Tom na Clach Wind Farm Extension

Appendix 11.B

Bat Survey Report

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Client	Nan Clach Extension Ltd
Project	Proposed Tom na Clach Wind Farm Extension
Version	FINAL
Project number	P20-227

	Name	**Position**	**Date**
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Reviewed	Steven Betts	Associate Director	28 February 2022
Approved for issue to client	Steven Betts	Associate Director	02 March 2022
Issued to client	Steven Betts	Associate Director	02 March 2022

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Contents

1 Introduction

Background to commission

1.1 BSG Ecology was commissioned by Nan Clach Extension Ltd (the Applicant) in March 2020 to complete bat survey work at the proposed Tom na Clach Extension site (hereafter referred to as the Proposed Development), in support of an application to extend the operational Tom na Clach Wind Farm (hereafter referred to as the Operational Scheme) which is located to the north and west. Bat survey has been undertaken in July and September 2020, and in April/ May 2021.

1.2 The site is located approximately 7 km north-east of Tomatin at an approximate central Ordnance Survey Grid Reference (OSGR) of NH 86563 34600. The boundary of the Proposed Development and the proposed turbine locations are shown in Figure 1, Section 5, of this report.

Site description

1.3 The Proposed Development site covers an area of approximately 3.95 km^2 within an upland area comprising undulating, open moorland that is dominated by blanket bog. This habitat has been modified through drainage, burning and grazing by sheep. The majority of this habitat is relatively dry due to the combined effects of gully erosion and the presence of drainage ditches.

1.4 A number of small stream valleys cross the blanket bog. These have dry heath communities on their slopes, and occasional acid flush habitat in their bases. Acid grassland communities are present where the soils are more freely draining.

1.5 Small areas of lichen heath are present on the top of small hillocks and on the upper slopes within the western part of the Proposed Development. This habitat is generally located on slopes with northerly aspects where they are shaded and/or are likely to accumulate significant quantities of snow in winter.

1.6 A small area of juniper *Juniperus communis* scrub is present in the valley which forms the headwaters of the Allt Seileach in the far south-western part of the Proposed Development site.

1.7 To the south-west (and outside) of the Proposed Development is an area of young forestry plantation which is part of Glenkirk Forest.

1.8 The access track to the Operational Scheme runs in a south-westerly direction from the B9007. This route is c. 10 km long and crosses countryside that supports a more diverse range of habitats, including a number of small river valleys. This track will also provide the access for the Proposed Development.

Description of project

1.9 At the time that the bat survey work was commissioned, the Proposed Development included the installation of ten wind turbines and supporting infrastructure. The scope of the survey was therefore developed with reference to the indicative ten turbine layout.

1.10 The scheme has since been reduced to seven proposed turbines with associated infrastructure.

Aims of the Study

1.11 The aims of the bat survey work were:

- To assess the habitats within the Proposed Development site to identify features that have potential to support roosting bats.
- To identify the species of bat using the Proposed Development site at different times of the year.
- To identify habitats that are favoured by foraging and commuting bats.
- To assess the level of bat activity within different parts of the Proposed Development site.
- To collect baseline information to inform an assessment of potential impacts on bats arising from the construction and operation of the Proposed Development.

1.12 Bat detector deployment, recovery, data collection and processing were completed by Hannah Breadin ACIEEM, Senior Ecologist at BSG Ecology. She is an experienced ecologist who has undertaken ecological assessments on a range of different development sites in northern England and Scotland. Assistance was provided by Matthew Breadin Assistant Ecologist at BSG Ecology.

1.13 This report was prepared by Hannah Breadin ACIEEM and reviewed by Steven Betts CEcol, CEnv, MCIEEM, Associate Director at BSG Ecology. Steven has worked in the ecological sector for more than 27 years and he has undertaken ecological assessments of many different wind farm sites.

1.14 Full details of experience and qualifications can be found at http://www.bsg-ecology.com/people.

2 Methods

Desk study

2.1 A search of the National Biodiversity Network atlas has been undertaken, which contains the majority of recent bat records held by the Highlands Biological Recording Group. A search for all bat records was carried out on in January 2021 for the Proposed Development site and a study area that extends 2 km from the site boundary. Online aerial photography of the site and its surroundings (Google Earth Pro, accessed on 13 August 2021) was examined to further assist in understanding the context of the Proposed Development site and to identify and assess possible linkages with other habitats or sites of ecological importance within the local area.

Field survey

Roost Survey

2.2 SNH guidance (SNH *et al*, 2019) recommends that key features that could support maternity roosts and significant hibernation and/or swarming sites within 200 m plus rotor radius of the boundary of the proposed development should be subject to further investigation. Survey should establish presence or absence of roosts and, if bats are present, the species, numbers, function of the roost and flight lines away from the roost.

2.3 A search of aerial and Ordnance Survey mapping indicated that the only building present in the area surrounding the Proposed Development site is the site office of the Operational Scheme (located at OSGR NH 85936 34156). This building is approximately 450 m to the north-west of proposed turbine T5.

2.4 No trees are present within the Site or the surrounding 200 m. As such the roost potential of the Proposed Development site was evaluated to be low and this was confirmed through observations during site visits to install static bat detector equipment.

Static Bat Detector Survey

2.5 Bat survey of the Proposed Development site was carried out in line with current industry guidance (SNH *et al*, 2019) which recommends that static detectors should be placed to collect a representative sample of bat activity at or close to the proposed turbine locations. Static bat detectors were placed at or close to each of the proposed turbine locations (ten locations at the time of survey commission).

2.6 During the evolution of the project adjustments have been made to the Proposed Development design, including a reduction in the number of proposed turbines and changes to their locations. As these changes took place following the initial commissioning of the bat survey work, static detector locations all vary slightly with regard to their distance from the nearest proposed turbine location based on the final layout. However, given the homogeneous nature of the habitats within the Proposed Development site, all static bat detector locations are still considered to be representative of the habitats present at each of the proposed turbine locations.

2.7 The OSGRs for the static bat detector locations and the distance from the nearest proposed turbine location are presented in Table 1 below. The locations of the detectors in relation to proposed turbine placements is shown in Figure 1 in Section 5 of this report.

2.8 With the exception of turbine location T6 the bat detectors were all located within 270 m of the proposed turbine locations. The nearest bat detector locations to turbine T6 is location reference 7, which is approximately 500 m to the south-west.

***Table 1**: Static bat detector locations*

Static bat detector location reference	OSGR	Nearest turbine number	Distance from nearest turbine in m
1	NH 8710935385	T1	70
8	NH 8753435261	T2	145
2	NH 8721534845	T3	20
3	NH 8702834281	T4	150 (560 m from T6)
9	NH 8607233688	T5	270
7	NH 8728233901	T7	275 (500 m from T7)
6	NH 8680533697	T7	265
4	NH 8654233938	T5	300
10	NH 8578033883	T5	585
5	NH 8531134688	T5	1415

2.9 Survey work has been undertaken in July 2020 (Survey Period 1), late August/early September 2020 (Survey Period 2), and late April/ early May 2021 (Survey Period 3).

2.10 Table 2 below shows the dates of each deployment for all detector locations. The detector locations are shown on Figure 1 in Section 5.

***Table 2**: Dates of deployment at each detector location*

Survey Period	Dates of deployment	Total number of nights deployed
Survey period 1	21/07/20 to 04/08/20	15
Survey period 2	08/09/20 to 20/09/20	13
Survey period 3	27/04/21 to 09/05/21	13

2.11 Survey was undertaken using Wildlife Acoustics Song Meter SM4 bat detectors with external microphones. The SM4 detectors were configured to record above the level of ambient noise, such as noise generated by wind or rain, using an adaptive trigger set to 6 dB. They were set to define a bat pass as a call note of >2 ms duration, which is separated from another by more than one second.

2.12 An external microphone was connected via a cable to the detector unit, and attached to a pole at approximately 2 m above ground level. For each night sampled, detectors were set to record from half an hour before sunset to half an hour after sunrise.

2.13 Weather conditions have been recorded concurrently with static bat detector survey. Weather was recorded from a single location (OSGR NH 87127 34859) within the Proposed Development site using a Davis Vantage Pro weather station, which was set up to record temperature, wind speed, wind direction and rainfall.

