNR)	
	Site of Special Scientific Interest (SSSI)	

<sup>1</sup> NatureScot (2021). *SiteLink*. Available online at: <https://sitelink.nature.scot/home> (Accessed 15/08/2023)

## 2.2 Field Survey

### 2.2.1 Roost Survey

Roost Surveys were not required as no potential roost features (PRF) were identified in the trees in the conifer plantations on the Site and immediate surrounds.

### 2.2.2 Remote Static Survey

A ground-level static survey was undertaken to identify the species assemblage and activity levels at the Site (the Remote Static Survey) taking account of the NatureScot guidance for assessing windfarms<sup>2</sup>. Two full spectrum Anabat Swift bat detectors (hereby referred to as Anabats), were deployed at ground-level (secured to 1 m high posts, or existing fence lines – see Table 2 and Figure 7.5) and were set to record from approximately half an hour before sunset, until approximately half an hour after sunrise, for a minimum of ten consecutive nights in each season (see Table 3).

**Table 2: Remote Static Survey Locations**

RSSL ID	Habitat Description	Habitat Type
A	Forest ride in conifer plantation	Edge
B	Forest ride in conifer plantation	Edge

**Table 3: Remote Static Survey Dates**

Session	Deployment Period	Survey Hours (per Anabat)	Survey Hours (per Session)
1 (spring)	14/06/2022 – 28/06/2022	93.24	186.48
2 (summer)	21/07/2022 – 03/08/2022	106.08	212.16
3 (autumn)	06/09/2022 - 27/09/2022	257.25	514.5
Total			913.14

## 2.3 Data Analyses

### 2.3.1 Bat Call Analysis

The data were analysed using BatExplorer and Anabat Insight software, with reference to bat species call identification guidance<sup>3</sup>, to enable identification of bat species. Although automatic analysis of does assist in identification of bat species, there are some limitations, as calls from bats in the same genus often exhibit a large degree of overlap in their call structures, making definitive identification difficult. Additionally, a bat will vary the structure of its echolocation calls to reflect its needs.

Other limiting factors which may affect the recording of a bat echolocation call include (but are not strictly limited to):

- The distance and direction of the bat in relation to a bat detector;

<sup>2</sup> NatureScot (2021). Bats and Onshore Wind Turbines – Survey, Assessment and Mitigation. Available online at: Bats and onshore wind turbines - survey, assessment and mitigation | NatureScot (Accessed 15/08/2023)

<sup>3</sup> Russ, J (2012). British Bat Calls: A Guide to Species Identification. Pelagic Publishing

- The amount and type of ‘clutter’ in the vicinity of a bat detector;
- Weather conditions; and
- The frequency response of the bat detector microphone.

There is significant overlap in the call parameters between the two most common Scottish bat species; soprano pipistrelle (*Pipistrellus pygmaeus*) and common pipistrelle (*Pipistrellus pipistrellus*). Where this overlap exists, identification may be restricted to genus level, and defined as *Pipistrellus* species (sp.).

### 2.3.2 Bat Activity Index

The Anabats record bat echolocation as individual files containing bat calls within set periods of time (up to a maximum of 20 seconds), as opposed to the total individual bat calls. Additionally, it is often difficult (or not possible in the case of remote monitoring), to distinguish between a single bat passing the detector several times and several bats passing once in succession. Bat data are quantified as the number of files recorded containing bat calls (bat files), not the number of actual calls in real time. Baseline data were interpreted to give an indication of bat activity using an index known as the Bat Activity Index (BAI).

The length of the night (hours of darkness) varies throughout the survey season by up to 40%, and thus the period over which bats may be active also varies significantly. As the surveys were carried out over at least ten nights, the survey time in each session will vary too and this temporal bias was allowed for using the BAI.

BAI is expressed as passes (i.e. bat files) per hour (pph) and helps to identify the highest intensities of habitat use by bats during the available recording time. It allows the data to be interpreted by locations, species, habitat feature and survey session, and informs spatial patterns in activity, as well as temporal patterns across survey session(s).

BAI was calculated for each location by dividing the number of recorded Anabat files by the total number of sampling hours (between 0.5 hours before sunset to 0.5 hours after sunrise), to provide the mean number of bat pph. The mean BAI for each survey session across both locations was calculated by dividing the number of recorded Anabat files by the total number of detector hours per session (total session sampling hours multiplied by number of detectors).

The mean BAI across the survey sessions (e.g. per species), was calculated by dividing the number of recorded Anabat files across the three sessions per species, by the total number of detector hours across the sessions (sampling hours multiplied by number of detectors).

