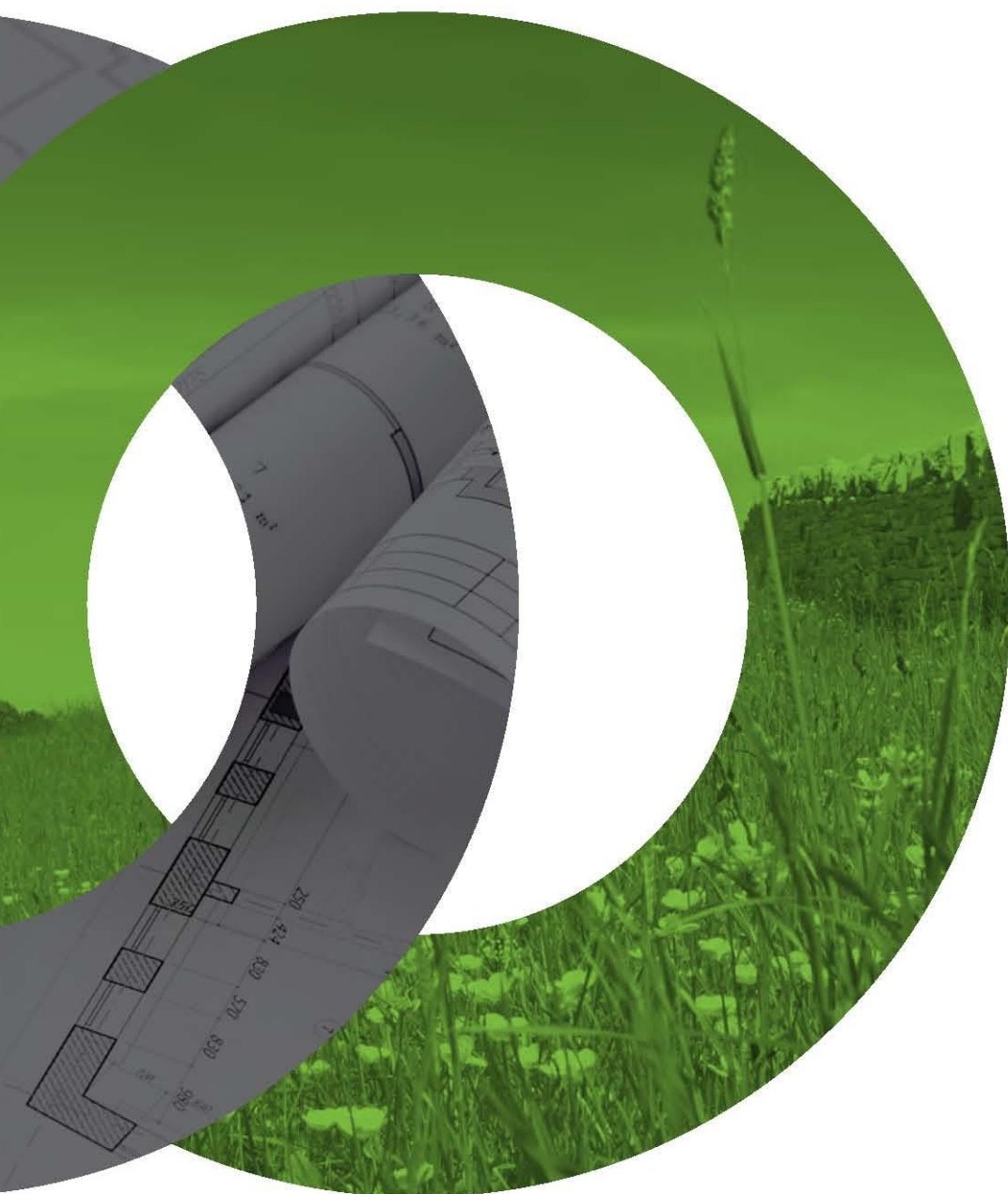


# Convatec Green Manufacturing Hub

## Appendix 11.3: Bats



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## ANNEXES

Annex 1: Scientific Bat Names

Annex 2: Survey Weather Conditions

# 1 INTRODUCTION

- 1.1.1 This Appendix has been prepared to accompany **Chapter 11: Ecology** of the Convatec Green Manufacturing Hub (the 'Proposed Development') Environmental Statement (ES).
- 1.1.2 It presents detailed methodologies, and results of desk studies and field surveys completed to establish baseline conditions with regards bats, in order to inform the design and assessment of the Proposed Development.
- 1.1.3 The objectives of the baseline studies were to:
- Assess the habitats within the Site to identify:
    - Features that have potential to support maternity roosts and significant hibernation roosts; and,
    - the location and extent of commuting and foraging habitat used by bats.
  - Identify the bat species assemblage using the Site, and the temporal and spatial variations in use; and,
  - Assess the level of activity of bats within the Site.
- 1.1.4 This Appendix also provides a Risk Assessment for bats in accordance with NatureScot guidance (2021) in **Section 5**.
- 1.1.5 It should be read with reference to the following figures presented in **Volume XX** of the ES Report:
- **Figure 11.1a:** Ecological Statutory Designated Sites;
  - **Figure 11.1b:** Ecological Non-statutory Designated Sites;
  - **Figure 11.2a:** Existing Ecological Records (Non-Sensitive) – Priority Species; and,
  - **Figure 11.6** – Preliminary (Bat) Roost Potential Survey Plan; and,
  - **Figure 11.7** - Bat Activity Survey Plan.
- 1.1.6 Information considered sensitive (bat roosts) is presented separately in the **Confidential Figure C11.1:** Existing Ecological Records (Sensitive). Such information will not be made publicly available but will be provided to Natural Resources Wales (NRW) and the Local Planning Authority.
- 1.1.7 Only common bat species names are used throughout this appendix. Scientific names for all species referenced are provided in **Annex 1**.

## 1.2 Key Guidance

- 1.2.1 Survey methodology and subsequent interpretation of results made reference to the following key guidance documents:
- Hundt, L. (2012) *Bat Surveys: Good Practice Guidelines (2<sup>nd</sup> edition)*. The Bat Conservation Trust, London.
  - Collins, J. (ed.) (2023) *Bat Surveys for Professional Ecologists: Good Practice Guidelines (4<sup>th</sup> Edition)*. The Bat Conservation Trust, London.

- Lintott PR, Davison S, van Breda J, et al. (2018) *Ecobat: An online resource to facilitate transparent, evidence-based interpretation of bat activity data*. Ecology and Evolution. 8:935–941.
- Natural England (2014) Technical Information Note TIN051: Bats and onshore wind turbines interim guidance. Natural England, Peterborough.