Data analysis

2.14 Recorded bat calls were classified using Wildlife Acoustics Kaleidoscope Pro Software. The software uses predefined classifiers to label bat calls to species[1] where the call characteristics allow an identification to be made. The classified calls were then audited by an experienced surveyor using Analook software to confirm the species. Where possible, a bat call was identified to species level but if this was not possible then genus was used.

[1]For more information on how Wildlife Acoustics Kaleidoscope Pro Software classifies bat calls please see: https://www.wildlifeacoustics.com/products/kaleidoscope-software-ultrasonic

2.15 For pipistrelle species the following criteria, based on measurements of peak frequency, were used to classify calls:

- common pipistrelle ≥42 and <49 kHz
- soprano pipistrelle ≥51 kHz
- Nathusius' pipistrelle <39 kHz
- common pipistrelle / soprano pipistrelle ≥49 and <51 kHz
- common pipistrelle / Nathusius' pipistrelle ≥39 and <42 kHz

2.16 Weather data were analysed to check for any periods where conditions were poor and which could have potentially affected levels of bat activity within the site. Poor conditions that may influence bat behaviour include, for example, high wind speeds or heavy rain.

Limitations to methods

2.17 All the detectors worked correctly during deployment, although many did not record bat activity every night that they were deployed. It is assumed that this was due to a lack of bat activity within range of the detector, and not due to equipment failure as all detectors were working correctly when tested prior to deployment. Nights where no activity was recorded were also interspersed with nights when data were recorded, indicating that the detector was functioning at that time. This supports the conclusion that the lack of data on some survey nights was due to a lack of detectable bat activity at that location.

3 Results and Interpretation

Desk study

3.1 A search of the NBN atlas identified eight bat records within 2 km of the site. These included five records of Daubenton's bat *Myotis daubentonii*, one of Natterer's bat *Myotis nattereri* and two records identified only as 'bat'. All of the records dated from before 2001 and so the data are over twenty years old.

Roost Survey

3.2 A single building is present within the Operational Scheme and this comprises the control centre. The building is of corrugated sheet metal construction and is located at approximately 450 m from the nearest proposed turbine location (turbine T5). Given the distance of the building from the nearest proposed turbine, detailed assessment for roosting bats was not completed; however, given the construction materials used for the building, bat roosts are considered unlikely. Sheet metal construction is unlikely to provide suitable voids for bats and this material is likely to result in a widely fluctuating internal temperature depending upon the prevailing weather.

3.3 No trees with the potential to support roosting bats are present within the Proposed Development site. Trees are absent from the site with the exception of the occasional shrub or small stand of juniper. Overall, the Proposed Development site is considered to be of negligible bat roosting suitability.

Bat survey data

3.4 Bat activity recorded within the Proposed Development site was limited to two genus of bat: *Pipistrellus* sp. and *Myotis* sp. Most of the recorded bat activity was attributed to common pipistrelle *Pipistrellus pipistrellus* which accounted for 74% of all bat activity recorded within the Proposed Development. *Myotis* sp. was the second most frequently recorded bat with a total of 20% of all bat activity attributed to this species. *Myotis* sp. was also the only bat to be recorded during all three survey periods. Soprano pipistrelle *Pipistrellus pygmaeus* activity accounted for 7% of all recorded bat activity.

3.5 Overall, bat activity within the site was very low, with the highest number of bat passes being recorded at Location 5 during Survey Period 2 (September 2020): a total of 50 bat passes was recorded for the entire monitoring period (an average of 3.8 bat passes per night). Location 5 falls outside the Proposed Development site boundary following the reduction from 10 to 7 turbines (see Figure 1, Section 5). The highest number of bat passes recorded within the Proposed Development site boundary was at location 8 where 48 passes was recorded in Survey Period 2 (an average of 3.7 bat passes per night).

3.6 Bat activity was higher during Survey Period 2 (September 2020) when a total of 249 bat passes were recorded by all static bat detectors. In comparison, 17 passes were recorded in Survey Period 1 (July/August 2020) and just 3 bat passes were recorded in Survey Period 3 (April/May 2021). During each survey period there were multiple nights where no bat activity at all was recorded.

3.7 Tables 3 to 5 below show the number of bat calls recorded at each survey location during each of the survey periods.

***Table 3**: Number of bat passes recorded at each detector location during Survey Period 1.*

	Total number of bat passes recorded at each location during Survey Period 1										
Species	**Location 1**	**Location 2**	**Location 3**	**Location 4**	**Location 5**	**Location 6**	**Location 7**	**Location 8**	**Location 9**	**Location 10**	**Grand Total**
Common pipistrelle	1				2			5		1	9
Soprano pipistrelle				1			1		1		3
Myotis sp.			1				1			3	5
Total	1	0	1	1	2	0	2	5	1	4	17

***Table 4**: Number of bat passes recorded at each survey location during Survey Period 2.*

Species	Total number of bat passes recorded at each location during Survey Period 2										
	Location 1	Location 2	Location 3	Location 4	Location 5	Location 6	Location 7	Location 8	Location 9	Location 10	Grand Total
Common pipistrelle		8	6	19	47	18		44	20	29	191
Soprano pipistrelle								1	3	9	13
Myotis sp		3	8	7	3	7		3	6	8	45
Total	0	11	14	26	50	25	0	48	29	46	249

***Table 5**: Number of bat passes recorded at each survey location during Survey Period 3.*

Species	Total number of bat passes recorded at each location during Survey Period 3										
	Location 1	Location 2	Location 3	Location 4	Location 5	Location 6	Location 7	Location 8	Location 9	Location 10	Grand Total
Myotis sp.			1				1	1			3
Total	0	0	1	0	0	0	1	1	0	0	3

3.8 The average number of bat passes recorded per night at each of the survey locations was never higher than 4 bat passes a night and for the majority of locations was below 1 bat pass a night. Table 6 shows the average number of bat passes recorded per night at each location during each survey period.

***Table 6**: Average number of bat passes recorded per night at each survey location.*

	Survey location									
	1	2	3	4	5	6	7	8	9	10
Survey Period 1	0.1	0.0	0.1	0.1	0.1	0.0	0.1	0.3	0.1	0.3
Survey Period 2	0.0	0.8	1.1	2.0	3.8	1.9	0.0	3.7	2.2	3.5
Survey Period 3	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.1	0.0	0.0

Weather data

3.9 Weather data are presented in Graphs 1-3 in Appendix 1. Conditions during Survey Period 1 remained optimal for bats throughout the survey period. Optimal conditions are considered to be temperatures of 10°C or higher at sunset, rainfall less than 5 mm per day and an average wind speed of less than 15 km/hour.

3.10 During Survey Period 2 temperatures were lower, falling within the range 7-10°C on several evenings. One period of higher wind speed was also recorded, and on this occasion the wind speed reached over 30 km/h for two days. These weather conditions are considered to be typical of the highland area of Scotland during the late summer / autumn period in which survey was undertaken[2].

3.11 During Survey Period 3 temperatures were also low, measuring below 10°C for the majority of the survey period. Wind levels were also the highest of all three survey periods, rising above 20 km/hour on seven occasions. Whilst temperatures were below the threshold of conditions which would be considered optimal for bats, the temperatures were considered to be typical for late April / early May in the Scottish highlands.

[2] Historical weather conditions are summarised at: https://www.timeanddate.com/weather/@2635710/historic.

3.12 Although the lower temperatures may explain in part the very low levels of bat activity recorded during this survey period, the weather conditions are considered to be representative for the time of year and the geographical location of the survey.

3.13 None of the weather data collected during the three survey periods indicated extreme or unusual conditions for the Proposed Development site, and which would trigger the need to repeat a survey.

4 Assessing Potential Risk to Bats

Introduction

4.1 Wind farms can affect bats in the following ways (SNH *et al*., 2019):

- Collision mortality, barotrauma and other injuries (although it is important to consider these in the context of other forms of anthropogenic mortality)
- Loss or damage to commuting and foraging habitat (wind farms may form barriers to commuting or seasonal movements, and can result in severance of foraging habitat);
- Loss of, or damage to, roosts;
- Displacement of individuals or populations (due to wind farm construction or because bats avoid the wind farm area).

