AULTMORE WIND FARM REDESIGN

Technical Appendix 8.4: Bat Survey Report

Prepared for: Vattenfall Wind Power Limited

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1.0 Introduction

1.1 Background

Vattenfall Wind Power Ltd ('Vattenfall') are seeking to redesign the consented Aultmore Wind Farm at Aultmore Forest, Moray (the Site). Vattenfall (the Applicant) has appointed SLR Consulting Limited (SLR) to conduct a range of environmental studies on the site to inform the Environmental Impact Assessment (EIA) Report.

This report provides the results of survey and monitoring relating to bats, carried out between May and September 2021. It also details the results of additional survey work carried out in August 2022 and September 2023 to inform a proposed access track variation leading into Aultmore Forest.

1.2 Site Description

The proposed wind farm site ('the Site') is located within Aultmore Forest, approximately 6km to the north of the settlement of Keith, Moray. The Site is managed on behalf of Scottish Ministers by Forestry and Land Scotland (FLS) and is defined by the red-line boundary in **Figure 8.4.1**.

The area of the Site extends to 2,400ha, with the proposed wind turbines located in the eastern and western parts of the Site.

The Site consists predominantly of commercial forestry, which comprises one large parcel of land that is referred to as the eastern and western sections, as the central part of the Site is separated by a small strip of non-forested farmland. The three highest hills within the Site are Millstone Hill (301m above ordnance datum (AOD) in the west, Addie Hill (272m AOD) in the centre of the Site and Old Fir Hill (262m AOD) in the east.

Several small, mostly unnamed watercourses are present across the Site; however, none are located within the areas marked for development.

The surrounding area is rural in nature, with land predominantly used for farming, commercial forestry, and areas of open moorland. There are a number of small groups of residential properties and farms close to the Site, the nearest of which is approximately 50m from the edge of the forest.

1.2.1 Site Access

The proposed access route into the Site has been subject to a series of variations throughout the design process. Following a design freeze meeting in March 2023, the proposed route will now traverse east from the B9016 (just north of Croft of Ryeriggs) through agricultural grazing land, rush pasture, and scrubby woodland, before joining an existing forest ride within Aultmore Forest (**Figure 8.4.2**).

1.3 Scope of Study

The over-arching aim of this study is to provide baseline data to inform the wind farm design process and inform the Environmental Impact Assessment (EIA) Report. More specifically, this report aims to:

- Determine the bat assemblage using the Site for foraging or commuting purposes;
- Identify any roosts, key commuting or foraging habitat features that could be affected by the proposal;
- For high collision risk species only:

- Compare levels of bat activity between recording locations within the Site, to identify locations that may be of most importance to commuting or foraging bats, or indicate the nearby presence of a roost; and
- Undertake analysis to determine, if possible, relative levels of activity compared with other sites, using the online *Ecobat* tool[1].

The survey methodology was designed in accordance with wind farm specific guidelines of relevance to the study period (NatureScot *et al.*, 2021) published in August 2021.

This report presents the findings of the bat surveys. The assessment of impacts resulting from the proposed wind farm and the development of mitigation, compensation and enhancement measures (if required) is beyond the scope of this report and is presented separately within **Chapter 8: Ecology** of the EIA Report.

1.4 Relevant Legislation

All bats in Scotland are classed as European protected species and receive full protection under both national and international legislation (**Appendix 01**). The overarching aim of this legislation is to protect, restore and maintain populations of protected bat species at favourable conservation status. It is therefore an offence to intentionally or recklessly kill, injure or disturb any bat, or damage a destroy a bat roost.

While bat fatalities associated with wind farms are generally considered to relate to 'incidental' killing and are unlikely to class as an offence, once a certain level of fatality impact is reached, such killing may cease to be incidental and become classified as intentional or reckless. It is therefore important to understand what species of bat utilise the Site, and how they use it, so that any potential impacts on populations can be adequately assessed, avoided, and/or mitigated for, to ensure compliance with relevant legislation.

[1] The Mammal Society. *EcoBat*. An EcoStat tool. Available online: http://www.mammal.org.uk/science-research/ecostat/ [accessed December 2021].

2.0 Methodology

It should be noted that the scoping response from NatureScot (dated 8 December 2021) detailed no issues or comments relating to the desk study and bat survey methodology.

2.1 Desk Study

A preliminary ecology and ornithology desk study was undertaken by SLR Consulting in August 2021 (SLR Consulting, 2021a). This included a review of publicly available online resources to identify the presence of designated sites for bats within 10km of the site and recent records of bat species within 10 km of the site. Data were primarily sourced from:

- National Biodiversity Network (NBN) Atlas[2]; and
- The North East Scotland Biological Records Centre (NESBReC).

In addition, the following Environmental Statements (ES) for nearby wind farms were also reviewed for relevant species information, including information relating to bats:

- Aultmore Wind Farm (consented; Hyder, 2007) previous ES for the Site;
- Lurg Hill Wind Farm (consented; Vento Ludens, 2017) 3km east of the Site; and
- Myreton Crossroads 2 Wind Farm (operational; RSK Group, 2009) 5km south of the Site.

2.2 Field Surveys

The field survey methodology was designed with reference to wind farm specific guidelines[3]. It comprises habitat appraisal and deployment of a suite of automated full spectrum detectors at 12 of the 16 turbine locations, at ground level. No at height monitoring was undertaken and no walked transects were undertaken. Full details of each survey type are provided below; where the methodology deviates from the guidelines, a rationale has been provided.

2.2.1 Survey Area

The Site

The survey area was designed to take into account the survey requirements set out in bat related guidance of relevance to the time period of this study (Collins, 2016).

Site Access

An additional area of land to the west of the Site boundary, encompassing the proposed access route into Aultmore Forest, was assessed in August 2022 and September 2023. The corresponding 'survey area' encompassed the proposed access route and an associated 250m buffer, as denoted by the blue dashed line in **Figure 8.4.2**.

[2] Available online: http://nbnatlas.org

[3] NatureScot (2021) Bats and onshore wind turbines – survey, assessment and mitigation. Available at: https://www.nature.scot/doc/bats-and-onshore-wind-turbines-survey-assessment-and-mitigation

2.2.2 Habitat Appraisal

The Site

Maternity Roost/Significant Winter Hibernation Potential

Key features for supporting maternity roosts and significant hibernation and/or swarming sites within 200m plus rotor radius of the boundary of the proposed development would ideally be surveyed for commuting/foraging potential (note that the Aultmore site did not provide for this). The guidelines[Error! Bookmark not defined.] state that the search area may need to be extended if there is a high level of habitat connectivity in the surrounding area and this is considered likely to attract bats into the wind farm area from further afield. Habitat assessment, for key features to support maternity and significant hibernation/swarming, needs to be considered to cover the site and a 200m plus rotor radius buffer from proposed turbine locations, which totals a 285m buffer (where this extends beyond the Site). Assuming blade length of 85m, hub height of 115m and feature height of 20m (tree height). No areas were identified on aerial images and mapping that would necessitate the search of this wider area on the ground; therefore, it was not conducted.

Bat Roost Potential

The bat roost potential survey on the ground covered the site and up to a 50m buffer area of planned infrastructure, where accessible to the surveyor. A high-level roosting suitability assessment was carried out for the Site (owing to the wider Site being dominated by coniferous plantation woodland that presented access issues).

Commuting/Foraging Potential

The suitably of the Site to support foraging and commuting bats was assessed following BCT guidelines.

Site Access

A walkover of the proposed access route survey area to assess the suitability of habitats for support commuting, foraging, and roosting bats was carried out during daylight hours in August 2022. During the appraisal, habitats within the survey area were assessed against specific criteria detailed within Collins (2016) in order to assign a 'level' of commuting and foraging suitability (i.e., High, Moderate, or Low).

The access route was subject to a detailed Preliminary Roost Assessment (PRA). Trees within the access route were subject to an external visual assessment for evidence of current or historic bat roosting, undertaken from ground-level, using close-focusing binoculars (8x32), during daylight hours in August 2022.

This approach enables a direct search for evidence of roosting, such as live or dead bats, droppings or staining from urine or fur oils, or features with suitability to allow bat access e.g., torn off branches, or split bark.

A given tree may support several features of potential value to roosting bats; it is not always possible to confirm if a feature is being used by bats, as they may not use the feature frequently or at the time of survey. Consequently, it is customary when undertaking a PRA to assign each potential roosting feature to a defined category of roosting suitability in accordance with good practice, as follows: Negligible, Low, Moderate, High, and Confirmed, with the overall suitability of the tree evaluated based upon the features identified.

Trees that were initially recorded as having suitability for roosting bats were subject to further survey. Features with suitability for roosting bat were surveyed with an endoscope and given an updated roosting assessment.

2.2.3 Static Bat Activity Survey

The guidelines state that the survey effort should be focused in areas of the development site where turbines are likely to be located. When developments have more than ten turbines (this Site has 16) then the remainder should be distributed to give representative indication of bat activity in different habitats and topographical locations on the Site. The static bat detector surveys sampled the proposed turbine locations, as well as further locations within the site on survey sessions where it was not possible to sample all proposed turbine locations (further information is provided in Sections 2.3.2 and 2.7). It should be noted that design iterations and limited access to the locations mean that some locations are not directly on the final turbine locations.

The survey area boundary and static detector locations are shown in **Figure 8.4.1**.

2.2.4 Habitat Appraisal for Potential Bat Roost Suitability & Assessment of Habitat Risk

A desk study was conducted using aerial maps to identify potential roost and foraging habitats in the vicinity of the Site.

The Site survey area (see **Figure 8.4.1**) was walked during daylight hours to search for potential bat roost features. The Site has no buildings or underground features present. An Initial Site Risk Assessment was also conducted, assigning the habitat within the survey area to a risk category (low, moderate or high) using criteria provided within the current guidelines (Collins, 2016) and reproduced in **Appendix 02**. Habitat suitability was assigned to individual features with the exception of areas of forestry plantation that were described as a block/coupe.

The surveys were undertaken in conjunction with vegetation/mammal surveys on 09-13th August 2021 inclusive. During all days, rain showers occurred, but the weather was generally dry and breezy.

2.2.5 Activity Survey – Static Bat Detector Survey

Full spectrum bat detectors (SM2, SM2+ and SM4, Wildlife Acoustics) were deployed at 12 of the 16 turbine locations (locations as submitted to Scoping, T1, T5-T8 and T10-T16) for the following periods:

- Spring: 03/06/2021 – 19/06/2021 and 19/06/2021 – 05/07/2021 (see Limitations in **Section 2.7.2**)
- Summer: 20/07/2021 – 05/08/2021
- Autumn: 20/08/2021 – 05/09/2021

The summer and autumn surveys were undertaken with use of SM4 detectors only.

Detectors were deployed with microphones attached to wooden stakes approximately 1m above ground level (see **Photographs 2.1** and **2.2**), facing approximately north, with detectors programmed to record from half an hour before sunset until half an hour after sunrise on each night.

The locations of each static detector are shown in **Figure 8.4.1** and described in more detail in **Table 2-1**. The broad habitat of each static detector are:

- Detectors 1, 7, 8, 10, 11 are within/on edge of coniferous woodland habitat;
- Detectors 5, 12 – 16 are located within coniferous woodland ride habitat; and
- Detector6 is located within *Holcus-Juncus* neutral grassland habitat.

Table 2-1
Static Bat Detector Locations

Sample Point	Grid Reference	Description
1	NJ 46420 58440	Detector located at proposed location of Turbine 12, at the eastern end of the site, within/on edge of coniferous woodland habitat, with no linear features within 50m.
5	NJ 46544 58751	Detector located between proposed location of Turbine 10 and Turbine 12, at the eastern end of the site, within coniferous woodland ride/edge habitat, with no linear features within 50m.
6	NJ 45002 58737	Detector located approximately 400m west of Turbine 6, at the central area of the site, within Holcus-Juncus neutral grassland habitat, with no linear features within 50m.
7	NJ 47555 57794	Detector located between proposed location of Turbine 15 and 16, at the south-eastern end of the site, within coniferous woodland habitat, with no linear features within 50m.
8	NJ 47803 58538	Detector located close to proposed location of Turbine 13, at the eastern end of the site, within coniferous woodland habitat, with no linear features within 50m.
10	NJ 46091 59252	Detector located close to proposed location of Turbine 7, at the north-eastern end of the site, within coniferous woodland habitat, with no linear features within 50m.
11	NJ 46893 59450	Detector located approximately 200m west of proposed location of Turbine 8, at the northern end of the site, within coniferous woodland habitat, with no linear features within 50m.
12	NJ 41440 56981	Detector located between proposed location of Turbine 2 and 4, at the western end of the site, within coniferous woodland ride/edge habitat, with no linear features within 50m.
13	NJ 42229 57582	Detector located approximately 200m north of proposed location of Turbine 3, at the western end of the site, within coniferous woodland ride/edge habitat, with no linear features within 50m.
14	NJ 42673 57201	Detector located approximately 400m south-east of proposed location of Turbine 3, at the western end of the site, within coniferous woodland ride/edge habitat, with no linear features within 50m.
15	NJ 42446 56709	Detector located approximately 500m south-east of proposed location of Turbine 4, at the south-eastern end of the site, within coniferous woodland ride/edge habitat, with no linear features within 50m.
16	NJ 41289 56942	Detector located between proposed location of Turbine 2 & 5, at the south-eastern end of the site, within coniferous woodland habitat, with no linear features within 50m.