## 2.4 Ecobat Assessment

A measure of relative bat activity was obtained using the online tool Ecobat<sup>4</sup>. The tool compares data from the survey locations with bat survey information collected from similar areas at the same time of year. Ecobat uses the total bat passes for each night for each species and compares this to the values in the systems reference database. Ecobat generates a percentile rank for each night of activity and its associated level of relative bat activity using the following activity categories:

- Low activity: 0-20th percentiles;
- Low to moderate activity: 21<sup>st</sup> - 40<sup>th</sup> percentiles;
- Moderate activity: 41<sup>st</sup> - 60<sup>th</sup> percentiles;
- Moderate to high activity: 61<sup>st</sup> - 80<sup>th</sup> percentiles; and
- High activity: 81<sup>st</sup> - 100<sup>th</sup> percentiles.

<sup>4</sup> Ecobat (2022). Available online at: <http://www.ecobat.org.uk/> (Accessed 15/08/2023)

The reference database includes surveys from the National Bats and Wind Turbine Project and other research studies, as well as data submitted by users. Each output is given an associated Reference Range, which is the number of nights for each bat species that the data were compared to. A Reference Range of over 200 is recommended to be confident in the relative activity level. However, the reference range depends on the number of records held within the Ecobat database for a given species in a given area. The Reference Range was set to include:

- Records from all time periods;
- Only records from within 100 km radius of the survey location; and
- Records using any make of bat detector.

## 2.5 Survey Limitations

Surveys were conducted as part of an earlier scheme design including two wind turbines. As such the location and methodology follows onshore wind guidance as described above. Despite this, data collected are of relevance to the Proposed Development to provide an understanding of species diversity and activity levels, in addition habitats present around the static locations are representative of that lost as part of the Proposed Development.

Due to the dense nature of conifer plantation, it was not possible for surveyors to physically access all woodland areas within the Site and its immediate surrounds, however where possible, the surveyors used binoculars to visually scan these areas to identify any potential roost features.

## 3. DESK STUDY FINDINGS

### 3.1 Designated Sites

No statutory designated sites, where bats are a qualifying feature of the designation, are present in 5 km of the Site, or non-statutory designated sites / areas of Ancient Woodland in 2 km of Site.

### 3.2 Bat Species Records

HBRG provided bat records within a 10 km radius of the Site, as described in **Table 4**.

**Table 4: Bat Species Desk Study Results**

Species	Conservation Status	Year of Record(s)
Common pipistrelle ( <i>Pipistrellus pipistrellus</i> )	EPS <sup>5</sup> , WCA <sup>6</sup> , SBL <sup>7</sup>	2009 - 2012 (18 records)
Soprano pipistrelle ( <i>Pipistrellus pygmaeus</i> )	EPS, WCA, SBL	2009 (1 record)

**Key:**  
 EPS: European Protected Species  
 WCA: Wildlife and Countryside Act  
 SBL: Scottish Biodiversity List

<sup>5</sup> The Conservation (Natural Habitats, &c.) Regulations (1994). *European Bat*. Available online at: <http://www.legislation.gov.uk/uksi/1994/2716/contents/made> (Accessed 15/08/2023)

<sup>6</sup> Wildlife and Countryside Act, 1981 (as amended).

<sup>7</sup> NatureScot (2020). Scottish Biodiversity List. Available online at: <https://www.nature.scot/doc/scottish-biodiversity-list> (Accessed 15/08/2023)