4.2 To ensure that bats are protected by minimising the risk of collision, an assessment of impact at a site requires a detailed appraisal of:

- The risk of turbine-related mortality for all bat species recorded at the site during bat activity surveys.
- The effect on the species' population status if predicted impacts are not mitigated.
- The level of activity of all bat species recorded at the site assessed both spatially and temporally.

4.3 The above information should be interpreted in the context of likely impacts on local populations. Relevant factors that should be considered include whether populations are at the edge of their range, cumulative effects, presence of protected areas designated for their bat interest and proximity to maternity roosts, key foraging areas or key flight routes, including possible migration routes.

4.4 The risk of mortality of bat species at wind farms was categorised by Natural England (2012) as high, medium and low, based on mortality data from monitoring studies at operational wind farms as well as habitat preferences, echolocation characteristics, weight, wing-shape, flight speed and height, hunting techniques, flight behaviour, and use of the landscape. This has since been amended in SNH *et al*. (2019) to re-classify common pipistrelle and soprano pipistrelle as "High Risk" based on evidence from a Defra-commissioned study (Mathews *et al*., 2016). Table 7 assigns species of bats a category of likely level of risk of death through interaction with operational wind turbines.

Table 7*: The likelihood of bat species being killed by wind turbines (based on Table 2 in SNH et al.,* 2019).

High-risk	Medium-risk	Low-risk
Nathusius' pipistrelle	**Serotine**	***Myotis*[3] species**
Common pipistrelle	**Barbastelle**	**Long-eared bats**
Soprano pipistrelle		**Horseshoe bats**
Noctule		
Leisler's bat		

4.5 In addition, SNH *et al.* (2019) guidance assesses the potential threat (high, medium or low) posed to species populations from mortality caused by collision with wind turbines. Table 8 lists the likely risk to bat populations in Scotland to wind farm related adverse effects, which is adapted from Wray *et al*. (2010). Table 8 has been amended to exclude species that do not occur in Scotland[4].

[3] Refers to any bat species of the genus *Myotis*.

[4] Based on information presented in https://cdn.bats.org.uk/pdf/Bats-in-Scotland.pdf?mtime=20181101151315, accessed March 2020.

Table 8: Threat to bat populations in Scotland from wind turbines (based on Table 2 in SNH *et al.*, 2019).

High-risk	Medium-risk	Low-risk
Nathusius' pipistrelle	**Common pipistrelle**	**Brown long-eared bat**
Noctule	**Soprano pipistrelle**	**Daubenton's bat**
Leisler's bat	**Whiskered bat**	**Natterer's bat**

Site risk level for bats

4.6 Table 3a in SNH *et al*. (2019) sets out a matrix to derive an indicative risk for proposed wind farm sites based on the habitats present and the scale of the proposed development. The Proposed Development site has been categorised as a "low site risk" (risk level = 2) according to the supporting definitions of low habitat risk and medium project size in Table 9 below and the matrix in Table 10. Note that, whilst the height of the turbines within the proposed development exceeds the defined height for "small" project size, the number of proposed turbines (seven) meets the definition for "small" project size.

4.7 The Operational Scheme is also located immediately to the north-west of the Proposed Development and meets the definition for a "medium" project size. The Proposed Development has therefore been assessed on the basis of it being classed as a "medium project".

Table 9*: Descriptions of habitat risk and project size categories used to inform the site risk level 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 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.
Project Size	**Description**
Small	Small scale development (≤10 turbines). No other wind energy developments within 10 km. Comprising turbines <50 m in height.
Medium	Larger developments (between 10 and 40 turbines). May have some other wind developments within 5 km. Comprising turbines 50-100 m in height.
Large	Largest developments (>40 turbines) with other wind energy developments within 5 km. Comprising turbines >100 m in height.

***Table 10**: Site risk level derived from the outcome of Table 9 (taken from SNH et al., 2019).*

Site Risk Level		Project Size		
		Small	Medium	Large
Habitat Risk	Low	1	2	3
	Moderate	2	3	4
	High	3	4	5

Key: Green (1-2) - low/lowest site risk; Amber (3) - medium site risk; Red (4-5) - high/highest site risk.

Bat activity assessment

4.8 The SNH *et al*. (2019) assessment of potential risk involves consideration of habitat and development related features, the relative vulnerability of each species of bat potentially at risk, and the bat activity output from the EcoBat tool[5].

4.9 The EcoBat tool relies on a baseline dataset that allows bat activity recorded at a site to be contextualised against reference levels recorded in the same region, at the same time of year etc. The 'reference range' is the stratified dataset by which percentile outputs can be generated.

4.10 The EcoBat tool generates a site-specific report that evaluates the recorded bat activity at each bat detector location and expresses it as a percentile that is generated by comparing it to the reference range. Percentiles provide a numerical indicator of the relative importance of a nights' worth of bat activity. For example, activity data in the 70th percentile would indicate that the recorded data were in the top 30% of activity for the reference range. The tool suggests the following cut-offs between activity categories:

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

4.11 At the current time, the supporting database within the EcoBat tool that is used for activity level comparison is limited. The total available data within the 100 km reference range for comparison of bat activity is below the level recommended by EcoBat for meaningful analysis (the recommended comparison data set size is 2,000+ nights; the maximum data set available for comparison against the survey data for the proposed development is 312 nights, i.e., less than 20% of the recommended comparison data set). Whilst the reference range used for comparison is expected to grow as adoption of the EcoBat tool for analysis of data increases, the limited data set available for this assessment means that the conclusions cannot be considered robust.

[5] The Ecobat tool is an internet-based tool that can be found at: http://www.ecobat.org.uk/

Deriving an overall risk assessment

4.12 In order to derive an "overall risk assessment" for a wind farm development site, SNH *et al.* (2019) guidance suggests that an activity category is derived from comparison of the recorded activity of each species of high collision risk (as defined in Table 7 above) at the site against a data set (summarised in Tables 9 and 10). These scores should then be set against the "site risk level" (as defined in Table 9 above) using the matrix presented in Table 11 below (based on Table 3b in SNH *et al*, 2019) to determine the level of overall risk.

***Table 11**: Overall risk assessment (taken from SNH et al., 2019)*

	Activity category					
Site Risk Level (taken from Table 9)	**Nil (0)**	**Low (1)**	**Low-moderate (2)**	**Moderate (3)**	**Moderate-high (4)**	**High (5)**
Lowest (1)	**0**	**1**	**2**	**3**	**4**	**5**
Low (2)	**0**	**2**	**4**	**6**	**8**	**10**
Moderate (3)	**0**	**3**	**6**	**9**	**12**	**15**
High (4)	**0**	**4**	**8**	**12**	**15**	**18**
Highest (5)	**0**	**5**	**10**	**15**	**20**	**25**

4.13 Taking into account the limitations associated with the use of the EcoBat tool, the output needs to be treated with caution and should only be used to inform the overall assessment and the conclusions reached. Table 12 provides a summary of the data output from the EcoBat tool for the static bat detector surveys undertaken during the periods 21 July 2020 to 4 August 2020, 8 September 2020 to 20 September 2020, and 27 April 2021 to 9 May 2021 with regards to common pipistrelle activity. This equates to 41 nights of survey per bat detector location (see Table 2).

4.14 Summary tables for EcoBat data have been produced for common pipistrelle only as this was the dominant species recorded during the survey with only very small numbers of bat calls from soprano pipistrelle (22 bat calls over three Survey Periods) and *Myotis* sp (53 calls over three Survey Periods) recorded. The data for these latter species are shown in Appendix 2, however, and are commented on below.

4.15 When interpreting the data in Tables 12 and 13 it is important to remember that the total number of nights where bat activity was recorded includes a range of activity levels as shown by the activity category. For example, at Location 3 common pipistrelle was detected during 3 out of a total of 41 survey nights with the median percentile activity being described as 'Low to Moderate' (score 2) and the maximum percentile activity being described as 'Moderate' (score 4). Taking into account the site risk level of 2, the overall risk score is 4 (Low) for the median percentile bat activity and 8 (Moderate) for the maximum percentile common pipistrelle activity.