- Russ, J. (2012) *British Bat Calls: A Guide to Species Identification*. Pelagic Publishing, Exeter.
- NatureScot (2023) *General pre-application and scoping advice for onshore wind farms*.
- NatureScot (2021) *Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation*. In association with others, including NRW.

1.2.2 Additional peer reviewed literature and industry guidance has also been reviewed and is referred to where relevant.

## 2 METHODOLOGY

### 2.1 Desk Study and Consultation

2.1.1 The desk study was undertaken to identify the proximity of the Site to any statutory or non-statutory designated site for nature conservation with bats as a qualifying interest species and to obtain any records of bats within the Site and the surrounding wider area.

2.1.2 Key desk study sources, search areas and information obtained is summarised in **Table 2.1**.

2.1.3 Details of all consultation undertaken in relation to ecology is presented in **Table XX** of **Chapter 11: 'Ecology'** in **Volume xx** of the ES.

**Table 2.1: Desk study key sources and information sought.**

Key Source	Date of Consultation	Information Sought	Study Area
Natural Resources Wales website <a href="https://naturalresources.wales/?lang=en">https://naturalresources.wales/?lang=en</a>	December 2023	Proximity to statutory designated sites.	Within 10km of the Site. Shown in <b>Figure 11.1a</b> .
South East Wales Biodiversity Records Centre (SEWBReC)	December 2023	Existing ecological records <sup>1</sup> , including non-statutory sites.	Within 2km of the Site, extended to 10km for bat roosts. Shown respectively in <b>Figure 11.2a</b> and <b>Confidential Figure C11.1</b> .
National Biodiversity Network (NBN) Atlas	December 2023	Existing, open-access bat records (2013 onwards; data with licence types CC0, CC-BY and OGL covering commercial use only).	Within 10km of the Site.

<sup>1</sup> From the last ten years (since 2013).

2.1.4 Furthermore, the following have also been reviewed:

- Aerial imagery and Ordnance Survey (OS) maps to identify any features of potential value to foraging, commuting or roosting bats;
- A review of the Sites's location in relation to species known ranges in Wales, with reference to the most recent UK Habitats Directive<sup>2</sup> Article 17 Report<sup>3</sup>;
- The location of other wind farm developments within 5km of the Site to inform classification of Site Risk, including the number of turbines and their size, through a review of the Blaenau Gwent County Borough Council local authority planning portal wind turbine mapping<sup>4</sup>; and,
- A review of publicly available information from the planning applications relating to wind farms outlined in, where available and relevant to the Proposed Development.

