

# PEN MARCH WIND FARM

**Bat Survey Report 2019**

Prepared for: **RWE Renewables UK  
Swindon Ltd**

SLR Ref: 406.02273.00066  
Version No: 2  
June 2023



## BASIS OF REPORT

This document has been prepared by SLR Consulting Limited with reasonable skill, care and diligence, and taking account of the manpower, timescales and resources devoted to it by agreement with RWE Renewables UK Swindon Ltd (the Client) as part or all of the services it has been appointed by the Client to carry out. It is subject to the terms and conditions of that appointment.

SLR shall not be liable for the use of or reliance on any information, advice, recommendations and opinions in this document for any purpose by any person other than the Client. Reliance may be granted to a third party only in the event that SLR and the third party have executed a reliance agreement or collateral warranty.

Information reported herein may be based on the interpretation of public domain data collected by SLR, and/or information supplied by the Client and/or its other advisors and associates. These data have been accepted in good faith as being accurate and valid.

The copyright and intellectual property in all drawings, reports, specifications, bills of quantities, calculations and other information set out in this report remain vested in SLR unless the terms of appointment state otherwise.

This document may contain information of a specialised and/or highly technical nature and the Client is advised to seek clarification on any elements which may be unclear to it.

Information, advice, recommendations and opinions in this document should only be relied upon in the context of the whole document and any documents referenced explicitly herein and should then only be used within the context of the appointment.

## CONTENTS

|            |                                                                                       |           |
|------------|---------------------------------------------------------------------------------------|-----------|
| <b>1.0</b> | <b>INTRODUCTION .....</b>                                                             | <b>3</b>  |
| 1.1        | Background .....                                                                      | 3         |
| 1.2        | Site Description.....                                                                 | 3         |
| 1.3        | Scope of study.....                                                                   | 3         |
| 1.4        | Relevant Legislation .....                                                            | 4         |
| 1.4.1      | Conservation of Habitats and Species Regulations 2017 .....                           | 4         |
| 1.4.2      | Wildlife & Countryside Act 1981 .....                                                 | 4         |
| 1.4.3      | Environment (Wales) Act 2016 .....                                                    | 4         |
| <b>2.0</b> | <b>METHODOLOGY.....</b>                                                               | <b>5</b>  |
| 2.1        | Desk Study .....                                                                      | 5         |
| 2.2        | Field Survey Methodology and Rationale .....                                          | 5         |
| 2.2.1      | Survey Area .....                                                                     | 5         |
| 2.2.2      | Habitat Appraisal for Potential Bat Roost Features & Assessment of Habitat Risk ..... | 5         |
| 2.2.3      | Activity Survey – Static Bat Detector Survey .....                                    | 5         |
| 2.2.4      | Activity Survey – Automated Static Surveys at Height .....                            | 9         |
| 2.2.5      | Activity Survey – Walked Transect and Vantage Point Surveys .....                     | 9         |
| 2.3        | Bat Sonogram Analysis .....                                                           | 9         |
| 2.4        | Survey Personnel .....                                                                | 10        |
| 2.5        | Assessment of Relative Bat Activity Levels .....                                      | 10        |
| 2.6        | Survey Limitations .....                                                              | 11        |
| 2.6.1      | Equipment Limitations .....                                                           | 11        |
| 2.6.2      | Weather Limitations .....                                                             | 12        |
| 2.6.3      | General Limitations .....                                                             | 12        |
| <b>3.0</b> | <b>RESULTS .....</b>                                                                  | <b>13</b> |
| 3.1        | Desk Study .....                                                                      | 13        |
| 3.1.1      | Designated Sites.....                                                                 | 13        |
| 3.1.2      | Pre-existing Records.....                                                             | 13        |
| 3.2        | Field Surveys .....                                                                   | 15        |
| 3.2.1      | Habitat Assessment.....                                                               | 15        |
| 3.2.2      | Activity Surveys – Static Bat Detector Survey – All Species .....                     | 15        |
| <b>4.0</b> | <b>DISCUSSION AND CONCLUSIONS.....</b>                                                | <b>22</b> |
| 4.1        | Habitat Assessment.....                                                               | 22        |
| 4.2        | Overview of Bat Activity .....                                                        | 22        |

|       |                                                                             |    |
|-------|-----------------------------------------------------------------------------|----|
| 4.3   | Spatial Distribution of Bat Activity .....                                  | 22 |
| 4.4   | Temporal Distribution of Bat Activity .....                                 | 22 |
| 4.5   | ‘High Collision Risk’ and ‘High Population Vulnerability’ Bat Species ..... | 23 |
| 4.5.1 | Bat Activity Relative to Other Sites.....                                   | 23 |

## DOCUMENT REFERENCES

### TABLES

|                                                                                          |    |
|------------------------------------------------------------------------------------------|----|
| Table 2-1: Static Bat Detector Locations .....                                           | 6  |
| Table 2-2: Survey Dates and Weather Conditions .....                                     | 8  |
| Table 3-1: Summary of Results per Season.....                                            | 14 |
| Table 3-2: Summary of Results per Sample Location across all Seasons .....               | 16 |
| Table 3-3: Summary of Results per Season across all Sample Locations .....               | 17 |
| Table 3-4: Summary of Ecobat Outputs, by Detector, Compared with Sites Within 100km..... | 18 |

### FIGURES

Figure 7-3a: Anabat Location Plan

### APPENDICES

Appendix 1: Criteria for Assessing Habitat Risk for Bats

Appendix 2: Collision Risk, Relative Abundance and Overall Population Vulnerability of Bat Species in Wales

## 1.0 Introduction

### 1.1 Background

RWE Renewables UK Swindon Ltd (RWE) is investigating the development of a Wind Farm at Pen March, north-east of Merthyr Tydfil in Mid Glamorgan (approximate centre site Grid Reference: SO 08654 10182).

SLR Consulting Ltd. (SLR) was commissioned by RWE (then Innogy Renewables UK Ltd) in March 2019 to undertake baseline bat activity surveys at the proposed Pen March Wind Farm (the Site), during the period May to October 2019.

### 1.2 Site Description

The Site centre is located approximately 1km north-east of the suburb of Dowlais Top on the north-eastern fringe of Merthyr Tydfil and 2km north-west of the centre of Rhymney village. The southern boundary of the survey area lies approximately 90m north of the A465 Heads of the Valleys Road. The survey area comprises a broadly sloping area of purple moor grass *Molinia caerulea* dominated grassland, with small scattered areas of dense scrub, exposed rock, dry heath and standing open water habitats. The survey area rises from approximately 370m above sea level at the southern extent of the survey area (adjacent to the A465 road) up to approximately 530m in the north of the survey area.

The wider landscape around the survey area is typified by grazed moorland habitats, with frequent scattered areas of industrial and residential development to the south, south-east and south-west of the survey area and the Bannau Brycheiniog National Park lying to the north of the survey area.

### 1.3 Scope of study

The aims of the surveys were to:

- determine the bat assemblage using the site, the level of bat activity and its spatial and temporal distribution, identify any key commuting or foraging habitat features, and identify any roosts which could potentially be affected by the proposed development; and
- provide baseline data to inform the wind farm design process, inform the Environmental Impact Assessment (EIA), and identify the need for any mitigation and compensation measures (if required).

The survey methodology was designed in accordance with wind farm specific guidelines in place at the time<sup>1</sup>, published in January 2019.

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 within a separate Environmental Statement.

This report refers to the 'site', which relates to the area within the red line shown on Figure 7-3a, and the 'survey area' which is the 'developable area' and a buffer of 250m, as agreed with RWE prior to the surveys commencing.

---

<sup>1</sup> Scottish Natural Heritage, Natural England, Natural Resources Wales, RenewableUK, Scottish Power Renewables, Ecotricity Ltd, University of Exeter & Bat Conservation Trust (2019) Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation. Available online at: <https://www.nature.scot/sites/default/files/2019-01/Bats%20and%20onshore%20wind%20turbines%20-%20survey%2C%20assessment%20and%20mitigation.pdf> [Last Accessed November 2019]

## 1.4 Relevant Legislation

### 1.4.1 Conservation of Habitats and Species Regulations 2017

The Conservation of Habitats and Species Regulations 2017 (the Habitats Regulations) (as amended) transpose Council Directive 92/43/EEC on the Conservation of Natural Habitats and Wild Flora and Fauna (Habitats Directive) into law in England and Wales, making it an offence to deliberately capture, kill or disturb wild animals listed under Schedule 2 of the Regulations. It is also an offence to damage or destroy a breeding site or resting place of such an animal (even if the animal is not present at the time). All UK bat species are included on Schedule 2 of the Regulations.

### 1.4.2 Wildlife & Countryside Act 1981

The Wildlife and Countryside Act 1981, as amended by the Countryside and Rights of Way Act (CROW) 2000 and the Natural Environment and Rural Communities Act (NERC) 2006, consolidates and amends existing national legislation to implement the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) and Council Directive 79/409/EEC on the Conservation of Wild Birds (Birds Directive), making it an offence to:

- Intentionally kill, injure or take any wild animal listed under Schedule 5 to the Act;
- intentionally or recklessly damage, destroy or obstruct any place used for shelter or protection by any wild animal listed under Schedule 5 to the Act; and
- intentionally or recklessly disturb certain Schedule 5 animal species while they occupy a place used for shelter or protection.

All UK bat species are included on Schedule 5 of the Act.

### 1.4.3 Environment (Wales) Act 2016

The Environment (Wales) Act 2016 puts in place the legislation needed to plan and manage Wales' natural resources in a more proactive, sustainable and joined-up way. Part 1 Section 6 of the Act requires public authorities to seek to maintain and enhance biodiversity in the exercise of their functions and in so doing promote the resilience of ecosystems. Section 7 of the Act lists living organisms and types of habitat in Wales, considered to be of key significance to sustain and improve biodiversity in relation to Wales.

Seven bat species are included on the Section 7 list:

- Bechstein's bat *Myotis bechsteinii*;
- noctule *Nyctalus noctule*;
- common pipistrelle *Pipistrellus pipistrellus*;
- soprano pipistrelle *Pipistrellus pygmaeus*;
- brown long-eared bat *Plecotus auritus*;
- greater horseshoe bat *Rhinolophus ferrumequinum*; and
- lesser horseshoe bat *Rhinolophus hipposideros*.

## 2.0 Methodology

### 2.1 Desk Study

A data search for records of bats with 10km of the site boundary shown on Figure 7-3a was requested from South East Wales Biodiversity Records Centre (SEWBRC). The data set referred to was provided on 22<sup>nd</sup> May 2019.

### 2.2 Field Survey Methodology and Rationale

The field survey methodology was designed with reference to wind farm specific guidelines in place at the time of survey<sup>1</sup>. Where the methodology deviated from the guidelines, a rationale has been provided.

#### 2.2.1 Survey Area

The survey area was designed to take into account the survey requirements set out in the current guidelines<sup>1</sup>. The guidelines require surveys to cover the area within which turbines are likely to be located and a buffer zone of at least 200m plus rotor radius.

At this early stage in the development process turbine locations had not yet been confirmed and the survey therefore focussed on the area within which turbines could potentially be located (the developable area) and a 250m buffer.

#### 2.2.2 Habitat Appraisal for Potential Bat Roost Features & Assessment of Habitat Risk

The survey area was walked during daylight hours to search for potential bat roost features including trees, buildings and underground structures.

The guidelines<sup>1</sup> 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. However, it was not considered necessary to extend the survey area in this instance, as there are no obvious areas of high habitat connectivity between the site and surrounding areas, which predominantly comprises open upland grassland, likely to be of low value to bats.

The habitat within the survey area was also assessed for its risk to bats (low, moderate or high) using criteria provided within the guidelines in place at the time of survey<sup>1</sup> and reproduced in Appendix 1.

#### 2.2.3 Activity Survey – Static Bat Detector Survey

Five static bat detectors (Anabat Express, Titley Scientific) were deployed in spring (late May -early June), summer (late July – early August) and autumn (October) 2019, to record bat activity over a period of 10 nights per season. In practice a minimum of 15 nights deployment was adopted to enable potentially nights in which weather conditions were unsuitable for bat activity to be discounted from the analysis.

The locations of each static detector are shown in Table 2-1 and Figure 7-3a. Detectors were deployed approximately 0.5m above ground level with the microphone facing at an upwards angle and programmed to record from half an hour before sunset until half an hour after sunrise on each night.

During the second and third recording sessions all five locations were determined with a hand-held GPS within the field based on the pre-determined grid references shown in Table 2-1, it is therefore possible that minor variations in the positioning of the detector occurred between recording periods. All locations are within the developable area and were chosen, following discussions with Innogy, as being representative of the areas in which turbines are likely to be located.

Static detector 3 was stolen in May and static detector 5 was stolen in October. August is therefore the only month with results from all five detectors.

**Table 2-1: Static Bat Detector Locations**

| Sample point and Co-ordinates (Lat, Long) | Photograph – Detector                                                               | Photograph – Microphone field of detection                                           | Brief habitat description                                                                                 |
|-------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|
| 1<br>308639,<br>210583                    |    |    | Facing out over tussocky purple moor-grass dominated grassland.                                           |
| 2<br>308389,<br>210309                    |   |   | Facing out over a mosaic of rush and purple moor-grass dominated sward.                                   |
| 3<br>308807,<br>210246                    |  |  | Facing out over a purple moor-grass dominated stand of marshy grassland interspersed with stands of rush. |

| Sample point and Co-ordinates (Lat, Long) | Photograph – Detector                                                              | Photograph – Microphone field of detection                                          | Brief habitat description                                                             |
|-------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 4<br>309150,<br>210151                    |   |    | Facing out over a stand of rush-dominated marshy grassland adjacent to a dry ditch.   |
| 5<br>308913,<br>209900                    |  |  | Facing over a mosaic of relatively closely grazed grassland with occasional tussocks. |

### Weather Data and Survey Dates

The guidelines<sup>1</sup> state that 10 nights of data per season should be collected, within appropriate weather conditions, specifically with a dusk temperature of 10°C or above, 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 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 minimum period of 15 nights during each season to maximise the chances of obtaining 10 nights of data during optimal weather conditions. Despite this, in practice it was not possible to obtain 10 nights of data in optimal weather conditions during all survey periods and where necessary the 10 nights with the best weather conditions during each period (including all nights meeting the criteria set out in the guidelines<sup>1</sup>) were selected to include within the bat activity analysis.

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) |
|----------------------------------------------------------------------------------------------------------------------------|------------------|-----------------------|----------------------------------|---------------------|
| <b>Spring session - deployment period: 16<sup>th</sup> May to 5<sup>th</sup> June</b><br>Sample locations: 1, 2, 4, 5      |                  |                       |                                  |                     |
| 16 <sup>th</sup> May 2019                                                                                                  | 21:00 – 05:18    | 13.2                  | 0.83                             | 0                   |
| 17 <sup>th</sup> May 2019                                                                                                  | 21:02 – 05:16    | 11.7                  | 0                                | 0.51                |
| 18 <sup>th</sup> May 2019                                                                                                  | 21:03 – 05:15    | 12.3                  | 0.1                              | 0                   |
| 19 <sup>th</sup> May 2019                                                                                                  | 21:05 – 05:14    | 12.6                  | 0.02                             | 0.51                |
| 20 <sup>th</sup> May 2019                                                                                                  | 21:06 – 05:12    | 10.7                  | 0.03                             | 1.78                |
| 21 <sup>st</sup> May 2019                                                                                                  | 21:08 – 05:11    | 11.9                  | 0.02                             | 0                   |
| 22 <sup>nd</sup> May 2019                                                                                                  | 21:09 – 05:10    | 12.4                  | 0                                | 0                   |
| 23 <sup>rd</sup> May 2019                                                                                                  | 21:10 – 05:09    | 13.5                  | 0.31                             | 0                   |
| 24 <sup>th</sup> May 2019                                                                                                  | 21:12 – 05:08    | 15.2                  | 0.21                             | 0                   |
| 25 <sup>th</sup> May 2019                                                                                                  | 21:13 – 05:06    | 16.1                  | 1.12                             | 0                   |
| <b>Summer session - deployment period: 1<sup>st</sup> – 11<sup>th</sup> August 2019</b><br>Sample locations: 1, 2, 3, 4, 5 |                  |                       |                                  |                     |
| 1 <sup>st</sup> August 2019                                                                                                | 21:02 – 05:37    | 16.0                  | 0.3                              | 0                   |
| 2 <sup>nd</sup> August 2019                                                                                                | 21:01 – 05:38    | 19.4                  | 0                                | 0                   |
| 3 <sup>rd</sup> August 2019                                                                                                | 20:59 – 05:40    | 16.9                  | 0                                | 0                   |
| 4 <sup>th</sup> August 2019                                                                                                | 20:57 – 05:41    | 18.2                  | 0.9                              | 0.25                |
| 5 <sup>th</sup> August 2019                                                                                                | 20:56 – 05:43    | 16.5                  | 0.5                              | 0.51                |
| 6 <sup>th</sup> August 2019                                                                                                | 20:54 – 05:45    | 15.1                  | 0.1                              | 1.52                |
| 7 <sup>th</sup> August 2019                                                                                                | 20:52 – 05:46    | 16.5                  | 0.5                              | 1.02                |
| 11 <sup>th</sup> August 2019                                                                                               | 20:45 – 05:52    | 14.3                  | 0.02                             | 0.25                |
| 12 <sup>th</sup> August 2019                                                                                               | 20:43 – 05:54    | 11.4                  | 0                                | 0.51                |
| 13 <sup>th</sup> August 2019                                                                                               | 20:41 – 05:56    | 15.0                  | 0.14                             | 0                   |
| <b>Autumn session - deployment period: 1<sup>st</sup> to 16<sup>th</sup> October 2019</b><br>Sample locations: 1, 2, 3, 4  |                  |                       |                                  |                     |
| 4 <sup>th</sup> October 2019                                                                                               | 18:44 – 07:20    | 13.0                  | 6.0                              | 0                   |
| 5 <sup>th</sup> October 2019                                                                                               | 18:42 – 07:21    | 14.0                  | 6.8                              | 0                   |
| 6 <sup>th</sup> October 2019                                                                                               | 18:40 – 07:23    | 10.0                  | 3.3                              | 0                   |
| 7 <sup>th</sup> October 2019                                                                                               | 18:38 – 07:25    | 15.0                  | 2.7                              | 0                   |
| 8 <sup>th</sup> October 2019                                                                                               | 18:35 – 07:26    | 11.0                  | 3.1                              | 0                   |
| 9 <sup>th</sup> October 2019                                                                                               | 18:33 – 07:28    | 11.0                  | 1.8                              | 0                   |
| 10 <sup>th</sup> October 2019                                                                                              | 18:31 – 07:30    | 15.0                  | 2.5                              | 0.8                 |
| 11 <sup>th</sup> October 2019                                                                                              | 18:29 – 07:31    | 12.0                  | 0                                | 0.5                 |
| 12 <sup>th</sup> October 2019                                                                                              | 18:26 – 07:33    | 12.0                  | 0                                | 0                   |
| 13 <sup>th</sup> October 2019                                                                                              | 18:24 – 07:35    | 11.0                  | 0                                | 0                   |

A Vantage Pro2 weather station was deployed during the August and October survey sessions to collect temperature, rainfall and wind speed data, although there was interference with the equipment as discussed in Section 2.6 and so sufficient site-based data were only obtained for the October session. Weather data for May and August were obtained from a weather station at Abergavenny (<https://www.metoffice.gov.uk/>).

