atmos CONSULTING

Environmental Impact Assessment Report

Swarclett Wind Farm

Technical Appendix 6-2: Bat Surveys

Swarclett Wind Energy Limited

wind2

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Document Prepared For

Hannah Brown
Wind 2 Limited

Document Prepared By

Claire Smith
Seasonal Ecologist
claire.smith@atmosconsulting.com

Document Approved By

James Wilson
Principal Ecologist
james.wilson@atmosconsulting.com

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1 Introduction

1.1 Terms of Reference

In September 2019, Atmos Consulting Ltd. (Atmos) was appointed by Swarclett Wind Energy Limited to undertake bat survey work to inform the layout of the Proposed Development (Swarclett Wind Farm), located approximately 10km southeast of Thurso, Highland (hereafter referred to as the "Site").

Due to subsequent design changes and the passage of time, repeat surveys were undertaken in 2023.

1.2 Site Location and Description

The Proposed Development lies approximately 10km to the southeast of Thurso, Caithness, Highland, centred on National Grid Reference (NGR) ND 20915 62900 (Figure 6-2-1).

The Proposed Development Site is a mix of semi-improved agricultural fields, felled / windblown forestry plantation, and an area of mire or fen in the valley bottom. Loch Scarmclate is situated 2.3km to the southwest.

1.3 Proposed Development

The Proposed Development will consist of two three-bladed horizontal axis wind turbines, each up to 149.9m above ground level (agl) maximum blade tip height and a rotor diameter of 133m. The final choice of turbine will be subject to a selection process which considers technical and commercial aspects of the turbines and would be based on the turbine models which are commercially available at the time of construction.

Associated infrastructure includes hard standing areas for erecting cranes at each turbine location, on-site access tracks and turning heads, an on-site substation compound with control building and battery storage, and a temporary construction compound. The proposed development has been designed to have an operational life of 30 years.

1.4 Objectives

The principal objectives of this Technical Appendix are as follows:

- to outline the legislative protection conferred on bats;
- to detail existing bat records and designated sites of relevance to bats in the vicinity of the proposed development (if any);
- to outline the survey methodologies; and
- to summarise the results of the bat surveys undertaken.

2 Context

2.1 Legislation and Policy

All bat species in the UK are afforded full statutory protection as European Protected Species listed on Schedule 2 of the Conservation (Natural Habitats, &c.) Regulations 1994 as amended in Scotland, which transpose into Scottish Law the European Community's Habitats Directive (92/43/EEC).

It is an offence to deliberately or recklessly:

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

It is also an offence of strict liability to:

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

Of the 18 UK bat species, 10 occur in Scotland at varying levels of distribution. Common pipistrelle *Pipistrellus pipistrellus*, soprano pipistrelle *P. pygmaeus*, Daubenton's *Myotis daubentonii,* and brown long-eared bat *Plecotus auritus* are considered to be common species within Scotland with generally widespread distributions. Nathusius' pipistrelle *P. nathusii*, Natterer's *M. nattereri*, noctule bat *Nyctalus noctula*, Leisler's bat *N. leisleri* and whiskered / Brandt's bats *M. mystacinus / M. brandtii* are also recorded within Scotland, however these are considered to be relatively rare species with a restricted distribution.

The Scottish Biodiversity List (SBL) was developed to meet the requirements of Section 2 (4) of the Nature Conservation (Scotland) Act 2004 (NCSA) for the conservation of biodiversity. This legislation required Scottish Ministers to publish lists of species of flora and fauna and habitats considered to be of principal importance for the purposes of biodiversity. Included on this list are the following bats: Brandt's bat, Daubenton's bat, whiskered bat, Natterer's bat, noctule bat, Nathusius' pipistrelle, common pipistrelle, soprano pipistrelle and brown long-eared bat.

The 'UK Post-2010 Biodiversity Framework' (JNCC & DEFRA, 2012), published in July 2012, also sets out a framework of priorities for UK-level work for the Convention on Biological Diversity, to which the UK is a signatory. Covering the period 2011-2020, this framework replaces the original UK Biodiversity Action Plan (UK BAP, 2004) system and now the work is focussed on the separate countries (England, Scotland, Northern Ireland and Wales). The overall aim remains to protect and prevent the decline of rare species and

habitats, and so currently many of the species and habitats in the UK BAP still form the basis of the biodiversity work carried out in the devolved countries.

Furthermore, Local Biodiversity Action Plans (LBAP) are still in place under this framework to manage and conserve species and habitats of priority at a local level. The LBAP which is relevant for this proposed development is the Highland LBAP. The LBAP reflects all species listed on the SBL, including the bat species mentioned above.

2.2 Impacts of Wind Turbines on Bat Species

Natural England Technical Information Note TIN051 (Natural England, 2014) provides some guidance on the risk levels associated with UK bat species and wind turbines, based on analysis of flight patterns, foraging strategies and echolocation calls. Table 6-2-1, reproduced from TIN051, shows the levels of risk derived for key species. Table 6-2-2, also reproduced from TIN051, takes relative population sizes into account and presents the levels of risk at population level.