4.16 If a site risk level of 2 is used for the assessment (based on the Proposed Development being considered a medium project and the habitat risk low – see Table 10) the overall risk category is Low for 4 bat detector locations and Medium for 6 bat detector locations (for median percentile common pipistrelle activity). When considering maximum percentile activity the overall risk category would be Low for three detector locations and Medium for seven detector locations.

4.17 With regard to soprano pipistrelle all detector locations have an overall risk category of Low at both the medium and maximum percentile. For *Myotis* sp. all are low at the medium percentile whilst three are classified as medium (Locations 3, 4 and 10) at the maximum percentile.

4.18 Overall, it is concluded that there is a low likelihood of the proposed development resulting in a significant impact on bats. Three species / species groups have been recorded using the Proposed Development site: common pipistrelle, which was the most frequently recorded species, soprano pipistrelle (where only 16 bat calls were recorded) and *Myotis* sp. (where a total of 53 bat calls were recorded).

4.19 All three species / species groups are considered to be medium risk with regard to population-related impacts. The data collected indicate that bat activity levels are low, i.e., low numbers of bat passes have been recorded. Analysis using EcoBat indicates that the overall risk category is Low or Medium for the detector locations used, based on the assumption that the development is "medium" in size. If, however, the project is assumed to be "small" in size (based on turbine number alone) then the overall risk category is Low for all detector locations and species. The EcoBat assessment is not considered to be robust, however, due to the small number of data points available for comparison (the EcoBat report is provided in Appendix 2).

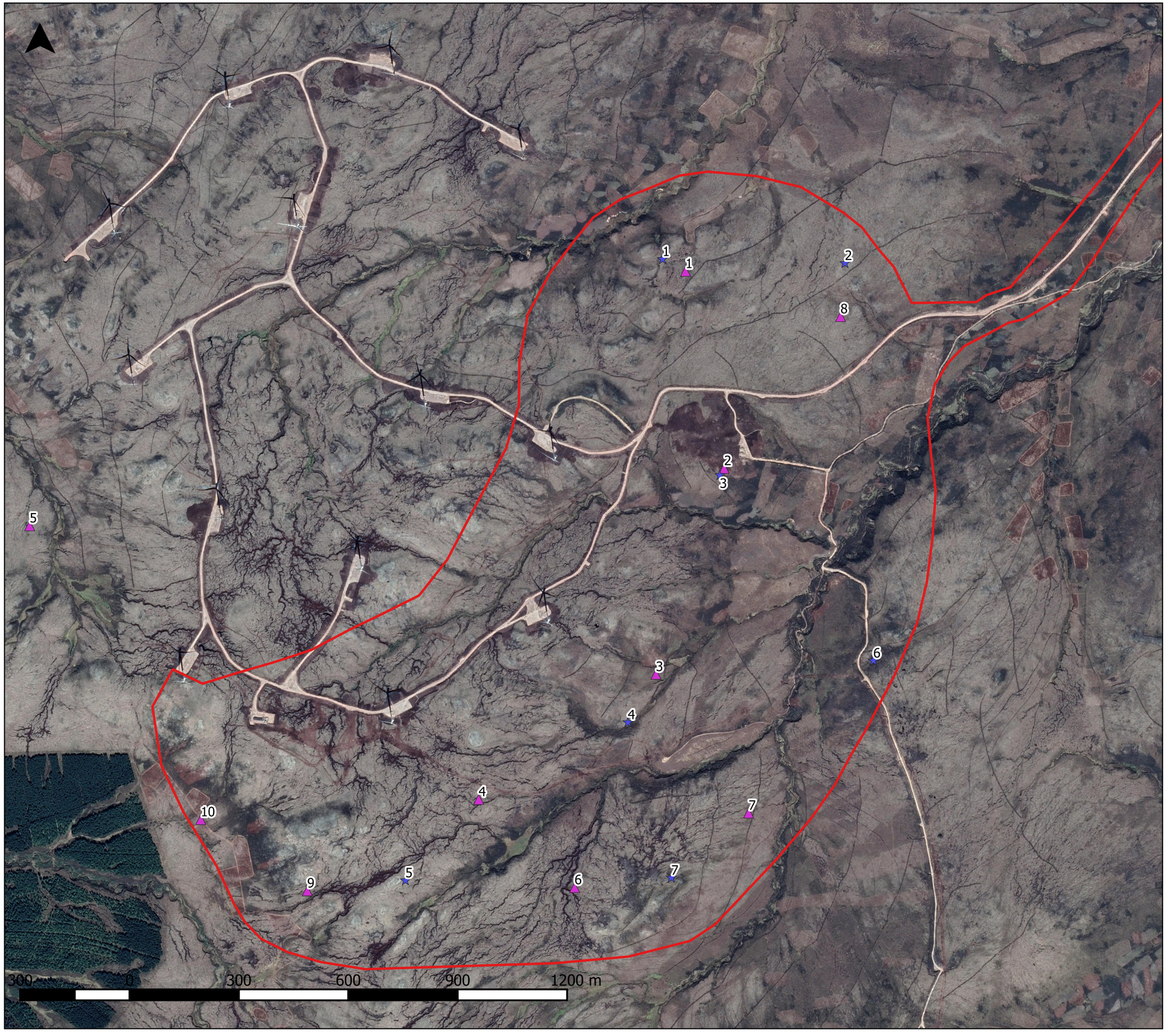
***Table 12**: Summary of bat activity with reference to the median percentile (data compared with the reference range using the EcoBat tool for Pipistrellus pipistrellus).*

Detector location	Median percentile	Activity category	Nights recorded	Site risk level	Overall risk score	Overall risk category
1	0	Low (1)	1	2	2	Low
2	35	Low to Moderate (2)	3	2	4	Low
3	35	Low to Moderate (2)	3	2	4	Low
4	67	Moderate to high (4)	3	2	8	Medium
5	57	Moderate (3)	8	2	6	Medium
6	47	Moderate (3)	3	2	6	Medium
7	0	Low (1)	1	2	2	Low
8	59	Moderate (3)	7	2	6	Medium
9	62	Moderate to high (4)	4	2	8	Medium
10	57	Moderate (3)	7	2	6	Medium

***Table 13**: Summary of bat activity with reference to the maximum percentile (data compared with the reference range using the EcoBat tool for Pipistrellus pipistrellus).*

Detector location	Max percentile	Activity category	Nights recorded	Site risk level	Overall risk score	Overall risk category
1	0	Low (1)	1	2	2	Low
2	35	Low to Moderate (2)	3	2	4	Low
3	47	Moderate (3)	3	2	6	Medium
4	73	Moderate to High (4)	3	2	8	Medium
5	78	Moderate to High (4)	8	2	8	Medium
6	75	Moderate to High (4)	3	2	8	Medium
7	0	Low (1)	1	2	2	Low
8	80	Moderate to High (4)	7	2	8	Medium
9	67	Moderate to High (4)	4	2	2	Medium
10	72	Moderate to High (4)	7	2	8	Medium