#### 2.2.4 Activity Survey – Automated Static Surveys at Height

No at-height bat detector surveys were undertaken. Excluding at-height surveys is considered to be appropriate in this situation, as none of the turbine locations are situated within woodland, and the guidelines<sup>1</sup> state that except in woodland monitoring at height is unlikely to detect the presence of any species not already recorded using detectors at ground level. There is also no supporting evidence (i.e. from the desk study or the bat habitat assessment) that suggests a high level of bat activity is likely and therefore surveys at height cannot be justified.

#### 2.2.5 Activity Survey – Walked Transect and Vantage Point Surveys

The guidelines<sup>1</sup> state that walked transect or vantage point surveys can be used to complement the information gained from static detectors and other sources, but their applicability is discretionary and site-specific.

The site was scoped as likely to be of low value to bats (see Section 3.2.1). No potential roost habitat was identified and no features or areas of high habitat connectivity which are likely to be important commuting routes were identified within the survey area. It is therefore considered that sufficient data to assess the possible impacts of the proposals upon bats has been gathered through the static detector sampling, and that walked transect or vantage point surveys would be unlikely to provide important additional information. In addition, it is noted that walked activity transect surveys were not appropriate for health and safety reasons, i.e. risks associated with walking across boggy and uneven ground on a remote site, in the dark.

### 2.3 Bat Sonogram Analysis

Bat calls were analysed using AnalookW (version 4.4a) software. An auto identification filter within Analook was used initially to remove noise files. Due to the relatively small data set involved, it was also possible to manually check all files to confirm identification, using call parameters within Russ (2012)<sup>2</sup>. Files assigned by the filter as being noise were also checked manually, to ensure no faint calls were missed.

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 necessarily relate to the number of bats present in one location (as one bat may make several passes); but rather gives an indication of the level of bat activity in that location over each recording period.

*Nyctalus* and *Eptesicus* calls can easily be misclassified; particularly those of Leisler’s bat *N. leisleri* and Serotine *E. serotinus*. Vaughan *et al.* (1997)<sup>3</sup> found that both noctule and Leisler’s use calls of two types that alternate in frequency, whereas serotine uses only one type. They found that noctules use calls with the longest duration and interpulse interval and the lowest peak frequency (in their study the mean was 20 kHz) and that serotine uses calls of the shortest duration and interpulse interval and the highest peak frequency (in their study the mean was 30 kHz) and that calls of Leisler’s bats are intermediate. Calls were therefore identified as noctule if there were two types of call of alternating frequency and the peak was below 21 kHz. Calls were only identified as Leisler’s bat if there were calls of alternating frequency but the peak frequency was above 24 kHz. Serotine bats calls were identified if they were of only one type that peaked between 24 and 32 kHz. Calls with a peak

<sup>2</sup> Russ, J. (2012) British Bat calls. A Guide to Species Identification. Pelagic Publishing, Exeter.

<sup>3</sup> Nancy Vaughan., Gareth Jones and Stephen Harris (Jun., 1997). Habitat Use by Bats (Chiroptera) Assessed by Means of a Broad-Band Acoustic Method. *Journal of Applied Ecology* Vol. 34, No. 3), pp. 716-730.

frequency below 35 kHz showing some but not all the characteristics of a particular species were identified as *Nyctalus/Eptesicus* sp.

Pipistrelle calls were distinguished from each other following set parameters. Common pipistrelle calls were defined as calls between 40 and 50kHz, pipistrelle calls above 50kHz were classified as soprano pipistrelle, and those below 40kHz were classified as Nathusius' pipistrelle *Pipistrellus nathusii*.

Due to the similarity and overlap between Myotis bat calls, and recognised difficulties/inaccuracies in determining individual species using bat detectors alone, this species grouping is reported collectively.

Equally, the genus *Plecotus* is reported collectively, although in reality these will almost certainly relate to brown long-eared bat *Plecotus auritus*.

## 2.4 Survey Personnel

The initial assessment of habitat suitability for foraging bats was undertaken by Chris Mitchell BSc CEcol CEnv MCIEEM on the 16<sup>th</sup> May when detectors were first deployed. Mr Mitchell is an experienced bat surveyor (current Natural Resources Wales licence number 78305:OTH:CSAB:2018).

Further assessment of bat roost and habitat potential was undertaken by Robert Williams BSc MSc ACIEEM in conjunction with vegetation surveys between 10<sup>th</sup> and 11<sup>th</sup> July 2019. Robert is an experienced ecologist with over eight years professional experience and has previously worked on a number of different wind farm developments.

Bat call analysis was undertaken by Rebecca Rooney GradCIEEM BSc, a Project Ecologist with SLR with extensive experience of bat call analysis. A quality assurance review of a sample (approximately 30%) of the analysed data was undertaken by Dale Broadbent MCIEEM, a Senior Ecologist with over 10 years' bat survey experience and a licenced batworker.

## 2.5 Assessment of Relative Bat Activity Levels

In accordance with the guidelines<sup>1</sup>, the relative level of bat activity recorded during the static detector surveys was analysed through the use of the secure online tool *Ecobat*<sup>4</sup>, initially designed by the University of Exeter and now hosted and developed by the Mammal Society<sup>5</sup>. *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 region 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 100km of the survey location.

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.

---

<sup>4</sup> <http://www.mammal.org.uk/science-research/ecostat/>

<sup>5</sup> Lintott, P. R., Davison, S., Breda, J., Kubasiewicz, L., Dowse, D., Daisley, J. & Mathews, F. (2018). *Ecobat*: An online resource to facilitate transparent, evidence-based interpretation of bat activity data. *Ecology and Evolution* 8(2): 935-941.

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 80<sup>th</sup> 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<sup>1</sup> define bat activity levels on a particular night as:

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

## 2.6 Survey Limitations

### 2.6.1 Equipment Limitations

On two occasions during the survey season bat detectors were stolen, meaning that in May and October data were only collected from four detectors. During each deployment, detectors were attached to stakes at locations determined with hand-held GPS units and a photographic record taken to assist with recovery of the detector at the end of the recording period. In both instances of theft, the resultant holes from the stakes were located and no remnant of the stake was found, indicating the detector and stake had been removed vertically rather, than say, been simply knocked over by a grazing animal. Due to the upland nature of the site, there are no features to secure equipment too i.e. fences or gates, to minimise the risk of theft or interference. The two instances of theft were therefore unavoidable and it is considered that the best efforts possible were made to obtain field data in accordance with the guidelines.

Weather data could not be collected on site during the May survey period at the request of Innogy and, as such, the nearest publicly available data source has been used (SO 292 150, Abergavenny 20km east of the site). During the August survey period, a site weather station was deployed at grid reference 310974, 210809 which is approximately 1.1km east of the site boundary. This location was used on the basis of a wider survey area being investigated at the time of survey which is no longer the case. During the August period, the site weather station was subject to interference and damage and therefore didn't record data. As such, the Abergavenny weather station was also used to provide weather data for the August survey period. The on-site weather station was used for the October survey period. Due to the feasibility of deploying bulky equipment and previous issues with equipment theft and damage, this was deployed at grid reference 309737, 210195 within the site albeit approximately 350m east of the developable area as this was considered to be a less visible location but still in close enough proximity to obtain site-specific data.

The guidelines in place at the time of survey<sup>1</sup> state (Section 5.2 of the guidelines) that full spectrum bat detectors should be used for bat activity surveys, although they also infer (Section 6.1 (2) of the guidelines) that zero-crossing analysis of sound files is acceptable. The detectors used for these surveys (Anabat Express) do not record in full spectrum but instead record in zero-crossing format. Following discussions with one of the authors of the guidelines (Robert Raynor, SNH, pers. comm.) it is understood that whilst the aspiration of the guidelines is for full spectrum detectors to be used, it was not realistic to expect surveyors to replace their zero-crossing detectors straight away. It is therefore understood that during the first 1-2 years following publication of the guidelines the use of zero-crossing detectors will be acceptable. The use of Anabat Express detectors is therefore compliant with the guidelines at this time and is not considered likely to affect the conclusions of this report.

### 2.6.2 Weather Limitations

Due to weather conditions it was not possible to collect a full 10 nights of static bat detector data in suitable conditions, as defined by the guidelines<sup>1</sup>, each season as such weather windows very rarely exist in upland areas such as that in which the site is located.

During the autumn sample period, two of the 10 nights used for the analysis recorded an average wind speeds of 6.0 m/s and 6.8 m/s, which is slightly over the 5 m/s threshold set within the guidelines<sup>1</sup>, however all other nights met the criteria. On the 4<sup>th</sup> October, average wind speeds were 6.0 m/s and 26 bat passes were recorded which actually represents over 50% of the entire bat activity recorded during the autumn session and is therefore considered a valid night. Whilst no bat activity was recorded on the 5<sup>th</sup> October, this is not uncommon for the site across the wider survey period in which the majority of nights were below 5 m/s average wind speed.

Overall, given the location of the site and habitats present, it is concluded that sufficient bat data has been collected in suitable conditions so as to be able to assess the potential impacts of the proposed development upon bats.

### 2.6.3 General Limitations

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 there are identified limitations, it is considered unlikely that any significant activity by additional bat species has been overlooked or likely to occur at the site. However, 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. It is considered unlikely however, that additional surveys of the site at this time would materially alter the conclusions of this report.

Direct access to land east of the site boundary was not possible. As such, the full 250m buffer from the developable area could not be applied here although it was inspected from the boundary and using aerial imagery. This did not identify any obvious potential bat roost sites and at this stage is not considered a significant limitation.

## 3.0 Results

### 3.1 Desk Study

#### 3.1.1 Designated Sites

The site is approximately 7.5km west of the Usk Bat Sites Special Area of Conservation (SAC). The Usk Valley area in south-east Wales contains one of the largest maternity roosts for lesser horseshoe bat as well as a number of important hibernacula in caves in the area. The area contains up to 5% of the UK lesser horseshoe population, though counts in hibernation sites suggest this may be an underestimate.

The Bannau Brycheiniog SAC, Cwm Cadlan SAC and River Usk SAC also occur in the 10km search area although these are not notified on the basis of bat interest.

The data search identified the presence of 21 Sites of Special Scientific Interest (SSSI) within the 10km search area which includes those recognised for geological interest. None of these are notified specifically on the basis of bat interest, although the presence of bats is noted in the citations for River Usk (Upper Usk) SSSI, Mynydd Llangatwg SSSI and River Usk (Tributaries) SSSI.

The data search identified the presence of 10 Sites of Importance for Nature Conservation (SINC's). None are specifically designated on account of bat interest, although the presence of bats is noted in the descriptions given for River Rhymney SINC and Cefn Gelligaer, west of Deri SINC.

#### 3.1.2 Pre-existing Records

The data search returned 3,483 bat records within 10km of the site boundary. Due to the large number of records analysis was focused on the records closest to site, records of rare species and/or species considered to be at high risk from wind turbines (see Appendix 2) and roost sites.

Due to the high number of records a summary has been provided in Table 3-1 below. As not all records specify the type of record, i.e. roost or foraging, the following summary paragraph relates to all bat records. Due to the confidential nature of bat roost records, precise locations and details are not provided within this report but could be provided to statutory consultees if required in the future.

**Table 3-1: Summary of Results per Season**

| Bat Species         | Scientific Name                  | Total Number of records |
|---------------------|----------------------------------|-------------------------|
| Common Pipistrelle  | <i>Pipistrellus pipistrellus</i> | 594                     |
| Soprano Pipistrelle | <i>Pipistrellus pygmaeus</i>     | 191                     |
| Noctule             | <i>Nyctalus noctula</i>          | 124                     |
| <i>Myotis</i> sp.   | <i>Myotis</i> sp.                | 178                     |
| Daubenton's         | <i>Myotis daubentonii</i>        | 89                      |
| Natterer's          | <i>Myotis nattereri</i>          | 49                      |
| Brandt's Bat        | <i>Myotis brandtii</i>           | 15                      |
| Whiskered           | <i>Myotis mystacinus</i>         | 32                      |
| Lesser Horseshoe    | <i>Rhinolophus hipposideros</i>  | 1758                    |
| Brown Long Eared    | <i>Plecotus auratus</i>          | 117                     |
| Long Eared sp.      | <i>Plecotus</i> sp.              | 31                      |
| Big Bat             | <i>Nyctalus/Eptesicus</i> agg.   | 4                       |
| Serotine            | <i>Eptesicus serotinus</i>       | 4                       |
| Barbastelle         | <i>Barbastella barbastellus</i>  | 3                       |

Noctule, Leisler's, Nathusius' pipistrelle, serotine and barbastelle *Barbastella barbastellus* are the five species with high population vulnerability to wind farms in Wales (Appendix 2).

Of these species there are records within 2km only for noctule, and there are no confirmed noctule roost records within a 2km radius of the site boundary.

There are no records of Leisler's or Nathusius' pipistrelle within 10km of the site boundary returned by the desk study. Four records of serotine were returned, the closest 2,327m away. Three records of barbastelle exist, the closest is 9,058m from the site boundary. As far as can be ascertained from the data search, none of the serotine or barbastelle records within 10km relate to roosts.

There are no records of roosts for any bat species within the survey area boundary or within the wider site boundary. There are 32 recorded roosts within 2km, including roosts for common pipistrelle, brown long-eared, Natterer's *Myotis nattereri* and lesser horseshoe.

A single lesser horseshoe is noted as hibernating 416m from the site boundary at Rhymney Reservoir, to the east of the site. There are also records of lesser horseshoe and brown long-eared hibernation roosts in the Morlais Tunnel, approximately 750m from the site boundary. There are records of hibernating brown long-eared in a few small caves in the Ogof Cwael area near Morlais 910m away, and of hibernating Natterer's in the Pont Sarn-Pantcadifor railway tunnel, 999m from the site boundary.

## 3.2 Field Surveys

### 3.2.1 Habitat Assessment

#### Roost Potential Survey

No structures, trees or underground features such as mine entrances, which could be used by roosting bats, were evident in the survey area. The survey area comprises open upland habitats offering no bat roosting potential.

The potential presence of bat roosting sites has been noted incidentally in the wider site area such as rock exposures. Based on indicative proposals provided by Innogy these features all occur more than 250m from any potential turbine location and further investigation is therefore not necessary (although this will need to be the subject of review as the proposed design evolves). For the purpose of this baseline activity survey report, no further consideration of bat roosts is given.

#### Habitat Risk Assessment

The habitats at the site are considered to represent low habitat risk for bats, according to criteria presented in the guidelines<sup>1</sup> and reproduced in Appendix 1. The survey area is dominated by marshy grassland, heath and modified bog<sup>6</sup>, with areas of semi-improved acid grassland and semi-improved neutral grassland also present where grazing pressure is particularly high. Rock exposure, dry heath, running water and standing open water are also present but not a major component of the habitats within the survey area, whilst mixed plantation woodland, fen-basin mire and acid flush habitats are all rare and each only occurs in one location. These represent low quality habitat for foraging/commuting bats.

There is also a lack of potential roosting habitat within the survey area (see above) and the survey area is relatively isolated and not connected to the wider landscape by prominent linear features.

### 3.2.2 Activity Surveys – Static Bat Detector Survey – All Species

#### Spatial Distribution

The results of the remote detector surveys for all species and detector locations are summarised in Table 3-2 which shows the total number of bat passes recorded at each of the sample locations, as well as the median and mean bat passes per night. The data are skewed (i.e. not normally distributed), due to most nights recording nil bat passes, and most nights where bat activity has been recorded recording just one or two bat passes. Therefore, in accordance with the guidelines<sup>1</sup> the median bat passes per night (rather than mean) is the more representative statistic in this situation (although both have been reported for information).

Bat records for at least six species were recorded on the site, including common pipistrelle, soprano pipistrelle, Myotis bat species (*Myotis sp*), serotine, noctule, long-eared species (*Plecotus sp*) and 'big bats', (*Nyctalus/Eptesicus*) species, where it was not possible to distinguish between *Nyctalus* and *Eptesicus* species.