Table 6-2-1: Bat Species likely to be at risk from wind turbines

Low risk	Medium risk	High risk
Long-eared bats	Common pipistrelle	Noctule
Myotis species	Soprano pipistrelle	Leisler's
Lesser horseshoe	Serotine	Nathusius' pipistrelle
Greater horseshoe	Barbastelle	

Table 6-2-2: Bat Populations likely to be threatened due to impacts from wind turbines

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

Three species are identified to be at high risk from wind turbines: Nathusius' pipistrelle, Leisler's bat and Noctule. This is due to the type of flight each species exhibits, the height at which each species flies at, and the type of habitat preferred. Common and soprano pipistrelle bats and *Myotis* species do cross open spaces, however, they are relatively less likely to fly at a height that would bring them into contact with a turbine blade. Noctule and Leisler's bats however, and Nathusius' pipistrelle to a lesser extent, do fly at height and often cross open spaces, making them "high risk" species.

Noctule, Leisler's bats and Nathusius' pipistrelle remain in the "high risk" category at population level as they have smaller populations than other more common species and therefore their populations are considered to be at greater risk from wind farm developments.

Common and soprano pipistrelle bats, and *Myotis* species are more common, and therefore their populations as a whole are less threatened by impacts from wind turbines than other scarcer species. This has resulted in a "low risk" classification at the population level.

3 Methodology

3.1 Desk Study

A desk study was undertaken in order to gain further understanding of the Site, to gather information on the presence of statutory nature conservation sites within 10km of the Site, and any existing records of bats within 5km of the site. Various data sources were utilised including the website of the statutory agency, NatureScot via the 'Site Link Portal', publicly available datasets available for commercial use held on the National Biodiversity Network (NBN) Atlas website, and aerial photography used to aid in the assessment of habitat features.

A review of existing bat survey data from wind energy projects (operational, under construction, and those at various stages in the planning system) within 10km of the Proposed Development was also undertaken.

3.2 Site Surveys

All methodology follows the current guidance in relation to bats and onshore wind turbines (Collins, 2016; NatureScot *et* al., 2021) unless otherwise specified.

Habitat Assessment Surveys of the Site and the immediate surrounding area were undertaken in September / October 2020 by experienced Atmos Consulting Ltd. ecologists. Deployment of static bat detectors was undertaken at various times between April and September 2023 (Section 3.2.2).

3.2.1 Habitat Assessment

A daylight bat feature assessment was undertaken in September / October 2020. The aim of this survey was to identify any potential or confirmed roost sites, to assess the location and suitability of habitats for foraging and commuting, and to identify if further surveys such as emergence / re-entry or detailed roost inspection surveys were required. All areas of the site were assessed with an emphasis on features located within 250m of potential / proposed turbine locations.

3.2.2 Activity Surveys – Static Recorders

In line with current guidance in relation to onshore wind energy projects (NatureScot, 2021), activity surveys were limited to the deployment of automated static detectors.

Three survey periods were undertaken during spring (April – May, Survey 1), summer (June – July, Survey 2) and autumn (August – September, Survey 3). On each survey occasion, detectors were deployed for a minimum of 10 days, recording in full spectrum. All detectors were set to commence recording a minimum of 30 minutes before sunset and continue until a minimum of 30 minutes after sunrise. The full details of the static detector locations and deployment details is presented in Table 6-2-3.

Static detectors were located approximately at the location of the proposed turbines, although turbine locations were not fixed during the period of survey and as such detector locations altered to some degree. The locations did however provide a good representation of turbine locations.

Table 6-2-3: Summary of automated static detector deployment

Survey Visit	Detector ID and Model	Deployment Location (Turbine Number, Grid Reference)	Deployment Date	Collection Date	Detector Failure Date	Minimum Number of Active Nights	Scheduled Start / End Time	Total Time Recorded
1	1 Wildlife Acoustics Song Meter Mini	Turbine 1 321247 963173	20/04/2023	03/05/2023	03/05/2023	13	20:00 / 06:20	134 hrs 20 mins
	2 Wildlife Acoustics Song Meter Mini	Turbine 2 321208 962678	20/04/2023	03/05/2023	03/05/2023	13	20:00 / 06:20	134 hrs 20 mins
2	1 Wildlife Acoustics Song Meter Mini	Turbine 1 321247 963173	27/06/2023	10/07/2023	10/07/2023	13	21:40 / 05:00	95 hrs 20 mins
	2 Wildlife Acoustics Song Meter Mini	Turbine 2 321208 962678	27/06/2023	10/07/2023	10/07/2023	13	21:40 / 05:00	95 hrs 20 mins
3	1 Wildlife Acoustics Song Meter Mini	Turbine 1 321247 963173	05/09/2023	20/09/2023	18/09/2023	13	18:45 / 07:25	164 hrs 40 mins
	2 Wildlife Acoustics Song Meter Mini	320185 962571*	05/09/2023	20/09/2023	13/09/2023	9	18:45 / 07:25	113 hrs 56 mins

* Access to the proposed location of Turbine 2 was not possible at this time due to the presence of cattle / crops. This location was chosen instead as being representative of the immediate area with ease of access.

The Proposed Development is for two turbines, and in line with current guidance (NatureScot *et al.*, 2021, two detectors were utilised.

There were some limitations (Section 3.4) in relation to the placement of the static detectors.