## 2.2 Field Surveys

2.2.1 The following field surveys have been completed for the Proposed Development:

- Habitat Suitability Appraisal;
- Preliminary Roost Assessment; and,
- Activity Surveys – Ground Level Automated Monitoring.

### *Habitat Suitability Appraisal*

2.2.2 Habitats present within the Site were appraised for their potential to support bats in terms of both foraging and commuting opportunities in accordance with BCT guidance (Collins, 2023<sup>5</sup>).

2.2.3 The survey area consisted of the Site, in addition to a 290m buffer around each proposed turbine location.

2.2.4 The habitat suitability appraisal (HSA) was undertaken through a review of aerial imagery and OS mapping, and further informed by ground truthing of habitats present during an extended phase 1 habitat survey which took place on the 28<sup>th</sup> to 31<sup>st</sup> August 2023.

### *Preliminary Roost Assessment*

2.2.5 Any structures and trees with bat roost potential (with particular attention to features which might support maternity roosts and significant hibernation and/ or swarming sites), if present, were noted within the survey area (same as that used for HSA) during the extended phase 1 habitat survey.

2.2.6 Suitable features identified were further subject to a ground-level preliminary roost assessment (PRA) to assess any potential roost features (PRFs) present, and subsequently assigned a roost suitability category ranging from **None** – **High**, based on BCT guidance (Collins, 2023).

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<sup>2</sup>Council Directive 92/43/EEC.

<sup>3</sup><https://jncc.gov.uk/our-work/article-17-habitats-directive-report-2019-species/#regularly-occurring-species-vertebrate-species-mammals-terrestrial> [Accessed January 2024].

<sup>4</sup> <https://www.blaenau-gwent.gov.uk/resident/planning/local-development-plan/wind-turbine-mapping/> [Accessed January 2024].

<sup>5</sup> Note, the guidance applicable at the time was Collins (2016), but given there are no marked differences with the recently updated guidance, the 2023 guidance is referenced.

2.2.7 A ground-level PRA was conducted within the survey area during the extended phase 1 habitat survey, carried out by C. Davies, who is a suitably qualified and experienced ecologist, who regularly undertakes PRAs.

2.2.8 Results of the PRA are shown on **Figure 11.6**.

### ***Activity Surveys – Automated Monitoring***

2.2.9 Bat activity surveys, comprising ground-level static surveys, were undertaken during spring (May), summer (July) and autumn (September) 2023 activity periods, in accordance with NatureScot guidance (2021). A summary of survey effort is outlined in **Table 2.2** below.

**Table 2.2: Total deployment duration of monitoring stations (MSs) during each monitoring period.**

Recording Period	Recording Location	Period Start	Period End	Deployment Duration (No. of successful recording Nights)
Spring	MS1	04/05/2023	19/05/2023	15
	MS2	04/05/2023	19/05/2023	15
	MS3	04/05/2023	19/05/2023	15
Summer	MS1	07/07/2023	22/07/2023	15
	MS2	07/07/2023	22/07/2023	15
	MS3	07/07/2023	22/07/2023	15
Autumn	MS1	09/09/2023	23/09/2023	13
	MS2	09/09/2023	23/09/2023	13
	MS3	09/09/2023	23/09/2023	13

2.2.10 The survey methodology employed the use of automated monitoring stations (MSs), each consisting of a full spectrum Songmeter Mini (SM Mini) bat detector fitted with a single omnidirectional microphone and attached to a fence post at c.1m high.

2.2.11 In total, three MSs (MS1 – MS3) were deployed within the survey area during spring, summer and autumn recording periods; monitoring stations were located close to each proposed turbine location (noting, the known turbine locations at the time of survey), in accordance NatureScot guidance (2021).

2.2.12 Monitoring was undertaken between the time-period spanning approximately 30 minutes before sunset and half an hour after sunrise, with equipment set up to record simultaneously, to allow comparison of activity recorded at monitoring stations located within different habitats.

2.2.13 A recording summary of MSs deployed is detailed in **Table 2.3**, and deployment locations of MSs are presented in **Figure 11.7**.