A total of 338 bat passes from those species were recorded by the five static detectors over a total of 30 nights of recording during spring, summer and autumn 2019 (20 nights of recording at locations 3 and 5, see Section 2.2.3). The maximum number of passes recorded in a single night was 69 passes on 24<sup>th</sup> May 2019.

The highest overall activity was attributed to location 4 (approximately 50.3% of all activity), followed by location 5 (20.5%), location 2 (11.3%), location 1 (10.1%) and location 3 (7.7% of all activity) as shown in Table 3-2. These figures should be used with caution, however, as locations 3 and 5 had fewer recording nights. There is no obvious explanation for the variation in activity as all detectors were located in an open upland habitat setting (as shown in Table 2-1) and whilst a dry ditch occurs near to location 4 there is no significant difference in bat habitat quality and the overall number of bat passes is relatively low at all locations.

---

<sup>6</sup> SLR Consulting Ltd. 2019. Pen March Phase 1 Habitat Survey Report, December 2019.

**Table 3-2: Summary of Results per Sample Location across all Seasons**

| Bat Species            | Survey nights included within analysis | Detector Location | Total bat passes | Maximum bat activity (bat passes per night) <sup>a</sup> | Median bat passes per night | Mean bat passes per night |
|------------------------|----------------------------------------|-------------------|------------------|----------------------------------------------------------|-----------------------------|---------------------------|
| Common Pipistrelle     | 30                                     | 1                 | 30               | 10                                                       | 0.00                        | 1                         |
|                        | 30                                     | 2                 | 24               | 7                                                        | 0.00                        | 0.8                       |
|                        | 20                                     | 3                 | 17               | 8                                                        | 0.00                        | 0.85                      |
|                        | 30                                     | 4                 | 111              | 32                                                       | 0.00                        | 3.7                       |
|                        | 20                                     | 5                 | 46               | 25                                                       | 0.00                        | 2.3                       |
| Soprano Pipistrelle    | 30                                     | 1                 | 2                | 2                                                        | 0.00                        | 0.07                      |
|                        | 30                                     | 2                 | 3                | 2                                                        | 0.00                        | 0.1                       |
|                        | 20                                     | 3                 | 1                | 1                                                        | 0.00                        | 0.05                      |
|                        | 30                                     | 4                 | 15               | 8                                                        | 0.00                        | 0.5                       |
|                        | 20                                     | 5                 | 9                | 4                                                        | 0.00                        | 0.45                      |
| Myotis sp.             | 30                                     | 1                 | 2                | 0                                                        | 0.00                        | 0.07                      |
|                        | 30                                     | 2                 | 3                | 1                                                        | 0.00                        | 0.1                       |
|                        | 20                                     | 3                 | 1                | 1                                                        | 0.00                        | 0.05                      |
|                        | 30                                     | 4                 | 21               | 5                                                        | 0.00                        | 0.7                       |
|                        | 20                                     | 5                 | 4                | 2                                                        | 0.00                        | 0.2                       |
| Long Eared sp.         | 30                                     | 1                 | 0                | 0                                                        | 0.00                        | 0                         |
|                        | 30                                     | 2                 | 5                | 1                                                        | 0.00                        | 0.17                      |
|                        | 20                                     | 3                 | 5                | 2                                                        | 0.00                        | 0.25                      |
|                        | 30                                     | 4                 | 7                | 2                                                        | 0.00                        | 0.23                      |
|                        | 20                                     | 5                 | 4                | 1                                                        | 0.00                        | 0.2                       |
| Noctule                | 30                                     | 1                 | 0                | 0                                                        | 0.00                        | 0                         |
|                        | 30                                     | 2                 | 2                | 1                                                        | 0.00                        | 0.07                      |
|                        | 20                                     | 3                 | 2                | 2                                                        | 0.00                        | 0.1                       |
|                        | 30                                     | 4                 | 10               | 4                                                        | 0.00                        | 0.33                      |
|                        | 20                                     | 5                 | 2                | 1                                                        | 0.00                        | 0.1                       |
| Nyctalus/Eptesicus sp. | 30                                     | 1                 | 0                | 0                                                        | 0.00                        | 0                         |
|                        | 30                                     | 2                 | 0                | 1                                                        | 0.00                        | 0                         |
|                        | 20                                     | 3                 | 0                | 0                                                        | 0.00                        | 0                         |
|                        | 30                                     | 4                 | 3                | 1                                                        | 0.00                        | 0.1                       |
|                        | 20                                     | 5                 | 2                | 1                                                        | 0.00                        | 0.1                       |
| Serotine               | 30                                     | 1                 | 0                | 0                                                        | 0.00                        | 0                         |
|                        | 30                                     | 2                 | 1                | 1                                                        | 0.00                        | 0.03                      |
|                        | 20                                     | 3                 | 0                | 0                                                        | 0.00                        | 0                         |
|                        | 30                                     | 4                 | 2                | 1                                                        | 0.00                        | 0.07                      |
|                        | 20                                     | 5                 | 2                | 2                                                        | 0.00                        | 0.1                       |

*a = highest number of bat passes recorded on any one night.*

### Temporal Distribution

A summary of the results per survey season is provided in Table 3-3, to illustrate any seasonal variation.

Bat activity was lowest in autumn (October) (with 40 bat passes in total recorded), the highest in summer (August) (with 197 bat passes recorded), and in between these two values in spring (May) (with a total of 101 passes recorded).

Although a slight seasonal variation was recorded with peak numbers recorded in summer, the number of bat passes recorded in all seasons was relatively low for the majority of species, with a mean of <1 bat passes per

night for all species except common pipistrelle recorded in spring and autumn. Common pipistrelle was present at higher levels, with a mean of 9.1 passes per night in spring, 2.1 in autumn and 11.9 in summer. All bat species were present in slightly higher numbers in summer, with means  $\geq 1$  bat pass per night for soprano pipistrelle (2.4 passes per night), *Myotis* sp. (1.8 passes per night), long-eared sp. (1.9 passes per night) and noctule (1.0 passes per night).

**Table 3-3: Summary of Results per Season across all Sample Locations**

| Season | Survey nights included within analysis | Bat species               | Total bat passes: | Maximum bat activity (bat passes per night) <sup>a</sup> | Median bat passes per night | Mean bat passes per night |
|--------|----------------------------------------|---------------------------|-------------------|----------------------------------------------------------|-----------------------------|---------------------------|
| Spring | 10<br>(Anabat 3 missing)               | Common Pipistrelle        | 91                | 32                                                       | 3.5                         | 9.1                       |
|        |                                        | Soprano Pipistrelle       | 1                 | 1                                                        | 0.0                         | 0.1                       |
|        |                                        | <i>Myotis</i> sp.         | 5                 | 4                                                        | 0.0                         | 0.5                       |
|        |                                        | Long-eared sp.            | 0                 | 0                                                        | 0.0                         | 0.0                       |
|        |                                        | Noctule                   | 2                 | 1                                                        | 0.0                         | 0.2                       |
|        |                                        | <i>Nyctalus/Eptesicus</i> | 2                 | 1                                                        | 0.0                         | 0.2                       |
|        |                                        | Serotine                  | 0                 | 0                                                        | 0.0                         | 0.0                       |
| Summer | 10                                     | Common Pipistrelle        | 119               | 10                                                       | 4.0                         | 11.9                      |
|        |                                        | Soprano Pipistrelle       | 24                | 8                                                        | 2.0                         | 2.4                       |
|        |                                        | <i>Myotis</i> sp.         | 18                | 5                                                        | 1.0                         | 1.8                       |
|        |                                        | Long-eared sp.            | 19                | 3                                                        | 1.0                         | 1.9                       |
|        |                                        | Noctule                   | 10                | 4                                                        | 1.0                         | 1.0                       |
|        |                                        | <i>Nyctalus/Eptesicus</i> | 2                 | 1                                                        | 0.0                         | 0.2                       |
|        |                                        | Serotine                  | 5                 | 2                                                        | 0.0                         | 0.5                       |
| Autumn | 10<br>(Anabat 5 missing)               | Common Pipistrelle        | 21                | 9                                                        | 1.0                         | 2.1                       |
|        |                                        | Soprano Pipistrelle       | 3                 | 1                                                        | 0.0                         | 0.3                       |
|        |                                        | <i>Myotis</i> sp.         | 6                 | 3                                                        | 0.0                         | 0.6                       |
|        |                                        | Long-eared sp.            | 5                 | 1                                                        | 0.5                         | 0.5                       |
|        |                                        | Noctule                   | 4                 | 4                                                        | 0.0                         | 0.4                       |
|        |                                        | <i>Nyctalus/Eptesicus</i> | 1                 | 1                                                        | 0.0                         | 0.1                       |
|        |                                        | Serotine                  | 0                 | 0                                                        | 0.0                         | 0.0                       |

*a* = highest number of bat passes recorded on any one night.

### High Collision Risk and High Population Vulnerability Species

High collision risk species in Wales, as defined by the guidelines<sup>1</sup>, are detailed in Appendix 2. The potential collision risk for each species is based upon its behaviour and ecology and evidence of casualty rates in the UK and the rest of Europe.

Of the species recorded during the activity surveys, the following species are classified as of high collision risk in Wales:

- Common pipistrelle;
- Soprano pipistrelle; and
- Noctule.

Bats recorded that have a medium collision risk are:

- Serotine.

Relative abundance (common, rarer or rarest species) is combined with the collision risk of a species to indicate the potential vulnerability of populations (see Appendix 2). Common and soprano pipistrelle are classified as

having a medium population vulnerability in Wales. Noctule and serotine are rarer species with a high population vulnerability.

### Bat Activity Relative to Other Sites

A summary of the output from *Ecobat*, for each detector location, is included in Table 3-4.

**Table 3-4: Summary of Ecobat Outputs, by Detector, Compared with Sites Within 100km**

| Location Ref. | Species             | Nights of Activity |          |     |         |     | Nil Activity | Median percentile | (95% CIs) <sup>7</sup> | Median bat activity level <sup>8</sup> | Max. percentile | Max. bat activity level <sup>9</sup> | No. of records compared against |
|---------------|---------------------|--------------------|----------|-----|---------|-----|--------------|-------------------|------------------------|----------------------------------------|-----------------|--------------------------------------|---------------------------------|
|               |                     | High               | Mod/High | Mod | Low/Mod | Low |              |                   |                        |                                        |                 |                                      |                                 |
| 1             | Common pipistrelle  | 0                  | 2        | 4   | 0       | 0   | 24           | 59                | 51.5-51.5              | Mod                                    | 77              | Mod/High                             | 205                             |
|               | Soprano pipistrelle | 0                  | 0        | 1   | 0       | 0   | 29           | 44                | 0                      | Mod                                    | 44              | Mod                                  | 135                             |
|               | Myotis sp.          | 0                  | 0        | 0   | 0       | 0   | 30           | 0                 | 0                      | Low                                    | 0               | Low                                  | 119                             |
|               | Long-eared          | 0                  | 0        | 0   | 0       | 0   | 30           | 0                 | 0                      | Low                                    | 0               | Low                                  | 85                              |
|               | Noctule             | 0                  | 0        | 0   | 0       | 0   | 30           | 0                 | 0                      | Low                                    | 0               | Low                                  | 134                             |
|               | Nyctalus/Eptesicus  | 0                  | 0        | 0   | 0       | 0   | 30           | 0                 | 0                      | Low                                    | 0               | Low                                  | 241                             |
|               | Serotine            | 0                  | 0        | 0   | 0       | 0   | 30           | 0                 | 0                      | Low                                    | 0               | Low                                  | 102                             |
| 2             | Common pipistrelle  | 0                  | 1        | 5   | 2       | 0   | 25           | 49                | 48.5-48.5              | Mod                                    | 72              | Mod/High                             | 205                             |
|               | Soprano pipistrelle | 0                  | 0        | 1   | 1       | 0   | 29           | 34                | 0                      | Low/Mod                                | 44              | Mod                                  | 135                             |
|               | Myotis sp.          | 0                  | 0        | 0   | 1       | 0   | 29           | 23                | 0                      | Low/Mod                                | 23              | Low/Mod                              | 119                             |
|               | Long-eared          | 0                  | 0        | 0   | 5       | 0   | 25           | 23                | 23-23                  | Low/Mod                                | 23              | Low/Mod                              | 85                              |
|               | Noctule             | 0                  | 0        | 0   | 0       | 2   | 29           | 23                | 0                      | Low/Mod                                | 23              | Low/Mod                              | 134                             |

<sup>7</sup> 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).

<sup>8</sup>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: 0-20<sup>th</sup> percentile=low, 21<sup>st</sup>-40<sup>th</sup> percentile=low/mod, 41<sup>st</sup>-60<sup>th</sup> percentile = mod, 61<sup>st</sup>-80<sup>th</sup> percentile = mod/high, 81<sup>st</sup> – 100<sup>th</sup> percentile = high.

<sup>9</sup> 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) <sup>7</sup> | Median bat activity level <sup>8</sup> | Max. percentile | Max. bat activity level <sup>9</sup> | No. of records compared against |
|---------------|---------------------|--------------------|----------|-----|---------|-----|--------------|-------------------|------------------------|----------------------------------------|-----------------|--------------------------------------|---------------------------------|
|               |                     | High               | Mod/High | Mod | Low/Mod | Low | Nil Activity |                   |                        |                                        |                 |                                      |                                 |
|               | Nyctalus/Eptesicus  | 0                  | 0        | 0   | 0       | 0   | 30           | 0                 | 0                      | Low                                    | 0               | Low                                  | 241                             |
|               | Serotine            | 0                  | 0        | 0   | 1       | 0   | 29           | 23                | 0                      | Low/Mod                                | 23              | Low/Mod                              | 102                             |
| 3             | Common pipistrelle  | 0                  | 2        | 3   | 2       | 0   | 13           | 53                | 33.5–63                | Mod                                    | 73              | Mod/High                             | 205                             |
|               | Soprano pipistrelle | 0                  | 0        | 0   | 1       | 0   | 19           | 23                | 0                      | Low/Mod                                | 23              | Low/Mod                              | 135                             |
|               | Myotis sp.          | 0                  | 0        | 0   | 3       | 0   | 17           | 23                | 23–23                  | Low/Mod                                | 23              | Low/Mod                              | 119                             |
|               | Long-eared          | 0                  | 0        | 1   | 3       | 0   | 16           | 23                | 23–23                  | Low/Mod                                | 44              | Mod                                  | 85                              |
|               | Noctule             | 0                  | 0        | 1   | 0       | 0   | 19           | 44                | 0                      | Mod                                    | 44              | Mod                                  | 134                             |
|               | Nyctalus/Eptesicus  | 0                  | 0        | 0   | 0       | 0   | 20           | 0                 | 0                      | Low                                    | 0               | Low                                  | 241                             |
|               | Serotine            | 0                  | 0        | 0   | 0       | 0   | 20           | 0                 | 0                      | Low                                    | 0               | Low                                  | 102                             |
| 4             | Common pipistrelle  | 2                  | 6        | 3   | 0       | 0   | 19           | 72                | 87.5–87.5              | Mod/High                               | 91              | High                                 | 205                             |
|               | Soprano pipistrelle | 0                  | 1        | 2   | 3       | 0   | 24           | 34                | 44–73                  | Low/Mod                                | 73              | Mod/High                             | 135                             |
|               | Myotis sp.          | 0                  | 1        | 3   | 7       | 0   | 19           | 23                | 33.5–33.5              | Low/Mod                                | 44              | Mod                                  | 119                             |
|               | Long-eared          | 0                  | 0        | 1   | 5       | 0   | 24           | 23                | 42–42                  | Low/Mod                                | 53              | Mod                                  | 85                              |
|               | Noctule             | 0                  | 0        | 2   | 2       | 0   | 26           | 41                | 41–41                  | Mod                                    | 59              | Mod                                  | 134                             |
|               | Nyctalus/Eptesicus  | 0                  | 1        | 1   | 1       | 0   | 27           | 44                | 0                      | Mod                                    | 64              | Mod/High                             | 241                             |
|               | Serotine            | 0                  | 0        | 0   | 2       | 0   | 28           | 23                | 23–23                  | Low/Mod                                | 23              | Low/Mod                              | 102                             |
| 5             | Common pipistrelle  | 1                  | 3        | 2   | 0       | 0   | 14           | 64                | 76–76                  | Mod/High                               | 88              | High                                 | 205                             |
|               | Soprano pipistrelle | 0                  | 0        | 2   | 2       | 0   | 16           | 38                | 23–53                  | Low/Mod                                | 59              | Mod                                  | 135                             |
|               | Myotis sp.          | 0                  | 0        | 1   | 2       | 0   | 17           | 23                | 23–23                  | Low/Mod                                | 44              | Mod                                  | 119                             |

| Location Ref. | Species            | Nights of Activity |          |     |         |     |              | Median percentile | (95% CIs) <sup>7</sup> | Median bat activity level <sup>8</sup> | Max. percentile | Max. bat activity level <sup>9</sup> | No. of records compared against |
|---------------|--------------------|--------------------|----------|-----|---------|-----|--------------|-------------------|------------------------|----------------------------------------|-----------------|--------------------------------------|---------------------------------|
|               |                    | High               | Mod/High | Mod | Low/Mod | Low | Nil Activity |                   |                        |                                        |                 |                                      |                                 |
|               | Long-eared         | 0                  | 0        | 0   | 4       | 0   | 16           | 23                | 23–23                  | Low/Mod                                | 23              | Low/Mod                              | 85                              |
|               | Noctule            | 0                  | 0        | 0   | 0       | 2   | 18           | 23                | 23–23                  | Low/Mod                                | 23              | Low/Mod                              | 134                             |
|               | Nyctalus/Eptesicus | 0                  | 0        | 1   | 1       | 0   | 18           | 34                | 0                      | Low/Mod                                | 44              | Mod                                  | 241                             |
|               | Serotine           | 0                  | 0        | 1   | 0       | 0   | 19           | 44                | 0                      | Mod                                    | 44              | Mod                                  | 102                             |

The median percentile for common pipistrelle activity on those nights where bats were recorded ranges from 49 ('moderate' activity; two detector locations fell into this category) to 72 ('moderate to high' activity; three detector locations fell into this category), when compared against the reference range. Although all detectors recorded 'moderate to high' or 'moderate' activity, this only represents 28% of the total nights for which data have been analysed, as the majority (94) of nights recorded no bats. The median number of common pipistrelle passes recorded on any night was 0 at all locations, and the mean number of passes recorded (across all detector locations combined) was 1.73 passes per night. The *Ecobat* output therefore potentially overestimates the level of bat activity at the site.