To place the bat activity levels into context, site specific weather monitoring was undertaken through the deployment of a weather station. Within the centre of the site, a Davis Vantage Vue Weather Station combined with a WeatherLink – Windows USB data logger was deployed for the duration of the surveys. The weather station was mounted on a pole at approximately 2m in height in open ground. Further limitations in relation to the acquisition of weather data were experienced (Section 3.4).

3.3 Sonogram Analysis

Analysis of full spectrum WAV files was undertaken firstly using Kaleidoscope (to convert the raw data into ZCA files) and then Analook W software to enable identification of species. All files were manually analysed to identify bat species and to separate common and soprano pipistrelle. All sonogram files classified as "noise" by Kaleidoscope during the conversion process were then subject to manual checking of sonograms, and where bat calls were present, manual identification was undertaken. Species identification broadly followed that presented in Russ (2012), taking into account the geographical location of the Site, habitats present and ecologists' own expertise and site knowledge.

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

For ease of examination, three arbitrary levels have been created to provide a context in which to discuss the results. Table 6-2-4 indicates the levels of activity required to be considered as "low", "medium" or "high" activity. It should be recognised that in the context of bat activity across wider landscapes these activity brackets are all relatively low as would be expected for a site at this altitude supporting open agricultural habitats.

Table 6-2-4: Criteria for Determining Bat Activity Levels

Activity Level	Number of bat passes per hour [1]
Low	< 2
Medium	2 – 5
High	> 5

[1] A bat pass is classified as the presence of a species within a single Analook file.

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

3.4 Limitations

A number of limitations were experienced during the bat assessment and surveys:

- The deployed weather station did not function correctly with data not logged. As a result, no site specific data was obtained. This represents a significant limitation when attempting to draw conclusions on the influence of weather on activity levels. Proxy data from a recording station approximately 10km to the northwest of the Site was utilised to provide valid estimates of wind and temperature, but rainfall from this location would not be wholly relevant.
- Some static detectors deployed (particularly during Survey 3) functioned for varying times with some units recording for only a small number of days. The reasons for this are unclear but is likely to be a result of the effect of cold temperatures on batteries. This reduces the survey duration and results in variable survey durations at different locations. For any detailed analysis, data is adjusted to a per unit time measure mitigating to some extent this limitation, however, detectors at some locations did not record the recommended number of nights / hours resulting in a limitation.
- A minor limitation was the inconsistency of recording location for the Autumn deployment at the proposed Turbine 2 position. Access to Turbine 2 was not possible at the time of deployment due to the presence of cows and their calves. Therefore the location as detailed in Table 6-2-3 was used as this was considered representative of the locale with ease of access (Figure 6-2-2).

Despite these limitations, and as the Site is an area of open and exposed farmland which offers little habitat for bats in terms of foraging and commuting, it is believed the data provides a clear picture of bat activity across the Site and wider environs, and as a result it is not anticipated that the limitations affect the robustness of the results to a significant degree. It should also be noted that with respect to roosting, the Site offers only minor potential in the form of some ruined farm buildings to the south, and scattered farms and residential properties in the wider area.

4 Results

4.1 Desk Study

4.1.1 Designated Sites

There are no environmentally designated sites with bats as a qualifying species within 10km of the Proposed Development Site.

4.1.2 Species Records

According to the publicly held datasets on the National Biodiversity Network (NBN) Atlas, there is one record of a group of four bats of Pipistrelle *Pipistrellus* species within 5km of the approximate centre of the site (ND 20775 62628). This is the only record from within the past 10 years dated April 2015.

4.1.3 Review of Existing Bat Survey Data from Wind Energy Projects

Fifteen wind farm developments (either currently in the planning system awaiting determination, refused and currently the subject of an appeal, consented or operational) are located within 10km of the Site (The Highland Council, July 2023), and EIA documents available online via The Highland Council's planning portal were reviewed with respect to the level of bat activity recorded, and likely significant effects (Table 6-2-5) [1].

Table 6-2-5: Wind farm developments within 10km of the Site

Wind Farm Development	Details	Status	Approx. Distance from Site at its closest point	Bat Species Present	Likely Significant Effect (according to published report)
Lochend	4 Turbines	Operational	c. 7.71km to the northeast	Bat activity was low with only one bat pass recorded during walked transects, and only 14 bat passes recorded from static detectors. All bat passes were later attributed to common pipistrelle.	None
Halsary	15 Turbines	Operational	c. 9.93km to	Only low numbers	None

[1] The search criteria was for wind farm developments with three or more turbines, with tip heights greater than 50m. These parameters were selected because smaller developments are less likely to have quantitative data and / or may not even have an associated EIA Report.