5 Figures



Legend

- Proposed Turbine Location
- Bat Detector Locations

BSG | ecology

OFFICE: Newcastle
T: 0191 303 8964

JOB REF: P20-227

PROJECT TITLE

Tom nan Clach

DRAWING TITLE

Figure 1: Bat Detector and Proprosed Turbine

DATE: 07.01.2022

SCALE: 1:10,000

DRAWN: HB

STATUS: FINAL

Sources: BSG Ecology survey data

Document path

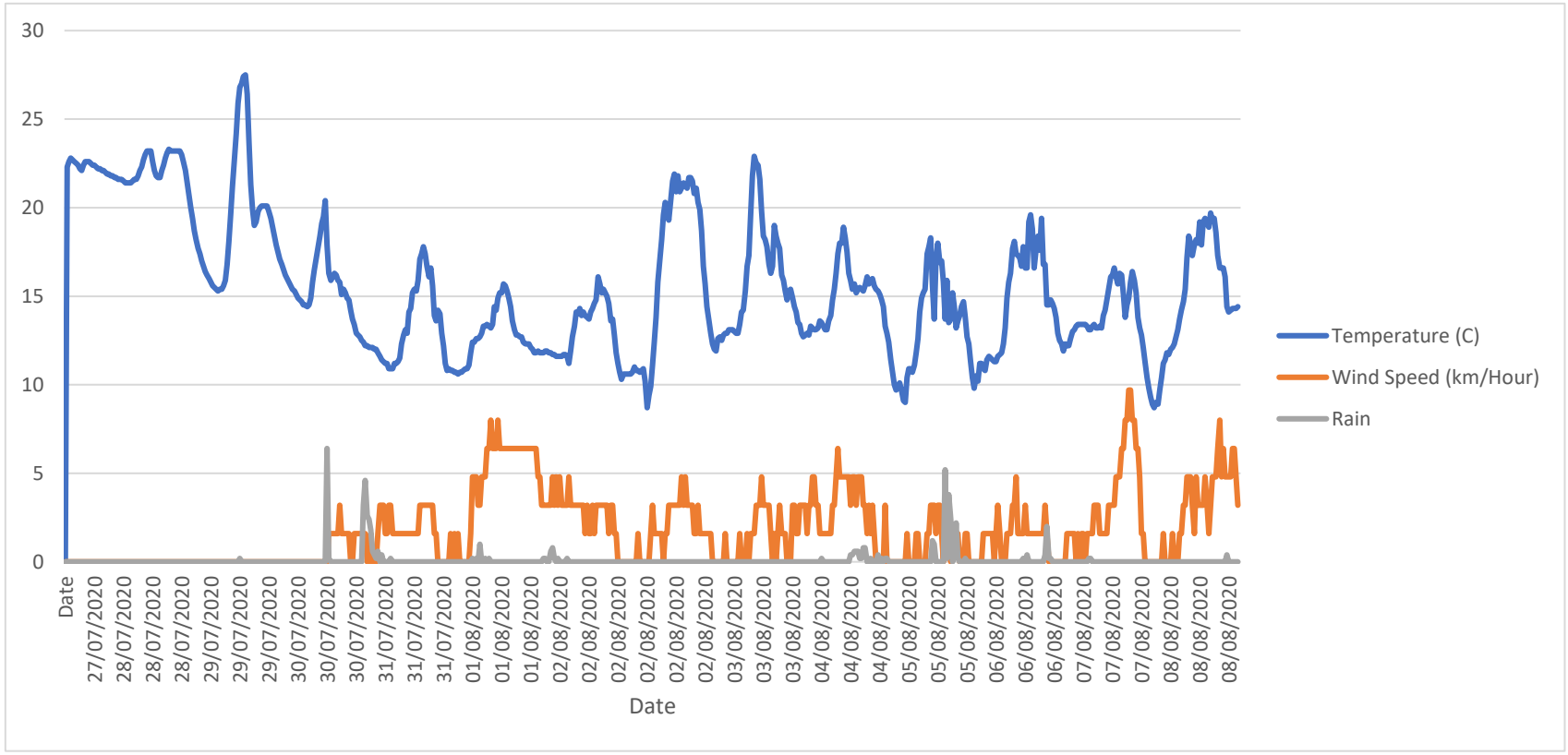
6 References

EcoBat tool, http://www.ecobat.org.uk/ (accessed September 2021).

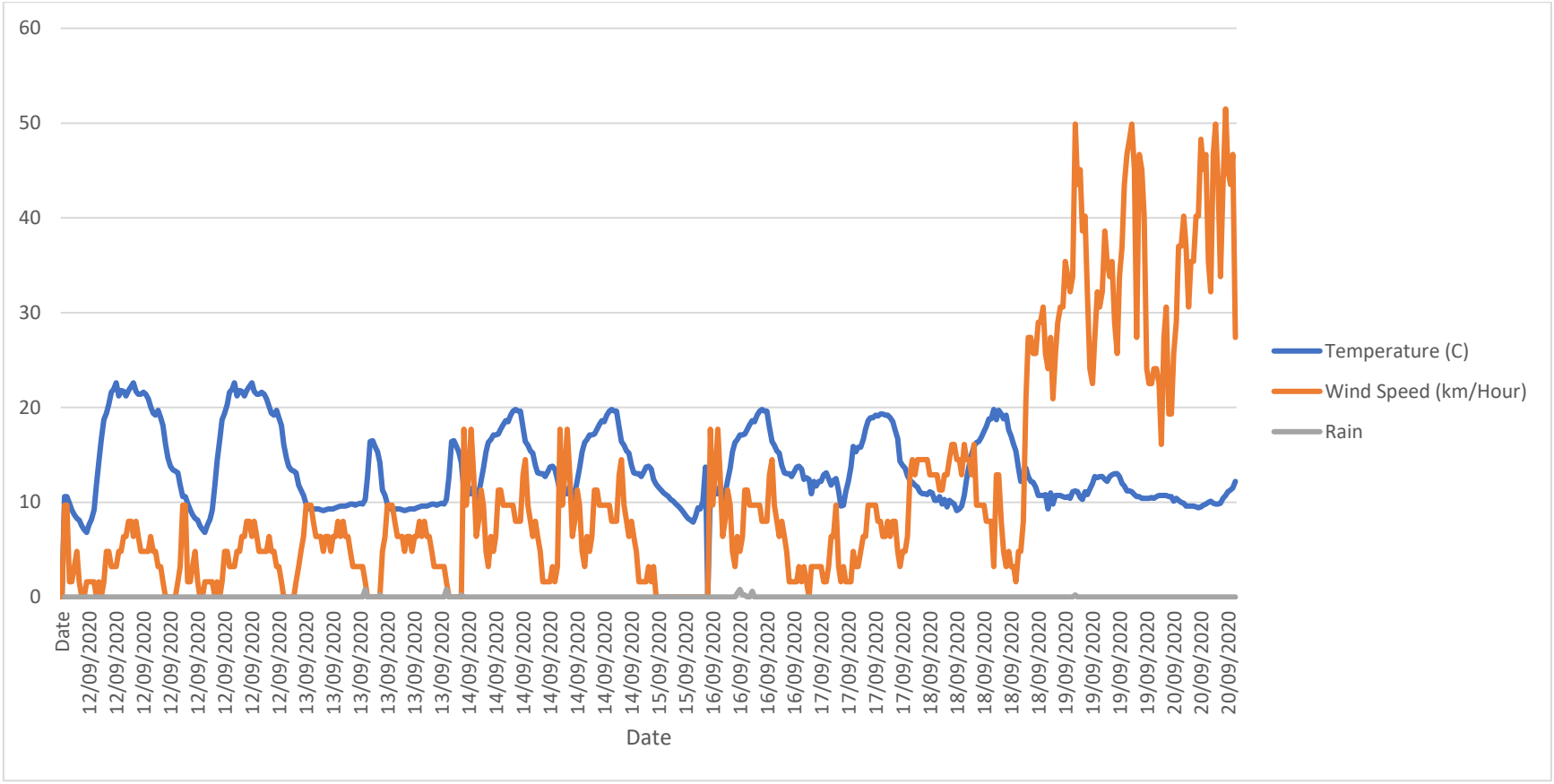
Scottish Natural Heritage, English Nature, Natural Resources Wales, Ecotricity Ltd, the University of Exeter and the Bat Conservation Trust. (2019). Bats and onshore wind turbines: survey, assessment and mitigation. Version: January 2019.