Photograph 2.1
Example of static bat detector setup on edge of coniferous woodland habitat (Sample location 1)

Photograph 2.2
Example of static bat detector setup within plantation ride/edge habitat (Sample location 5)

Weather Data and Survey Dates

The guidelines[Error! Bookmark not defined.] state that minimum 10 nights of data per season should be collected, within appropriate weather conditions, specifically with a dusk temperature of 8°C or above (in Scotland), ground level wind speed of 5m/s or lower, and no rain or very light rain. The guidelines also state that surveys should aim for 10 consecutive nights, but in practice weather conditions may preclude this, particularly early or late in the year and in more northerly latitudes. The guidelines also go on to say that in practice, particularly in more northerly latitudes, there will be limitations on the number of suitable nights and some surveys may need to take place over longer periods which sample a range of conditions. In such cases, the survey period should be planned and justified by the ecologist and the effect on bat behaviours considered taking account of weather forecasts.

The deployment of detectors was targeted for periods where the weather forecast indicated the best possible chance for suitable weather conditions. The detectors were then deployed for a period of 16 nights during each season to maximise the chances of obtaining 10 nights of data during optimal weather conditions. During spring there were some faults with the static detectors, resulting in them being dispatched in two batches, see section 2.7.2 for further explanation of limitations. However, 10 nights of data were still collected during optimal conditions for both sets of detectors in spring (**Table 2-2**).

The dates used in the analysis, along with details of the weather conditions on those dates, are detailed in **Table 2-2**.

Table 2-2
Survey Dates and Weather Conditions

Survey Nights Used for Analysis	Sunset - Sunrise	Temperature at Sunset	Nightly Average Wind Speed (m/s)	Daily Rainfall (mm)
Spring session - deployment dates: 3rd June – 19th June 2021 (16 nights) and 19th June – 5th July 2021 (16 nights) Sample locations: 1, 5, 6, 7, 8, 10, 11, 12, 13, 14, 15, 16 (12 sample points)				
4th June 2021	22:02 – 04:18	13.4	2.24	0.0
5th June 2021	22:03 – 04:17	13.8	3.71	3.2
6th June 2021	22:04 – 04:16	8.9	2.176	0.0
7th June 2021	22:06 – 04:15	10.1	2.4	0.0
8th June 2021	22:07 – 04:15	15.0	2.01	1.8
9th June 2021	22:08 – 04:14	14.3	2.13	1.2
10th June 2021	22:09 – 04:13	14.1	5.0	0.0
11th June 2021	22:10 – 04:13	8.1	3.87	0.0
12th June 2021	22:10 – 04:12	12.3	3.02	0.0
13th June 2021	22:11 – 04:12	13.0	3.9	0.0
20th June 2021	22:15 – 04:12	8.2	3.58	0.0
22nd June 2021	22:15 – 04:12	9.7	2.71	0.8
23rd June 2021	22:15 – 04:13	14.4	1.92	0.0
25th June 2021	22:15 – 04:14	8.3	4.7	1.0

Survey Nights Used for Analysis	Sunset - Sunrise	Temperature at Sunset	Nightly Average Wind Speed (m/s)	Daily Rainfall (mm)
26th June 2021	22:15 – 04:14	8.5	1.59	0.0
27th June 2021	22:14 – 04:15	10.4	1.94	0.0
28th June 2021	22:14 – 04:16	12.0	1.2	0.0
29th June 2021	22:14 – 04:17	8.9	3.04	0.4
1st July 2021	22:13 – 04:18	8.1	0.67	0.0
2nd July 2021	22:12 – 04:19	10.9	2.61	0.2
Summer session - deployment dates: 20th July – 5th August 2021 (16 nights) Sample Locations: 1, 5, 6, 7, 8, 10, 11, 12, 13, 14, 15, 16 (12 sample points)				
20th July 2021	21:50 – 04:46	10.3	1.72	0.0
21st July 2021	21:49 – 04:48	10.6	1.76	0.0
22nd July 2021	21:47 – 04:50	10.3	1.59	0.0
23rd July 2021	21:14 – 04:52	11.4	1.17	0.0
24th July 2021	21:43 – 04:54	10.1	2.45	0.0
25th July 2021	21:41 – 04:56	12.1	1.3	0.2
26th July 2021	21:39 – 04:57	13.9	1.28	0.0
30th July 2021	21:31 – 05:05	11.2	4.0	0.2
31st July 2021	21:29 – 05:07	9.6	4.54	0.8
1st August 2021	21:27 – 05:10	9.9	2.5	0.0
Autumn session - deployment dates: 20th August – 5th September 2021 (16 nights) Sample Locations: 1, 5, 6, 7, 8, 10, 11, 12, 13, 14, 15, 16 (12 sample points)				
22nd August 2021	20:36 – 05:54	13.8	1.31	0.0
23rd August 2021	20:33 – 05:56	12.8	1.64	0.0
24th August 2021	20:30 – 05:58	12.2	1.66	0.0
25th August 2021	20:28 – 06:00	11.5	3.83	0.2
26th August 2021	20:25 – 06:02	9.5	1.68	0.0
27th August 2021	20:22 – 06:04	8.8	1.89	0.0
28th August 2021	20:20 – 06:06	12.3	2.23	0.4
29th August 2021	20:17 – 06:08	9.3	1.69	0.2
30th August 2021	20:14 – 06:11	10.2	3.23	0.8
31st August 2021	20:11 – 06:13	10.1	3.63	0.0

**weather data highlighted in bold indicates values that do not meet the threshold criteria for appropriate weather*

Survey Nights Used for Analysis	Sunset - Sunrise	Temperature at Sunset	Nightly Average Wind Speed (m/s)	Daily Rainfall (mm)
conditions within the guidelines[1] (refer to Section 2.7 for a discussion of weather limitations).				

Temperature and wind speed data were collected from meso data[4] as provided by Vattenfall, which takes readings every 60 minutes. The lowest met mast sample point was at 10m height. A conversion was used to convert the wind speed data at 40m to 10m[4] (this is likely to be similar but marginally higher than wind speed at ground level). Wind speed data was provided as average wind speed per 1-hour interval from April – October 2021 inclusive. Using these values, an average per night was determined. Since the duration of the night-time period varies over the course of the monitoring period, a simplifying protocol was applied to most efficiently undertake data analysis. This process, which is not considered likely to have significantly affected the results, involved assuming the same sunset and sunrise time for each day in each month, with the longest possible night-time period within each month used in the analysis, with an additional 30 minutes added prior to sunset and after sunrise to account for periods of twilight, as described in Error! Reference source not found.**3**. This period was then used to work out the average nightly wind speed.

Rainfall data were obtained from a weather station at RAF Lossiemouth[5] (located approximately 15km east of the site). It was not possible to obtain night-time only rainfall data, and therefore the amount of rain falling during the night is likely to be smaller than the rainfall figures given in **Table 2-2** (which includes the full 24-hour period). For the purposes of this assessment, light rain has been classified as daily rainfall of under 4mm.

Table 2-3
Night-time Period: Maximum Extent Applied for Each Month to Determine Nightly Average Wind Speed

Month	Latest sunrise + 30 minutes	Earliest sunset -30 minutes
June	04:52:00	21:28:00
July	05:35:00	20:59:00
August	06:41:00	19:41:00

2.3 Bat Sonogram Analysis

Bat calls were analysed in full spectrum format using Kaleidoscope Pro (version 5.1.3) software. An auto identification filter within Kaleidoscope Pro was used initially to assign calls to likely species, using a Bats of Europe filter (version 5.1.0). This software allows data to be classified automatically with bat species which fit the same call characteristics that each call file provides. While the software is efficient, it is not totally infallible, therefore the following manual checks by an experienced bat worker skilled in bat call identification at SLR were also undertaken as follows:

- All locally rare/previously unrecorded species including Nathusius' pipistrelle (*Pipistrellus nathusii*), brown long-eared bat (*Plecotus auritus*) and noctule bat (*Nyctalus noctula*) auto-ids. If incorrect, these were manually corrected;

[4] EMD-WRF Europe+ MesoScale Data Set - Learn more hereEMD International (emd-international.com)

[5] Rainfall data was obtained from: RAF Lossiemouth via FS PG Hodges, Airfield Manager (ATC)

- 5% of each of the auto-id results for common pipistrelle (*Pipistrellus pipistrellus*) and soprano pipistrelle (*Pipistrellus pygmaeus*). These were not manually corrected if wrong (due to large number of registrations), but the process enabled verification of the error rate of the software; and

- Due to the difficulties of separating *Myotis* species from sonograms alone, *Myotis* calls have not been manually identified beyond genus level.

John Russ (2021) was used as the main reference text for the above process. When interpreting the data, the following premise was used:

- For the purpose of differentiating between common and soprano pipistrelle bat, calls with a peak frequency between 41.1kHz and 50kHz have been classified as common pipistrelle. Above 50kHz as soprano pipistrelle. Initially, calls with a peak frequency of 41kHz or less are considered to be Nathusius pipistrelle (in line with John Russ 2021). However, detailed interrogation of these concluded that most were common pipistrelle, as evidenced by them being isolated passes within a period of common pipistrelle activity and with a peak above 40kHz (i.e., still within the range used by common pipistrelle).

- Therefore, in this instance calls were only assigned as Nathusius pipistrelle if the characteristic frequency was 40kHz or below and in the absence of common pipistrelle calls immediately before or afterward. Pipistrelle registrations may however remain ambiguous, such registrations were instead assigned to 'pipistrelle species'.

For the comparison of results a quantity called a 'bat pass' has been created. A bat pass has been defined as a file generated by the bat detector, which contains two or more bat calls (likely attributed to the same bat). The detectors are programmed to generate a new file when no bat call has been detected for at least 1 second. The number of bat passes does not relate to the number of bats present in one sample location (as one bat may make several passes); yet rather, gives an indication of the level of bat activity in that location over each recording period.

2.4 Survey and Data Analysis Personnel

Nicola Faulks MCIEEM, SLR Principal Ecologist, undertook the habitat assessment for bat roosting potential and Nicola Tyrrell CEnv, MCIEEM, SLR Principal Ecologist deployed the static detectors at the start of the spring monitoring period with Fiona Newcombe (Field Ecologist on behalf of Stagfire Ecology). Static detectors were subsequently collected and re-deployed by Fiona for the remainder of the survey period. Bat call analysis was undertaken by Rachel McLeod, SLR Assistant Ecologist.

Nicola Faulks has over 15 years' professional experience within ecological consultancy, and has extensive experience in bat survey and analysis. Nicola Tyrrell has survey experience and has managed numerous bat projects and teams over her 15 years' experience. Rachel has survey experience and has conducted intensive sonogram analysis and EcoBat training with support of the SLR expert bat team.

Endoscopic inspection of trees that were assessed to have bat roost suitability during the initial survey was carried out by Hannah Rowding ACIEEM, SLR Senior Ecologist, and Stuart Abernethy ACIEEM, SLR Senior Field Ecologist, on September 8th 2023. Both Hannah (licence no. 224935) and Stuart (licence no. 165055) are NatureScot licenced bat surveyors and trained tree climbers.

2.5 Assessment of Relative Bat Activity Levels

In accordance with current guidelines (Collins, 2016), the relative level of bat activity recorded during the static

detector surveys was analysed through the use of the secure online tool *Ecobat*[6], initially designed by the University of Exeter and now hosted and developed by the Mammal Society (Lintott *et al.*, 2018). *Ecobat* compares data entered by the user with bat survey information collected from similar areas at the same time of year and (where possible) in comparable weather conditions. *Ecobat* generates a percentile rank for each night of activity and provides a numerical way of interpreting the relative levels of bat activity recorded at a site with other sites across the same regions or across Britain as a whole.