Wind Farm Development	Details	Status	Approx. Distance from Site at its closest point	Bat Species Present	Likely Significant Effect (according to published report)
			the south	of common pipistrelle and very low numbers of soprano pipistrelle were reported.	
Slickly	11 Turbines	Approved	c. 9.11km to the east-northeast	Surveys recorded 100 bat passes in total with 90 attributed to common pipistrelle and 10 attributed to *Pipistrellus* sp.	None
Hollandmey Energy Development	10 Turbines	In Planning	c. 7.77km to the northeast	Of the 3,470 bat passes recorded, 25 were attributed to brown long-eared bat, 3,287 were attributed to common pipistrelle, 27 were attributed to *Myotis* sp., 7 were attributed to Noctule bat, and 124 were attributed to soprano pipistrelle.	None
Greenland Wind Energy Project SCRE	3 Turbines	In Planning – Scoping / Screening	c. 5.23km to the northeast	No survey information available	Unknown
Lochend Extension SCOP	5 Turbines	In Planning – Scoping / Screening	c. 6.85km to the northeast	Surveys recorded 678 passes, all of which were attributed to common pipistrelle.	None
Loch Toftinghall Wind Farm SCOP	6 Turbines	In Planning – Scoping / Screening	c. 8.24km to the south	No survey information available	Unknown
Durran Mains	13 Turbines	In Planning – Refused / Expired / Withdrawn	Immediately adjacent to the west	No survey information available	Unknown
Seater Farm Bower	3 Turbines	In Planning – Refused /	c. 3.08km to the	Only low numbers (11 bat passes in	None

Wind Farm Development	Details	Status	Approx. Distance from Site at its closest point	Bat Species Present	Likely Significant Effect (according to published report)
		Expired / Withdrawn	southeast	total; 5 in Spring, 4 in Summer and 2 in Autumn) of common pipistrelle were recorded.	
Spittal Hill I	27 Turbines	In Planning – Refused / Expired / Withdrawn	c. 4.88km to the south-southwest	No survey information available	Unknown
Spittal Hill	7 Turbines	In Planning – Refused / Expired / Withdrawn	c. 5.44km to the southeast	Static detectors recorded a total of 239 bat passes in total between May and September. Of these, 199 were attributed to common pipistrelle (4 in May, 87 in June and July, and 108 in August and September), 16 to soprano pipistrelle (all recorded in August), and 24 to *Pipistrellus* sp. (all recorded in August).	None
Lyth	10 Turbines	In Planning – Refused / Expired / Withdrawn	c. 6.92km to the northeast	During static detector surveys, only very low numbers of bat passes were recorded and all were attributable to common pipistrelle.	None
Cogle Moss	12 Turbines	In Planning – Refused / Expired / Withdrawn	c. 7.70km to the southeast	No survey information available	Unknown
Buckies Hill	5 Turbines	In Planning – Refused / Expired / Withdrawn	c. 8.36km to the west	Only three bat passes were recorded during static detector surveys, all attributable to common pipistrelle.	None

Wind Farm Development	Details	Status	Approx. Distance from Site at its closest point	Bat Species Present	Likely Significant Effect (according to published report)
Cnoc Morail	5 Turbines	In Planning – Refused / Expired / Withdrawn	c. 8.69km to the south-southeast	Only common pipistrelle were recorded, with 76 passes in Spring, 51 passes in Summer and 18 passes in Autumn.	None

4.2 Habitat Assessment

The site is located in a predominantly farmland setting with the habitats within the turbine envelope dominated by agricultural grasslands (used for grazing livestock) and fields for crop production, and topography ranging in altitude from 30 to 60m Above Ordnance Datum (AOD).

Post-and-wire livestock fencing are scattered throughout and there is a traditional Caithness flagstone wall with an associated band of thick vegetation within the Site, which could form a good commuting route for bats were there suitable foraging available. A network of drainage ditches within the Site flow within a north – south trending area of marshy grassland. These drainage ditches appear to be separate from those to the southwest of the Site which drain into Loch Scarmclate and then Loch Watten and form part of a northwest – southeast trending system which eventually join with the Wick River. A commercial conifer plantation just south of the site has been recently felled.

The grasslands comprise species defined in the NVC (National Vegetation Classification) as mesotrophic grasslands, which are also referred to as improved, neutral, and marshy grasslands. There are some small areas of gorse scrub, but there is a general lack of any substantial stands of trees or bushes to provide suitable foraging for bats.

4.2.1 Wider Habitat and Connectivity

The wider environs are also intensively farmed, this being part of Caithness which does not have a covering of deep peat, but a till which is more suited to arable farming. Surrounding this area are the typical Flow Country landscapes, dominated by open upland habitats. It is generally a highly exposed environment with a slight coastal influence.

The relatively high altitude and exposed nature of the generally open habitats of low suitability result in local bat populations generally being at low density with low species diversity.

4.3 Bat Activity Survey

4.3.1 Weather

Current guidance (NatureScot *et al*., 2021) stipulates that surveys should capture a sufficient number of nights with appropriate weather conditions for bat activity. Lower temperature requirements are identified for Scotland with a minimum recommended temperature of 8°C at dusk. Due to malfunctions with the on-site weather station, the nearest reliable historical weather data was used as a proxy for conditions on Site. The weather station was located at Thurso, approximately 10km to the northwest of the Site at approximately 30m above sea level (asl), allowing broad comparisons to be made for the Site in the absence of site specific weather data.

During the spring survey, average temperatures were generally in excess of the 8°C minimum although the night time minimums were in the region of 5°C, and there was a cold snap at the end of April where nighttime temperatures fell to near to or zero degrees. The summer deployment period had quite variable temperatures, the minimums in the range of 6 - 13°C. Again, the autumn deployment period had quite a variation with high daytime temperatures and low night-time temperatures, sometimes down to 5°C (Plate 6-2-1).