**Table 2.3: Automated monitoring station locations and recording nights.**

I.D.	Grid Ref	No. of Successful Recording Nights <sup>6</sup>				Nearest Turbine	Distance from Turbine (m)	Phase 1 Habitat Classification <sup>7</sup>	Linear Feature within 50m
		Spring	Summer	Autumn*	Total				
<b>MS1</b>	SO 09466 08318	15	4	13	32	T1	c. 200m SE	Marshy Grassland	Fence-line.
<b>MS2</b>	SO 09891 08474	15	15	13	43	T2	c. 270m SSE	Neutral grassland - Semi-improved	Fence-line and defunct hedgerow.
<b>MS3</b>	SO 09949 08065	15	15	2	32	T3	c. 320m E	Neutral grassland - Semi-improved	Fence-line.

<sup>6</sup> Combined survey periods (where applicable), nights deemed unsuitable due to weather conditions removed.

<sup>7</sup> JNCC (2010) *Handbook for Phase 1 Habitat Survey – a technique for environmental audit*. JNCC. Peterborough

## 2.3 Weather Data

- 2.3.1 Weather data were collected from a weather station located within the Site at SO 09463 08332.
- 2.3.2 Weather parameters collected included temperature (°C), rainfall (mm) and wind speed at dusk (mps) and data were analysed to account for any periods of poor weather which could have affected bat activity. Weather conditions are summarised in **Annex 2**. Nights of unsuitable weather that recorded no bats were removed from the dataset.

## 2.4 Data Analysis and Assumptions of Bat Activity

- 2.4.1 Data analysis and interpretation of results followed the principles presented in the BCT guidance (Collins, 2023). Data analysis was undertaken by A. Hulme *BSc (Hons.)* and L. Quarton *MSc BSc*, both experienced bat ecologists who regularly carry out analysis of bat survey data.
- 2.4.2 Bat detectors recorded data onto digital media and were analysed using Kaleidoscope Pro (Wildlife Acoustics) software. Kaleidoscope Pro automatically identified sonograms, and a manual check was conducted for non-pipistrelle species. Bat species were identified using diagnostic features such as frequency, slope, duration, time between calls, minimum call length, and smoothness. Bat activity levels were estimated based on the passage of echolocating bats during surveys, but limitations to this method are recognised.
- 2.4.3 For the purpose of sonogram analysis, the number of 'bat registered calls' were defined as a sequence of echolocation calls consisting of two or more call notes (pulse of frequency), not separated by more than one second (White and Gehrt, 2001<sup>8</sup>; Gannon *et al.*, 2003<sup>9</sup>), with a minimum call note length of two milliseconds (Weller *et al.*, 2009<sup>10</sup>).
- 2.4.4 An individual bat can pass a particular feature on several occasions while foraging and therefore it was not possible to estimate the number of individual bats or draw a fair comparison where survey time differs. As such, bat activity is recorded as an index. The Bat Activity Index (BAI), based on BCT guidance (Collins, 2023), is defined as follows:

$$\text{BAI (per hour)} = \text{Total number of bat 'registered calls' / number of hours of recording}$$

### ***Assessment Tool – High Collision Risk Species***

- 2.4.5 In accordance with NatureScot guidance (2021), *Ecobat*<sup>11</sup> should be used to provide an objective interpretation of the relative importance of bat activity levels recorded within the Site.
- 2.4.6 The *Ecobat* tool is currently offline; so, in order to carry out the risk of wind farm developments in relation to bats, in accordance with NatureScot guidance (2021), Avian Ecology Ltd. (AEL) have

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<sup>8</sup> White, E. and Gehrt, S. (2001). Effects of recording media on echolocation data from broadband bat detectors. *Wildlife Society Bulletin*, 29, pp. 974-978.

<sup>9</sup> Gannon, W., Sherwin, R. and Haymond, S. (2003). On the importance of articulating assumptions when conducting acoustic studies of habitat use by bats. *Wildlife Society Bulletin*, 31, pp. 45-61.

<sup>10</sup> Weller, T., Cryan, P. and O'Shea, T. (2009). Broadening the focus of bat conservation and research in the USA for the 21st century. *Endangered Species Research*, 8: 129-145.

<sup>11</sup> Lintott, P.R., Davison, S., van Breda, J., Kubasiewicz, L., Dowse, D., Daisley, J., Haddy, E. and Mathews, F. (2018). *Ecobat*: An online resource to facilitate transparent, evidence-based interpretation of bat activity data. *Ecology and Evolution* <https://doi.org/10.1002/ece3.3692> (Accessed 30/01/2024).



developed an independent way of assessing bat activity levels for high collision risk species (*Pipistrellus* species and *Nyctalus* species<sup>12</sup>) using the same principles as *Ecobat*.