The median percentile for soprano pipistrelle activity on those nights where bats were recorded ranges from 23 ('low to moderate' activity; four detector locations fell into this category) to 44 ('moderate' activity; one detector location fell into this category), when compared against the reference range. As for common pipistrelle it is noted that these levels of activity represent only 10% of the total nights for which data have been analysed, as the majority (117) of nights recorded no bats. The median number of soprano pipistrelle passes recorded on any night was 0 at all locations, and the mean number of passes recorded (across all detector locations combined) was 0.22 passes per night.

When compared against the reference range the median percentile for *Myotis* sp. activity ranges from 0 to 23, one detector falling in the 'low' activity group, and four detectors within the 'low to moderate' activity category, although as highlighted above for common and soprano pipistrelle these levels of activity only relate to 14% of the nights for which data have been analysed. The median number of *Myotis* sp. passes recorded on any night was 0 at all locations, and the mean number of passes recorded (across all detector locations combined) was 0.22 passes per night.

For noctule activity the median percentile on those nights where bats were recorded ranges from 0 ('low' activity; one detector location fell into this category) to 44 ('moderate' activity; two detector locations fell into this category), the other two detectors were categorised as 'low to moderate' activity. As highlighted above for other species these levels of activity only relate to 6% of the nights for which data have been analysed. The median number of noctule passes recorded on any night was 0 at all locations, and the mean number of passes recorded (across all detector locations combined) was 0.12 passes per night.

The median percentile for serotine activity ranges from 0 ('low' activity; two detector locations fell into this category) to 53 ('moderate' activity; one detector location fell into this category and two were 'low to moderate' activity, when compared against the reference range. As highlighted above for other species these levels of activity only relate to 3% of the nights for which data have been analysed. The median number of serotine passes recorded on any night was 0 at all locations, and the mean number of passes recorded (across all detector locations combined) was 0.04 passes per night.

Similarly, the median percentile for long-eared sp. activity ranges from 0 ('low' activity; one detector location fell into this category) to 23 ('low to moderate' activity; four detector locations fell into this category). As highlighted above for other species these levels of activity only relate to 15% of the nights for which data have been analysed. The median number of long-eared sp. passes recorded on any night was 0 at all locations, and the mean number of passes recorded (across all detector locations combined) was 0.18 passes per night.

The median percentile for *Nyctalus/Eptesicus* activity ranges from 0 ('low' activity; three detector locations fell into this category) to 44 ('moderate' activity; one detector location fell into this category), with one detector falling into the 'low to moderate' activity category when compared against the reference range. As highlighted above for other species these levels of activity only relate to 4% of the nights for which data have been analysed. The median number of *Nyctalus/Eptesicus* passes recorded on any night was 0 at all locations, and the mean number of passes recorded (across all detector locations combined) was 0.04 passes per night.

The reference range incorporates a maximum 1021 records only from other sites within 100km of Pen March. This represents a relatively small comparative dataset and the outputs should therefore be treated with some caution. In addition, it should be noted that most of these records are likely to have been obtained during surveys undertaken at proposed or operational wind farm site and therefore most of these records are also likely to be from exposed sites with similarly low levels of bat activity. As such it must be considered that the relative level of activity generated by *Ecobat* represents the relative level of activity compared with other similar sites, not the relative level of activity compared with other sites which provide much better habitats for bats. This potentially also helps explain the relatively high occurrence of locations with a moderate or higher level of relative activity, despite the low number of bat passes recorded.

## 4.0 Discussion and Conclusions

### 4.1 Habitat Assessment

The habitat at the site constitutes 'low risk' bat habitat as defined within the guidelines<sup>1</sup> (see Appendix 1). Specifically, no potential bat roosting habitat was identified within the survey area. The site also lacks prominent linear features likely to be of high value to foraging/commuting bats and the vast majority of the survey area comprises habitat likely to be of low value to foraging/commuting bats.

### 4.2 Overview of Bat Activity

Within 2.5km of the survey area there are 19 existing records of long-eared sp. or brown long-eared, 16 records of *Myotis* sp. 61 of common pipistrelle, 19 of soprano pipistrelle, 11 of lesser horseshoe, four of noctule and two of *Nyctalus/Eptesicus* sp. These records include 47 roosts, including roosts for common pipistrelle, brown long-eared, Natterer's *Myotis nattereri* and lesser horseshoe and including a number of hibernation roosts. The closest known roost to the site is 416m from the site boundary.

During static detector surveys at least six bat species were recorded on the site, including common pipistrelle, soprano pipistrelle, *Myotis* sp., serotine, noctule, long eared sp. and 'big bats', i.e. *Nyctalus/Eptesicus* sp., where it was not possible to distinguish between *Nyctalus* and *Eptesicus* species.

The number of bat passes recorded was low (338 in total for all species combined over 30 nights of recording at three locations and 20 nights of recording at two locations). The majority of passes were attributed to common pipistrelle (67.9%), followed by *Myotis* sp. (9.2%), soprano pipistrelle (8.9%), long-eared sp. (6.3%), noctule (4.8%), big bats (1.5%) and serotine (1.5%). It should be considered that *Myotis* sp. and long-eared sp. may be underrepresented by virtue of their lower detectability. The low proportion of noctule, serotine and 'big bat' is considered likely to be an accurate representation of activity levels for these species however due to their high detectability.

### 4.3 Spatial Distribution of Bat Activity

Common and soprano pipistrelle and *Myotis* sp. were recorded at all detector locations. Long-eared sp. and noctule were not recorded at location 1 but were present at all other locations. Serotine was recorded at locations 2, 4 and 5, while *Nyctalus/Eptesicus* bats were recorded at locations 4 and 5 only.

The highest overall activity was attributed to location 4 (approximately 50.3% of all activity), followed by location 5 (20.5%), location 2 (11.3%), location 1 (10.1%) and location 3 (7.7% of all activity), although note that locations 3 and 5 had fewer recording nights. The broad habitat characteristics at each location are comparable in terms of suitability for bat foraging and commuting i.e. open upland habitat. As such, given the relatively low numbers of passes recorded, the variations recorded between sample locations cannot be readily explained and may be simply be representative of random chance as to where individual bats were detected during the survey period rather than indicating any particular variation in habitat quality or bat usage of a given area of the site. It is also noted that the actual number of bat passes is so low that even substantial differences of percentage of activity are in reality attributed to low numbers of passes. For example, 33% of all recorded bat activity relates to common pipistrelle at location 4 alone which could easily be attributed to a single bat foraging near to a detector over a short period of time in response to localised conditions on a given night.

### 4.4 Temporal Distribution of Bat Activity

Bat activity was highest in summer (August) (a mean of 19.7 bat passes per night across all detectors), and lowest in autumn (October) (a mean of 1 bat pass per night across all detectors). Overall, although a slight peak in activity was recorded in summer, bat activity was still relatively low during all seasons.

## 4.5 'High Collision Risk' and 'High Population Vulnerability' Bat Species

Common and soprano pipistrelle are both classified by the guidelines<sup>1</sup> as species at high risk of collision, with medium population vulnerability in Wales. Noctule is classified as being at high risk of collision and having high population vulnerability in Wales. Serotine has a medium risk of turbine collision and high population vulnerability in Wales. A small number of bats that could not be identified to species were identified as *Nyctalus/Eptesicus* sp. and are likely to have been either noctule or serotine. These are also considered to have high population vulnerability.

Also recorded on site were long-eared sp. and *Myotis* sp. bats which are considered to have a low risk of collision with turbines.

The data search found records of lesser horseshoe in the area surrounding the site however, despite being a rare species, the lesser horseshoe is at low risk of collision and has low population vulnerability in Wales. A small number of records of barbastelle, a rare species of medium risk of collision and high population vulnerability were also found for the surrounding area, although these were all from over 9km from the site. Neither species was recorded during the on-site surveys.

There are no existing records of Nathusius' pipistrelle or Leisler's bats (also high collision risk and high population vulnerability species) within 10km and neither species was recorded during the on-site surveys. It is therefore considered unlikely that these species would occur at the site.

### 4.5.1 Bat Activity Relative to Other Sites

Levels of bat activity relative to other sites are summarised below for each high collision risk and/or high population vulnerability species recorded during the bat activity surveys.

#### Common Pipistrelle

On nights where common pipistrelle was recorded, the level of activity either represented 'moderate' or 'moderate to high' bat activity levels when compared against records from a similar date in a similar geographic location in *Ecobat*.

Overall, it is concluded that the relative level of common pipistrelle activity is better considered to be 'low' or 'low to moderate' considering that no bat activity was recorded on 72% of nights and that the median number of bat passes per night was 0 (and the mean was 1.73). In addition, it is noted that the *Ecobat* reference range in the analysis is relatively small and compares against data which are mostly likely to be from other exposed upland sites with similarly low levels of bat activity, rather than other sites which provide much better habitats for bats.

#### Soprano Pipistrelle

On nights where soprano pipistrelle was recorded, the level of activity either represented 'low to moderate' or 'moderate' bat activity levels when compared against records from a similar date in a similar geographic location in *Ecobat*.

Overall, it is concluded that the relative level of soprano pipistrelle activity is better considered to be 'low' considering that no bat activity was recorded on 90% of nights and that the median number of bat passes per night was 0 (and the mean was 0.22). In addition, it is noted that the *Ecobat* reference range in the analysis is relatively small and compares against data which are mostly likely to be from other exposed upland sites with similarly low levels of bat activity, rather than other sites which provide much better habitats for bats.

#### Noctule

On nights where noctule was recorded, the level of activity either represented 'low', 'low to moderate' or 'moderate' bat activity levels when compared against records from a similar date in a similar geographic location in *Ecobat*.

Overall, it is concluded that the relative level of noctule activity is better considered to be 'low' considering that no bat activity was recorded on 94% of nights and that the median number of bat passes per night was 0 (and the mean was 0.12). In addition, it is noted that the *Ecobat* reference range in the analysis is relatively small and compares against data which are mostly likely to be from other exposed upland sites with similarly low levels of bat activity, rather than other sites which provide much better habitats for bats.

### Serotine

On nights where serotine was recorded, the level of activity either represented 'low', 'low to moderate' or 'moderate' bat activity levels when compared against records from a similar date in a similar geographic location in *Ecobat*.

Overall, it is concluded that the relative level of serotine activity is better considered to be 'low' considering that no bat activity was recorded on 97% of nights and that the median number of bat passes per night was 0 (and the mean was 0.04). In addition, it is noted that the *Ecobat* reference range in the analysis is relatively small and compares against data which are mostly likely to be from other exposed upland sites with similarly low levels of bat activity, rather than other sites which provide much better habitats for bats.

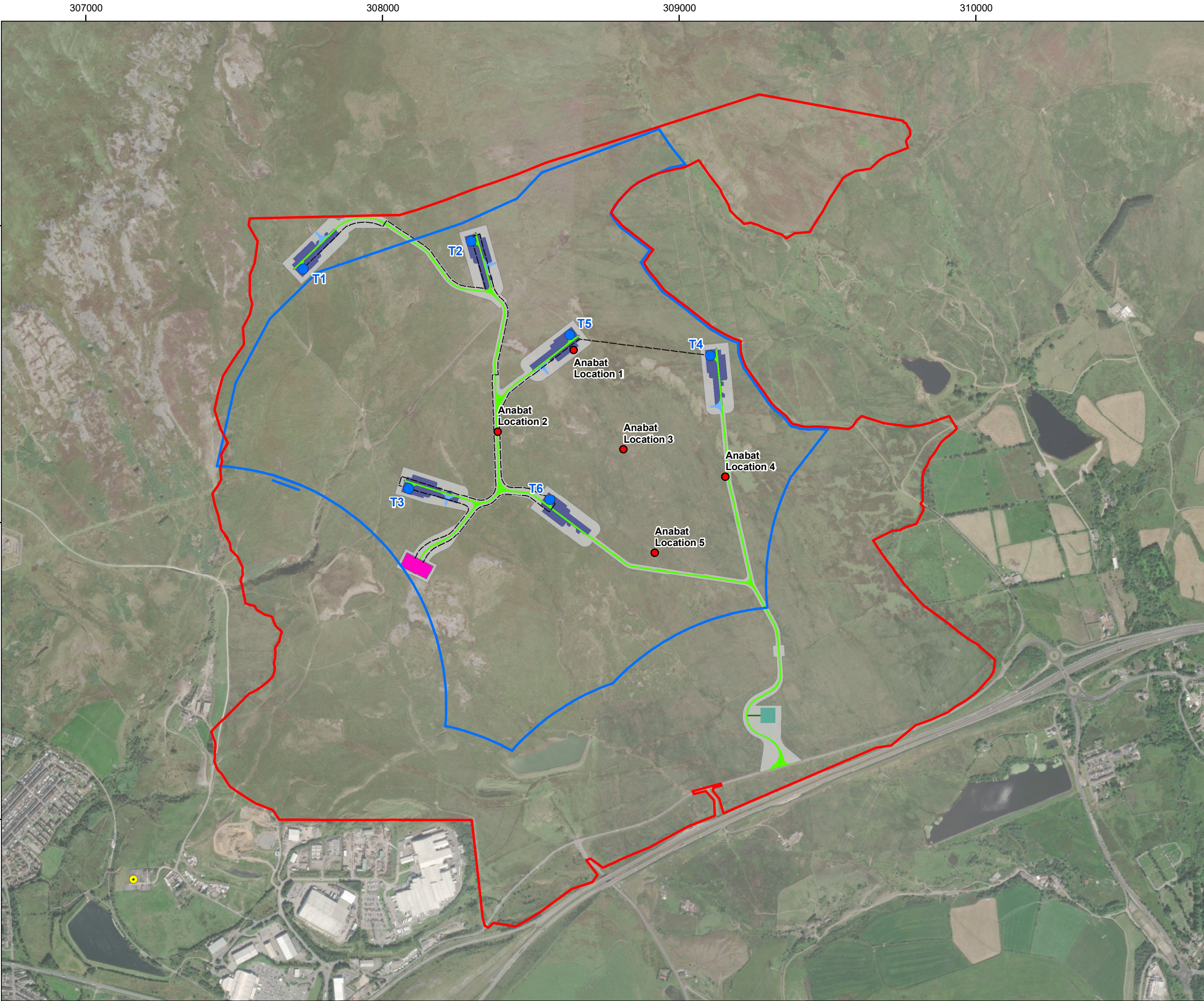
### Nyctalus/ Eptesicus sp.

On nights where *Nyctalus/ Eptesicus* sp. was recorded, the level of activity either represented 'low' or 'low to moderate' bat activity levels when compared against records from a similar date in a similar geographic location in *Ecobat*.

Overall, it is concluded that the relative level of *Nyctalus/ Eptesicus* sp. activity is better considered to be 'low' considering that no bat activity was recorded on 96% of nights and that the median number of bat passes per night was 0 (and the mean was 0.04). In addition, it is noted that the *Ecobat* reference range in the analysis is relatively small and compares against data which are mostly likely to be from other exposed upland sites with similarly low levels of bat activity, rather than other sites which provide much better habitats for bats.

## FIGURES

Figure 7-3a: Anabat Location Plan 2019



**Legend:**

- Pen March Site Boundary
- Developable Area
- Proposed Turbine Location
- Grid Connection
- Cable
- Substation and Energy Storage
- Access Track
- Access for Construction Compound
- Turning Head
- Construction Compound
- Worst-Case Pad
- Indicative Construction Working Area
- Anabat Locations

Coordinate System: British National Grid  
Projection: Transverse Mercator  
Datum: OSGB 1936  
Units: Meter

|     |            |                 |     |     |     |
|-----|------------|-----------------|-----|-----|-----|
|     |            |                 |     |     |     |
| 2   | 19/06/2023 | Second Revision | CME | SH  | CM  |
| 1   | 09/16/2022 | First Revision  | JK  | Chk | CM  |
| Rev | Date       | Description     | Drn | Chk | App |

**Pen March Wind Farm**

TITLE: Figure 7-3a:  
Anabat Location Plan 2019

0

250

500

Metres

SCALE: 1:12,000 @ A3

N

E

S

W

REV 01

## APPENDICES

## Appendix 1: Criteria for Assessing Habitat Risk for Bats

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

Table taken from current SNH et al. (2019) guidelines<sup>1</sup>.

## Appendix 2: Collision Risk, Relative Abundance and Overall Population Vulnerability of Bat Species in Wales

*Yellow = low population vulnerability*

*Beige = medium population vulnerability*

*Red = high population vulnerability*

| Relative abundance | Wales          | Collision risk                                                                                                            |                         |                                                        |
|--------------------|----------------|---------------------------------------------------------------------------------------------------------------------------|-------------------------|--------------------------------------------------------|
|                    |                | Low collision risk                                                                                                        | Medium collision risk   | High collision risk                                    |
|                    | Common species |                                                                                                                           |                         | Common pipistrelle<br>Soprano pipistrelle              |
|                    | Rarer species  | Brown long eared bat<br>Daubenton's bat<br>Natterer's bat<br>Lesser horseshoe                                             |                         |                                                        |
|                    | Rarest species | Alcathoe bat <sup>7</sup><br>Bechstein's bat<br>Brandt's bat<br>Greater horseshoe<br>Grey long eared bat<br>Whiskered bat | Barbastelle<br>Serotine | Nathusius' pipistrelle<br>Noctule bat<br>Leisler's bat |

Table taken from current SNH (2019) guidelines<sup>1</sup>.