The average wind speeds throughout the survey periods were on average around the acceptable survey maximum of 5 – 6m/s with higher values regularly occurring especially in the spring and autumn. Daily highs of more than 8m/s occurred fairly regularly throughout the survey season. Within northern Scotland the wind is generally high and the maximum wind speeds indicate that throughout the majority of the 2023 activity season strong gusts were prevalent (Plate 6-2-2).

Rainfall seems to have followed a normal seasonal trend but as rainfall is likely to be more Site specific than either temperature or wind speed, the details presented in Plate 6-2-3 should be viewed cautiously. However, based on the available information, significant rainfall was present during the survey periods but significant dry periods were also present. Overall, it is anticipated that the weather is likely to have affected the activity levels from bats within the survey area, although the weather was generally adequate and consistent with that of the region. Countrywide, as has been well documented, the summer of 2023 was one of the warmest on record, while also being wetter than average, and was characterised by having mixed conditions.

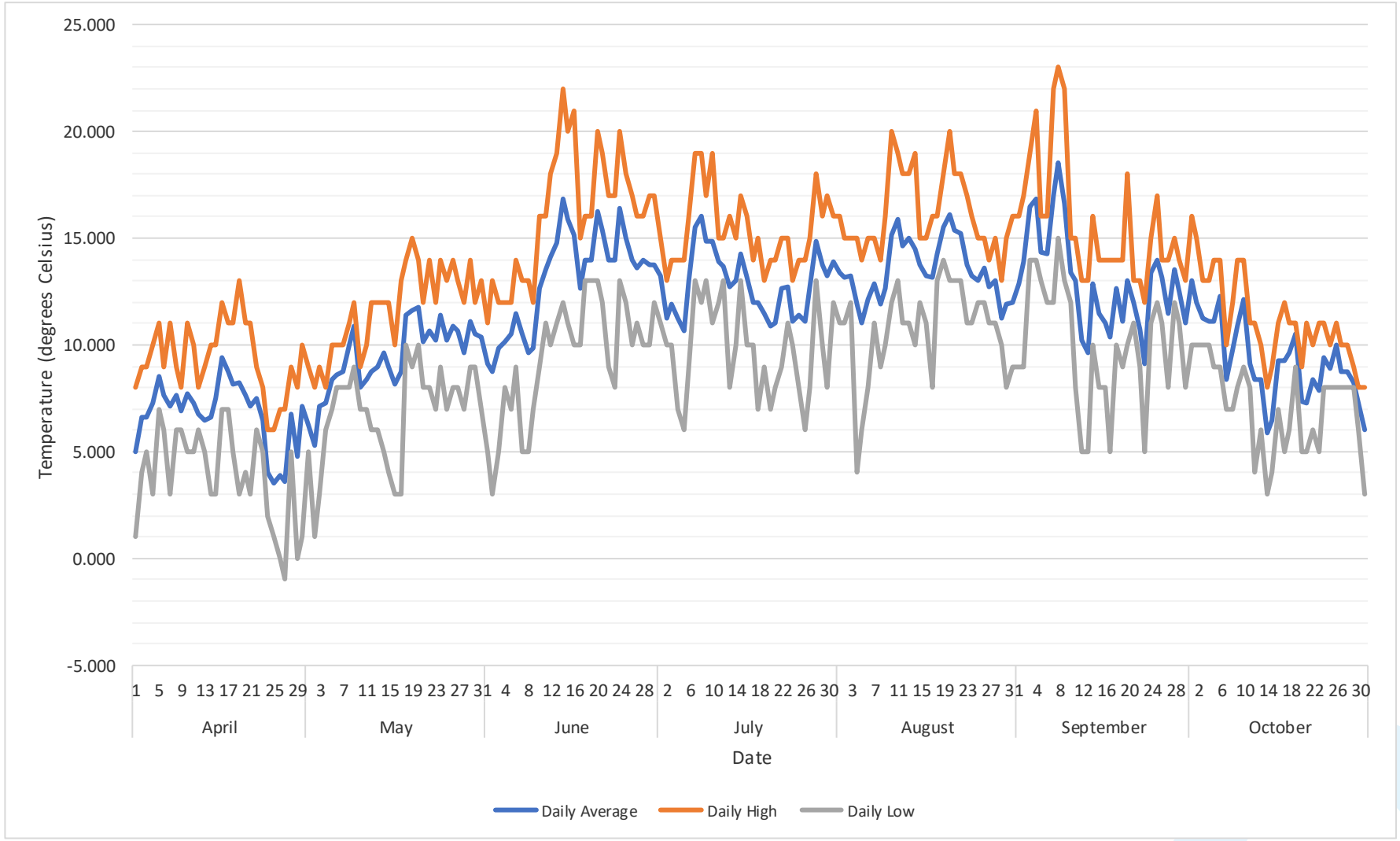

Plate 6-2-1: Temperature (Thurso proxy) for 2023 field season.