- 2.4.7 *Ecobat* used a database of user submitted data (reference database), to determine bat activity levels within the Site relative to other data within the reference database. The reference database used geographical region (up to a 200km radius) and dates (+/- 30 days) either side of the recording nights within the Site. Bat activity levels (bat passes per night per hour) within the Site would be assigned based on the median and max percentile, when compared to other activity levels within the reference database matching the geographical region and date parameters used.
- 2.4.8 *Ecobat* also determined the validity of the bat activity levels using a reference range. The reference range is the number of bat records (individual bat passes) held within the *Ecobat* database for each species within the used parameters. *Ecobat* stated that a reference range of at least 200 nights of activity is required to be confident in the relative activity level.
- 2.4.9 AEL adopted the bases of the *Ecobat* tool of determining activity levels and created a database using bat data collected from wind farm projects that AEL have worked on. The whole database includes data from 27 sites/datasets within Scotland and Wales between 2019 – 2023.
- 2.4.10 For the purpose of this assessment this was filtered to include only sites within Wales located within 200km of the Site (just like *Ecobat*); this consisted of 4 sites/datasets dating from 2019, 2021 and 2023. These sites contain similar habitats of those within the Site and are located in upland locations with similar climate/weather conditions; so are considered likely to contain comparable species composition and activity levels.
- 2.4.11 Unlike the *Ecobat* tool, the AEL database does not directly compare activity levels from other sites over the same recording dates as the Site (+/-30 days) (other than coincidentally on some other sites that were also subject to static monitoring in the same year). To overcome this, the datasets was split up seasonally, and although in different years, this means that night length and seasonal climatic conditions are likely very similar between datasets, thus allowing for comparison when assessing activity levels.
- 2.4.12 As the AEL database matches similar parameters given within the *Ecobat* tool, the reference range of 200 nights of activity would still be sufficient to determine confidence in the relative activity levels of high collision risk species. As a result, Noctule and Leisler's were combined to *Nyctalus* sp. to reach the reference range and Nathusius pipistrelle was excluded from the assessment as it failed to reach a 200-night threshold. The reference ranges of high collision risk species included in the assessment are summarised below:
- Common pipistrelle – 388;
  - Soprano pipistrelle – 299; and,
  - *Nyctalus* species - 374.
- 2.4.13 The Site data was included into the database and the BAI was then calculated for all data within the database, which was done by survey seasons and individual monitoring station locations. The BAI result of all the data within the database were then ranked to produce a percentile rank of bat activity levels providing both a median and max percentile. The median and max percentile rank for the Site data could then be extracted for each species during each season and at each monitoring station.

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<sup>12</sup> In accordance with NatureScot guidance (2021) these are the bat groups that are required to be risk assessed.

2.4.14 The median and max percentiles could then be used to determine the bat activity category as stated in the NatureScot guidance (2021) as replicated in **Table 2.4**.

**Table 2.4: Percentile Scope and Categorised Level of Bat Activity.**

Percentile	Bat Activity Category
81 to 100	High
61 to 80	Moderate to High
41 to 60	Moderate
21 to 40	Low to Moderate
0 to 20	Low

## 2.5 Risk Assessment

2.5.1 In accordance with NatureScot guidance (2021), a risk assessment was carried out to identify the potential risk to bat populations (for high collision risk species). Wind farm developments can impact upon bat species as a result of:

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

2.5.2 To ensure that bat species are protected by minimising the risk of collision, NatureScot guidance (2021) advises that an assessment of impact for a proposed wind farm development, requires a detailed appraisal of:

- the level of activity of high collision risk species recorded at the site assessed both spatially and temporally;
- the risk of turbine-related mortality for high collision risk species recorded at the wind farm area (turbine location out to 200m plus tip height buffer) during bat activity surveys; and,
- the effect on the species' population status if predicted impacts are not mitigated.

### **Assessing Potential Risk**

2.5.3 NatureScot guidance (2021) presents a two-stage process for assessing the potential risk to bats as a result of onshore wind turbine developments:

- Stage 1 - gives an indication of the potential risk level of a site, based on a consideration of habitat and development-related features; and,
- Stage 2 – uses the output of Stage 1 (i.e., the potential risk level of a site) to provide an overall risk assessment based on the activity level of high collision risk species.

- 2.5.4 The assessment is intended to assist in the identification of those developments which are of greatest concern in terms of potential collision risks at the population level and inform the potential requirements for mitigation.