## EUROPEAN OFFICES

### United Kingdom

#### AYLESBURY

T: +44 (0)1844 337380

#### BELFAST

T: +44 (0)28 9073 2493

#### BRADFORD-ON-AVON

T: +44 (0)1225 309400

#### BRISTOL

T: +44 (0)117 906 4280

#### CARDIFF

T: +44 (0)29 2049 1010

#### CHELMSFORD

T: +44 (0)1245 392170

#### EDINBURGH

T: +44 (0)131 335 6830

#### EXETER

T: + 44 (0)1392 490152

#### GLASGOW

T: +44 (0)141 353 5037

#### GUILDFORD

T: +44 (0)1483 889800

#### LONDON

T: +44 (0)203 805 6418

#### MAIDSTONE

T: +44 (0)1622 609242

#### MANCHESTER

T: +44 (0)161 872 7564

#### NEWCASTLE UPON TYNE

T: +44 (0)191 261 1966

#### NOTTINGHAM

T: +44 (0)115 964 7280

#### SHEFFIELD

T: +44 (0)114 245 5153

#### SHREWSBURY

T: +44 (0)1743 23 9250

#### STIRLING

T: +44 (0)1786 239900

#### WORCESTER

T: +44 (0)1905 751310

### Ireland

#### DUBLIN

T: + 353 (0)1 296 4667

### France

#### GRENOBLE

T: +33 (0)6 23 37 14 14

# PEN MARCH WIND FARM

**2020 Bat Survey Report**

Prepared for: **RWE Renewables Ltd**

SLR Ref: 406.02273.00066  
Version No: 2  
June 2023



| Document Control    |                                |
|---------------------|--------------------------------|
| Document Properties |                                |
| Organisation        | SLR Consulting Ltd             |
| Project Name        | Pen March Wind Farm            |
| Report Title        | 2020 Bat Survey Report         |
| Author(s)           | Rebecca Rooney and Emma Clarke |
| Draft version/final | FINAL                          |
| Document reference  | 406.02273.00066                |

| Date       | Revision No | Prepared By                    | Reviewed By    | Approved By   | Status | Comments |
|------------|-------------|--------------------------------|----------------|---------------|--------|----------|
| 21/06/2023 | 2           | Rebecca Rooney and Emma Clarke | Chris Mitchell | Duncan Watson | FINAL  |          |
|            |             |                                |                |               |        |          |
|            |             |                                |                |               |        |          |

## BASIS OF REPORT

This document has been prepared by SLR Consulting Limited with reasonable skill, care and diligence, and taking account of the manpower, timescales and resources devoted to it by agreement with RWE Renewables UK Ltd (the Client) as part or all of the services it has been appointed by the Client to carry out. It is subject to the terms and conditions of that appointment.

SLR shall not be liable for the use of or reliance on any information, advice, recommendations and opinions in this document for any purpose by any person other than the Client. Reliance may be granted to a third party only in the event that SLR and the third party have executed a reliance agreement or collateral warranty.

Information reported herein may be based on the interpretation of public domain data collected by SLR, and/or information supplied by the Client and/or its other advisors and associates. These data have been accepted in good faith as being accurate and valid.

The copyright and intellectual property in all drawings, reports, specifications, bills of quantities, calculations and other information set out in this report remain vested in SLR unless the terms of appointment state otherwise.

This document may contain information of a specialised and/or highly technical nature and the Client is advised to seek clarification on any elements which may be unclear to it.

Information, advice, recommendations and opinions in this document should only be relied upon in the context of the whole document and any documents referenced explicitly herein and should then only be used within the context of the appointment.

## CONTENTS

|            |                                                                                       |           |
|------------|---------------------------------------------------------------------------------------|-----------|
| <b>1.0</b> | <b>INTRODUCTION .....</b>                                                             | <b>3</b>  |
| 1.1        | Background .....                                                                      | 3         |
| 1.2        | Site Description .....                                                                | 3         |
| 1.3        | Scope of study.....                                                                   | 3         |
| 1.4        | Relevant Legislation .....                                                            | 4         |
| 1.4.1      | Conservation of Habitats and Species Regulations 2017 .....                           | 4         |
| 1.4.2      | Wildlife & Countryside Act 1981.....                                                  | 4         |
| 1.4.3      | Environment (Wales) Act 2016.....                                                     | 4         |
| <b>2.0</b> | <b>METHODOLOGY .....</b>                                                              | <b>6</b>  |
| 2.1        | Desk Study .....                                                                      | 6         |
| 2.2        | Field Survey Methodology and Rationale .....                                          | 6         |
| 2.2.1      | Survey Area .....                                                                     | 6         |
| 2.2.2      | Habitat Appraisal for Potential Bat Roost Features & Assessment of Habitat Risk ..... | 6         |
| 2.2.3      | Activity Survey – Static Bat Detector Survey 2019 .....                               | 6         |
| 2.2.4      | Activity Survey – Static Bat Detector Survey 2020 .....                               | 6         |
| 2.2.5      | Activity Survey – Automated Static Surveys at Height .....                            | 10        |
| 2.2.6      | Activity Survey – Walked Transect and Vantage Point Surveys .....                     | 10        |
| 2.3        | Bat Sonogram Analysis.....                                                            | 10        |
| 2.4        | Survey Personnel .....                                                                | 11        |
| 2.5        | Assessment of Relative Bat Activity Levels.....                                       | 12        |
| 2.6        | Survey Limitations.....                                                               | 12        |
| 2.6.1      | Equipment Limitations .....                                                           | 12        |
| 2.6.2      | Weather Limitations.....                                                              | 13        |
| 2.6.3      | General Limitations .....                                                             | 13        |
| <b>3.0</b> | <b>RESULTS .....</b>                                                                  | <b>14</b> |
| 3.1        | Desk Study .....                                                                      | 14        |
| 3.1.1      | Designated Sites .....                                                                | 14        |
| 3.1.2      | Pre-existing Records.....                                                             | 14        |
| 3.2        | Field Surveys .....                                                                   | 14        |
| 3.2.1      | Habitat Assessment.....                                                               | 14        |
| 3.2.2      | Activity Surveys – Static Bat Detector Survey – All Species.....                      | 14        |
| <b>4.0</b> | <b>DISCUSSION AND CONCLUSIONS.....</b>                                                | <b>23</b> |

|       |                                                                             |    |
|-------|-----------------------------------------------------------------------------|----|
| 4.1   | Habitat Assessment .....                                                    | 23 |
| 4.2   | Overview of Bat Activity .....                                              | 23 |
| 4.3   | Spatial Distribution of Bat Activity .....                                  | 23 |
| 4.4   | Temporal Distribution of Bat Activity .....                                 | 23 |
| 4.5   | ‘High Collision Risk’ and ‘High Population Vulnerability’ Bat Species ..... | 23 |
| 4.5.1 | Bat Activity Relative to Other Sites .....                                  | 24 |

## DOCUMENT REFERENCES

### TABLES

|                                                                                           |    |
|-------------------------------------------------------------------------------------------|----|
| Table 2-1: Static Bat Detector Locations .....                                            | 6  |
| Table 2-2: Survey Dates and Weather Conditions .....                                      | 9  |
| Table 3-1: Summary of Results per Season .....                                            | 14 |
| Table 3-2: Summary of Results per Sample Location across all Seasons .....                | 14 |
| Table 3-3: Summary of Results per Season across all Sample Locations .....                | 17 |
| Table 3-4: Summary of Ecobat Outputs, by Detector, Compared with Sites Within 100km ..... | 19 |

### FIGURES

Figure 7-3b: Anabat Location Plan

### APPENDICES

Appendix 1: Criteria for Assessing Habitat Risk for Bats

Appendix 2: Collision Risk, Relative Abundance and Overall Population Vulnerability of Bat Species in Wales

## 1.0 Introduction

### 1.1 Background

This report has been prepared by SLR Consulting Limited (SLR) on behalf of RWE Renewables Ltd and discusses the findings of bat activity surveys undertaken at Pen March, a proposed wind farm, hereafter referred to as the Site, broadly centred on National Grid Reference (NGR) SO 08654 10182.

SLR undertook baseline bat activity surveys at the Site during the period May to October 2019. At the time the proposals included 5 turbine locations. Following completion of the 2019 surveys, the scale of wind farm development being considered increased to seven turbines. As such, in order to ensure the baseline data complied with current guidance and best practise, additional survey has been completed in 2020 on the basis of seven turbine locations.

The results of the 2020 surveys are detailed in this report and should be read in conjunction with the 2019 bat survey report for context (SLR, January 2020).

### 1.2 Site Description

The Site centre is located approximately 1km north-east of the suburb of Dowlais Top on the north-eastern fringe of Merthyr Tydfil and 2km north-west of the centre of Rhymney village. The Site is immediately north of the A465 Heads of the Valleys Road. The survey area comprises a broadly sloping area of purple moor grass *Molinia caerulea* dominated grassland, with small, scattered areas of dense scrub, exposed rock, heath, modified bog and standing open water habitats. The survey area rises from approximately 370m above sea level at the southern extent of the survey area (adjacent to the A465 road) up to approximately 530m in the north of the survey area.

The wider landscape around the survey area is typified by grazed moorland habitats, with frequent scattered areas of industrial and residential development to the south, south-east and south-west of the survey area and the Bannau Brycheiniog National Park lying to the north of the survey area.

### 1.3 Scope of study

The aims of the surveys were to:

- determine the bat assemblage using the site, the level of bat activity and its spatial and temporal distribution, identify any key commuting or foraging habitat features, and identify any roosts which could potentially be affected by the proposed development; and
- provide baseline data to inform the wind farm design process, inform the Environmental Impact Assessment (EIA), and identify the need for any mitigation and compensation measures (if required).

The survey methodology was designed in accordance with wind farm specific guidelines in place at the time of survey<sup>1</sup>, published in January 2019.

---

<sup>1</sup> Scottish Natural Heritage, Natural England, Natural Resources Wales, RenewableUK, Scottish Power Renewables, Ecotricity Ltd, University of Exeter & Bat Conservation Trust (2019) Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation. Available online at: <https://www.nature.scot/sites/default/files/2019-01/Bats%20and%20onshore%20wind%20turbines%20-%20survey%2C%20assessment%20and%20mitigation.pdf> [Last Accessed November 2019]

This report presents the findings of the 2020 bat activity surveys only. 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 within a separate Environmental Statement.

This report refers to the 'Site', which relates to the area within the red line shown on Figure 7-3b, and 'Survey Area', which refers to the area within which turbines may be located plus a buffer zone of 250m.

## 1.4 Relevant Legislation

### 1.4.1 Conservation of Habitats and Species Regulations 2017

The Conservation of Habitats and Species Regulations 2017 (the Habitats Regulations) (as amended) transpose Council Directive 92/43/EEC on the Conservation of Natural Habitats and Wild Flora and Fauna (Habitats Directive) into law in England and Wales, making it an offence to deliberately capture, kill or disturb wild animals listed under Schedule 2 of the Regulations. It is also an offence to damage or destroy a breeding site or resting place of such an animal (even if the animal is not present at the time). All UK bat species are included on Schedule 2 of the Regulations.

### 1.4.2 Wildlife & Countryside Act 1981

The Wildlife and Countryside Act 1981, as amended by the Countryside and Rights of Way Act (CROW) 2000 and the Natural Environment and Rural Communities Act (NERC) 2006, consolidates and amends existing national legislation to implement the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) and Council Directive 79/409/EEC on the Conservation of Wild Birds (Birds Directive), making it an offence to:

- Intentionally kill, injure or take any wild animal listed under Schedule 5 to the Act;
- intentionally or recklessly damage, destroy or obstruct any place used for shelter or protection by any wild animal listed under Schedule 5 to the Act; and
- intentionally or recklessly disturb certain Schedule 5 animal species while they occupy a place used for shelter or protection.

All UK bat species are included on Schedule 5 of the Act.

### 1.4.3 Environment (Wales) Act 2016

The Environment (Wales) Act 2016 puts in place the legislation needed to plan and manage Wales' natural resources in a more proactive, sustainable and joined-up way. Part 1 Section 6 of the Act requires public authorities to seek to maintain and enhance biodiversity in the exercise of their functions and in so doing promote the resilience of ecosystems. Section 7 of the Act lists living organisms and types of habitat in Wales, considered to be of key significance to sustain and improve biodiversity in relation to Wales.

Seven bat species are included on the Section 7 list:

- Bechstein's bat *Myotis bechsteinii*;
- noctule *Nyctalus noctule*;
- common pipistrelle *Pipistrellus pipistrellus*;
- soprano pipistrelle *Pipistrellus pygmaeus*;
- brown long-eared bat *Plecotus auritus*;

- 
- greater horseshoe bat *Rhinolophus ferrumequinum*; and
  - lesser horseshoe bat *Rhinolophus hipposideros*.

## 2.0 Methodology

### 2.1 Desk Study

This report sets out the results of update field survey only.

### 2.2 Field Survey Methodology and Rationale

The field survey methodology was designed with reference to wind farm specific guidelines in place at the time of survey<sup>1</sup>. Where the methodology deviated from the guidelines, a rationale has been provided.

#### 2.2.1 Survey Area

The survey area was designed to take into account the survey requirements set out in the current guidelines<sup>1</sup>. The guidelines require surveys to cover the area within which turbines are likely to be located and a buffer zone of at least 200m plus rotor radius.

#### 2.2.2 Activity Survey – Static Bat Detector Survey 2020

Seven static full spectrum bat detectors (Anabat Swift, Titley Scientific) were deployed in spring (late May), summer (early August) and autumn (September) 2020, to record bat activity over a period of 10 nights per season. In practice a minimum of 15 nights deployment was adopted to enable potentially nights in which weather conditions were unsuitable for bat activity to be discounted from the analysis.

The locations of each static detector are shown in Table 2-1 and Figure 7-3b. Detectors were deployed approximately 0.75m above ground level with the microphone facing at an outwards angle and programmed to record from half an hour before sunset until half an hour after sunrise on each night.

During the recording sessions all locations were determined with a hand-held GPS within the field based on the pre-determined grid references shown in Table 2-1, it is therefore possible that minor variations in the positioning of the detector occurred between recording periods.

**Table 2-1: Static Bat Detector Locations**

| Anabat Location and Co-ordinates (Lat, Long) | Photograph – Detector                                                                |
|----------------------------------------------|--------------------------------------------------------------------------------------|
| A1<br>308698,<br>210860                      |  |

| Anabat Location and Co-ordinates (Lat, Long)           | Photograph – Detector                                                                                                                                                                                                                           |
|--------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>A2<br/>           308888,<br/>           210558</p> |  <p>A photograph showing a wooden stake with an Anabat detector attached, standing in a grassy field with a rocky area in the background.</p>                 |
| <p>A3<br/>           308292,<br/>           210853</p> |  <p>A photograph showing a wooden stake with an Anabat detector attached, standing in a grassy field with a distant landscape visible in the background.</p> |
| <p>A4<br/>           308299,<br/>           210437</p> |  <p>A photograph showing a wooden stake with an Anabat detector attached, standing in a grassy field.</p>                                                   |

| Anabat Location and Co-ordinates (Lat, Long) | Photograph – Detector                                                                |
|----------------------------------------------|--------------------------------------------------------------------------------------|
| <p>A5<br/>308491,<br/>210232</p>             |    |
| <p>A6<br/>307861,<br/>210799</p>             |   |
| <p>A7<br/>309181,<br/>211250</p>             |  |

## Weather Data and Survey Dates

The guidelines<sup>1</sup> state that 10 nights of data per season should be collected, within appropriate weather conditions, specifically with a dusk temperature of 10°C or above, 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 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 minimum period of 15 nights during each season to maximise the chances of obtaining 10 nights of data during optimal weather conditions. Despite this, in practice it was not possible to obtain 10 nights of data in optimal weather conditions during all survey periods and where necessary the 10 nights with the best weather conditions during each period (including all nights meeting the criteria set out in the guidelines<sup>1</sup>) were selected to include within the bat activity analysis.