The static bat detector survey data were entered into the *Ecobat* tool and relative levels of activity were determined by comparison with a reference data set including records from within 30 days of each survey date and within 200km of the survey location. Although there is an option to include data within a 100km radius only, a 200km radius was used (covering northern and central Scotland) in order to provide enough reference points to allow for a meaningful output (the dataset was compared against 4,005 records within a 200km radius of the site), given the geographical location, with much of the search radius comprising sea.

Only bat presence data is captured by *Ecobat*. The tool does not capture nights or sample points where no bat activity is recorded, such that the output statistics and percentiles relate only to those nights where bats were recorded.

For each night where bat activity was recorded, *Ecobat* reports the percentile (and associated confidence limits) of the night of data against the reference range. For example, data reported as being within the 80th percentile means that 80% of the nights within the reference range have less than or equal to the number of bat passes than the night being analysed.

The guidelines[1] define bat activity levels on a particular night as:

- 0 - 20th percentile – low;
- 21st - 40th percentile – low to moderate;
- 41st – 60th percentile – moderate;
- 61st – 80th percentile – moderate to high; and
- 81st – 100th percentile – high.

2.6 Survey Limitations

2.6.1 Automated Survey: Weather

In autumn and the first spring deployment it was possible to collect 10 consecutive nights of static bat data in suitable weather conditions. In the second spring deployment and summer it was not. In the second spring deployment three nights had rain that exceeded the threshold for appropriate weather (21 June, 24 June and 30 June2021) and were thus removed from the analysis. Additionally, in summer the 10 nights of data used are for a period of seven suitable nights and a period of three suitable nights, separated by three days with rain (27 July 2021 – 29 July 2021) that exceeds the threshold for appropriate weather.

2.6.2 Automated Survey: Equipment Malfunction

In spring, there were some issues with the SM2 model bat detectors where they failed to record at some point

[6] http://www.mammal.org.uk/science-research/ecostat/

during the monitoring period. This affected the data collected at the following locations (**Table 2-4**):

Table 2-4
Locations of Failed Detectors During Static Activity Surveys

Location	Dates	Issue
1	19th June 2021	Issue with date time resetting itself, no data recorded during full spring survey period.
12	19th June 2021	No power on opening detector at end of survey period.
15	28th May 2021	Issue with advanced setting when collected, this was resolved and programmed with correct advanced settings.

Replacements/alterations were made as soon as practical to minimise the period without data, such that minimum of 10 nights of data were obtained for each location, in each season, during suitable weather.

During spring the static detector at location 1 failed to record throughout the survey period.

2.6.3 Automated Survey: Survey Period

The collision risk assessment relates to data obtained for the full active bat season, and does not differentiate activity between seasons (i.e., spring, summer, autumn).

2.6.4 Chance

An ecological study provides only a 'snapshot' of the conditions prevailing at the time of survey. Lack of evidence of any one protected bat species does not necessarily preclude them from being present on site at a later date. Whilst it is considered unlikely that any significant evidence of additional bat species has been overlooked, due to the nature of the subjects of ecological surveys it is feasible that species that use the site may not have been recorded by virtue of their seasonality, habit or random chance.

2.6.5 Conclusion

It is considered unlikely however, that additional surveys of the site at this time would materially alter the conclusions of this report.

3.0 Results

3.1 Desk Study

NBN holds 49 bat records between a 5 and 10km radius from the site. From the desk study (SLR Consulting, 2021a) there were 8 records from NESBReC comprising common pipistrelle, soprano pipistrelle, Daubenton's bat (*Myotis daubentonii*), brown long-eared bat and noctule.

Possible roost sites were located in the old railway abutments and the occasional mature ivy clad trees further west of the plantation forest. No emergence/re-entry surveys were conducted as they were beyond the zone of influence of the proposed work. There was no bat activity noted along the Site roads, the majority of the access road and along the existing tracks through the planation areas. Pipistrelles (non-species-specific) were recorded feeding and commuting from the dismantled railway westwards to the end of the access road, where the habitat was more suitable. Bat activity was also found along linear features such as hedges, the existing road, broadleaved woodland edge and in the vicinity of the Burn of Tynet.

From the previous Aultmore ES common pipistrelle and unconfirmed pipistrelle species were found within the site boundary (Hyder, 2007; RSK Group, 2009). Additionally, bat surveys were undertaken by Vento Ludens in 2017 as part of the EIA for Lurg Hill Wind Farm, located 3km east of the site, one to three common pipistrelles were recorded foraging during these activity surveys.

Some of these records are only accurate to a 10km grid square, therefore they may relate to records further than 10km from the site.

3.2 Field Surveys

3.2.1 Habitat Appraisal

Potential Roost Assessment

The Site

There are no buildings, structures, or underground features such as mine entrances, which could be used by roosting bats within the survey area. During the daytime assessment on site (9th to 13th August 2021) the site was assessed to offer limited suitability for roosting bats as there are minimal mature trees on site, trees are planted very close together resulting in thin, long stems with less likelihood of Potential Roost Features (PRFs). None were visible to the surveyor, where access allowed; it is noted that, coniferous trees can provide some roosting potential where there is flaking bark, damage to the trunk/limbs and not all trees could practically be inspected at the time of survey. Habitat suitability was assigned as a block/coupe in the forestry area since survey of every individual tree was not practical/accessible (see below).

Site Access

The ground based preliminary roost assessment (PRA) of the survey area associated with the proposed access route identified a total of five trees with suitability to support roosting bats:

- Two trees with low suitability to support roosting bats, one of which is located within 30m of the proposed access route; and
- Four trees with moderate suitability to support roosting bats, three of which are located within 30m of

the proposed access route.

The follow-up endoscopic inspection of the above trees updated their bat roosting suitability as follows:

- Three trees with negligible suitability to support roosting bats, one of which is within 30m of the proposed access route; and
- Three trees with low suitability to support roosting bats, two of which are located within 30m of the proposed access route.

Target notes with details of each tree and associated features, are provided in **Appendix 03** and illustrated in **Figure 8.4.2**.

Habitat Risk Assessment

The majority of the site comprises commercial conifer dominated plantations, along with degraded blanket bog, dense scrub, upland heathland, purple moor grass and rush pasture, bracken, upland acid grassland and other neutral grassland. The plantation is made up of *Picea stichensis, Pinus contorta var., latifolia* with some *Larix decidua* too. There are the upper reaches of burns within the site, however, these are mostly dry and small and constitute minor rather than prominent linear features. The tracks within the forestry also provide linear routes across the Site, providing foraging access to bats that is sheltered. The conifer plantation also contains rides and these, along with the plantation edge habitat provide less exposed conditions more conducive to bat foraging, especially in areas where heathland regeneration is occurring on Site and around the edge of the Site where the forestry borders grassland habitat. There is sub-optimal potential roosting habitat on the site (not forgoing those conifers can provide roosting habitat in flaked bark, damaged trees structure etc.; although, this working forest is a mix of age classes with the most mature trees being or in the process of being removed in many areas). There does exist a farmland landscape with hedgerows, several farms and buildings in the surrounding area which may provide opportunities for roosting bats (ascertained from aerial imagery and from viewing habitat from within the site boundaries). The Site is well connected to the surrounding area with burns, hedgerows and woodland pockets all connecting into the Site, these also connected into the two extensive conifer plantations to the east and west of the Site.

The habitats at the site are therefore considered to be of moderate habitat risk for bats, according to criteria presented in the guidelines[2] and reproduced below:

- Buildings, trees or other structure with moderate-high potential as roost sites on or near the site. The Site itself does not provide many roosting opportunities, though there may be potential within farm buildings which surround the Site.
- Habitat could be used extensively by foraging bats and
- Site is connected to the wider landscape by linear features such as scrub, tree lines and streams.

A study undertaken by Stirling University in 2016 (Kirkpatrick, 2016) demonstrated evidence that common bat species exhibited an increase in foraging activity after felling had occurred or in areas of less dense planting. This was attributed to a combination of increased accessibility/ease of movement in these areas, despite there being a reduction in moth abundance. On this basis, it can be concluded that the coniferous plantation does offer suitability for bats to commute and forage with that suitability decreasing with increased age and density of planting. Aultmore is a working forest and is variable in structure, which would make it more attractive to foraging bats The habitat suitability is concluded to be low in areas of dense and established coniferous plantation with habitat suitability increasing to a moderate level in clear-felled and relatively immature and less-

densely planted areas. However, it is understood that trees have been subject to pesticide spraying to control beetle populations that may minimise the invertebrate population/food resource for bats (Pers. Comm. Between Nicola Faulks, SLR Principal Ecologist and Stuart Picken, Forestry Consultant, whilst on site).

3.2.2 Activity Surveys – Static Bat Detector Survey – All Species

Three species and one additional species group were recorded:

- Common pipistrelle;
- Soprano pipistrelle;
- Brown long-eared bat;
- *Myotis* spp. – Bats of the Myotis genus (most likely Daubenton's bat); and
- Pipistrelle – social calls of common/soprano pipistrelles.

Spatial Distribution

Table 3-1 reports the maximum, median and mean bat passes per night at each location, for all species combined, across all seasons combined. It shows that:

- Most activity (based on mean and median) was recorded at sample location 8.
- Least activity (based on mean and median) was recorded at sample location 5.
- Most variable activity (based on a large difference between mean and median) was recorded at sample location 12 and 8.

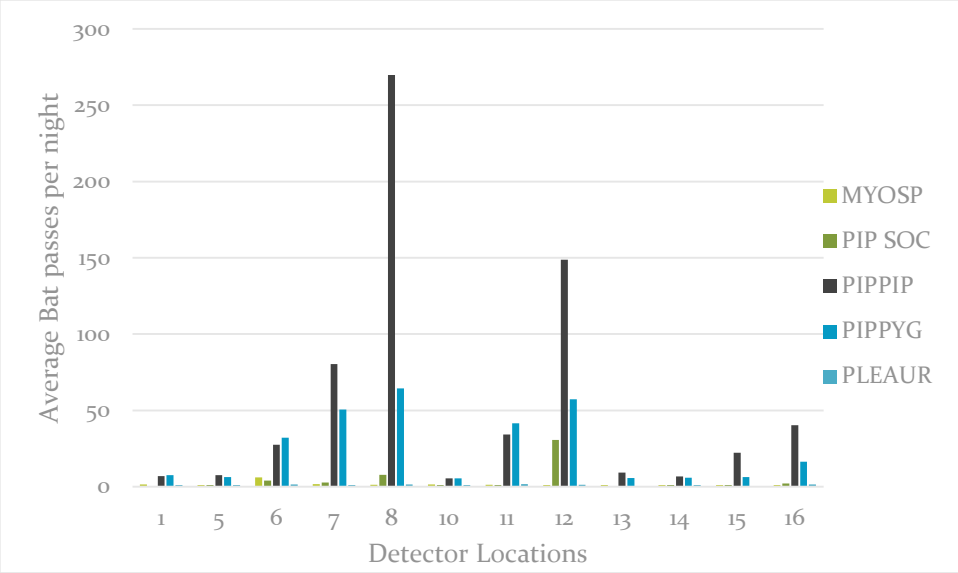

Chart 3-1. Bat passes at each detector location (N = 12) for each species recorded. PIPPIP = common pipistrelle, PIPPYG = soprano pipistrelle, PIP SOC = pipistrelle social call, MYOSP = *Myotis*, PLEAUR = brown long-eared bat.

Table 3-1
Summary of Results per Sample Location Across All Seasons

Detector Ref.	Maximum Bat Activity (Peak Bat Passes per Night)[a]	Median Bat Passes per Night	Mean Bat Passes per Night
1	42	8	11.9
5	67	2	9
6	233	30	55.4
7	1131	71	129.3
8	1248	239	391.7
10	36	5	9.1
11	457	26	71.9
12	1168	20	187.7
13	68	3	12.3
14	43	4	9.1
15	81	18	23.4
16	429	16	52.2

Table 3-2 provides the same data, but instead summarises the results for coniferous woodland habitat, woodland rides/edge habitat and *Holcus-Juncus* grassland. It illustrated that:

- Most activity (based on mean and median) was recorded at coniferous woodland locations.
- Least activity (based on mean and median) was recorded plantation ride/edge.
- Most variable activity (based on a large difference between mean and median) was recorded at coniferous woodland locations.
- Most regular activity (based on similar mean/median) was recorded at grassland locations.