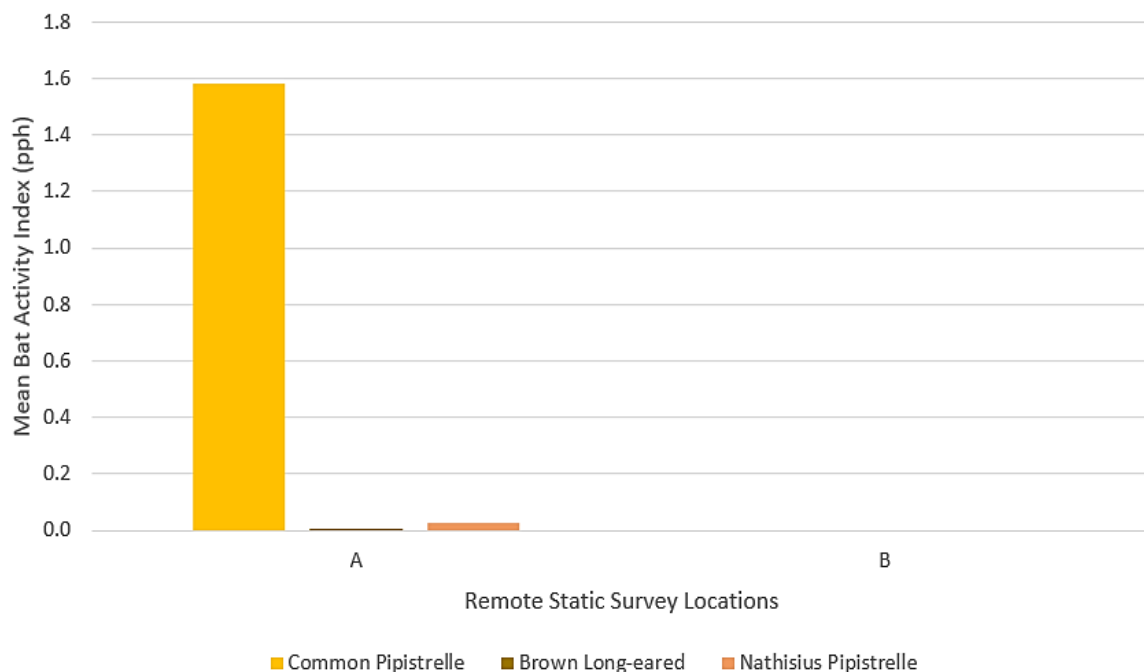
## 4. FIELD SURVEY FINDINGS

Three species of bat were detected including common pipistrelle, Nathusius' pipistrelle and brown long-eared (BLE). Of the total activity recorded, 98.1% was attributed to common pipistrelle, 1.76% attributed to Nathusius' pipistrelle and 0.14 % attributed to BLE. A total of 737 bat passes were recorded over a total of approximately 913 survey hours across the survey sessions (see Table A1, Annex A). This provides a 'total mean BAI' of 0.81 passes per hour (pph) for the Site, or one bat pass every one hour and 14 minutes. BAI expressed by (i) location and (ii) sessions are described in Table 7.

Both survey locations were situated in edge habitat along the rides in the conifer plantations. However, bat activity was only recorded at Location A (see **Chart 1**). Location A was in a much more open and wide forest ride, whilst Location B was in a more hidden / narrow ride (off the ride where Location A was situated). Bat activity was higher in Location A (1.61 pph) than the total mean BAI (0.81 pph) (see Table 5).

**Table 5: Summary of Mean Bat Activity Index**

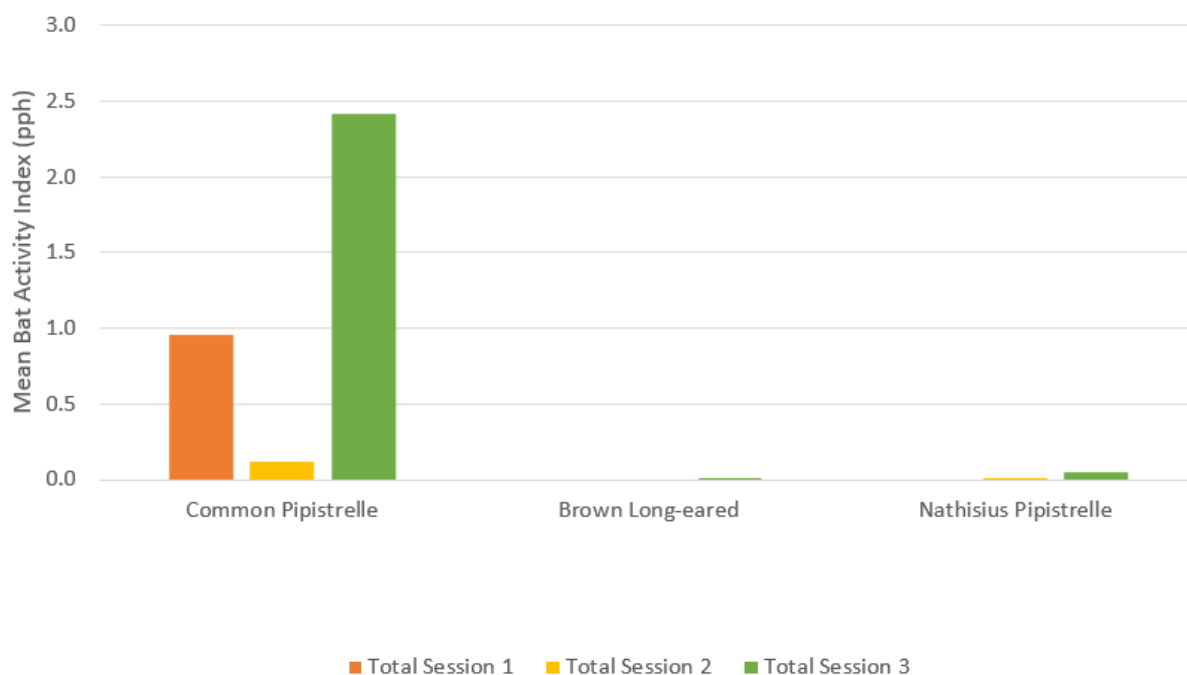
RSSL	Common Pip	Nathusius' Pip	BLE	Mean Total
A	1.58	0.03	<0.01	1.61
B	0	0	0	0
Survey Session	Common Pip	Nathusius' Pip	BLE	Mean Total
1 (spring)	0.96	0	0	0.955
2 (summer)	0.12	0.01	0	0.132
3 (autumn)	2.41	0.05	<0.01	2.465
Total	0.79	0.01	<0.01	0.81