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 (°C) | Nightly average wind speed (m/s) | Daily rainfall (mm) |
|----------------------------------------------------------------------------------------------------------------------------------|------------------|----------------------------|----------------------------------|---------------------|
| <b>Spring session - deployment period: 15<sup>th</sup> - 31<sup>st</sup> May 2020</b><br>Sample locations: 1, 2, 3, 4, 5, 6, 7   |                  |                            |                                  |                     |
| 15 <sup>th</sup> May 2020                                                                                                        | 21:00 – 05:18    | 10                         | 0                                | 0                   |
| 16 <sup>th</sup> May 2020                                                                                                        | 21:02 – 05:16    | 12                         | 0.6                              | 0                   |
| 17 <sup>th</sup> May 2020                                                                                                        | 21:03 – 05:15    | 13                         | 0                                | 0                   |
| 18 <sup>th</sup> May 2020                                                                                                        | 21:05 – 05:14    | 14                         | 3.3                              | 0                   |
| 19 <sup>th</sup> May 2020                                                                                                        | 21:06 – 05:12    | 15                         | 0                                | 0                   |
| 20 <sup>th</sup> May 2020                                                                                                        | 21:08 – 05:11    | 16                         | 1.4                              | 0                   |
| 21 <sup>st</sup> May 2020                                                                                                        | 21:09 – 05:10    | 18                         | 0                                | 0                   |
| 22 <sup>nd</sup> May 2020                                                                                                        | 21:10 – 05:09    | 12                         | 2.9                              | 2.3                 |
| 23 <sup>rd</sup> May 2020                                                                                                        | 21:12 – 05:08    | 12                         | 1.4                              | 3.6                 |
| 24 <sup>th</sup> May 2020                                                                                                        | 21:13 – 05:06    | 12                         | 1.4                              | 3.6                 |
| <b>Summer session - deployment period: 2<sup>nd</sup> – 19<sup>th</sup> August 2020</b><br>Sample locations: 1, 2, 3, 4, 5, 6, 7 |                  |                            |                                  |                     |
| 9 <sup>th</sup> August 2020                                                                                                      | 21:02 – 05:37    | 18                         | 0                                | 0                   |
| 10 <sup>th</sup> August 2020                                                                                                     | 21:01 – 05:38    | 21                         | 0                                | 0                   |
| 11 <sup>th</sup> August 2020                                                                                                     | 20:59 – 05:40    | 23                         | 0                                | 0                   |
| 12 <sup>th</sup> August 2020                                                                                                     | 20:57 – 05:41    | 21                         | 0.6                              | 6.3                 |
| 13 <sup>th</sup> August 2020                                                                                                     | 20:56 – 05:43    | 20                         | 0.4                              | 5.6                 |
| 14 <sup>th</sup> August 2020                                                                                                     | 20:54 – 05:45    | 18                         | 0                                | 7.6                 |

| Survey nights used for analysis                                                                                                              | Sunset - Sunrise | Temperature at sunset (°C) | Nightly average wind speed (m/s) | Daily rainfall (mm) |
|----------------------------------------------------------------------------------------------------------------------------------------------|------------------|----------------------------|----------------------------------|---------------------|
| 15 <sup>th</sup> August 2020                                                                                                                 | 20:52 – 05:46    | 17                         | 0.5                              | 0                   |
| 16 <sup>th</sup> August 2020                                                                                                                 | 20:45 – 05:52    | 17                         | 0                                | <b>10.9</b>         |
| 17 <sup>th</sup> August 2020                                                                                                                 | 20:43 – 05:54    | 17                         | 0                                | 1                   |
| 18 <sup>th</sup> August 2020                                                                                                                 | 20:41 – 05:56    | 19                         | 0                                | 3.3                 |
| <b>Autumn session - deployment period: 17<sup>th</sup> September to 5<sup>th</sup> October 2020</b><br>Sample locations: 1, 2, 3, 4, 5, 6, 7 |                  |                            |                                  |                     |
| 17 <sup>th</sup> September 2020                                                                                                              | 18:44 – 07:20    | 18                         | 0                                | 0                   |
| 18 <sup>th</sup> September 2020                                                                                                              | 18:42 – 07:21    | 18                         | 1.9                              | 0                   |
| 19 <sup>th</sup> September 2020                                                                                                              | 18:40 – 07:23    | 18                         | 0                                | 0.6                 |
| 20 <sup>th</sup> September 2020                                                                                                              | 18:38 – 07:25    | 19                         | 0.6                              | 0                   |
| 21 <sup>st</sup> September 2020                                                                                                              | 18:35 – 07:26    | 20                         | 0                                | 0                   |
| 22 <sup>nd</sup> September 2020                                                                                                              | 18:33 – 07:28    | 17                         | 0                                | 0                   |
| 23 <sup>rd</sup> September 2020                                                                                                              | 18:31 – 07:30    | 12                         | 0.6                              | 0.3                 |
| 24 <sup>th</sup> September 2020                                                                                                              | 18:29 – 07:31    | 10                         | 0.3                              | 3                   |
| 25 <sup>th</sup> September 2020                                                                                                              | 18:26 – 07:33    | 12                         | 1.4                              | 0                   |
| 26 <sup>th</sup> September 2020                                                                                                              | 18:24 – 07:35    | 12                         | 0                                | 0                   |

Weather data was obtained from a weather station at Abergavenny <https://www.metoffice.gov.uk/>.

### 2.2.3 Activity Survey – Automated Static Surveys at Height

No at-height bat detector surveys were undertaken. Excluding at-height surveys is considered to be appropriate in this situation, as none of the turbine locations are situated within woodland, and the guidelines<sup>1</sup> state that except in woodland monitoring at height is unlikely to detect the presence of any species not already recorded using detectors at ground level. There is also no supporting evidence (i.e. from the desk study or the bat habitat assessment) that suggests a high level of bat activity is likely and therefore surveys at height cannot be justified.

### 2.2.4 Activity Survey – Walked Transect and Vantage Point Surveys

The guidelines<sup>1</sup> state that walked transect or vantage point surveys can be used to complement the information gained from static detectors and other sources, but their applicability is discretionary and site-specific.

The site was scoped as likely to be of low value to bats (see Section 3.2.1). No potential roost habitat was identified and no features or areas of high habitat connectivity which are likely to be important commuting routes were identified within the survey area. It is therefore considered that sufficient data to assess the possible impacts of the proposals upon bats has been gathered through the static detector sampling, and that walked transect or vantage point surveys would be unlikely to provide important additional information. In addition, it is noted that walked activity transect surveys were not appropriate for health and safety reasons, i.e. risks associated with walking across boggy and uneven ground on a remote site, in the dark.

## 2.3 Bat Sonogram Analysis

Bat calls were analysed using Analook Insight (*version 1.9.6-0-g81d15cb*) software. Bat Classify, an auto identification filter within Analook Insight, was used to remove noise files and filter by species. Due to the

relatively small data set involved, it was also possible to manually check all files to confirm identification, using call parameters within Russ (2012)<sup>3</sup>. Files assigned by the filter as being noise were also checked manually, to ensure no faint calls were missed.

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 necessarily relate to the number of bats present in one location (as one bat may make several passes); but rather gives an indication of the level of bat activity in that location over each recording period.

*Nyctalus* and *Eptesicus* calls can easily be misclassified; particularly those of Leisler’s bat *N. leisleri* and Serotine *E. serotinus*. Vaughan *et al.* (1997)<sup>4</sup> found that both noctule and Leisler’s use calls of two types that alternate in frequency, whereas serotine uses only one type. They found that noctules use calls with the longest duration and interpulse interval and the lowest peak frequency (in their study the mean was 20 kHz) and that serotine uses calls of the shortest duration and interpulse interval and the highest peak frequency (in their study the mean was 30 kHz) and that calls of Leisler’s bats are intermediate. Calls were therefore identified as noctule if there were two types of call of alternating frequency and the peak was below 21 kHz. Calls were only identified as Leisler’s bat if there were calls of alternating frequency but the peak frequency was above 24 kHz. Serotine bats calls were identified if they were of only one type that peaked between 24 and 32 kHz. Calls with a peak frequency below 35 kHz showing some but not all the characteristics of a particular species were identified as *Nyctalus/Eptesicus* sp.

Pipistrelle calls were distinguished from each other following set parameters. Common pipistrelle calls were defined as calls between 40 and 50kHz, pipistrelle calls above 50kHz were classified as soprano pipistrelle, and those below 40kHz were classified as Nathusius’ pipistrelle *Pipistrellus nathusii*.

Due to the similarity and overlap between Myotis bat calls, and recognised difficulties/inaccuracies in determining individual species using bat detectors alone, this species grouping is reported collectively.

Equally, the genus *Plecotus* is reported collectively, although in reality these will almost certainly relate to brown long-eared bat *Plecotus auritus*.

## 2.4 Survey Personnel

The initial assessment of habitat suitability for foraging bats at the Site was undertaken by Chris Mitchell BSc CEcol CEnv MCIEEM on the 16<sup>th</sup> May 2019 when detectors were first deployed. Mr Mitchell is an experienced bat surveyor (current Natural Resources Wales licence number 78305:OTH:CSAB:2018).

Further assessment of bat roost and habitat potential was undertaken by Robert Williams BSc MSc ACIEEM in conjunction with vegetation surveys between 10<sup>th</sup> and 11<sup>th</sup> July 2019. Robert is an experienced ecologist with over eight years professional experience and has previously worked on a number of different wind farm developments.

Bat call analysis was undertaken by Rebecca Rooney GradCIEEM BSc, a Project Ecologist with SLR with extensive experience of bat call analysis. A quality assurance review of a sample (approximately 30%) of the analysed data was undertaken by Daniella Imbimbo, a Senior Field Ecologist at SLR.

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

<sup>4</sup> Nancy Vaughan., Gareth Jones and Stephen Harris (Jun., 1997). Habitat Use by Bats (Chiroptera) Assessed by Means of a Broad-Band Acoustic Method. *Journal of Applied Ecology* Vol. 34, No. 3), pp. 716-730.

## 2.5 Assessment of Relative Bat Activity Levels

In accordance with the guidelines<sup>1</sup>, the relative level of bat activity recorded during the static detector surveys was analysed through the use of the secure online tool *Ecobat*<sup>5</sup>, initially designed by the University of Exeter and now hosted and developed by the Mammal Society<sup>6</sup>. *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 region 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 100km of the survey location.

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 80<sup>th</sup> 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<sup>1</sup> define bat activity levels on a particular night as:

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

## 2.6 Survey Limitations

### 2.6.1 Equipment Limitations

During each deployment, detectors were attached to wooden stakes at locations determined with hand-held GPS units and a photographic record taken to assist with recovery of the detector at the end of the recording period. Due to the upland nature of the site, there are no features to secure equipment too i.e. fences or gates, to minimise the risk of damage, which resulted in a number of occasions whereby grazing animals had knocked over stakes and/or broken the detector microphones, meaning that they did not accurately record for the full amount of time. This was particularly a problem in May, whereby three of the detectors did not successfully record for the minimum of 10 nights, these included:

- A1 – 7 nights of successful recordings;

---

<sup>5</sup> <http://www.mammal.org.uk/science-research/ecostat/>

<sup>6</sup> Lintott, P. R., Davison, S., Breda, J., Kubasiewicz, L., Dowse, D., Daisley, J. & Mathews, F. (2018). *Ecobat*: An online resource to facilitate transparent, evidence-based interpretation of bat activity data. *Ecology and Evolution* 8(2): 935-941.

- A6 – 4 nights of successful recordings; and
- A7 – 8 nights of successful recordings.

The available nights have been used in the analysis, and the smaller data set is considered in the results and discussion sections of this report. Considering this, the previous years' data collection and the extent of data collected in 2020, this is not thought to have a significant negative effect on the outcomes presented.

In August, Anabats at locations 2 and 3 were found with their mounting stake knocked over, so that the microphone was laying on the ground. Despite this, the detectors still recorded sound and bats until the day that they were collected, with no obvious change in bat levels. It is not possible to find out when they were knocked over, but as bats were still recorded it is not thought to have a significant affect on the overall data and results.

### 2.6.2 Weather Limitations

A site weather station was deployed in May 2020 although it was damaged beyond use, following previous issues in 2019 with equipment damage and theft this was not redeployed and a local weather station data set reviewed as set out above.

Overall, given the location of the site and habitats present, it is concluded that sufficient bat data has been collected in suitable conditions so as to be able to assess the potential impacts of the proposed development upon bats.

### 2.6.3 General Limitations

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.

Following completion of the 2020 bat activity surveys, further refinement of the proposed turbine locations has been undertaken as part of the detailed design process to minimise potential environmental effects. As a result, the seven bat detector locations selected in 2020, to reflect the then proposed turbine locations, differ to the locations where turbines are now proposed. The guidelines identify that where turbine locations are not known, that the range of site habitats should be sampled. As this has been achieved during 2019 and 2020, with consistent results, this is not considered a significant limitation.

Whilst there are identified limitations, it is considered unlikely that any significant activity by additional bat species has been overlooked or likely to occur at the site. However, 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. 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 Field Surveys

#### 3.1.1 Habitat Assessment

##### Habitat Risk Assessment

The habitats at the site are considered to represent low habitat risk for bats, according to criteria presented in the guidelines<sup>7</sup> and reproduced in Appendix 1. The survey area is dominated by marshy grassland, heath and modified bog<sup>7</sup>, with areas of semi-improved acid grassland and semi-improved neutral grassland also present where grazing pressure is particularly high. Rock exposure, dry heath, running water and standing open water are also present but not a major component of the habitats present, whilst mixed plantation woodland, fen-basin mire and acid flush habitats are all rare and each only occurs in one location. These represent low quality habitat for foraging/commuting bats.

There is also a lack of potential roosting habitat within the survey area (see above) and the survey area is relatively isolated and not connected to the wider landscape by prominent linear features.

#### 3.1.2 Activity Surveys – Static Bat Detector Survey – All Species

##### Spatial Distribution

The results of the remote detector surveys for all species and detector locations are summarised in Table 3-2 which shows the total number of bat passes recorded at each of the sample locations, as well as the median and mean bat passes per night. The data are skewed (i.e. not normally distributed), due to most nights recording nil bat passes. Therefore, in accordance with the guidelines<sup>1</sup> the median bat passes per night (rather than mean) is the more representative statistic in this situation (although both have been reported for information).

Bat records for at least six species were recorded on the site, including common pipistrelle, soprano pipistrelle, Myotis bat species (*Myotis sp*), serotine, noctule, long-eared species (*Plecotus sp*) and 'big bats', (*Nyctalus/Eptesicus*) species, where it was not possible to distinguish between *Nyctalus* and *Eptesicus* species. It is worth noting that this is a minimum number of species as the Myotis grouping may include more than one species of bat.

Table 3-2 shows the levels of bat activity recorded per sample location across all seasons. The number of nights used in the analysis is given together with total bat passes, maximum bat passes per night, and average number of bat passes per night given as both a median and mean value. This allows direct comparison of levels of bat activity across the site despite varying levels of recording nights. The majority of the median values are very low or nil, this shows that the data is skewed and that in the case of a nil average more than half of the recording nights recorded none of the particular bat species.

**Table 3-1: Summary of Results per Sample Location across all Seasons**

| Bat Species | Survey nights included within analysis | Detector Location | Total bat passes | Maximum bat activity (bat passes per night) <sup>a</sup> | Median bat passes per night | Mean bat passes per night |
|-------------|----------------------------------------|-------------------|------------------|----------------------------------------------------------|-----------------------------|---------------------------|
|             | 27                                     | 1                 | 64               | 16                                                       | 1.00                        | 2.37                      |

<sup>7</sup> SLR Consulting Ltd. 2019. Pen March Phase 1 Habitat Survey Report, December 2019.

| Bat Species            | Survey nights included within analysis | Detector Location | Total bat passes | Maximum bat activity (bat passes per night) <sup>a</sup> | Median bat passes per night | Mean bat passes per night |
|------------------------|----------------------------------------|-------------------|------------------|----------------------------------------------------------|-----------------------------|---------------------------|
| Common Pipistrelle     | 30                                     | 2                 | 99               | 42                                                       | 0.00                        | 3.30                      |
|                        | 30                                     | 3                 | 9                | 4                                                        | 0.00                        | 0.30                      |
|                        | 30                                     | 4                 | 73               | 22                                                       | 0.00                        | 2.43                      |
|                        | 30                                     | 5                 | 38               | 17                                                       | 0.00                        | 1.27                      |
|                        | 24                                     | 6                 | 29               | 10                                                       | 0.00                        | 1.21                      |
|                        | 28                                     | 7                 | 49               | 8                                                        | 0.00                        | 1.75                      |
| Soprano Pipistrelle    | 27                                     | 1                 | 11               | 5                                                        | 0.00                        | 0.41                      |
|                        | 30                                     | 2                 | 7                | 3                                                        | 0.00                        | 0.23                      |
|                        | 30                                     | 3                 | 4                | 1                                                        | 0.00                        | 0.13                      |
|                        | 30                                     | 4                 | 12               | 3                                                        | 0.00                        | 0.40                      |
|                        | 30                                     | 5                 | 5                | 4                                                        | 0.00                        | 0.17                      |
|                        | 24                                     | 6                 | 6                | 3                                                        | 0.00                        | 0.25                      |
|                        | 28                                     | 7                 | 12               | 3                                                        | 0.00                        | 0.43                      |
| Myotis sp.             | 27                                     | 1                 | 9                | 3                                                        | 0.00                        | 0.33                      |
|                        | 30                                     | 2                 | 18               | 6                                                        | 0.00                        | 0.60                      |
|                        | 30                                     | 3                 | 8                | 2                                                        | 0.00                        | 0.27                      |
|                        | 30                                     | 4                 | 3                | 1                                                        | 0.00                        | 0.10                      |
|                        | 30                                     | 5                 | 1                | 1                                                        | 0.00                        | 0.03                      |
|                        | 24                                     | 6                 | 28               | 10                                                       | 0.00                        | 1.17                      |
|                        | 28                                     | 7                 | 32               | 15                                                       | 0.00                        | 1.14                      |
| Long Eared sp.         | 27                                     | 1                 | 2                | 1                                                        | 0.00                        | 0.07                      |
|                        | 30                                     | 2                 | 0                | 0                                                        | 0.00                        | 0.00                      |
|                        | 30                                     | 3                 | 2                | 1                                                        | 0.00                        | 0.07                      |
|                        | 30                                     | 4                 | 1                | 1                                                        | 0.00                        | 0.03                      |
|                        | 30                                     | 5                 | 0                | 0                                                        | 0.00                        | 0.00                      |
|                        | 24                                     | 6                 | 0                | 0                                                        | 0.00                        | 0.00                      |
|                        | 28                                     | 7                 | 1                | 1                                                        | 0.00                        | 0.04                      |
| Noctule                | 27                                     | 1                 | 10               | 6                                                        | 0.00                        | 0.37                      |
|                        | 30                                     | 2                 | 5                | 3                                                        | 0.00                        | 0.17                      |
|                        | 30                                     | 3                 | 0                | 0                                                        | 0.00                        | 0.00                      |
|                        | 30                                     | 4                 | 5                | 2                                                        | 0.00                        | 0.17                      |
|                        | 30                                     | 5                 | 0                | 0                                                        | 0.00                        | 0.00                      |
|                        | 24                                     | 6                 | 3                | 2                                                        | 0.00                        | 0.13                      |
|                        | 28                                     | 7                 | 7                | 3                                                        | 0.00                        | 0.25                      |
| Nyctalus/Eptesicus sp. | 27                                     | 1                 | 2                | 1                                                        | 0.00                        | 0.07                      |
|                        | 30                                     | 2                 | 3                | 2                                                        | 0.00                        | 0.10                      |
|                        | 30                                     | 3                 | 0                | 0                                                        | 0.00                        | 0.00                      |
|                        | 30                                     | 4                 | 1                | 1                                                        | 0.00                        | 0.03                      |
|                        | 30                                     | 5                 | 4                | 4                                                        | 0.00                        | 0.13                      |
|                        | 24                                     | 6                 | 3                | 1                                                        | 0.00                        | 0.13                      |
|                        | 28                                     | 7                 | 1                | 1                                                        | 0.00                        | 0.04                      |
| Serotine               | 27                                     | 1                 | 0                | 0                                                        | 0.00                        | 0.00                      |
|                        | 30                                     | 2                 | 1                | 1                                                        | 0.00                        | 0.03                      |
|                        | 30                                     | 3                 | 0                | 0                                                        | 0.00                        | 0.00                      |
|                        | 30                                     | 4                 | 0                | 0                                                        | 0.00                        | 0.00                      |

| Bat Species | Survey nights included within analysis | Detector Location | Total bat passes | Maximum bat activity (bat passes per night) <sup>a</sup> | Median bat passes per night | Mean bat passes per night |
|-------------|----------------------------------------|-------------------|------------------|----------------------------------------------------------|-----------------------------|---------------------------|
|             | 30                                     | 5                 | 0                | 0                                                        | 0.00                        | 0.00                      |
|             | 24                                     | 6                 | 1                | 1                                                        | 0.00                        | 0.04                      |
|             | 28                                     | 7                 | 0                | 0                                                        | 0.00                        | 0.00                      |