Table 3-2
Summary of Results per Broad Habitat Type Across All Seasons

Detector Ref.	Maximum Bat Activity (Peak Bat Passes per Night)[a]	Median Bat Passes per Night	Mean Bat Passes per Night
Coniferous woodland (1, 7, 8, 10, 11)	1248	30	130.7
Plantation ride/edge (5, 12 – 16,)	1168	7	51.7
Holcus-Juncus	233	30	55.4

Detector Ref.	Maximum Bat Activity (Peak Bat Passes per Night)[a]	Median Bat Passes per Night	Mean Bat Passes per Night
Neutral Grassland (6)			

Temporal Distribution

A summary of the results per survey season is provided in **Table 3-3 and Chart 3-2** to **Chart 3-4**, to illustrate any seasonal variation. **Table 3-3** reports the total, median and mean bat passes per night at all locations, for all species combined, for each survey season. It shows that:

- Most activity (based on mean and median) was recorded during autumn.
- Least activity (based on mean and median) was recorded during spring.
- Most variable activity (based on a large difference between mean and median) was recorded during summer.

Bat activity was the lowest in spring (with a mean of 39.5 and a median of 6), the highest in autumn (with a mean of 148.8 and a median of 41), and in between these two values in summer (with a mean of 54.9 and a median of 7). There is observed seasonal variation recorded with peak numbers occurring in autumn. However, the number of bat passes recorded overall in all seasons was moderate – high, with a mean of 80.25 bat passes per night recorded in all seasons.

Table 3-3
Summary of Results per Season Across All Sample Locations

Season	Total Bat Passes	Median Bat Passes per Night	Mean Bat Passes per Night
Spring	4322	6	39.3
Summer	6599	7	54.9
Autumn	17856	41	148.8

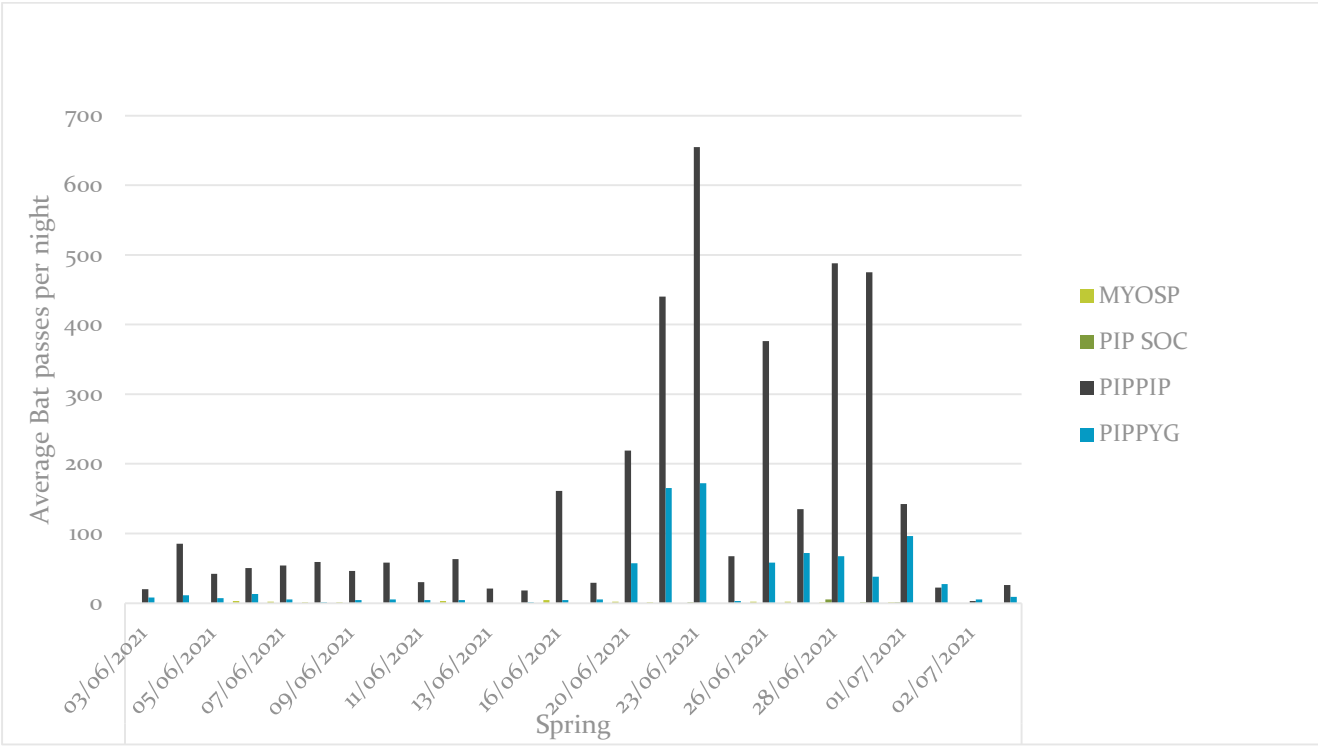

Chart 3-2. Average bat passes per night in spring across all detector locations. PIPPIP = common pipistrelle, PIPPYG = soprano pipistrelle, PIP SOC = pipistrelle social call, MYOSP = *Myotis*, PLEAUR = brown long-eared bat.

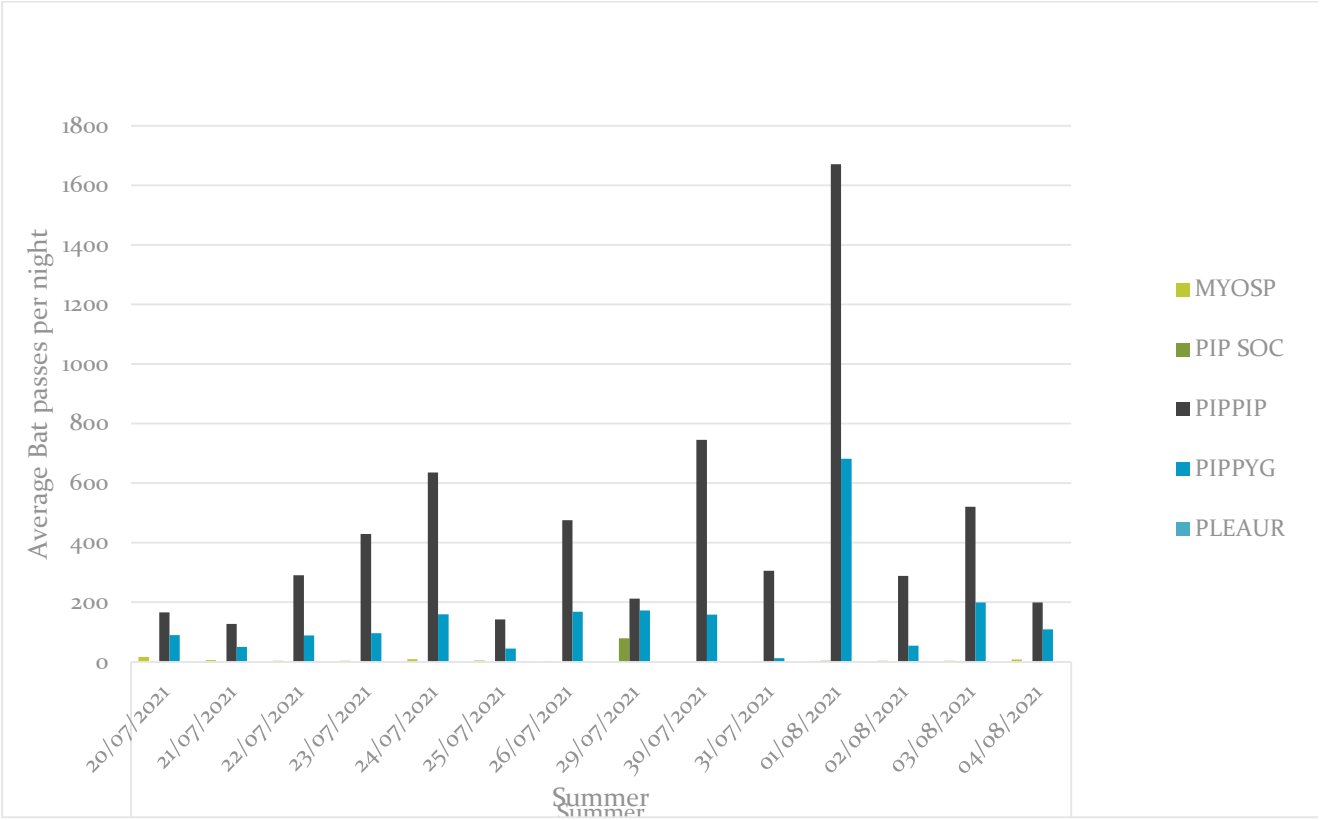

Chart 3-3. Average bat passes per night in summer across all detector locations. PIPPIP = common pipistrelle, PIPPYG = soprano pipistrelle, PIP SOC = pipistrelle social call, MYOSP = *Myotis*, PLEAUR = brown long-eared bat.

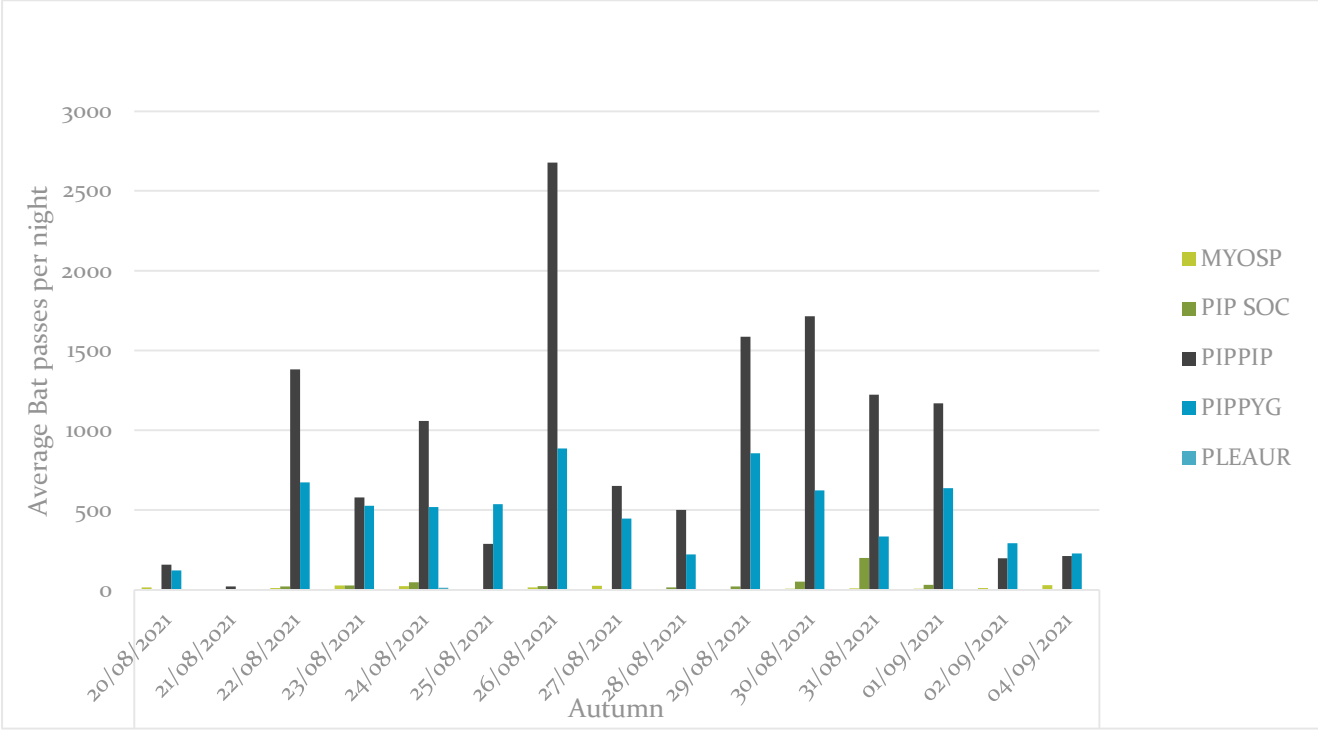

Chart 3-4. Average bat passes per night in autumn across all detector locations. PIPPIP = common pipistrelle, PIPPYG = soprano pipistrelle, PIP SOC = pipistrelle social call, MYOSP = *Myotis*, PLEAUR = brown long-eared bat.