## 2.6 Limitations

### *Field Surveys*

- 2.6.1 During automated static ground surveys, MS1 and MS3 were noted to have failed to record for the minimum survey effort (i.e., 10 nights of consecutive nights per detector, per season) during summer (July) and autumn (September) recording periods respectively. MS1 during summer only record for four nights and MS3 during autumn only recorded for two nights, as such, confidence in baseline activity at these locations, during their respective periods, is reduced. However, it is worth noting that additional recording nights above the minimum survey effort during the other recording periods meant that the combined minimum survey effort of 30 nights (10 nights for each season) was reached at all three monitoring stations.
- 2.6.2 Weather constraints including temperatures below 8°C, heavy rain and/ or winds exceeding 5 m/s were recorded at dusk on three nights during spring and five nights during the autumn recording period. However, bat activity was still recorded on seven of these nights, which were subsequently retained within the analysis. Conversely, on the remaining night of unsuitable conditions, no bat activity was recorded, leading to one night (during autumn) overall being excluded from analysis.
- 2.6.3 Although it is recognised that poor weather can affect bat activity, excluding these nights from the analysis may skew the data, and would remove some high collision risk species from the dataset. Consequently, inclusion of these nights represents a precautionary approach and weather is considered representative of the conditions at the Site.
- 2.6.4 Overall, in recognition of the limitations the completed survey effort is considered sufficient to achieve the objectives of the study and no limitations to baseline data gathering were encountered.

### *Sonograms Analysis*

- 2.6.5 Kaleidoscope software can identify certain bat species from sonograms, but some species within the *Myotis* and *Nyctalus* genus can be difficult to distinguish. In some cases, calls may be partially heard or distorted by external factors like passing cars, rain or wind, resulting in unknown or genus-only labels. Brown long-eared and barbastelle bat species have lower detectability and may not be detected during surveys due to their hunting strategies in less open habitats. However, the Site is principally open habitats so activity of these species is considered likely to be limited. Survey results have been carefully interpreted across species.

## 3 RESULTS

### 3.1 Desk Study

- 3.1.1 This section provides details of existing ecological information and existing records of bats species identified within and in proximity to the Site from desk study sources listed in **Table 2.1**.

#### *Statutory Designated Sites for Nature Conservation*

- 3.1.2 In review of NRW, the Site is located within 10km of any national or internationally designated sites for nature conservation which feature bat qualifying interests.

3.1.3 This section should be read with reference to **Figure 11.1a**<sup>13</sup>.

**Table 3.1: Statutory Designated Sites designated sites for nature conservation**

*SAC – Special Area of Conservation*

Site Name	Distance and Direction from the Site	Bat Qualifying Features
Safleoedd Ystlumod Wysg (Usk Bat Sites) SAC	7.99km, north-east	Lesser horseshoe bat is a qualifying feature.

### ***Non-statutory Designated Sites for Nature Conservation***

3.1.4 This section should be read with reference to **Figure 11.1b**.

3.1.5 In consultation with SEWBRc, the Site is not located within 10km of any non-statutory designated sites for nature conservation which specify bats as features of interest.

3.1.6 Although not features of interest, bats are listed as being present within two sites within 10km of the Site:

- Cefn Gelligaer SINC<sup>14</sup> located immediately south of the Site states records of whiskered/Brandt's bat, Natterer's bat, noctule, soprano pipistrelle and pipistrelle species.
- River Rhymney SINC located c.160m east of the Site at its closest states records of common pipistrelle, soprano pipistrelle, Daubenton's bat, whiskered/Brandt's bat, Natterer's bat, myotis species, noctule, greater horseshoe and lesser horseshoe.

### ***Existing Bat Records***

3.1.7 This section should be read with reference to **Figure 11.2a** (non-sensitive/non-roost bat records) and **Confidential Figure C11.1** (for bat roosts).

3.1.8 A total of 2,681 recent bat records were returned by SEWBRc from within a 10km radius of the Site, accounting for 13 confirmed species overall, in addition to records relating to the *Pipistrellus*, *Myotis* and *Nyctalus* genus.

3.1.9 A total of seven of these records were also identified within a 2km radius of the Site, accounting for three species (soprano pipistrelle, common pipistrelle and noctule).

3.1.10 Records returned no bat roost within 2km of the Site. The closest roost within the records, comprising of pipistrelle species, was located c.2.1km, a further 62 roost records relating to common pipistrelle, soprano pipistrelle, pipistrelle species, Daubenton's bat, greater horseshoe, lesser horseshoe, brown long-eared bat and (unknown) bat species within 10km of the Site.

3.1.11 Additionally, a review of open-access bat data available via the NBN Atlas returned a total of 1,722 records from within 10km of the Site, accounting for seven species overall, in addition to records relating to records within the *Pipistrellus* and *Nyctalus* genus.