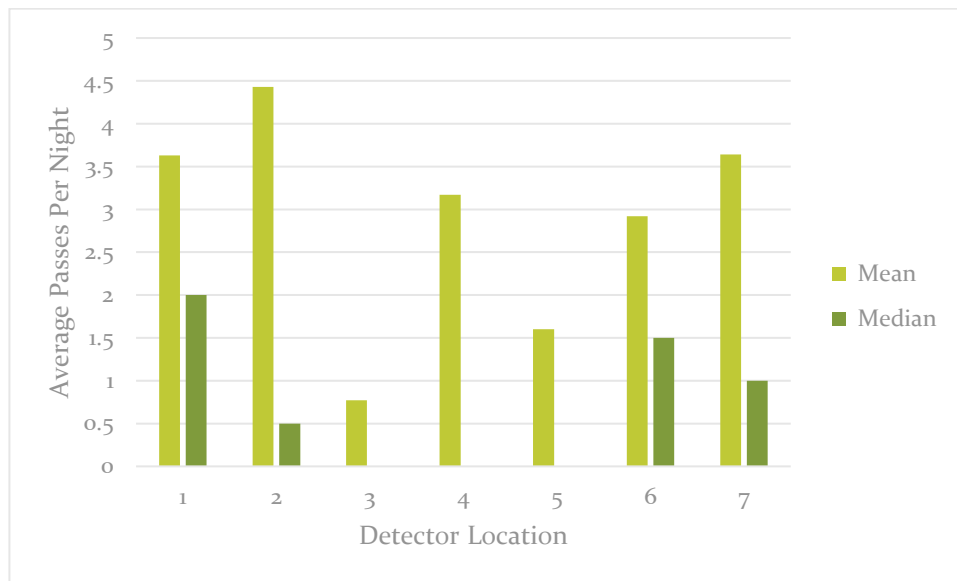
*a = highest number of bat passes recorded on any one night.*

Table 3-2 shows that a total of 569 bat passes from those species were recorded by the seven static detectors over a total of 3 deployments during spring, summer and autumn 2020. The maximum number of passes of per species in a single night were at any one detector location were as follows:

- Common pipistrelle – 42 (18/08/2020)
- Soprano pipistrelle – 5 (26/09/2020)
- Myotis sp. – 15 (21/05/2020)
- Long eared sp. – 1 (Multiple occasions)
- Noctule – 6 (11/08/2020)
- Nyctalus/ Eptesicus sp. – 4 (21/05/2020)
- Serotine – 1 (13/08/2020 & 17/09/2020)

This shows that for the majority of species recorded there were no nights with a substantially high levels of activity at any one detector. There is a slightly higher level of activity for common pipistrelle on the 18<sup>th</sup> August 2020. This was recorded at detector location 2.

Figure 3-1 shows the average number of bat passes (all species combined) per location across all seasons. This shows that levels of bat activity were lowest at detector location 3. The bat activity levels were most consistently high at detector 1, however this amounted to between 2 and 3.6 passes per night on average. In fact, none of the median values for each detector were above 2 passes per night. When looking at the mean values (which are a less reliable indicator of overall levels when the data is skewed, as it is here) detector locations 1, 2, 4 and 7 record an average of over 3 passes per night, but all less than 5. The median values are lower because there are anomalies in the data set, such as the night of the 18<sup>th</sup> August 2020, where a much higher level of common pipistrelle activity (42 passes) was recorded.



**Figure 3-1 Average Bat Activity (all species combined) Per Location**

### Temporal Distribution

A summary of the results per survey season is provided in Table 3-3, to illustrate any seasonal variation. This shows again that bat activity across the seasons was low, with all of the medians, except for one, indicating an average on nil passes of each species per night. The exception being the summer deployment, where common pipistrelle activity is slightly higher, but only amounting to a median value of 1 (average passes per night), the mean score is 3.39 showing that there are anomalies to this where bat common pipistrelle activity was much high i.e 18<sup>th</sup> August where there were 42 passes of common pipistrelle.

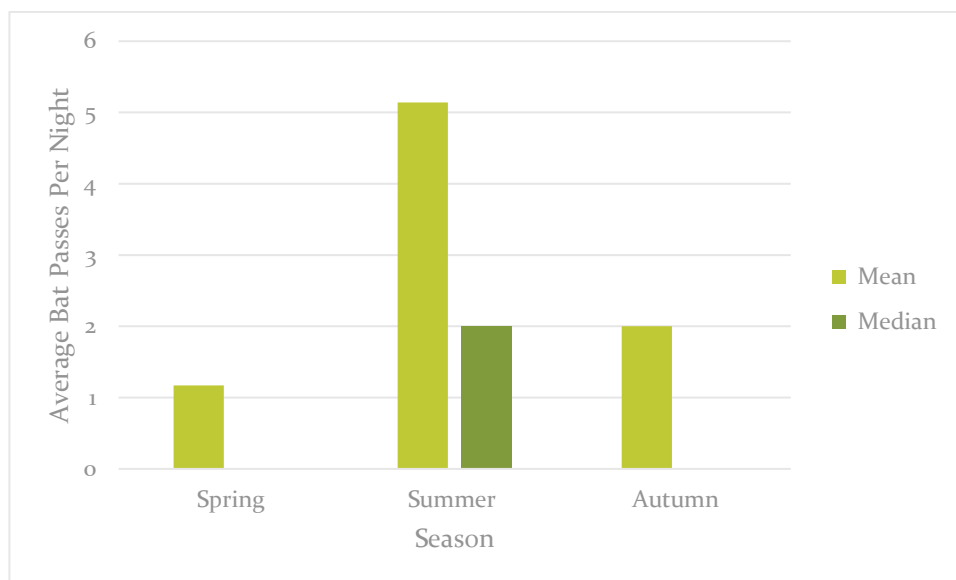
**Table 3-2: Summary of Results per Season across all Sample Locations**

| Season | Survey nights included within analysis | Bat species               | Total bat passes: | Maximum bat activity (bat passes per night) <sup>a</sup> | Median bat passes per night | Mean bat passes per night |
|--------|----------------------------------------|---------------------------|-------------------|----------------------------------------------------------|-----------------------------|---------------------------|
| Spring |                                        | Common Pipistrelle        | 32                | 7                                                        | 0                           | 0.54                      |
|        |                                        | Soprano Pipistrelle       | 4                 | 2                                                        | 0                           | 0.07                      |
|        |                                        | <i>Myotis</i> sp.         | 29                | 15                                                       | 0                           | 0.49                      |
|        |                                        | Long-eared sp.            | 0                 | 0                                                        | 0                           | 0                         |
|        |                                        | Noctule                   | 0                 | 0                                                        | 0                           | 0                         |
|        |                                        | <i>Nyctalus/Eptesicus</i> | 4                 | 0                                                        | 0                           | 0.07                      |
|        |                                        | Serotine                  | 0                 | 0                                                        | 0                           | 0                         |
| Summer |                                        | Common Pipistrelle        | 237               | 42                                                       | 1                           | 3.39                      |
|        |                                        | Soprano Pipistrelle       | 27                | 3                                                        | 0                           | 0.39                      |
|        |                                        | <i>Myotis</i> sp.         | 54                | 10                                                       | 0                           | 0.77                      |
|        |                                        | Long-eared sp.            | 2                 | 1                                                        | 0                           | 0.03                      |
|        |                                        | Noctule                   | 30                | 6                                                        | 0                           | 0.43                      |
|        |                                        | <i>Nyctalus/Eptesicus</i> | 9                 | 2                                                        | 0                           | 0.13                      |
|        |                                        | Serotine                  | 1                 | 1                                                        | 0                           | 0.01                      |
| Autumn |                                        | Common Pipistrelle        | 92                | 17                                                       | 0                           | 1.31                      |
|        |                                        | Soprano Pipistrelle       | 26                | 5                                                        | 0                           | 0.37                      |

| Season | Survey nights included within analysis | Bat species               | Total bat passes: | Maximum bat activity (bat passes per night) <sup>a</sup> | Median bat passes per night | Mean bat passes per night |
|--------|----------------------------------------|---------------------------|-------------------|----------------------------------------------------------|-----------------------------|---------------------------|
|        |                                        | <i>Myotis</i> sp.         | 16                | 3                                                        | 0                           | 0.23                      |
|        |                                        | Long-eared sp.            | 4                 | 1                                                        | 0                           | 0.06                      |
|        |                                        | Noctule                   | 0                 | 0                                                        | 0                           | 0.00                      |
|        |                                        | <i>Nyctalus/Eptesicus</i> | 1                 | 1                                                        | 0                           | 0.01                      |
|        |                                        | Serotine                  | 1                 | 1                                                        | 0                           | 0.01                      |

<sup>a</sup> = highest number of bat passes recorded on any one night.

Figure 3-2 shows the average number of bat passes (all species combined) for spring (May), summer (August) and autumn (September). This shows that bat activity was highest in spring with both the mean (average of 5 passes per night) and median (average of 2 passes per night) being the highest of the seasons. The median level for both spring and autumn was nil passes per night, showing that on more than half of the recording nights no bat passes were recorded. Autumn has a slightly higher mean average of 2 passes per night, whereas spring has just over 1 pass per night on average. Spring had the least bat activity overall.



**Figure 3-2 Average Bat Activity (all species combined) Per Season**

### High Collision Risk and High Population Vulnerability Species

High collision risk species in Wales, as defined by current guidelines<sup>1</sup>, are detailed in Appendix 2. The potential collision risk for each species is based upon its behaviour and ecology and evidence of casualty rates in the UK and the rest of Europe.

Of the species recorded during the activity surveys, the following species are classified as of high collision risk in Wales:

- Common pipistrelle;
- Soprano pipistrelle; and
- Noctule.

Bats recorded that have a medium collision risk are:

- Serotine.

Relative abundance (common, rarer or rarest species) is combined with the collision risk of a species to indicate the potential vulnerability of populations (see Appendix 2). Common and soprano pipistrelle are classified as having a medium population vulnerability in Wales. Noctule and serotine are rarer species with a high population vulnerability.

### Bat Activity Relative to Other Sites

A summary of the output from *Ecobat*, for each detector location, is included in Table 3-4. Note that species recorded as within the *Nyctalus*/*Eptesicus* grouping were run through *Ecobat* as '*Nyctalus*'.

**Table 3-3: Summary of Ecobat Outputs, by Detector, Compared with Sites Within 100km**

| Location Ref. | Species             | Nights of Activity |            |     |          |     |              | Median percentile | (95% CIs) <sup>8</sup> | Median bat activity level <sup>9</sup> | Max. percentile | Max. bat activity level <sup>10</sup> | No. of records compared against |
|---------------|---------------------|--------------------|------------|-----|----------|-----|--------------|-------------------|------------------------|----------------------------------------|-----------------|---------------------------------------|---------------------------------|
|               |                     | High               | Mod / High | Mod | Low/ Mod | Low | Nil Activity |                   |                        |                                        |                 |                                       |                                 |
| 1             | Common pipistrelle  | 1                  | 4          | 2   | 4        | 3   | 13           | 48                | 35 - 65                | Mod                                    | 83              | High                                  | 397                             |
|               | Soprano pipistrelle | 0                  | 1          | 0   | 0        | 6   | 20           | 14                | 7 - 39                 | Low                                    | 64              | Mod/ High                             | 238                             |
|               | Myotis sp.          | 0                  | 0          | 1   | 1        | 4   | 21           | 14                | 10.5 - 40              | Low                                    | 51              | Mod                                   | 275                             |
|               | Long-eared          | 0                  | 0          | 0   | 0        | 2   | 25           | 11                | 10.5 - 10.5            | Low                                    | 14              | Low                                   | 55                              |
|               | Noctule             | 0                  | 1          | 0   | 1        | 2   | 23           | 22                | 7 - 37.5               | Low/Mod                                | 68              | Low/ Mod                              | 122                             |
|               | Nyctalus            | 0                  | 0          | 0   | 0        | 0   | 27           | 22                | 21.5 - 21.5            | Low/Mod                                | 36              | Low/ Mod                              | 203                             |
|               | Serotine            | 0                  | 0          | 0   | 0        | 0   | 27           | 0                 | 0                      | Low                                    | 0               | Low                                   | N/a                             |
| 2             | Common pipistrelle  | 2                  | 5          | 1   | 0        | 3   | 19           | 38                | 14 - 58                | Low/Mod                                | 58              | Mod                                   | 355                             |

<sup>8</sup> 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).

<sup>9</sup>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: 0-20<sup>th</sup> percentile=low, 21<sup>st</sup>-40<sup>th</sup> percentile=low/mod, 41<sup>st</sup>-60<sup>th</sup> percentile = mod, 61<sup>st</sup>-80<sup>th</sup> percentile = mod/high, 81<sup>st</sup> – 100<sup>th</sup> percentile = high.

<sup>10</sup> 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) <sup>8</sup> | Median bat activity level <sup>9</sup> | Max. percentile | Max. bat activity level <sup>10</sup> | No. of records compared against |
|---------------|---------------------|--------------------|------------|-----|---------|-----|--------------|-------------------|------------------------|----------------------------------------|-----------------|---------------------------------------|---------------------------------|
|               |                     | High               | Mod / High | Mod | Low/Mod | Low | Nil Activity |                   |                        |                                        |                 |                                       |                                 |
|               | Soprano pipistrelle | 0                  | 0          | 1   | 0       | 3   | 26           | 11                | 7 - 14                 | Low                                    | 14              | Low                                   | 211                             |
|               | Myotis sp.          | 0                  | 1          | 1   | 2       | 4   | 22           | 14                | 7 - 36                 | Low                                    | 40              | Low/Mod                               | 199                             |
|               | Long-eared          | 0                  | 0          | 0   | 0       | 0   | 30           | 14                | 14 - 14                | Low                                    | 14              | Low                                   | N/a                             |
|               | Noctule             | 0                  | 0          | 1   | 0       | 2   | 27           | 0                 | 0                      | Low                                    | 0               | Low                                   | 122                             |
|               | Nyctalus            | 0                  | 0          | 1   | 0       | 1   | 28           | 0                 | 0                      | Low                                    | 0               | Low                                   | 203                             |
|               | Serotine            | 0                  | 0          | 0   | 0       | 1   | 29           | 7                 | 0                      | Low                                    | 7               | Low                                   | N/a                             |
| 3             | Common pipistrelle  | 0                  | 0          | 1   | 2       | 1   | 26           | 38                | 14 - 58                | Low/Mod                                | 58              | Mod                                   | 420                             |
|               | Soprano pipistrelle | 0                  | 0          | 0   | 0       | 4   | 26           | 11                | 7 - 14                 | Low                                    | 14              | Low                                   | 211                             |
|               | Myotis sp.          | 0                  | 0          | 0   | 2       | 4   | 24           | 14                | 7 - 36                 | Low                                    | 40              | Low/Mod                               | 231                             |
|               | Long-eared          | 0                  | 0          | 0   | 0       | 2   | 28           | 14                | 14 - 14                | Low                                    | 14              | Low                                   | 78                              |
|               | Noctule             | 0                  | 0          | 0   | 0       | 0   | 30           | 0                 | 0                      | Low                                    | 0               | Low                                   | N/a                             |
|               | Nyctalus            | 0                  | 0          | 0   | 0       | 0   | 30           | 0                 | 0                      | Low                                    | 0               | Low                                   | N/a                             |
|               | Serotine            | 0                  | 0          | 0   | 0       | 0   | 30           | 0                 | 0                      | Low                                    | 0               | Low                                   | N/a                             |
| 4             | Common pipistrelle  | 2                  | 2          | 2   | 3       | 0   | 21           | 58                | 40 - 78                | Mod                                    | 85              | High                                  | 378                             |
|               | Soprano pipistrelle | 0                  | 0          | 2   | 2       | 3   | 23           | 36                | 14 - 43.5              | Low/Mod                                | 51              | Mod                                   | 219                             |
|               | Myotis sp.          | 0                  | 0          | 0   | 0       | 2   | 28           | 14                | 14 - 14                | Low                                    | 14              | Low                                   | 296                             |
|               | Long-eared          | 0                  | 0          | 0   | 0       | 1   | 29           | 14                | 0                      | Low                                    | 14              | Low                                   | 78                              |
|               | Noctule             | 0                  | 0          | 0   | 2       | 1   | 27           | 36                | 14 - 40                | Low/Mod                                | 40              | Low/Mod                               | 193                             |
|               | Nyctalus            | 0                  | 0          | 1   | 0       | 0   | 29           | 49                | 0                      | Mod                                    | 49              | Mod                                   | 203                             |
|               | Serotine            | 0                  | 0          | 0   | 0       | 0   | 30           | 0                 | 0                      | Low                                    | 0               | Low                                   | N/a                             |
| 5             | Common pipistrelle  | 1                  | 0          | 3   | 2       | 7   | 17           | 14                | 40 - 62                | Low                                    | 84              | High                                  | 475                             |