**Chart 1: Spatial Variation in Total Bat Activity (mean BAI) across the Sessions**



Most of the bat activity recorded was in Session 3 (autumn), with 634 bat passes (86 % of the total activity levels recorded), Session 1 (spring) recorded 89 bat passes (12 %) and Session 2 (summer) recorded only 14 bat passes (2%). Due to longer day length during the summer months (and therefore less hours of darkness in which bats are active), the number of survey hours during Session 2 was less than Sessions 1 and 3 (see Table 3). This has been accounted for in the BAI to enable comparisons between each survey session (Annex C, Table C1). Therefore, Session 1 has a total mean BAI of 0.96 pph, compared with a mean BAI of 0.13 pph during Session 2, and mean BAI of 2.47 pph during Session 3. Species abundances were broadly consistent through the sessions, with common pipistrelle dominating the species recorded.



**Chart 2: Temporal Variation in Total Bat Activity (mean BAI) across the Bat Survey Season**

## 5. ECOBAT ASSESSMENT

**Table 6** presents a summary of the total number of bat passes recorded for each species across both locations across the sessions, based on the total number of nights that activity was recorded. Overall, based on the median percentile, Nathusius' pipistrelle was within the Moderate activity category, whereas common pipistrelle and BLE were recorded within the Low to Moderate activity range. However, these findings are relative to the information in the Ecobat database and it is recommended that a Reference Range of at least 200 is required to have confidence in the relative activity levels from such an assessment. Such an activity level is achieved only for common pipistrelle.

**Table 6: Summary of Median and Maximum Percentiles by Species Across the Sessions**

Species	Median Percentile	95% CIs	Maximum Percentile	Nights Recorded	Reference Range
Nathusius' pipistrelle	58 (Moderate)	30 - 100	100 (High)	6	13
Common pipistrelle	21 (Low to Moderate)	19.5 – 47.5	100 (High)	41	1701
BLE	31 (Low to Moderate)	0	31 (Low to Moderate)	1	29



**Table 7** shows the distribution of activity for each species, based on the total number of nights that activity was recorded; and classified using the Ecobat activity categories. Nathusius' pipistrelle and common pipistrelle both recorded nights of Exceptional activity, which represented less than 34 % and 5 % respectively for these species. Common pipistrelle was the only species to record nights of High activity, which represented less than 10%. With the exception of common pipistrelle, these findings are again based on few records, all from one location.

**Table 7: Summary of the Nights of Bat Recordings Across the Sessions in each Activity Category**

Species	Nights of Activity					
	Exceptional	High	Moderate/High	Moderate	Low / Moderate	Low
Nathusius' pipistrelle	2	0	1	1	2	0
Common pipistrelle	2	4	0	9	6	20
BLE	0	0	0	0	1	0

## 6. SUMMARY

The surveys recorded three species of bat (Nathusius' pipistrelle, common pipistrelle and brown long-eared), with the vast majority of the records (approximately 98%) comprising common pipistrelle, a common and widespread bat species. The conifer plantations were not found to provide roosting opportunities for bats and the Site is considered to be of low suitability for foraging and commuting bats. Bat activity was recorded only from the detector at Location outside the Site boundary, with no bat activity was recorded by the detector at Location B on the northern edge of the Site. Activity levels of all species were greatest in autumn.