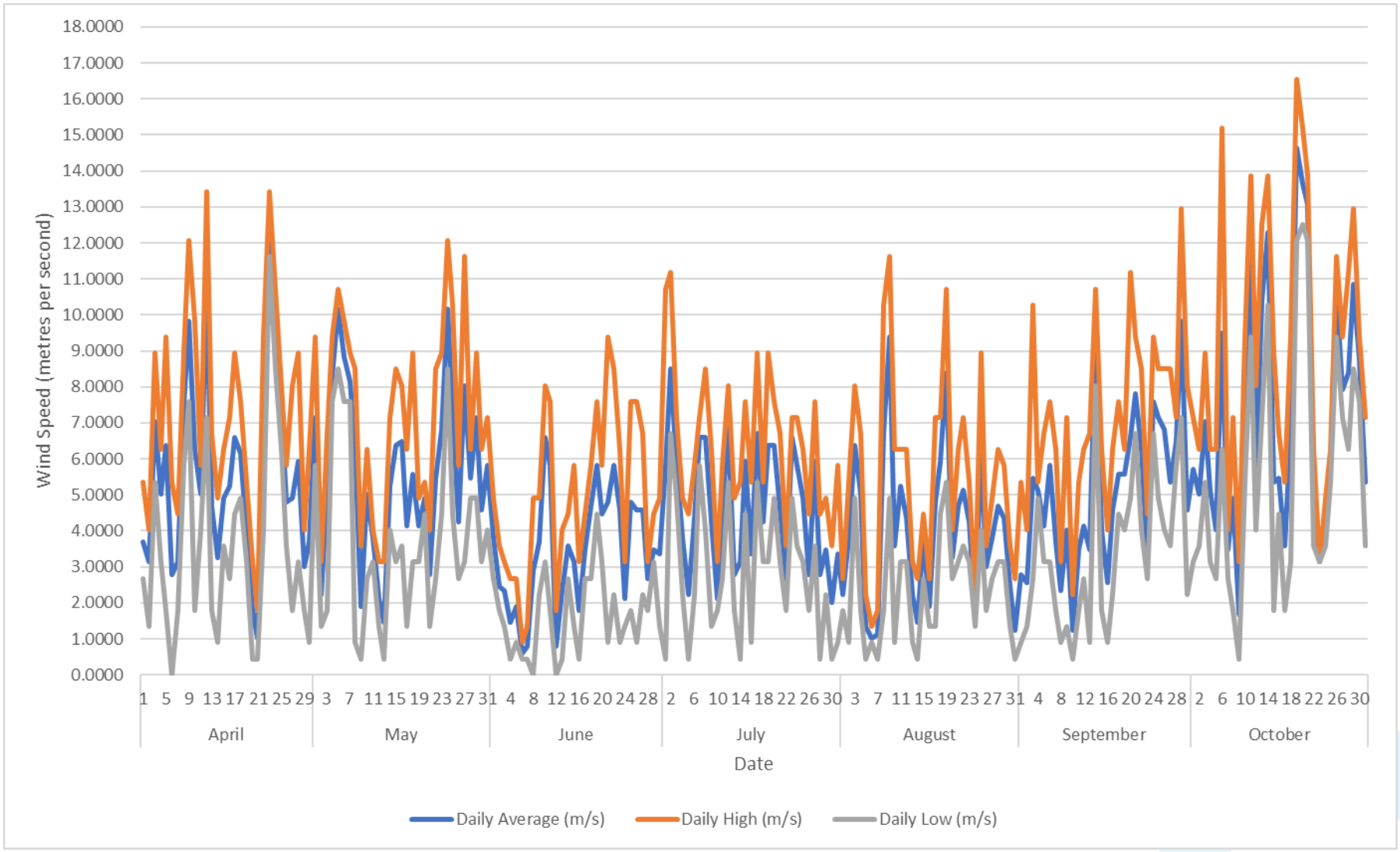

Plate 6-2-2: Wind speed (Thurso proxy) for 2023 field season.