Appendix 1: Weather Data

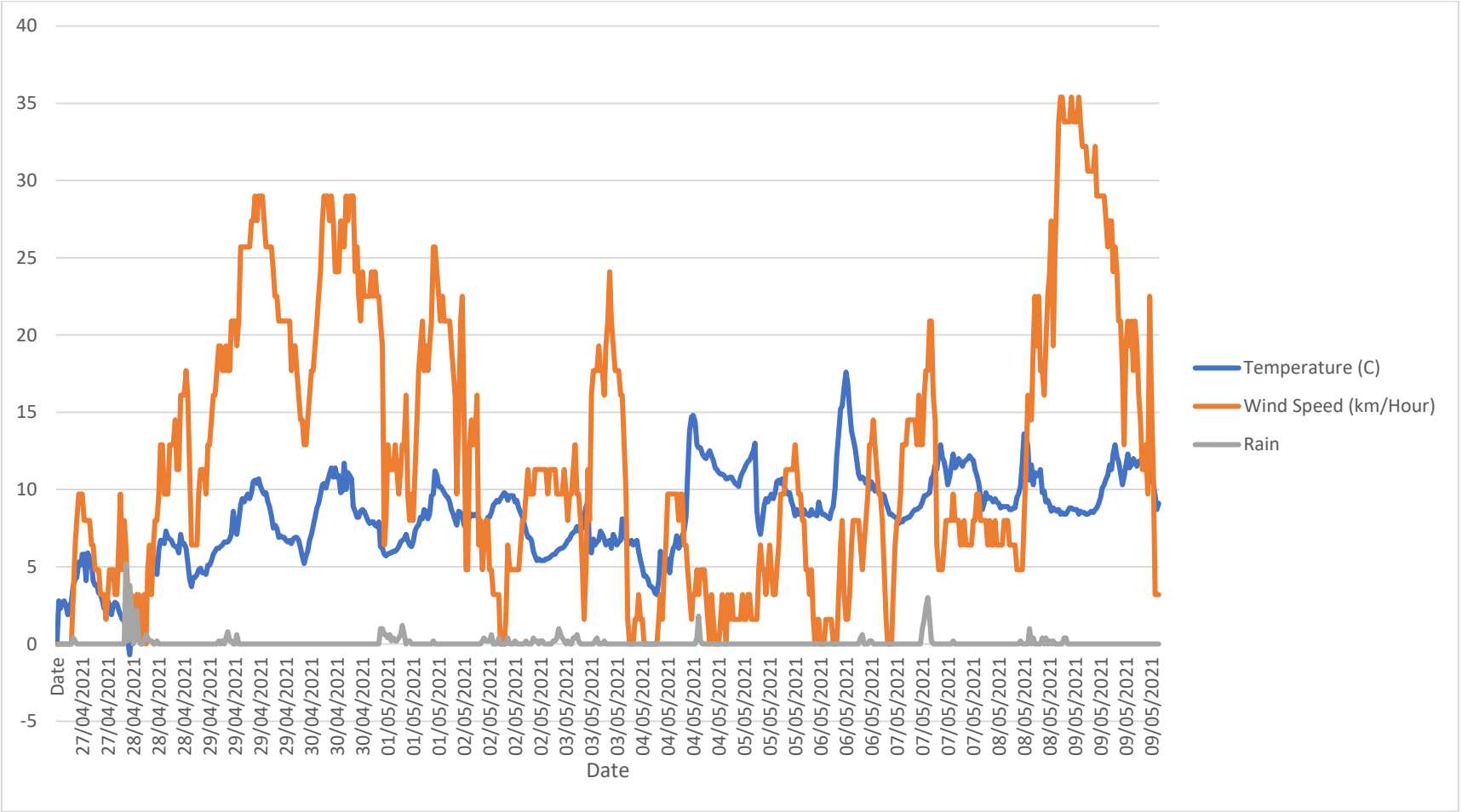
6.1 Rainfall, temperature and wind speed for each Survey Period is illustrated in Graphs 1-3 below.



Graph 1: Weather Data for Survey Period 1



Graph 2: Weather Data for Survey Period 2



Graph 3: Weather Data for Survey Period 3

Appendix 2: Ecobat Report

Ecobat Bat Activity Analysis

Site Name: Tom na Clach

BSG Ecology

13/09/2021

Summary

Bat surveys were conducted at Loc 10, Loc 3, Loc 7, Loc 5, Loc 6, Loc 4, Loc 2, Loc 8, Loc 9, Loc 1, for 19 nights between 2020-07-22 and 2021-05-09, using Wildlife Acoustics static bat detectors. The maximum of passes recorded in a single night was 19 passes, and 3 species were recorded.

The reference range dataset was stratified to include:

- Only records from within 30 days of the survey date.
- Only records from within 100km^2 of the survey location.
- Records using any make of bat detector.

Table 1

Summary table showing the number of nights recorded bat activity fell into each activity band for each species.

Location	Species/Species Group	Nights of High Activity	Nights of Moderate/ High Activity	Nights of Moderate Activity	Nights of Low/ Moderate Activity	Nights of Low Activity
Loc 1	*Pipistrellus pipistrellus*	0	0	0	0	1
Loc 10	*Myotis*	0	0	2	2	1
Loc 10	*Pipistrellus pipistrellus*	0	3	1	0	3
Loc 10	*Pipistrellus pygmaeus*	0	0	1	2	1
Loc 2	*Myotis*	0	0	0	1	1
Loc 2	*Pipistrellus pipistrellus*	0	0	1	1	1
Loc 3	*Myotis*	0	0	1	1	3

Loc 3	*Pipistrellus pipistrellus*	0	0	1	1	1
Loc 4	*Myotis*	0	0	1	1	2
Loc 4	*Pipistrellus pipistrellus*	0	2	0	0	1
Loc 4	*Pipistrellus pygmaeus*	0	0	0	0	1
Loc 5	*Myotis*	0	0	0	1	1
Loc 5	*Pipistrellus pipistrellus*	0	2	3	1	2
Loc 6	*Myotis*	0	0	0	2	3
Loc 6	*Pipistrellus pipistrellus*	0	1	1	0	1
Loc 7	*Myotis*	0	0	0	0	2
Loc 7	*Pipistrellus pygmaeus*	0	0	0	0	1
Loc 8	*Myotis*	0	0	0	0	4
Loc 8	*Pipistrellus pipistrellus*	1	2	2	0	2
Loc 8	*Pipistrellus pygmaeus*	0	0	0	0	1
Loc 9	*Myotis*	0	0	0	2	2
Loc 9	*Pipistrellus pipistrellus*	0	2	1	1	0
Loc 9	*Pipistrellus pygmaeus*	0	0	0	1	2

Table 2

Summary table showing key metrics for each species recorded.

Location	Species/Species Group	Median Percentile	95% CIs	Max Percentile	Nights Recorded	Reference Range
Loc 1	*Pipistrellus pipistrellus*	0	0	0	1	312
Loc 10	*Myotis*	35	35 - 47	47	5	140
Loc 10	*Pipistrellus pipistrellus*	54	54 - 72	72	7	312
Loc 10	*Pipistrellus pygmaeus*	35	35 - 35	54	4	220
Loc 2	*Myotis*	18	17.5 - 17.5	35	2	140

Loc 2	*Pipistrellus pipistrellus*	35	47 - 47	59	3	312
Loc 3	*Myotis*	0	47 - 47	59	5	140
Loc 3	*Pipistrellus pipistrellus*	35	41 - 41	47	3	312
Loc 4	*Myotis*	18	41 - 41	47	4	140
Loc 4	*Pipistrellus pipistrellus*	67	70 - 70	73	3	312
Loc 4	*Pipistrellus pygmaeus*	0	0	0	1	220
Loc 5	*Myotis*	18	17.5 - 17.5	35	2	140
Loc 5	*Pipistrellus pipistrellus*	57	47 - 75	78	8	312
Loc 6	*Myotis*	0	0 - 0	35	5	140
Loc 6	*Pipistrellus pipistrellus*	47	61 - 61	75	3	312
Loc 7	*Myotis*	0	0 - 0	0	2	140
Loc 7	*Pipistrellus pygmaeus*	0	0	0	1	220
Loc 8	*Myotis*	0	0 - 0	0	4	140
Loc 8	*Pipistrellus pipistrellus*	59	55.5 - 75	80	7	312
Loc 8	*Pipistrellus pygmaeus*	0	0	0	1	220
Loc 9	*Myotis*	18	17.5 - 17.5	35	4	140
Loc 9	*Pipistrellus pipistrellus*	62	35 - 67	67	4	312
Loc 9	*Pipistrellus pygmaeus*	0	0 - 0	35	3	220