3.2.2 Activity Surveys – Static Bat Detector Survey – High Collision Risk Species

High collision risk species in Scotland, as defined by current guidelines, include:

- Common pipistrelle;
- Soprano pipistrelle;
- Nathusius' pipistrelle;
- Noctule bat; and
- Leisler's bat (*Nyctalus leisleri*).

Common pipistrelle and soprano pipistrelle are the high collision risk species recorded at the site. Relative abundance (common, rarer or rarest species) is combined with the collision risk of a species to indicate the potential vulnerability of populations of British bat species (see **Appendix 04**). Common and soprano pipistrelles are classified as being common and having a medium population vulnerability in Scotland.

Common pipistrelle

Temporal distribution

A summary of the common pipistrelle activity results per survey season is provided in **Table 3-4. Table 3-4** reports the total, median and mean bat passes per night at all locations, for common pipistrelles, for each survey season. It shows that:

- Common pipistrelle activity was recorded at all detector locations and during all three survey seasons.
- The highest activity was during autumn (based on mean and median).
- Lowest common pipistrelle activity was during spring (based on mean and median).
- Most variable common pipistrelle activity (based on a large difference between mean and median) was recorded during summer.

Table 3-4
Summary of Common Pipistrelle Activity Results per Season Across All Sample Locations

Season	Total Bat Passes	Median Bat Passes per Night	Mean Bat Passes per Night
Spring	3508	5	31.8
Summer	4990	4	41.5
Autumn	11659	23	97.16

Spatial Distribution

A summary of the common pipistrelle activity results per sample location is provided in **Table 3-5** and **Chart 3-5,** to illustrate any spatial variation within the Site. Table 3-5 reports the total, median and mean bat passes per night at each location, for common pipistrelles, across all seasons combined. It shows that:

- Most common pipistrelle activity (based on mean and median) was recorded at sample location 8.
- Least activity (based on mean and median) was recorded at sample location 1 and 5.
- Most variable activity (based on a large difference between mean and median) was recorded at sample location 12 and 1.

Table 3-5
Summary of Common Pipistrelle Results per Sample Location Across All Seasons

Detector Ref.	Maximum Bat Activity (Bat Passes per Night)[a]	Median Bat Passes per Night	Mean Bat Passes per Night
1	22	4	5.8
5	45	1	4.9
6	129	19	24.77
7	653	41.5	80.4
8	1074	192	316.6
10	17	2.5	4.4
11	320	10	35.73
12	738	9.5	128.77

Detector Ref.	Maximum Bat Activity (Bat Passes per Night)[a]	Median Bat Passes per Night	Mean Bat Passes per Night
13	57	3	8.97
14	32	3.5	6.1
15	59	16.5	19.23
16	260	13	37.9

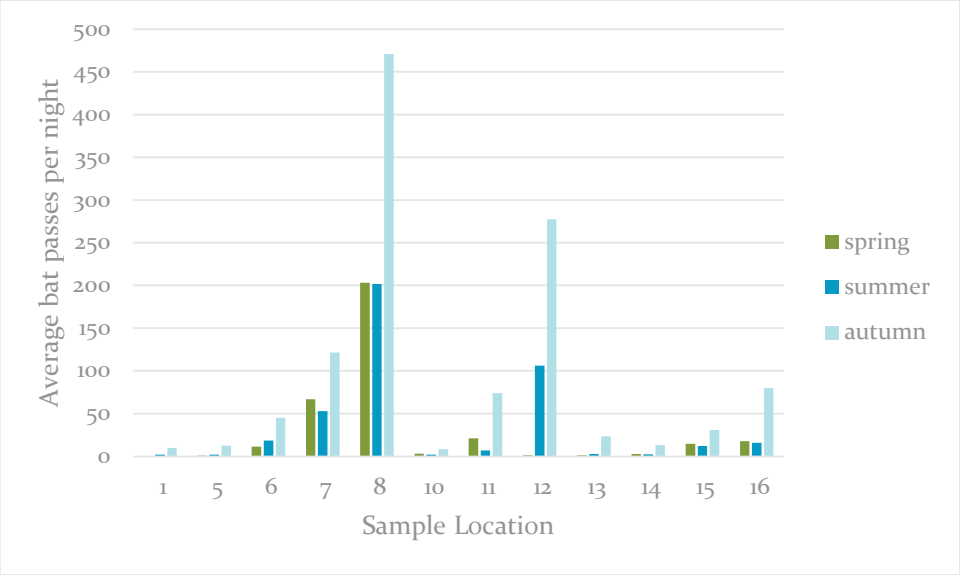

Chart 3-5. Average Common Pipistrelle Activity Per Sample Location Across All Seasons.

Chart 3-5 illustrates that during all seasons, common pipistrelle activity was highest at sample location 8, followed by location 12 in autumn. The fewest passes were noted at locations 1, 14 and 10. Soprano pipistrelle

Temporal distribution

A summary of the soprano pipistrelle activity results per survey season is provided in **Table 3-6.** Table 3-6 reports the total, median and mean bat passes per night at all locations, for soprano pipistrelles, for each survey season. It shows that:

- Soprano pipistrelle activity recorded at all detector locations and during all three survey seasons.
- The highest activity was during autumn (based on mean and median).
- Lowest soprano pipistrelle activity was during spring (based on mean and median).
- Most variable soprano pipistrelle activity (based on a large difference between mean and median) was recorded during spring.

Table 3-6
Summary of Soprano Pipistrelle Activity Results per Season Across All Sample Locations

Season	Total Passes	Median Bat Passes per Night	Mean Bat Passes per Night
Spring	787	0	7.2
Summer	1551	2	12.9
Autumn	5618	16.5	46.8

Spatial Distribution

A summary of the soprano pipistrelle activity results per sample location is provided in **Table 3-7** and **Chart 3-7**, to illustrate any spatial variation within the Site. **Table 3-7** reports the total, median and mean bat passes per night at each location, for soprano pipistrelles, across all seasons combined. It shows that:

- Most soprano pipistrelle activity (based on mean and median) was recorded at sample location 8.
- Least activity (based on mean and median) was recorded at sample location 14, 13, 1 and 5.
- Most variable activity (based on a large difference between mean and median) was recorded at sample location 12 and 6.

Table 3-7
Summary of Soprano Pipistrelle Results per Sample Location Across All Seasons

Detector Ref.	Maximum Bat Activity (Bat Passes per Night)[a]	Median Bat Passes per Night	Mean Bat Passes per Night
1	22	4	5.8
5	20	0	3.55
6	101	15.5	25.17
7	473	28.5	47.8
8	484	19	72.5
10	25	2	4.23
11	183	15	35.7
12	616	2	48.23
13	18	0	3.27
14	17	0	2.87
15	36	1	4.1
16	168	2	13.7

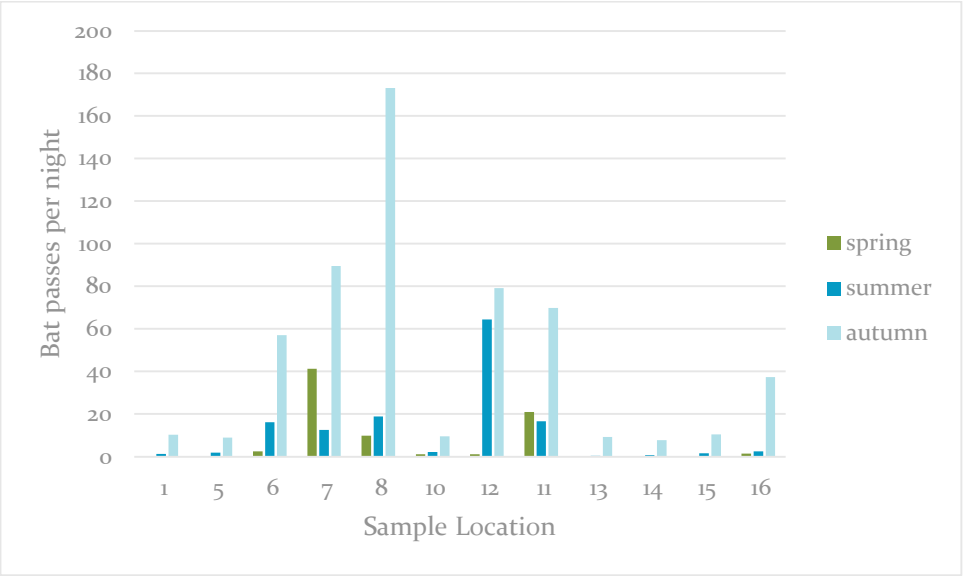

Chart 3-7 Average Soprano Pipistrelle Activity Per Sample Location and Season

It is evident from **Chart 3-7** that soprano pipistrelle was scarcely recorded in spring, but nevertheless present in all seasons. For all locations, august had the highest mean bat passes per night. Figures are exceptionally high at location 8 during August compared with other locations on site.

Pipistrelle Social Calls

Pipistrelle social calls were recorded during all seasons, though were much more common during autumn. They were only absent from locations 1, 10 (coniferous woodland habitat) and 13 (woodland edge/ride habitat). The peak of pipistrelle social calls is at location 12 (**Chart 3-8**) which is in a woodland ride/edge habitat.

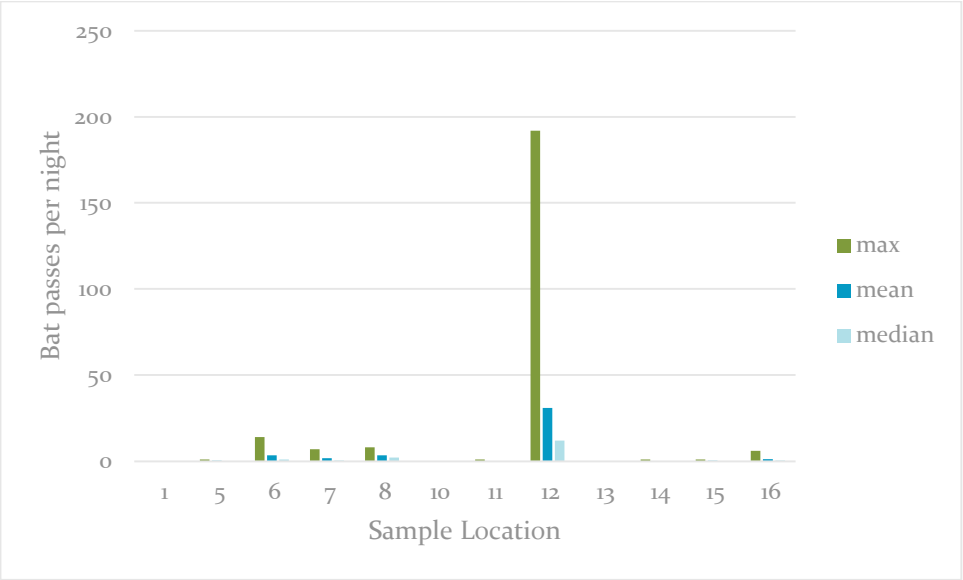

Chart 3-8 Average Pipistrelle Social Calls per Sample Location Across All Seasons

3.2.3 Bat Activity Relative to Other Sites

Ecobat compares the inputted data set with a reference range to provide a numerical way of interpreting the relative levels of bat activity recorded at a site with other sites across the same region, in this case with data within 200km of the site, consisting of 4,005 records. The full Ecobat output can be provided upon request; refer to **Appendix 5** which includes selected parts: **Tables A5-1 to A5-5** detailing the percentile statistics generated from *Ecobat* for those nights where bats were recorded, for each of the species recorded.

The following section summarises the main points from the *Ecobat* outputs **Table 3-8. Chart 3-9** illustrates the differences in bat activity at each detector location for each species.

Table 3-8 Median Percentile Bat Activity Level (on Nights When Bats Were Recorded) by Location

	Collision Risk	Low	Low-moderate	Moderate	Moderate-high	High
Myotis species	Low	Location 1, 5, 7, 8, 10 – 16	Location 6	N/A	N/A	N/A
Brown long-eared bat *	Low	Location 1, 5 – 8, 10, 12, 14, 16	Location 11	N/A	N/A	N/A
Common pipistrelle	High	N/A	Location 5	Locations 10, 13 and 14	Locations 6, 11, 15 and 16	Location 7, 8 and 12
Soprano pipistrelle	High	N/A	Location 10	Locations 1, 5, 12 – 16	Locations 6, 8 and 11	Location 7
Pipistrellus spp **	High	N/A	N/A	N/A	N/A	Locations 5 – 8, 11, 12 and 14 – 16

*These species were not detected at locations 13 and 15.