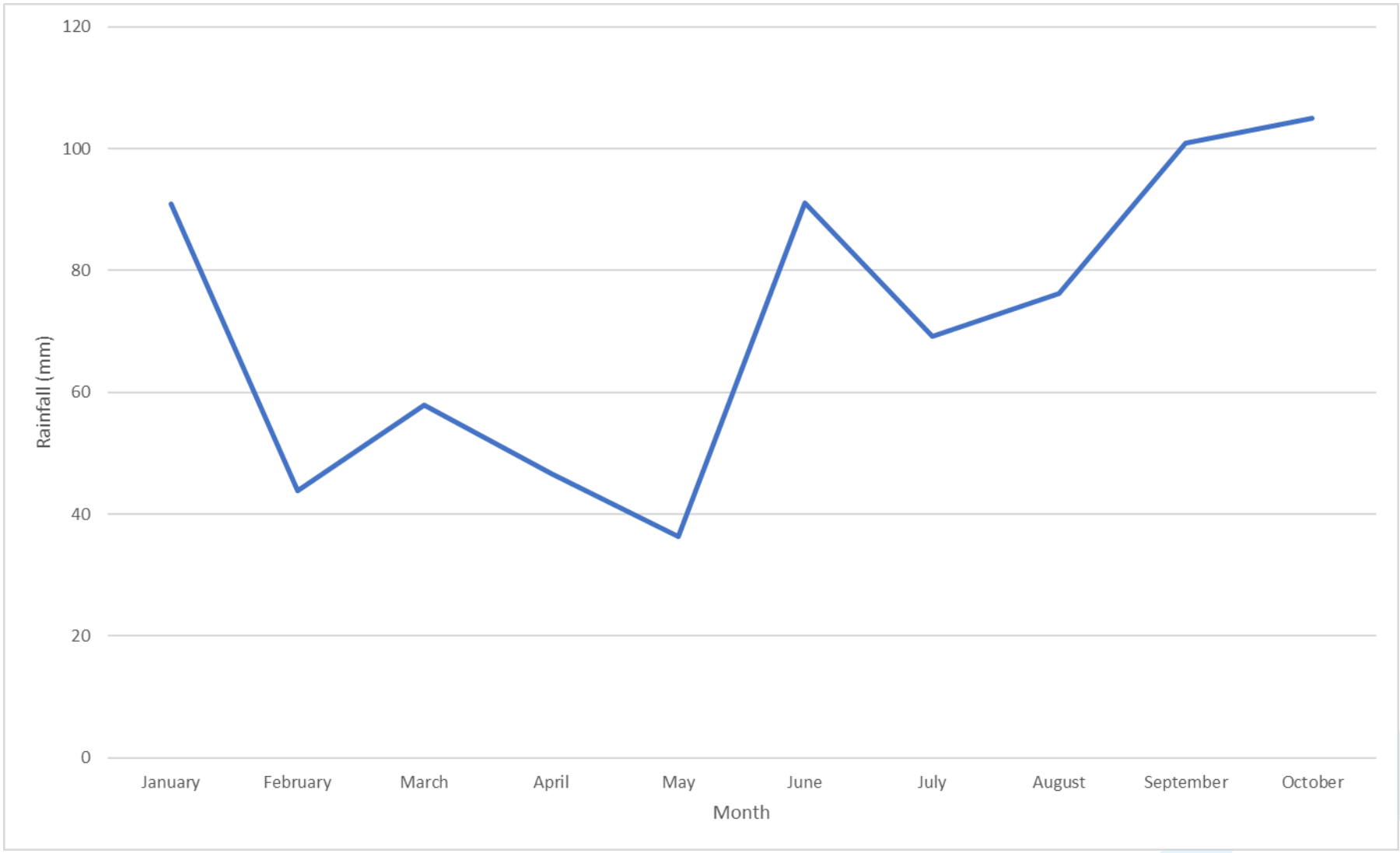

Plate 6-2-3: Average monthly rainfall (Thurso proxy) for 2023.

4.3.2 Overall Site Activity

The results of the static detector surveys identified the presence of one species – common pipistrelle.

Table 6-2-6 shows the number of common pipistrelle passes per detector per location per deployment period, with this converted to bat passes per hour and median bat passes per hour (Plate 6-2-4). The results are also presented in Figures 6-2-2, 6-2-3, and 6-2-4a.

Table 6-2-6: Number of common pipistrelle passes per detector per location per deployment period

Survey Period	Detect or ID	Location (turbine number and grid reference	Number of common pipistrelle passes	Total Time Recorded	Bat passes per hour	Median bat passes per hour	Activity level
1	1	Turbine 1 ND321247 963173	3	134 hrs 17 mins	0.02	1	Low
	2	Turbine 2 ND321252 962691	3	134 hrs 17 mins	0.02	1.5	Low
2	1	Turbine 1 ND321247 963173	4	95 hrs 17 mins	0.04	1	Low
	2	Turbine 2 ND321252 962691	4	95 hrs 17 mins	0.04	1	Low
3	1	Turbine 1 ND321247 963173	7	164 hrs 35 mins	0.04	1	Low
	2	Turbine 2 ND320185 962571	11	113 hrs 56 mins	0.1	1	Low

During the autumn deployment period, there was also one pass recorded by the detector at the location of Turbine 1 that was later attributed to *Pipistrellus* sp. (Table 6-2-7 and Figure 6-2-4b).

Table 6-2-7: Number of *Pipistrellus* sp. Passes per detector per location per deployment period

Survey Period	Detect or ID	Location (turbine number and grid reference	Number of other pipistrelle sp. Passes	Total Time Recorded	Bat passes per hour	Median bat passes per hour	Activity level
3	1	Turbine 1 ND321247 963173	1	164 hrs 35 mins	0.006	1	Low
	2	Turbine 2 ND320185 962571	0	113 hrs 56 mins	0	0	Low