3.1.12 A summary of the bat records returned from SEWBRc is provided in **Table 3.2**.

<sup>13</sup> Note, some designated sites on **Figure 11.1a** have other ecology, but no bat species qualifying interest.

<sup>14</sup> SINC: Site of Importance for Nature Conservation.

**Table 3.2: Desk study bat records relative to the Site.**

Species	No. of Records	Nearest Proximity	Status*	Notes
Brown long-eared	193	2.5km north-east of the Site	WCA, S7, HabDir4, LBAP	Recent records range from 2013 to 2021, which include bat passes, observations and roost emergence/signs. Closest record to Site relates to a grounded male bat.
Common pipistrelle	969	1km east of the Site	WCA, S7, HabDir4, LBAP	Recent records range from 2013 to 2023, which include bat passes, observations of foraging and roosts. Closest record to Site relates to foraging activity in a churchyard.
Soprano pipistrelle	230	1.1km east of the Site	WCA, S7, HabDir4, LBAP	Recent records range from 2013 to 2023, which include bat passes, observations of foraging and roosts. Closest records to Site relate to a field observation in Rhymney.
Nathusius' pipistrelle	59	5.8km east of the Site	WCA, S7, HabDir4, LBAP	Recent records relate from 2019 to 2022 (the majority from 2020) which include field observations and recordings.
Pipistrelle species	339	2.4km south-east of the Site	WCA, LBAP	Recent records range from 2013 to 2023, which include bat passes, observations of foraging and roosts. Closest records to Site relate to a field observation at Hill Street in Rhymney.
Daubenton's bat	12	2.8km north-east of the Site	WCA, S7, HabDir4, LBAP	Recent records range from 2016 to 2023, which include bat passes, observations of foraging. Closest records to Site relate to foraging activity within Bryn Bach Park
Natterer's bat	8	3.8km north-west of the Site	WCA, S7, HabDir4, LBAP	Recent records range from 2017 to 2023, which includes bat passes, observations of foraging and possible roost. Closest records to Site relate to foraging activity at Garth Farm.
Whiskered bat	1	9.8km south-west of the Site	WCA, S7, HabDir4, LBAP	The single record dates from 2021 and comprises a grounded individual within a garage.
Whiskered/Brandt's bat	7	7.4km north-east of the Site	WCA, S7, HabDir4, LBAP	Recent records range from 2019 to 2023, which includes field observations and bat passes. Closest records to Site relate to observation outside Charist's cave.
Myotis species	404	4.3km north-west of the Site	WCA, S7, HabDir4, LBAP	Recent records range from 2013 to 2021, which includes field observations, bat passes and roosts. Closest records to Site relate to activity recorded on a static monitoring recorder at Cwm Taf Fechan.
Noctule bat	200	1.1km east of the Site	WCA, S7, HabDir4, LBAP	Recent records range from 2013 to 2021, which includes field observations, bat passes and potential roosts. Closest records to Site relate to a field observation in Rhymney.
Leisler's bat	16	5.8km east of the Site	WCA, S7, HabDir4, LBAP	Records all date from 2020 all from bat pass recordings.
Nyctalus species	43	4.3km north-west of the Site	WCA, S7, HabDir4, LBAP	Records all date from 2021 all from field records. Closest records to Site relate to activity recorded on a static monitoring recorder at Cwm Taf Fechan.
Serotine	10	4.7km west of the Site	WCA, S7, HabDir4, LBAP	Recent records range from 2015 to 2021, which includes bat passes and foraging observations. Closest records to Site relate to foraging activity at Springfield Farm.

Species	No. of Records	Nearest Proximity	Status*	Notes
Greater horseshoe	13	4.3km north-west of the Site	WCA, S7, HabDir4, LBAP	Recent records range from 2018 to 2022, which includes bat passes, foraging observations and roost. Closest records to Site relate to activity recorded on a static monitoring recorder at Cwm Taf Fechan.
Lesser horseshoe	147	3.9km west north-west of the Site	WCA, S7, HabDir4, LBAP	Recent records range from 2013 to 2023, which includes bat passes, foraging observation and roosts. Closest records to Site relates to a hibernation roost in a tunnel.

\*WCA: Wildlife and Countryside Act (1981), S7: Section 7 of the Environment Act (Wales) (2016), HabDir2/4: Habitats Directive Annex 2/4, LBAP: Local Biodiversity Action Plan

### UK Bat Species Range

3.1.13 In review of the UK Habitats Directive Article 17 Report 'Habitats Directive Report 2019: Species Conservation Status Assessments 2019' based on Mathews *et al.* (2018<sup>15</sup>), the Site is located within the known UK distribution range for the following species:

- Common pipistrelle;
- Soprano pipistrelle;
- Nathusius' pipistrelle;
- Daubenton's;
- Natterer's;
- Whiskered;
- Brandt's
- Lesser horseshoe;
- Greater horseshoe;
- Barbastelle;
- Noctule;
- Leisler's;
- Serotine; and,
- Brown long-eared bat.