** Pipistrelle social calls were not detected at locations 1, 10 and 13.

The detector locations with the highest pipistrelle (both common and soprano) activity when compared with the reference dataset are locations 7, 8 and 12.

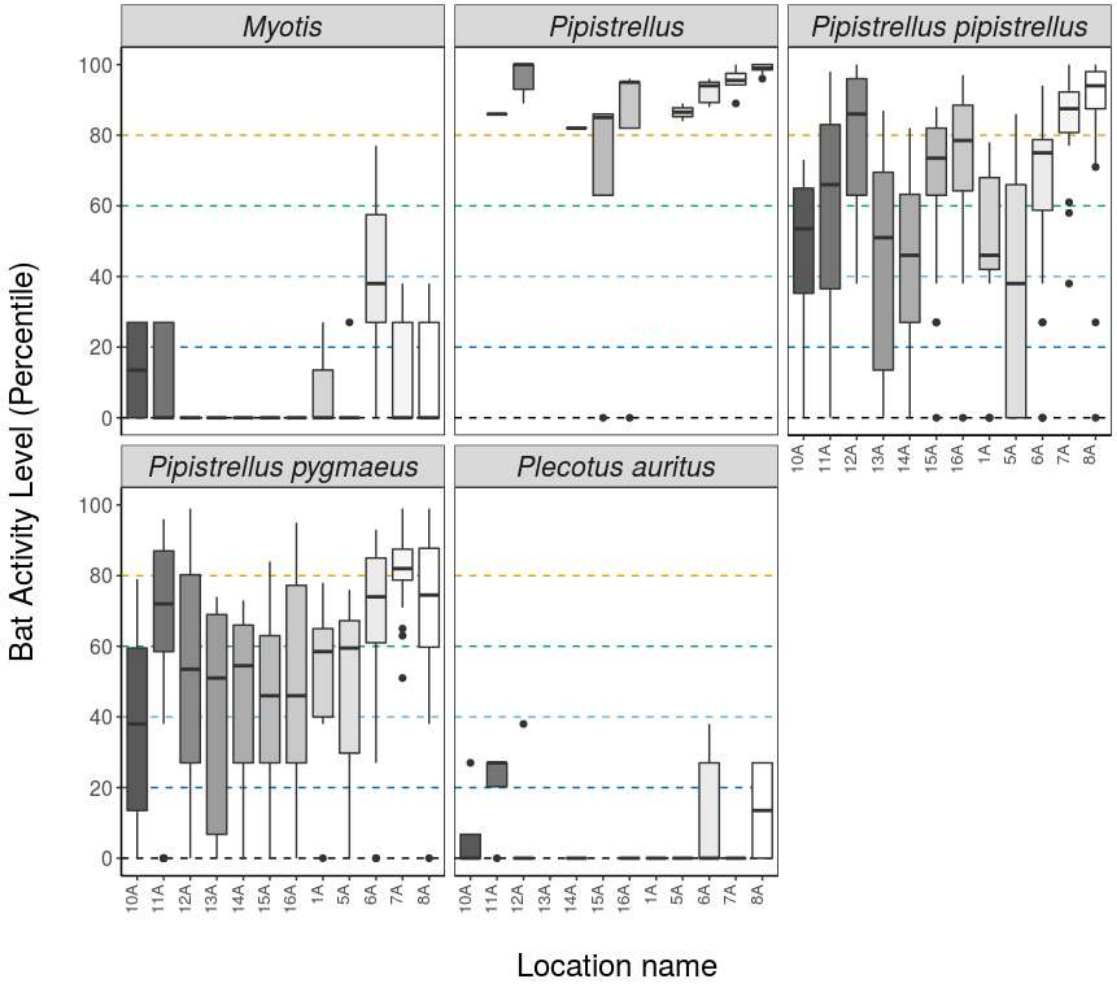

Chart 3-9: Differences in activity between static detector locations

Chart 3-9 shows the differences in activity between static detector locations, split by species and location. The center line indicates the median activity level whereas the box represents the interquartile range (the spread of the middle 50% of nights of activity). *Pipistrellus* refers to bat calls that were identified as pipistrelle social calls.

3.2.4 Collision Risk

Common pipistrelle

During typical activity periods, Common pipistrelle has:

- High collision risk at two locations – (7 and 8).
- Medium collision risk at the other ten locations.

During peak activity periods, Common pipistrelle has:

- Medium collision risk at three detector locations – (1, 10 & 11);
- High collision risk at the other nine detector locations.

Soprano Pipistrelle

During typical activity periods, Soprano pipistrelle has:

- High collision risk at one detector location (7); and
- Medium collision risk at the other 11 detector locations.

During peak activity periods, Soprano pipistrelle has:

- High collision risk at seven detector locations (6, 7, 8, 11, 12, 15, 16); and
- Medium collision risk at five detector locations (1, 5, 10, 13, 14).

Pipistrellus species

During typical activity periods, Pipistrellus species have:

- High activity risk at nine detector locations – 5, 6, 7, 8, 11, 12, 14, 15 and 16.

During peak activity periods, Pipistrellus species have:

- High activity risk at nine detector locations – 5, 6, 7, 8, 11, 12, 14, 15 and 16.

4.0 Discussion and Conclusions

4.1 Summary Overview

The desk study and field survey has confirmed that:

- The habitat at the main site constitutes 'moderate risk' bat habitat as defined within the guidelines (Collins, 2016).
- There are no known roosts at the main site or within 10km of this site.
- Five species of bats are recorded locally (within 10km), including common pipistrelle, soprano pipistrelle, Daubenton's bat, brown long-eared bat and noctule during the desk study.
- Common pipistrelle, soprano pipistrelles and myotis bats were recorded at all sample locations. Brown long-eared bats are absent from sample locations 13 and 15 (in plantation edge/ride habitat). Noctule was not recorded to be present on site at the time of survey/at the survey locations.
- Most bat activity (all species combined) was recorded at coniferous woodland locations, least activity at plantation ride/edge. Most regular activity was recorded at the grassland.
- Location 8 has significantly more bat activity than elsewhere within the site.
- Location 5, 13 and 14 have significantly less.
- Most bat activity was recorded in autumn, across all locations.
- Collision risk for common pipistrelle during typical activity periods was high at two detector locations and medium at ten detector locations.
- Collision risk for common pipistrelle during peak activity periods was high at nine detector locations and medium at three detector locations.
- Collision risk for soprano pipistrelle during typical activity periods was high at one detector location and medium at 11 detector locations.
- Collision risk for common pipistrelle during peak activity periods was high at seven detector locations and medium at five detector locations.
- Collision risk for *Pipistrellus* sp. during typical and peak activity periods was high at nine detector locations.

4.2 'High Collision Risk' Bat Species

4.2.1 Common pipistrelle

Common pipistrelle was recorded consistently across the site and all seasons, with peaks in autumn and high pipistrelle activity at sample location 8. The level of activity most frequently represents 'moderate-high' bat activity levels when compared against records from a similar date and geographic location in *Ecobat*. For example, 28% of nights sampled represented high bat activity, 23.6% represented moderate to high bat activity,

10.28% represented moderate bat activity, 8.33% and 9.17% represented low to moderate and moderate bat activity respectively, and 20.56% of nights recorded nil bat activity. Most common pipistrelle activity recorded was in locations 7, 8 and 12. These locations are within coniferous woodland plantation (7 and 8) and woodland edge/ride habitat (12). The locations with lower bat activity (sample locations 5) are within coniferous woodland rides/edge habitat.

4.2.2 Soprano pipistrelle

Soprano pipistrelles were two of the four species recorded on the site. As described in Section 3.2.2 these species were recorded consistently across the site and all seasons, with peaks in autumn and high pipistrelle activity at sample location 8. Soprano pipistrelle bat activity was recorded on most nights across all detector locations on the Site. The level of bat activity most frequently represents 'moderate' when compared against records from similar date and geographic location in *Ecobat.* For example, 14% of nights sampled represented high bat activity, 18.14% represented moderate to high bat activity, with 7.21% and 9.53% of nights representing moderate and low to moderate bat activity respectively, 23.7% of nights represented low with 27.4% of nights recording nil bat activity. Most soprano pipistrelle activity was recorded in locations 6, 7, 8, 11 and 12. These are in coniferous woodland plantation (7, 8, 11), Holcus-Juncus grassland (6) and woodland ride/edge habitat (12).

4.2.3 Pipistrelle social calls

Pipistrelle social calls were predominantly recorded at sample location 12, in open/edge habitat in the coniferous woodland. Using aerial imagery and the vegetation report there is a block of mature woodland north of location 12 that may provide roosting opportunities for a breeding male.

4.2.4 Other High-Risk Species

Noctule bat is classified by the guidelines[1] as being a 'rarer' species with a high collision risk and high population vulnerability. NBN atlas reported a dead male found around 6km away from the site. The core sustenance zone (CSZ) refers to the area surrounding a communal bat roost within which habitat availability and quality will have a significant influence of the resilience and conservation status of the colony using the roost. The CSZ for a noctule bat is 4km, given that the only recorded noctule was 6km away suggests it is unlikely that this species would occur on the Site. Noctule bats roost almost exclusively in tree holes but are sometimes found in bat boxes of buildings (Collins, 2016) and forage out in the open, often over trees and are reported as selecting broadleaved woodland and pasture. The Site has limited/no PRFs and is mainly comprised of coniferous plantation so the chances of roosting and foraging Noctule bats are low. It is possible that this species may occasionally occur on the site, although the fact that none were recorded during the static detector surveys indicates that this would likely be an infrequent occurrence, and that the site is not important for this species.

There are no records of Nathusius' pipistrelle or Leisler's bats (also high collision risk species) within 10km of the site. The CSZ for both Nathusius' pipistrelle and Leisler's bat is 3km. Leisler's bat roosts in trees, bat boxes and buildings and hibernate in tree holes and have been recorded foraging in woodland edge, scrub and over pastures. Nathusius' pipistrelle roost in buildings, with hibernation roosts in hollow trees and crevices in cliffs, walls and caves (Collins, 2016) and forages in riparian habitats, broadleaved and mixed woodland and parkland. The habitat and foraging preferences of these two species are mostly absent from the proposed development site and it is therefore considered unlikely that these species would occur on the site.

4.3 Other Bat Species

Other bat species recorded on the Site are Myotis species and brown long-eared bats.

4.3.1 Myotis species

Myotis bats are recorded in small numbers across the site. The level of myotis activity most commonly represents 'low' when compared against similar geographic locations and dates in *Ecobat*. Sample location 6 (coniferous ride/edge habitat) had 'low-moderate' activity, this area has several small burns flowing through the open grassland habitat. Although we could not identify down to species level, it was most likely Daubenton's bats present, these species have a strong affinity with water and favours riverine habitats but also forages within woodlands.

4.3.2 Brown long-eared bat

Brown long-eared bats are recorded across the site. However, were absent from sample locations 13 and 15 which are within coniferous plantation edge/ride habitat. This aligns with their foraging preferences as these bats forage within cluttered woodland understoreys.