| Location Ref. | Species             | Nights of Activity |            |     |         |     |              | Median percentile | (95% CIs) <sup>8</sup> | Median bat activity level <sup>9</sup> | Max. percentile | Max. bat activity level <sup>10</sup> | No. of records compared against |
|---------------|---------------------|--------------------|------------|-----|---------|-----|--------------|-------------------|------------------------|----------------------------------------|-----------------|---------------------------------------|---------------------------------|
|               |                     | High               | Mod / High | Mod | Low/Mod | Low | Nil Activity |                   |                        |                                        |                 |                                       |                                 |
|               | Soprano pipistrelle | 0                  | 0          | 1   | 0       | 1   | 28           | 36                | 14 - 36                | Low/Mod                                | 58              | Mod                                   | 275                             |
|               | Myotis sp.          | 0                  | 0          | 0   | 0       | 0   | 30           | 0                 | 0                      | Low                                    | 0               | Low                                   | N/a                             |
|               | Long-eared          | 0                  | 0          | 0   | 0       | 0   | 30           | 0                 | 0                      | Low                                    | 0               | Low                                   | N/a                             |
|               | Noctule             | 0                  | 0          | 0   | 0       | 0   | 30           | 0                 | 0                      | Low                                    | 0               | Low                                   | N/a                             |
|               | Nyctalus            | 0                  | 0          | 1   | 0       | 0   | 29           | 58                | 0                      | Mod                                    | 58              | Mod                                   | 366                             |
|               | Serotine            | 0                  | 0          | 0   | 0       | 0   | 30           | 0                 | 0                      | Low                                    | 0               | Low                                   | N/a                             |
| 6             | Common pipistrelle  | 1                  | 0          | 3   | 2       | 7   | 11           | 51                | 27 - 64                | Mod                                    | 77              | Mod/High                              | 475                             |
|               | Soprano pipistrelle | 0                  | 0          | 1   | 0       | 1   | 22           | 14                | 14 - 14                | Low                                    | 51              | Mod                                   | 275                             |
|               | Myotis sp.          | 0                  | 3          | 0   | 2       | 1   | 18           | 52                | 27 - 73                | Mod                                    | 77              | Mod/High                              | 296                             |
|               | Long-eared          | 0                  | 0          | 0   | 0       | 0   | 24           | 0                 | 0                      | Low                                    | 0               | Low                                   | N/a                             |
|               | Noctule             | 0                  | 0          | 0   | 0       | 0   | 24           | 27                | 27 - 27                | Low/Mod                                | 40              | Low/Mod                               | N/a                             |
|               | Nyctalus            | 0                  | 0          | 1   | 0       | 0   | 23           | 14                | 14 - 14                | Low                                    | 40              | Low/Mod                               | 366                             |
|               | Serotine            | 0                  | 0          | 0   | 0       | 1   | 23           | 14                | 0                      | Low                                    | 14              | Low                                   | 136                             |
| 7             | Common pipistrelle  | 0                  | 5          | 2   | 5       | 2   | 14           | 46                | 40 - 62                | Mod                                    | 73              | Mod/High                              | 475                             |
|               | Soprano pipistrelle | 0                  | 0          | 0   | 0       | 1   | 27           | 14                | 14 - 36                | Low                                    | 51              | Mod                                   | 275                             |
|               | Myotis sp.          | 1                  | 0          | 1   | 4       | 3   | 19           | 40                | 14 - 61                | Low/Mod                                | 82              | High                                  | 296                             |
|               | Long-eared          | 0                  | 0          | 0   | 0       | 1   | 27           | 14                | 0                      | Low                                    | 14              | Low                                   | 78                              |
|               | Noctule             | 0                  | 0          | 1   | 1       | 2   | 24           | 27                | 14 - 40                | Low/Mod                                | 51              | Mod                                   | 229                             |
|               | Nyctalus            | 0                  | 0          | 1   | 0       | 0   | 27           | 58                | 0                      | Mod                                    | 58              | Mod                                   | 366                             |
|               | Serotine            | 0                  | 0          | 0   | 0       | 0   | 28           | 0                 | 0                      | Low                                    | 0               | Low                                   | N/a                             |

Table 3-4 shows that for each species at each location the median bat activity level when compared to other sites in a 100km radius, was never above a 'moderate' level. Ecobat, however, does not look at nights which recorded no bats, so the output potentially overestimates the overall level of bat activity at the site.

The median percentile, at each detector location, for common pipistrelle activity on those nights where bats were recorded ranges from 14 to 48. The activity is rated as 'moderate' at locations 1, 4, 6 & 7 to 'low to moderate' at 2 and 3 and 'low' at location 5 when compared against the reference range. Although most of the detectors recorded a 'moderate' level of activity, this only represents 39% of the total nights for which data have been analysed, as 121 of the nights recorded no bats.

The median percentile, at each detector location, for soprano pipistrelle activity on those nights where bats were recorded ranges from 11 to 36. The activity level is rated 'low to moderate' at locations 4 and 5 to 'low' at 1, 2, 3, 6 and 7, when compared against the reference range. As for common pipistrelle it is noted that these levels of activity represent only 14% of the total nights for which data have been analysed, as the majority (172) of nights recorded no bats.

When compared against the reference range the median percentile for *Myotis* sp. activity ranges from 0 to 52, detector 6 falling in the 'moderate' activity group, detector 7 with 'low to moderate' and detectors 1, 2, 3, 4 and 5 within the 'low' activity category, although as highlighted above for common and soprano pipistrelle these levels of activity only relate to 19% of the nights for which data have been analysed.

The median percentile for long-eared sp. activity ranges from 0 to 14, meaning that all detector locations the bat activity level was 'low' when compared to the reference range. As highlighted above for other species these levels of activity only relate to 3% of the nights for which data have been analysed.

For noctule activity the median percentile on those nights where bats were recorded ranges from 0 – 36. Detectors 1, 4, 6 and 7 had 'low to moderate' activity and 2,3 and 5 had 'low' activity. As highlighted above for other species these levels of activity only relate to 7% of the nights for which data have been analysed.

The median percentile for serotine activity ranges from 0 to 14, all detector locations with 'low' activity, when compared against the reference range. As highlighted above for other species these levels of activity only relate to 1% of the nights for which data have been analysed.

The median percentile for *Nyctalus/ Eptesicus* activity ranges from 0-58, with 'moderate' activity levels associated with detector locations 5 and 7, 'low to moderate' at 1 and 4 and 'low' activity at 2, 3 and 14 when compared against the reference range. As highlighted above for other species these levels of activity only relate to 3% of the nights for which data have been analysed.

For any one detector the reference range incorporates a maximum of 1719 records from other sites within 100km of Pen March. This represents a relatively small comparative dataset and the outputs should therefore be treated with some caution. In addition, it should be noted that most of these records are likely to have been obtained during surveys undertaken at proposed or operational wind farm site and therefore most of these records are also likely to be from exposed sites with similarly low levels of bat activity. As such it must be considered that the relative level of activity generated by *Ecobat* represents the relative level of activity compared with other similar sites, not the relative level of activity compared with other sites which provide much better habitats for bats. This potentially also helps explain the relatively high occurrence of locations with a moderate or higher level of relative activity, despite the low number of bat passes recorded.

## 4.0 Discussion and Conclusions

### 4.1 Habitat Assessment

The habitat at the site constitutes 'low risk' bat habitat as defined within the guidelines<sup>1</sup> (see Appendix 1). Specifically, no potential bat roosting habitat was identified within the survey area. The site also lacks prominent linear features likely to be of high value to foraging/commuting bats and the vast majority of the survey area comprises habitat likely to be of low value to foraging/commuting bats.

### 4.2 Overview of Bat Activity

In terms of species abundance, the 2020 survey data followed a comparable pattern to the 2019 data with the majority of passes being attributed to common pipistrelle (67.9% in 2019 and 63.4% in 2020), followed by *Myotis* sp. (9.2% in 2019 and 17.4% in 2020), soprano pipistrelle (8.9% in 2019 and 10% in 2020), noctule (4.8% in 2019 and 5.3% in 2020), big bats (1.5% in 2019 and 2.5% in 2020), long-eared bat sp. (6.3% in 2019 and 1.1% in 2020) and serotine (1.5% in 2019 and 0.3% in 2020).

It should be considered that *Myotis* sp. and long-eared sp. may be under-represented by virtue of their lower detectability. The low proportion of noctule, serotine and 'big bat' is considered likely to be an accurate representation of activity levels for these species however due to their high detectability.

### 4.3 Spatial Distribution of Bat Activity

Common and soprano pipistrelle, big bats and *Myotis* sp. were recorded at all detector locations. *Nyctalus/Eptesicus* bats were recorded at all locations with the exception of location 3, long-eared sp were recorded at locations 1, 3, 4 and 7. Noctule were recorded at locations 1, 2, 4, 6 and 6 with serotine only being recorded at locations 2, 6 and 7.

The highest overall activity was attributed to location 2 (133 bat passes or approximately 23.3% of all activity), followed by location 7 (18%), location 1 (17.2%), location 4 (16.7%), location 6 (12.4%), location 5 (8.4%) and location 3 (4% of all activity), although note that locations 1, 6 and 7 had fewer recording nights.

#### 4.3.1 Temporal Distribution of Bat Activity

As noted in 2019, bat activity was highest in summer (August) (360 bat passes across all detectors which is c. 63%), although in 2020 activity was lowest in spring (May) (69 bat passes). Overall, although a peak in activity was recorded in summer, bat activity was again relatively low during all seasons which is reflective of the Site setting and low habitat suitability.

### 4.4 'High Collision Risk' and 'High Population Vulnerability' Bat Species

Common and soprano pipistrelle are both classified by the guidelines<sup>1</sup> as species at high risk of collision, with medium population vulnerability in Wales. Noctule is classified as being at high risk of collision and having high population vulnerability in Wales. Serotine has a medium risk of turbine collision and high population vulnerability in Wales. A small number of bats that could not be identified to species were identified as *Nyctalus/Eptesicus* sp. and are likely to have been either noctule or serotine. These are also considered to have high population vulnerability.

Also recorded on site were long-eared sp. and *Myotis* sp. bats which are considered to have a low risk of collision with turbines.

The data search found records of lesser horseshoe in the area surrounding the Site however, despite being a rare species, the lesser horseshoe is at low risk of collision and has low population vulnerability in Wales. No passes of this species were recorded during the 2019 or 2020 surveys.

There are existing records of Nathusius' pipistrelle and Leisler's bats (also high collision risk and high population vulnerability species) within 10km, although these are located 7km and 5km from the Site and neither species was recorded during the on-site surveys completed in 2019 or 2020. It is therefore considered unlikely that these species would occur at the site.

#### 4.4.1 Bat Activity Relative to Other Sites

Levels of bat activity relative to other sites are summarised below for each high collision risk and/or high population vulnerability species recorded during the bat activity surveys.

##### Common Pipistrelle

On nights where common pipistrelle was recorded, the level of activity either represented 'low', 'low to moderate' or 'moderate' bat activity levels when compared against records from a similar date in a similar geographic location in *Ecobat*.

Overall, it is concluded that the relative level of common pipistrelle activity is better considered to be 'low' or 'low to moderate'.

##### Soprano Pipistrelle

On nights where soprano pipistrelle was recorded, the level of activity either represented 'low' or 'low to moderate' bat activity levels when compared against records from a similar date in a similar geographic location in *Ecobat*.

Overall, it is concluded that the relative level of soprano pipistrelle activity is better considered to be 'low'.

##### Noctule

On nights where noctule was recorded, the level of activity either represented 'low' or 'low to moderate' bat activity levels when compared against records from a similar date in a similar geographic location in *Ecobat*.

Overall, it is concluded that the relative level of noctule activity is better considered to be 'low'.

##### Serotine

On nights where serotine was recorded, the level of activity either represented 'low' bat activity levels when compared against records from a similar date in a similar geographic location in *Ecobat*.

##### Nyctalus/ Eptesicus sp.

On nights where *Nyctalus/ Eptesicus* sp. was recorded, the level of activity either represented 'low', 'low to moderate' or 'moderate' bat activity levels when compared against records from a similar date in a similar geographic location in *Ecobat*.

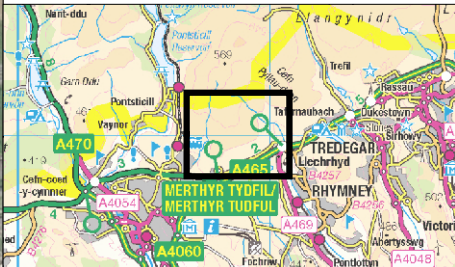
Overall, it is concluded that the relative level of *Nyctalus/ Eptesicus* sp. activity is better considered to be 'low'.

## FIGURES



- Legend:**
- Pen March Site Boundary
  - Proposed Turbine Location
  - Grid Connection
  - Cable
  - Substation and Energy Storage
  - Access Track
  - Access for Construction Compound
  - Turning Head
  - Construction Compound
  - Worst-Case Pad
  - Indicative Construction Working Area
  - Anabat Location

Coordinate System: British National Grid  
Projection: Transverse Mercator  
Datum: OSGB 1936  
Units: Meter

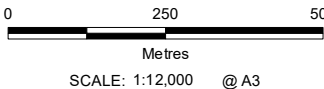


| Rev | Date       | Description     | Drn | Chk | App |
|-----|------------|-----------------|-----|-----|-----|
| 2   | 31/05/2023 | Second Revision | CN  | SH  | CM  |
| 1   | 09/16/2022 | First Revision  | JK  | Chk | CM  |

Pen March Wind Farm

**RWE**

TITLE: Figure 7-3b:  
Anabat Location Plan



REV 01

## APPENDICES

## Appendix 1: Criteria for Assessing Habitat Risk for Bats

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

Table taken from current SNH et al. (2019) guidelines<sup>1</sup>.

## Appendix 2: Collision Risk, Relative Abundance and Overall Population Vulnerability of Bat Species in Wales

*Yellow = low population vulnerability*

*Beige = medium population vulnerability*

*Red = high population vulnerability*

| Relative abundance | Wales          | Collision risk                                                                                                            |                         |                                                        |
|--------------------|----------------|---------------------------------------------------------------------------------------------------------------------------|-------------------------|--------------------------------------------------------|
|                    |                | Low collision risk                                                                                                        | Medium collision risk   | High collision risk                                    |
|                    | Common species |                                                                                                                           |                         | Common pipistrelle<br>Soprano pipistrelle              |
|                    | Rarer species  | Brown long eared bat<br>Daubenton's bat<br>Natterer's bat<br>Lesser horseshoe                                             |                         |                                                        |
|                    | Rarest species | Alcathoe bat <sup>7</sup><br>Bechstein's bat<br>Brandt's bat<br>Greater horseshoe<br>Grey long eared bat<br>Whiskered bat | Barbastelle<br>Serotine | Nathusius' pipistrelle<br>Noctule bat<br>Leisler's bat |

Table taken from current SNH (2019) guidelines<sup>1</sup>.

## EUROPEAN OFFICES

### United Kingdom

#### AYLESBURY

T: +44 (0)1844 337380

#### BELFAST

T: +44 (0)28 9073 2493

#### BRADFORD-ON-AVON

T: +44 (0)1225 309400

#### BRISTOL

T: +44 (0)117 906 4280

#### CARDIFF

T: +44 (0)29 2049 1010

#### CHELMSFORD

T: +44 (0)1245 392170

#### EDINBURGH

T: +44 (0)131 335 6830

#### EXETER

T: + 44 (0)1392 490152

#### GLASGOW

T: +44 (0)141 353 5037

#### GUILDFORD

T: +44 (0)1483 889800

#### LONDON

T: +44 (0)203 805 6418

#### MAIDSTONE

T: +44 (0)1622 609242

#### MANCHESTER

T: +44 (0)161 872 7564

#### NEWCASTLE UPON TYNE

T: +44 (0)191 261 1966

#### NOTTINGHAM

T: +44 (0)115 964 7280

#### SHEFFIELD

T: +44 (0)114 245 5153

#### SHREWSBURY

T: +44 (0)1743 23 9250

#### STIRLING

T: +44 (0)1786 239900

#### WORCESTER

T: +44 (0)1905 751310

### Ireland

#### DUBLIN

T: + 353 (0)1 296 4667

### France

#### GRENOBLE

T: +33 (0)6 23 37 14 14