Figures

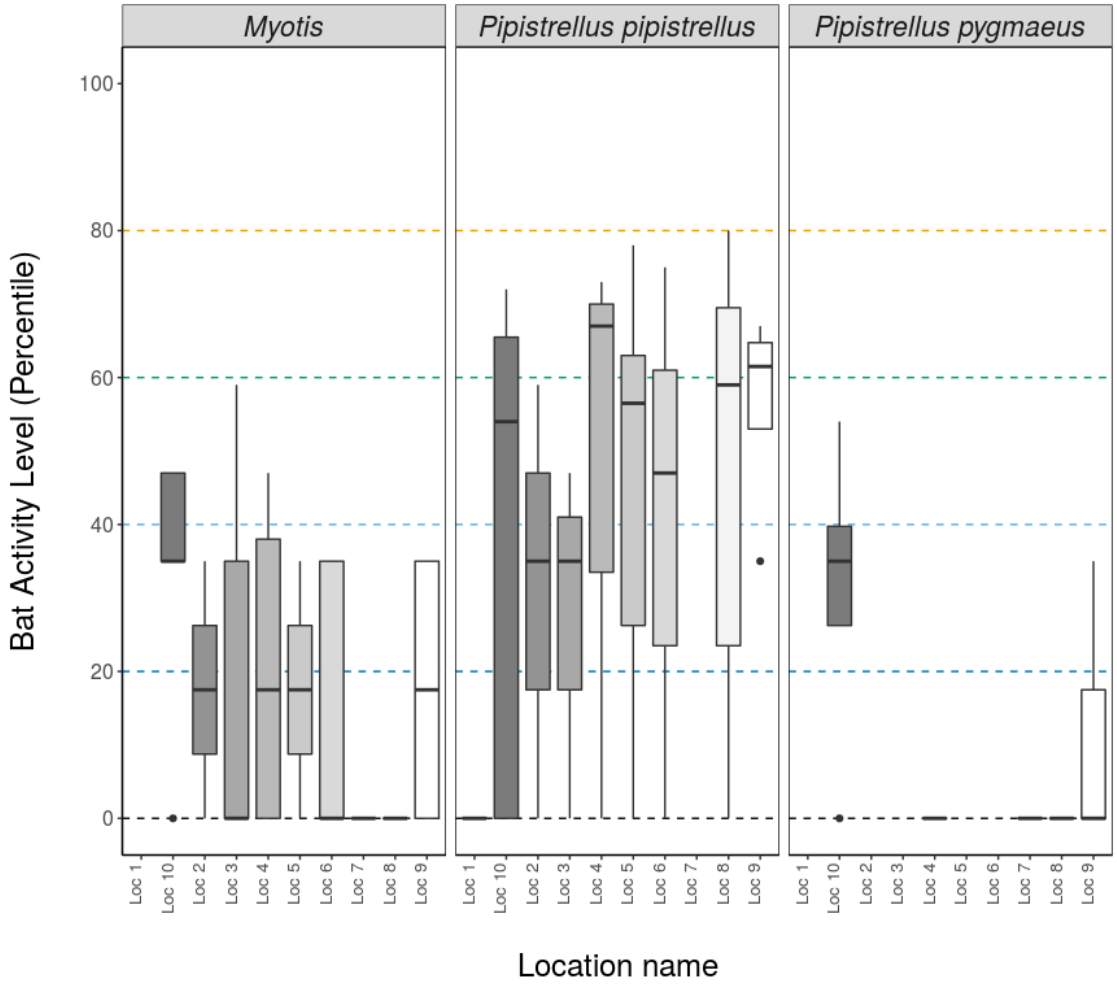
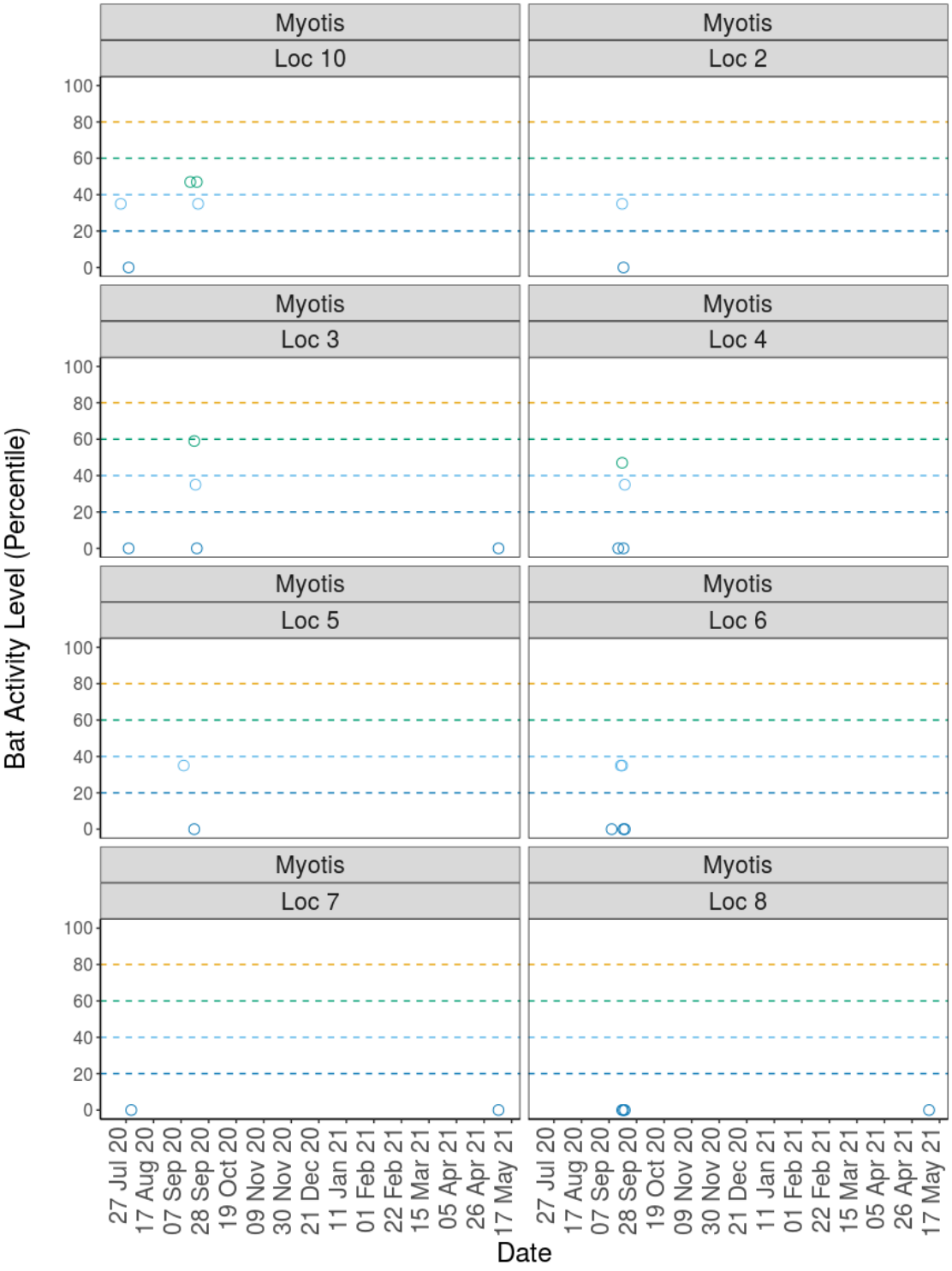
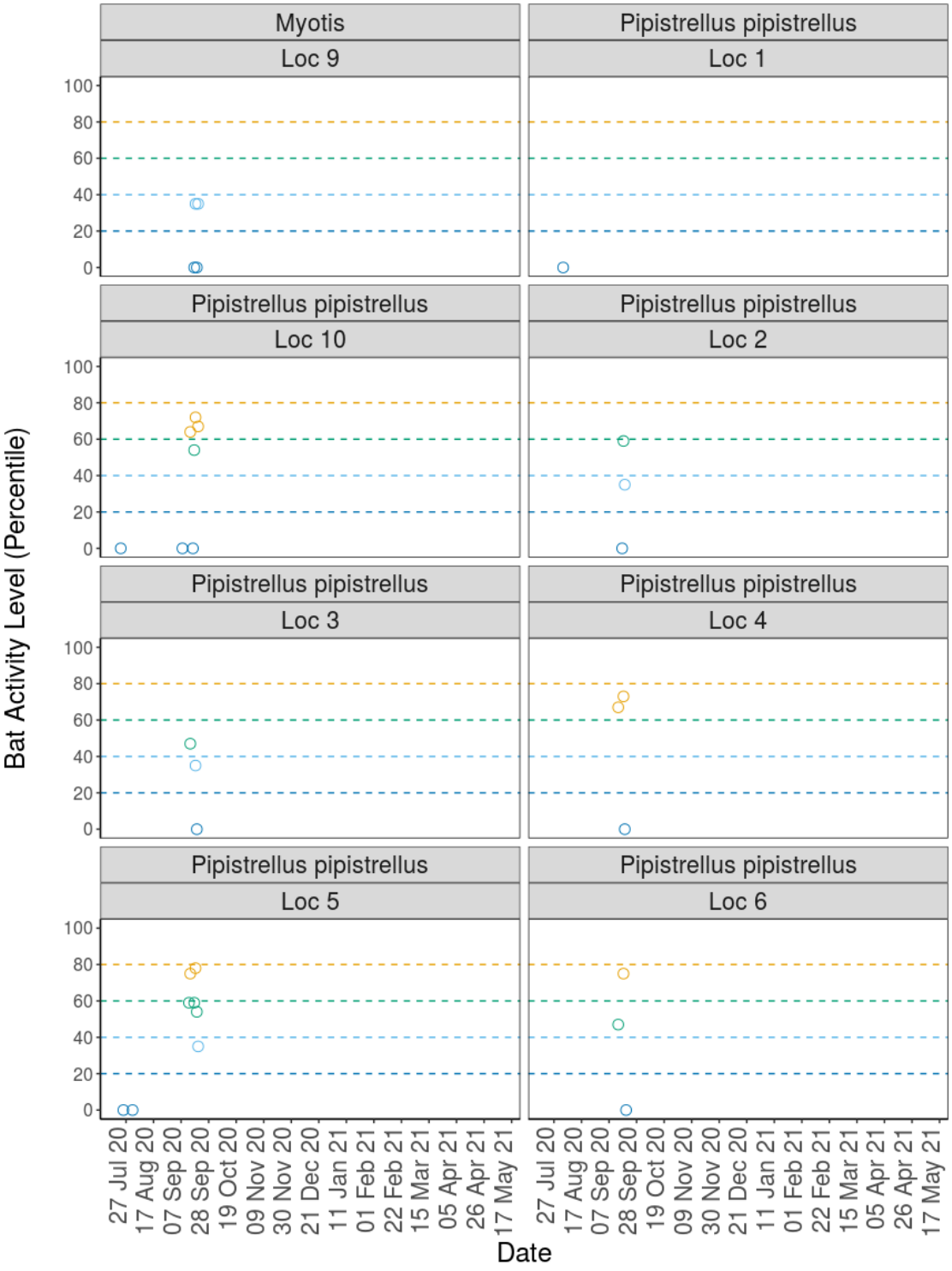