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FIGURES

340000 342000 344000 346000 348000

862000 860000 858000

LEGEND

- Site Boundary
- Turbine Location
- Permanent Hardstanding
- Temporary Hardstanding
- Upgraded Existing Track
- New Track
- Substation Location
- Temporary Construction Compound Location
- Borrow Pit Search Area
- Bat Detector Location

N

0 0.5 1 Kilometres

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TA 8.3 - PROTECTED MAMMALS

SITE LOCATION

FIGURE 8.2.1

Scale 1:30,000 @ A3

Date OCTOBER 2023

03640.00016.0192.0 Static Bat Detector Locations

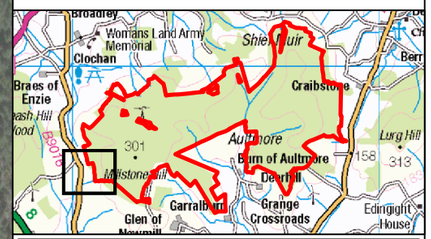
340000
340500
341000
857000
856500
N
B9016
2
0
250
500
Metres

LEGEND

- Site Boundary
- Turbine Location
- Permanent Hardstanding
- Temporary Hardstanding
- Upgraded Existing Track
- New Track
- Survey Area
- Survey Area

Bat Habitat Suitability Results

- Bat Roost Suitability (Low)
- Bat Roost Suitability (Negligable)
- Commuting and Foraging Suitability – Target Note



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TA 8.4 - BAT REPORT

SITE ACCESS AND BAT HABITAT SUITABILITY RESULTS

FIGURE 8.4.2

Scale	Date
1:5,000 @ A3	JUNE 2023

03640.00016.0193.0 Site Access and Bat Habitat Suitability Results

APPENDICES

APPENDIX 01

Relevant Legislation

Conservation (Natural Habitats, &c.) Regulations 1994 (as amended)

All bat species found in Scotland are classed as European protected species. They receive full protection under the Conservation (Natural Habitats, & c.) Regulations 1994 (as amended in Scotland)[7]. This legislation makes it an offence to deliberately or recklessly:

- Capture, injure or kill a wild bat;
- Harass a wild bat or group of bats;
- Disturb a wild bat in a roost (any structure or place it uses for shelter or protection);
- Disturb a wild bat while it is rearing or otherwise caring for its young (this would be a 'maternity' roost);
- Obstruct access to a bat roost or to otherwise deny the animal use of the roost;
- Disturb such a wild bat in a manner that is, or in circumstances which are, likely to significantly affect the local distribution or abundance of that species; and to
- Disturb a wild 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.

It is also an offence to:

- Damage or destroy a breeding site or resting place of such an animal (whether or not deliberately or recklessly); and to
- Keep, transport, sell or exchange, or offer for sale or exchange any wild bat (or any part or derivative of one) obtained after 10 June 1994.

Nature Conservation (Scotland) Act 2004

The Nature Conservation (Scotland) Act 2004 places a duty on public bodies to further the conservation of biodiversity in Scotland. Under this Act, Scottish Ministers must designate one or more strategies for biodiversity conservation, as defined within the Scottish Biodiversity Strategy. They are also required publish lists of species of flora and fauna and habitats considered to be of principal importance for biodiversity conservation in Scotland.

The Scottish Biodiversity List (SBL) is a list of plants, animals and habitats that Scottish ministers consider to be of principle importance for biodiversity conservation in Scotland. The following bat species are identified as a conservation priority through their listing on the SBL:

- Common pipistrelle *Pipistrellus pipistrellus*;
- Soprano pipistrelle *Pipistrellus pygmaeus*;
- Nathusius pipistrelle *Pipistrellus nathusii*;

[7] The Conservation (Natural Habitats & c.) Regulations 1994 (as amended) have been amended by the Conservation (Natural Habitats & c.) (EU Exit) (Scotland) (Amendment)Regulations 2019. This means that the Habitat Regulations remain in force following the UK's departure from the European Union and there is no change to the protection of European protected species.

- Daubentons bat *Myotis daubentonii*;
- Natterers bat *Myotis nattereri*;
- Whiskered bat *Myotis mystancinus*;
- Brandt's bat *Myotis brandtii*;
- Noctule *Nyctalus noctula*; and
- Brown long-eared bat *Plecotus auritus*.

APPENDIX 02

Criteria for Assessing Habitat Risk for Bats

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

Table extracted from current SNH (2019) guidelines[Error! Bookmark not defined.].

APPENDIX 03

Bat Habitat and Roost Suitability Results – Site Access

Table A3-1
Bat Habitat Suitability Results – Site Access

Target Note	Grid Reference	Detail	Bat Roost Suitability (Preliminary Roost Assessment)	Bat Roost Suitability (Endoscopic Inspection)
1	NJ 40654 56774	Dense willow scrub habitat with numerous narrow stems throughout. No obvious suitable bat roost features identified, however scrub and surrounding rush pasture likely to provide opportunities for foraging bats.	N/A	N/A
2	NJ 40530 56713	Two mature downy birch trees, multi-stemmed, measuring approximately 12m in height. **Tree 1:** Rot hole at base of trunk, extending to approximately 0.75m above ground level. At the top of the feature, the cavity narrows and extends further into the trunk. Entrance to cavity measures approximately 6cm diameter. No evidence of bat droppings present on ground below feature. This feature could be inspected with endoscope from ground level. Classified as having moderate bat roost suitability until inspected further. **Tree 2:** Mature birch, approximately 11-12m in height with several dead limbs. Rot hole noted in a dead limb approximately 6m above ground level, facing northwest. Entrance to cavity approximately 5x10cm wide. Tree looks unsafe to climb, however feature could be accessed using a ladder and harness with an endoscope to inspect. Classified as moderate suitability until inspected further.	Moderate	**Tree 1: Low** Assessed with endoscope from ground level. Feature only extends 5-10cm into trunk and is therefore unlikely to serve as permanent roost feature. Feature downgraded to low suitability. **Tree 2: Negligible** Assessed with ladder and endoscope. Feature does not extend into limb and therefore would not be suitable for supporting roosting bats.
3	NJ 40666 56737	Dead standing birch tree, approximately 4m in height with peeling bark. May provide a temporary roosing opportunity for a single bat and therefore classified as low suitability. Should tree require felling, features should be checked by a suitably qualified ecologist prior to works commencing.	Low	**Negligible** Assessed from ground level. On review of tree the bark is not platey enough for bat's to shelter and rather open to elements. Cobwebs also present between bark.

4	NJ 40670 56614	Downy birch with broken limb approximately 4m above ground level, facing east. Unlikely for cracks to lead anywhere however cannot see clearly from ground level. Tree could be climbed to assess feature. Likely to be low suitability for roosting bats, however classified as moderate until assessed further. Tree located within 30m of proposed access route.	Moderate	**Low** Assessed using ladder and endoscope. Crack present on upper side of broken limb, extending downwards approximately 30cm. Feature exposed to elements therefore only likely to support a opportunistic single bat in dry weather.
5	NJ 40681 56692	Downy birch with broken split limb approximately 3.5m above ground level. Feature facing east. Lots of cobwebs noted within the feature. Split may extend further into trunk than can be observed from ground level, providing potential for one or two opportunistic bats to shelter. Feature could be assessed with ladder and endoscope. Classified as moderate suitability until assessed further. Tree located within 20m of proposed access route.	Moderate	**Low** Assessed using ladder, torch and endoscope. Hazard beam found to extend downwards around 10cm. Feature open to elements. Unlikely to provide long term shelter for bats and therefore downgraded as low suitability.
6	NJ 40668 56682	Willow tree with split between limb and trunk approximately 1.5m above ground level, providing potential for one or two opportunistic bats to shelter. Classified as low suitability however, should the tree require felling, feature should be checked by a suitably qualified ecologist using a torch and endoscope before works proceed. Tree located within 20m of proposed access route.	Low	**Negligible** Lower limb snapped off over winter and no longer serves as a suitable bat roost feature.

APPENDIX 04

Collision Risk, Relative Abundance and Overall Population Vulnerability of Bat Species in Scotland

Yellow = low population vulnerability

Beige = medium population vulnerability

Red = high population vulnerability

Relative abundance	Scotland	Collision risk		
		Low collision risk	Medium collision risk	High collision risk
	Common species			Common pipistrelle Soprano pipistrelle
	Rarer species	Brown long eared bat Daubenton's bat Natterer's bat		
	Rarest species	Whiskered bat Brandt's bat		Nathusius' pipistrelle Noctule bat
				Leisler's bat

Table taken from current SNH (2019) guidelines

APPENDIX 05

Ecobat Output Data

Table A5-1

Common Pipistrelle: Summary of Ecobat Outputs, by Detector, Compared with Sites within 200km

Location Ref.	Species	Nights of Activity						Median Percentile (95% CIs)[8]	Median Bat Activity Level[9]	Max. Percentile	Max. Bat Activity Level[10]	No. of Records Compared Against
		High	Mod/ High	Mod	Low/ Mod	Low	Nil Activity					
1	Common pipistrelle	0	5	6	2	2	15	46 (46 – 65)	Moderate	78	Moderate to High	1402
5	Common pipistrelle	1	6	2	3	7	11	38 (52 – 71.5)	Low to Moderate	86	High	1402
6	Common pipistrelle	7	15	2	2	1	0	75 (65 – 81)	Moderate to High	94	High	1402
7	Common pipistrelle	19	3	1	1	0	6	88 (80.5– 90.5)	High	100	High	1402
8	Common pipistrelle	24	4	0	1	1	0	94 (88 – 96)	High	100	High	1402
10	Common pipistrelle	0	8	5	3	4	10	54 (48.5– 64.5)	Moderate	73	Moderate to High	1402
11	Common pipistrelle	8	8	4	2	5	3	66 (61 – 80.5)	Moderate to High	98	High	1402
12	Common pipistrelle	14	4	3	1	0	8	86 (72 – 91)	High	100	High	1402

[8] Median percentiles and Confidence Intervals (Cis) are calculated from the nights where bat activity was recorded only (i.e. it does not include nights where no bat activity was recorded).

[9]Activity level of the median number of bat passes recorded per night, from the nights where bat activity was recorded only, determined by percentile from reference range within Ecobat, using the following parameters: 0-20th percentile=low, 21st-40th percentile=low/mod, 41st-60th percentile = mod, 61st-80th percentile = mod/high, 81st – 100th percentile = high.

[10] Activity level of the night with the highest number of bat passes recorded, determined by percentile from reference range within *Ecobat* as detailed above.

Location Ref.	Species	Nights of Activity						Median Percentile (95% CIs)[8]	Median Bat Activity Level[9]	Max. Percentile	Max. Bat Activity Level[10]	No. of Records Compared Against
		High	Mod/ High	Mod	Low/ Mod	Low	Nil Activity					
13	Common pipistrelle	7	4	3	5	6	7	51 (49.5– 71.5)	Moderate	87	High	1402
14	Common pipistrelle	1	6	8	6	5	4	46 (44.5 – 61)	Moderate	82	High	1402
15	Common pipistrelle	11	11	2	3	1	2	74 (66 – 78)	Moderate to High	88	High	1402
16	Common pipistrelle	8	11	1	1	1	8	79 (69 – 84.5)	Moderate to High	97	High	1402
Total (all locations)	**Common pipistrelle**	**100**	**85**	**37**	**30**	**33**	**74**		**Moderate to High**			**1402**

Table A5-2

Soprano Pipistrelle Summary of Ecobat Outputs, by Detector, Compared with Sites within 200km

Location Ref.	Species	Nights of Activity						Median Percentile (95% CIs)[11]	Median Bat Activity Level[12]	Max. Percentile	Max. Bat Activity Level[13]	No. of Records Compared Against
		High	Mod/ High	Mod	Low/ Mod	Low	Nil Activity					
1	Soprano pipistrelle	0	7	3	3	1	16	59 (47 – 67)	Moderate	78	Moderate to High	696
5	Soprano pipistrelle	0	7	2	3	2	16	60 (51.5 – 71)	Moderate	76	Moderate to High	696
6	Soprano pipistrelle	10	9	0	2	74	5	74 (60 – 88)	Moderate to High	93	High	696
7	Soprano pipistrelle	15	8	1	0	0	6	82 (77.5– 85.5)	High	99	High	696
8	Soprano pipistrelle	13	9	5	2	1	0	75 (67 – 82)	Moderate to High	99	High	696
10	Soprano pipistrelle	0	6	3	8	6	7	38 (38 – 59.5)	Low to Moderate	79	Moderate to High	696
11	Soprano pipistrelle	10	10	2	1	4	3	72 (69 – 83)	Moderate to High	96	High	696
12	Soprano pipistrelle	6	4	2	7	3	8	54 (47 – 77)	Moderate	99	High	696

[11] Median percentiles and Confidence Intervals (Cis) are calculated from the nights where bat activity was recorded only (i.e. it does not include nights where no bat activity was recorded).

[12]Activity level of the median number of bat passes recorded per night, from the nights where bat activity was recorded only, determined by percentile from reference range within Ecobat, using the following parameters: 0-20th percentile=low, 21st-40th percentile=low/mod, 41st-60th percentile = mod, 61st-80th percentile = mod/high, 81st – 100th percentile = high.

[13] Activity level of the night with the highest number of bat passes recorded, determined by percentile from reference range within *Ecobat* as detailed above.