## ANNEX A: LOCATION - DATA SUMMARY

**Table A1: Total Bat Passes recorded during Remote Static Activity Surveys, by Taxa, Detector Location and Session.**

Session	Location	Common Pipistrelle	BLE	Nathusius' Pipistrelle	Total per Location
1	A	89	0	0	89
	B	0	0	0	0
<b>Total Session 1</b>		<b>89</b>	<b>0</b>	<b>0</b>	<b>89</b>
2	A	13	0	1	14
	B	0	0	0	0
<b>Total Session 2</b>		<b>13</b>	<b>0</b>	<b>1</b>	<b>14</b>
3	A	621	1	12	634
	B	0	0	0	0
<b>Total Session 3</b>		<b>621</b>	<b>1</b>	<b>12</b>	<b>634</b>
<b>Grand Total</b>		<b>723</b>	<b>1</b>	<b>13</b>	<b>737</b>

**Table A2: The mean Nightly Pass Rate (bat passes per hour, per night) recorded during Remote Static Activity Surveys, by Taxa and Detector Location. If NA, then no bat passes were recorded.**

Session	Location	Common Pipistrelle	BLE	Nathusius' Pipistrelle	Total per Location
1	A	0.95	0.00	0.00	0.95
	B	0.00	0.00	0.00	0.00
<b>Total Session 1</b>		<b>0.95</b>	<b>0.00</b>	<b>0.00</b>	<b>0.95</b>
2	A	0.12	0.00	0.01	0.13
	B	0.00	0.00	0.00	0.00
<b>Total Session 2</b>		<b>0.12</b>	<b>0.00</b>	<b>0.01</b>	<b>0.13</b>
3	A	0.00	2.41	0.05	2.46
	B	0.00	0.00	0.00	0.00
<b>Total Session 3</b>		<b>0.00</b>	<b>2.41</b>	<b>0.05</b>	<b>2.46</b>
<b>Grand Total</b>		<b>0.00</b>	<b>0.79</b>	<b>0.01</b>	<b>0.81</b>

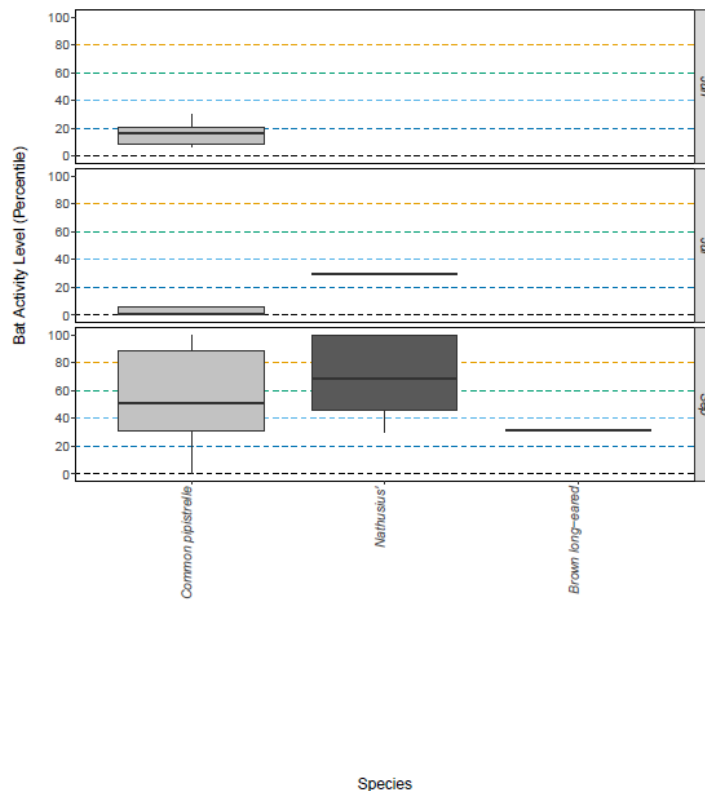
## ANNEX B: ECOBAT DATA SUMMARY

Table B1 below shows the Ecobat output of key metrics for each bat species recorded throughout each Survey Session.

**Table B1: Median and maximum percentiles for each species during each Survey Session**

Survey Session	Species	Median Percentile	95 % CIs	Maximum Percentile	Nights Recorded
Spring (June)	Common pipistrelle	17	19.5 - 47.5	30	13
Summer (July)	Nathusius' pipistrelle	30	30 - 100	30	1
	Common pipistrelle	1	19.5 - 47.5	6	7
Autumn (September)	Nathusius' pipistrelle	69	30 - 100	100	5
	Common pipistrelle	51	19.5 - 47.5	100	21
	BLE	31	0	31	1

The information in Table B1 is also represented graphically in the boxplot depicted by Chart B1 with species shown by month.



**Chart B1: Boxplot displaying the temporal variation in the activity level (percentile) of bats recorded during the survey. The centre line indicates the median activity level whereas the box represents the interquartile range (the spread of the middle 50% of nights of activity)**

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