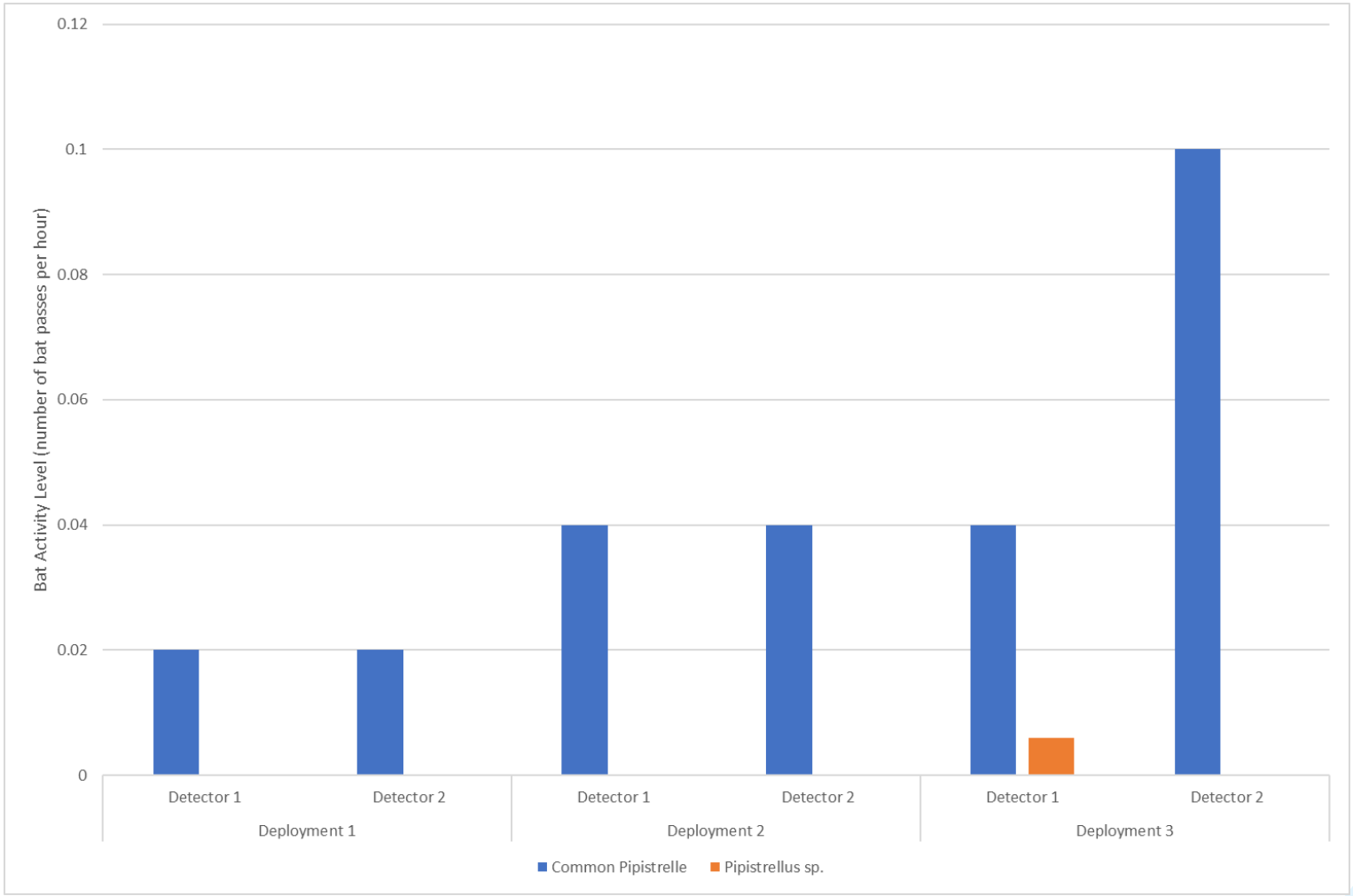

Plate 6-2-4: Number of common and other pipistrelle passes per hour per detector in each deployment period.

As can be seen in Tables 6-2-6 and 6-2-7, and Plate 6-2-4, the number of bat passes recorded within each deployment period was low with a high of 11 recorded at the proxy location of turbine 2 during the autumn deployment phase. The northern edge of the battery storage field was used at this time due to cattle preventing access to the location of Turbine 2. When converted to bat passes per hour, it is clear that activity across the Site is low reflecting its exposed, upland geographical location with little potential roosting and / or foraging habitat.

Bat pass rates are often highly variable between nights, with some nights having few or no passes and other nights having high activity. This is particularly pronounced on sites within the Scottish Highlands. In these circumstances, the median is likely to be a more useful summary of the typical activity than the mean (Lintott & Mathews, 2018).

4.3.3 Spatial Variation

The location of the Site in the north of Scotland requires careful analysis of the activity levels in the context of the location which is likely to result in reduced activity levels. Northern Scotland is also on the edge of the species range for the majority of the UK bat species, and this must also be taken into account.

4.3.4 Temporal Variation

Activity levels can vary significantly throughout the activity season which may indicate a number of potential features being close by, such as maternity roosts, swarming sites and hibernation roosts.

The activity levels of static detectors within the Site did not support enough bat passes to enable any worthwhile analysis of this kind.

5 Discussion

The Swarclett Wind Farm Site is an area of open and exposed farmland which offers little habitat for bats in terms of foraging and commuting. With respect to roosting, the Site offers only minor potential in the form of some ruined farm buildings to the south, and scattered farms and residential properties in the wider area. However, there is none of the mature deciduous woodland habitat favoured by bats for foraging and without foraging close by, bats are unlikely to use these structures.

Activity levels across the site were very low with a total of 33 bat passes across all detectors over three deployment occasions, in line with expectations.

Common pipistrelle are considered to be a species of medium risk from wind turbine mortality. However, based upon the results of the static bat detector deployments, it is concluded that the number of bat passes per hour is low and reflects the occasional use of the Site. It is concluded that the frequency of use of the Site and specifically the turbine envelope is low enough that the risk of killing and injury of bats from the wind turbines is very low. This risk is further reduced due to the open nature of the Site and lack of features such as mature deciduous woodland. The pre-existing conifer plantation to the south of the site has been felled, resulting in no areas of woodland edge habitat.

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