Location Ref.	Species	Nights of Activity						Median Percentile (95% CIs)[11]	Median Bat Activity Level[12]	Max. Percentile	Max. Bat Activity Level[13]	No. of Records Compared Against
		High	Mod/ High	Mod	Low/ Mod	Low	Nil Activity					
13	Soprano pipistrelle	0	5	4	1	4	16	51 (49-71)	Moderate	74	Moderate to High	696
14	Soprano pipistrelle	0	6	1	3	2	18	55 (38 – 68.5)	Moderate	73	Moderate to High	696
15	Soprano pipistrelle	1	5	4	3	4	13	46 (44.5 – 65)	Moderate	84	High	696
16	Soprano pipistrelle	5	2	4	8	1	10	46 (38 – 66.5)	Moderate	95	High	696
Total (all locations)	**Soprano pipistrelle**	**60**	**78**	**31**	**41**	**102**	**118**		**Moderate-High**			**696**

Table A5-3

Pipistrelle Social Call Ecobat Summary Outputs, by Detector, Compared with Sites Within 200km

Location Ref.	Species	Nights of Activity						Median Percentile (95% CIs)[14]	Median Bat Activity Level[15]	Max. Percentile	Max. Bat Activity Level[16]	No. of Records Compared Against
		High	Mod/ High	Mod	Low/ Mod	Low	Nil Activity					
1	Pipistrelle Social Call	0	0	0	0	0	30	N/A	N/A	N/A	N/A	N/A
5	Pipistrelle Social Call	2	0	0	0	0	28	87 (86.5– 86.5)	High	89	High	1535
6	Pipistrelle Social Call	6	0	0	0	0	24	94 (88 – 95.5)	High	96	High	1535
7	Pipistrelle Social Call	6	0	0	0	0	24	96 (92 – 98)	High	100	High	1535
8	Pipistrelle Social Call	11	0	0	0	0	19	99 (98 – 100)	High	100	High	1535
10	Pipistrelle Social Call	0	0	0	0	0	30	N/A	N/A	N/A	N/A	N/A
11	Pipistrelle Social Call	1	0	0	0	0	29	86 (0)	High	86	High	1535
12	Pipistrelle Social Call	9	0	0	0	0	21	100 (94.4 – 100)	High	100	High	1535

[14] Median percentiles and Confidence Intervals (Cis) are calculated from the nights where bat activity was recorded only (i.e. it does not include nights where no bat activity was recorded).

[15]Activity level of the median number of bat passes recorded per night, from the nights where bat activity was recorded only, determined by percentile from reference range within Ecobat, using the following parameters: 0-20th percentile=low, 21st-40th percentile=low/mod, 41st-60th percentile = mod, 61st-80th percentile = mod/high, 81st – 100th percentile = high.

[16] Activity level of the night with the highest number of bat passes recorded, determined by percentile from reference range within *Ecobat* as detailed above.

Location Ref.	Species	Nights of Activity						Median Percentile (95% CIs)[14]	Median Bat Activity Level[15]	Max. Percentile	Max. Bat Activity Level[16]	No. of Records Compared Against
		High	Mod/ High	Mod	Low/ Mod	Low	Nil Activity					
13	Pipistrelle Social Call	0	0	0	0	0	30	N/A	N/A	N/A	N/A	N/A
14	Pipistrelle Social Call	1	0	0	0	0	29	82 (0)	High	82	High	1535
15	Pipistrelle Social Call	3	0	0	0	1	26	85 (86- 86)	High	86	High	1535
16	Pipistrelle Social Call	4	0	0	0	1	25	95 (88.5– 95.5)	High	96	High	1535
Total (all locations)	**Pipistrelle Social Call**	**43**	**0**	**0**	**0**	**2**	**315**		**High**			**1535**

Table A5-4

Myotis Species Summary of Ecobat Outputs, by Detector, Compared with Sites Within 200km

Location Ref.	Species	Nights of Activity						Median Percentile (95% CIs)[17]	Median Bat Activity Level[18]	Max. Percentile	Max. Bat Activity Level[19]	No. of Records Compared Against
		High	Mod/ High	Mod	Low/ Mod	Low	Nil Activity					
1	Myotis Spp	0	0	0	1	2	27	0 (0 – 0)	Low	27	Low to Moderate	292
5	Myotis Spp	0	0	0	1	4	25	0 (27 – 55)	Low	27	Low to Moderate	292
6	Myotis Spp	6	5	4	9	38	8	38 (32.5 – 64)	Low to Moderate	77	Moderate to High	292
7	Myotis Spp	0	0	0	3	5	22	0 (27 – 27)	Low	38	Low to Moderate	292
8	Myotis Spp	0	0	0	7	14	9	0 (27 -27)	Low	38	Low to Moderate	292
10	Myotis Spp	0	0	0	3	3	24	14 (13.5– 13.5)	Low	27	Low to Moderate	292
11	Myotis Spp	0	0	0	2	3	15	0 (0 – 0)	Low	27	Low to Moderate	292
12	Myotis Spp	0	0	0	0	3	27	0 (0 – 0)	Low	0	Low	292

[17] Median percentiles and Confidence Intervals (Cis) are calculated from the nights where bat activity was recorded only (i.e. it does not include nights where no bat activity was recorded).

[18]Activity level of the median number of bat passes recorded per night, from the nights where bat activity was recorded only, determined by percentile from reference range within Ecobat, using the following parameters: 0-20th percentile=low, 21st-40th percentile=low/mod, 41st-60th percentile = mod, 61st-80th percentile = mod/high, 81st – 100th percentile = high.

[19] Activity level of the night with the highest number of bat passes recorded, determined by percentile from reference range within *Ecobat* as detailed above.

Location Ref.	Species	Nights of Activity						Median Percentile (95% CIs)[17]	Median Bat Activity Level[18]	Max. Percentile	Max. Bat Activity Level[19]	No. of Records Compared Against
		High	Mod/ High	Mod	Low/ Mod	Low	Nil Activity					
13	Myotis Spp	0	0	0	0	1	29	0 (0)	Low	0	Low	292
14	Myotis Spp	0	0	0	0	2	28	0 (0 – 0)	Low	0	Low	292
15	Myotis Spp	0	0	0	0	1	29	0 (0)	Low	0	Low	292
16	Myotis Spp	0	0	0	0	1	29	0 (0)	Low	0	Low	292
Total (all locations)	**Myotis Spp**	**6**	**5**	**4**	**26**	**77**	**272**		**Low**			**292**

Table A5-5

Brown Long-eared Bat Summary of Ecobat Outputs, by Detector, Compared with Sites Within 200km

Location Ref.	Species	Nights of Activity						Median Percentile (95% CIs)[20]	Median Bat Activity Level[21]	Max. Percentile	Max. Bat Activity Level[22]	No. of Records Compared Against
		High	Mod/ High	Mod	Low/ Mod	Low	Nil Activity					
1	Brown long-eared	0	0	0	0	1	29	0 (0)	Low	0	Low	80

[20] Median percentiles and Confidence Intervals (Cis) are calculated from the nights where bat activity was recorded only (i.e. it does not include nights where no bat activity was recorded).

[21]Activity level of the median number of bat passes recorded per night, from the nights where bat activity was recorded only, determined by percentile from reference range within Ecobat, using the following parameters: 0-20th percentile=low, 21st-40th percentile=low/mod, 41st-60th percentile = mod, 61st-80th percentile = mod/high, 81st – 100th percentile = high.

[22] Activity level of the night with the highest number of bat passes recorded, determined by percentile from reference range within *Ecobat* as detailed above.

Location Ref.	Species	Nights of Activity						Median Percentile (95% CIs)[20]	Median Bat Activity Level[21]	Max. Percentile	Max. Bat Activity Level[22]	No. of Records Compared Against
		High	Mod/ High	Mod	Low/ Mod	Low	Nil Activity					
	bat											
5	Brown long-eared bat	0	0	0	0	2	28	0 (0 – 0)	Low	0	Low	80
6	Brown long-eared bat	0	0	0	3	0	25	0 (32.5– 32.5)	Low	38	Low to Moderate	80
7	Brown long-eared bat	0	0	0	0	2	28	0 (0 – 0)	Low	0	Low	80
8	Brown long-eared bat	0	0	0	2	2	26	14 (13.5– 13.5)	Low	4	Low	80
10	Brown long-eared bat	0	0	0	1	3	26	0 (0 – 0)	Low	27	Low to Moderate	80
11	Brown long-eared bat	0	0	0	3	1	26	27 (27 -27)	Low to Moderate	27	Low to Moderate	80
12	Brown long-eared bat	0	0	0	1	5	24	0 (0 – 0)	Low	38	Low to Moderate	80
13	Brown long-eared bat	0	0	0	0	0	30	N/A	N/A	N/A	N/A	80
14	Brown	0	0	0	0	2	28	0 (0 – 0)	Low	0	Low	80

Location Ref.	Species	Nights of Activity						Median Percentile (95% CIs)[20]	Median Bat Activity Level[21]	Max. Percentile	Max. Bat Activity Level[22]	No. of Records Compared Against
		High	Mod/ High	Mod	Low/ Mod	Low	Nil Activity					
	long-eared bat											
15	Brown long-eared bat	0	0	0	0	0	30	N/A	N/A	N/A	N/A	80
16	Brown long-eared bat	0	0	0	0	3	27	0 (0 – 0)	Low	0	Low	80
Total (all locations)	**Brown long-eared bat**	**0**	**0**	**0**	**10**	**21**	**327**		**Low**			**80**

The full *Ecobat* report (14 pages) can be provided upon request.

APPENDIX 06

Collision Risk Assessment

Note that the collision risk assessment was carried out based on an a 'Medium' Initial Site Risk Level (score of 3) and for high collision risk species only.

Also note that the collision risk assessment relates to data obtained for the full active bat season, and does not differentiate activity between seasons (i.e., spring, summer, autumn).

Table A6-1

Overall Collision Risk Assessment - Common Pipistrelle

Location	Typical Activity (Median Percentile)	Typical Activity Category	Typical Activity Risk Assessment	Peak Activity (Max Percentile)	Peak Activity Category	Peak Activity Risk Assessment
1A	46	Moderate	Medium (9)	78	Moderate to High	Medium (12)
5A	38	Low to Moderate	Medium (6)	86	High	High (15)
6A	75	Moderate to High	Medium (12)	94	High	High (15)
7A	88	High	High (15)	100	High	High (15)
8A	94	High	High (15)	100	High	High (15)
10A	54	Moderate	Medium (9)	73	Moderate to High	Medium (12)
11A	66	Moderate to High	Medium (12)	98	High	Medium (10)
12A	86	Moderate to High	Medium (12)	100	High	High (15)
13A	51	Moderate	Medium (9)	87	High	High (15)
14A	46	Moderate	Medium (9)	82	High	High (15)
15A	74	Moderate to High	Medium (12)	88	High	High (15)
16A	79	Moderate to High	Medium (12)	97	High	High (15)

Table A6-2

Overall Collision Risk Assessment - Soprano Pipistrelle

Location	Typical Activity (Median Percentile)	Typical Activity Category	Typical Activity Risk Assessment	Peak Activity (Max Percentile)	Peak Activity Category	Peak Activity Risk Assessment
1A	59	Moderate	Medium (9)	78	Moderate to High	Medium (12)
5A	60	Moderate	Medium (9)	76	Moderate to High	Medium (12)
6A	74	Moderate to High	Medium (12)	93	High	High (15)
7A	82	High	High (15)	99	Hgh	High (15)
8A	75	Moderate to High	Medium (12)	99	High	High (15)
10A	38	Low - Moderate	Medium (6)	79	Moderate to High	Medium (12)
11A	72	Moderate to High	Medium (12)	96	High	High (15)
12A	54	Moderate	Medium (9)	99	High	High (15)
13A	51	Moderate	Medium (9)	74	Moderate to High	Medium (12)
14A	55	Moderate	Medium (9)	73	Moderate to High	Medium (12)
15A	46	Moderate	Medium (9)	84	High	High (15)
16A	46	Moderate	Medium (9)	95	High	High (15)

Table A6-3

Overall Collision Risk Assessment – Pipistrellus Species

Location	Typical Activity (Median Percentile)	Typical Activity Category	Typical Activity Risk Assessment	Peak Activity (Max Percentile)	Peak Activity Category	Peak Activity Risk Assessment
5A	87	High	High (15)	89	High	High (15)
6A	94	High	High (15)	96	High	High (15)
7A	96	High	High (15)	100	High	High (15)
8A	99	High	High (15)	100	High	High (15)
11A	86	High	High (15)	86	High	High (15)
12A	100	High	High (15)	100	High	High (15)
14A	82	High	High (15)	82	High	High (15)
15A	85	High	High (15)	86	High	High (15)
16A	95	High	High (15)	96	High	High (15)

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