Figure 1. Differences in activity between static detector locations, split by species and location. The centre line indicates the median activity level whereas the box represents the interquartile range (the spread of the middle 50% of nights of activity)


Myotis
Loc 10
Myotis
Loc 2
Myotis
Loc 3
Myotis
Loc 4
Myotis
Loc 5
Myotis
Loc 6
Myotis
Loc 7
Myotis
Loc 8
Bat Activity Level (Percentile)
0
20
40
60
80
100
27 Jul 20
17 Aug 20
07 Sep 20
28 Sep 20
19 Oct 20
09 Nov 20
30 Nov 20
21 Dec 20
11 Jan 21
01 Feb 21
22 Feb 21
15 Mar 21
05 Apr 21
26 Apr 21
17 May 21
Date


Myotis
Loc 9
Pipistrellus pipistrellus
Loc 1
Pipistrellus pipistrellus
Loc 10
Pipistrellus pipistrellus
Loc 2
Pipistrellus pipistrellus
Loc 3
Pipistrellus pipistrellus
Loc 4
Pipistrellus pipistrellus
Loc 5
Pipistrellus pipistrellus
Loc 6
Bat Activity Level (Percentile)
0
20
40
60
80
100
27 Jul 20
17 Aug 20
07 Sep 20
28 Sep 20
19 Oct 20
09 Nov 20
30 Nov 20
21 Dec 20
11 Jan 21
01 Feb 21
22 Feb 21
15 Mar 21
05 Apr 21
26 Apr 21
17 May 21
Date

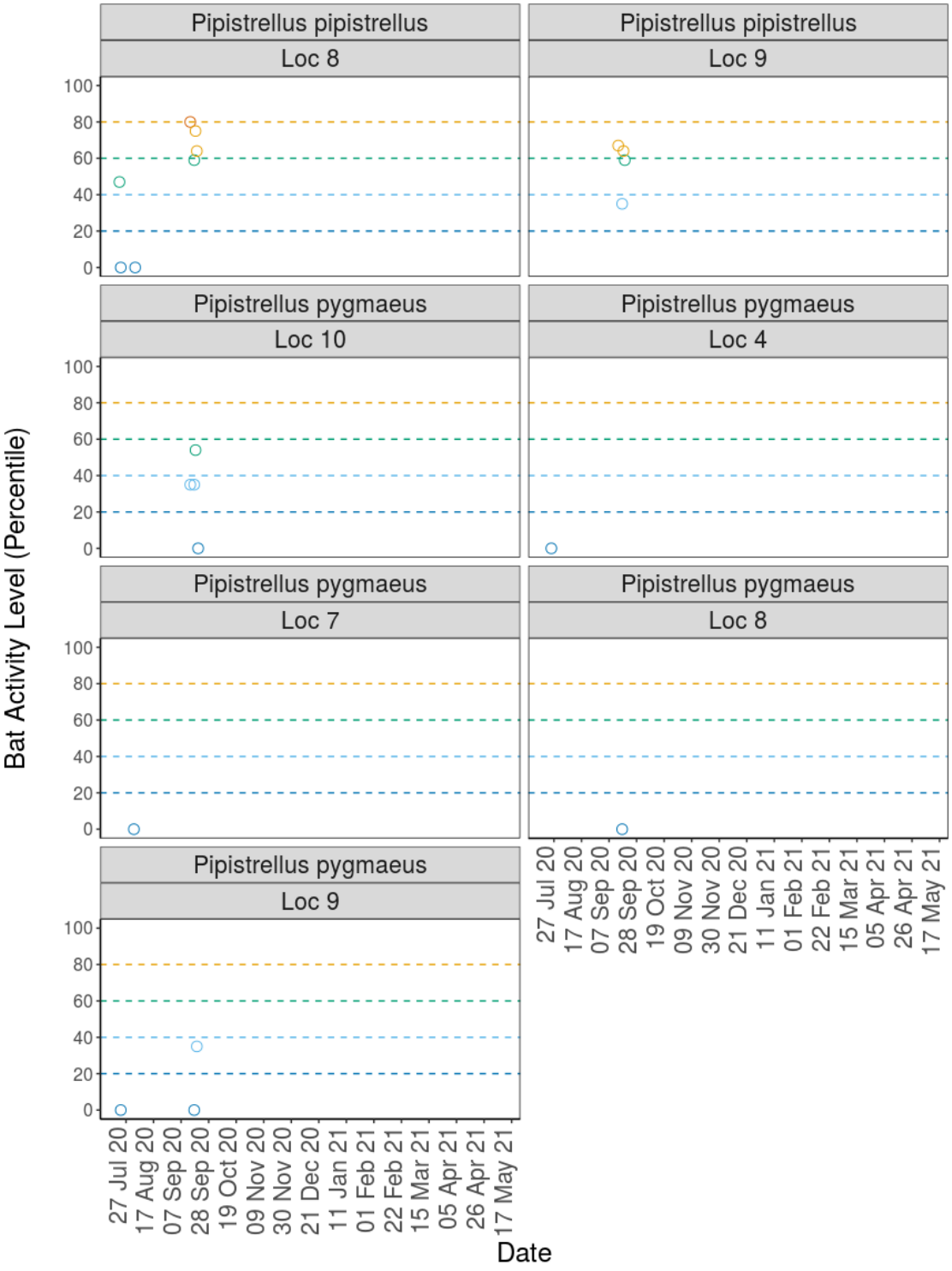


Figure 2. The activity level (percentile) of bats recorded across each night of the bat survey, split by location and species.