### Other Wind Developments

3.1.14 Identified operational and/or consented and potential wind farms within 5km of the Site are summarised in **Table 3.3**.

**Table 3.3: Wind farm developments within 5km of the Site.**

Wind Farm	Location from the Site	Status	No. of wind turbines	Max turbine height (m)
Pen Bryn Oer	2km west-north-west	Operational	3	110
Cwmbargoed Disposal Point	2.4km south-east	Consented	1	126
Pengarnddu Industrial Estate	2km east	Consented	4	77

<sup>15</sup> Mathews, F., Kubasiewicz, L.M., Gurnell, J., Harrower, C.A., McDonald, R.A. and Shore R.F. (2018) *A Review of the Population and Conservation Status of British Mammals: Technical Summary*. A report by the Mammal Society under contract to Natural England, Natural Resources Wales and Scottish Natural Heritage. Natural England, Peterborough.

Pengarnddu Industrial Estate	2km east	Operational	1	77
St Merryn Meat Factory	1.7km east	Proposed	1	77
Tafaranaubach Industrial Estate	2km north-east	Operational	1	74
Crown Business Park	4.4km north-east	Operational	2	45

## 3.2 Field Surveys

### *Habitat Appraisal*

#### Site Overview

- 3.2.1 The main habitats within the proposed turbine buffer are semi-improved neutral grassland and marshy grassland grazed by sheep; with a suspected small quarry also present. Linear habitats were limited to small sections of, principally defunct, hedgerow and dry ditches.

#### Foraging Potential

- 3.2.2 The main habitats within the turbine buffer are of low suitability foraging habitat comprising open grassland fields with limited higher suitability features limited to the small quarry, hedgerows and dry ditches, although these habitats are also considered to be of limited suitability.

#### Commuting Potential

- 3.2.3 Linear features within the turbine buffer comprise small sections of hedgerows, dry ditches and fences. Although these are of limited suitability for foraging, they are of a higher suitability for commuting being well connected throughout the turbine buffer and into the wider area.

#### Overall Suitability

- 3.2.4 The overall habitat suitability within the turbine buffer is considered to be **Low to Moderate** according to BCT guidance (Colins, 2023); comprising habitats that could be used by small numbers of bats along flight-paths such as a, largely defunct, hedgerows and limited suitable foraging habitats, such as open grassland, that are connected to the wider landscape.

### *Preliminary Roost Assessment*

- 3.2.5 No suitable roost features were identified within the survey area during the preliminary roost inspection. No trees or buildings are present and the old quarry within the turbine buffer had no suitable features to support roosting bats. As a result, the Site is assessed as having a potential roost suitability of **None** in accordance to BCT guidance (Colins, 2023); having no habitat features likely to be used by any roosting bats at any time of the year due to a complete absence of suitable features.

### *Activity Surveys – Automated Monitoring*

#### Overview

- 3.2.6 Bats were detected on 41 nights out of a possible 43 sampled nights over the course of each survey period, ranging from May (Spring), July (Summer) and September (Autumn), 2023.

3.2.7 Species identified are presented in **Table 3.4** along with potential collision risk and population vulnerability as described in Table 2 of NatureScot guidance (2021).

**Table 3.4: Bat species recorded, collision risk and population vulnerability in Wales.**

Species	Collision Risk	Population Vulnerability
Common pipistrelle	High	Medium
Soprano pipistrelle	High	Medium
Nathusius pipistrelle	High	High
<i>Nyctalus</i> species	High	High
Brown long-eared	Low	Low
Myotis species	Low	Low/Medium
Lesser horseshoe	Low	Low
Greater horseshoe	Low	Medium

3.2.8 A total of 7,236 bat passes were recorded over the 43 sampled nights summarised in **Table 3.5**.

**Table 3.5: Total number/percentage of bat passes, per species.**

Species	No. of nights Bats were Recorded	Percentage of Nights Bats were Recorded <sup>16</sup>	Passes (No.)	Percentage of Passes (%)
Common pipistrelle	41	95%	5,693	78.68%
Soprano pipistrelle	34	79%	914	12.63%
<i>Nyctalus</i> species	37	86%	376	5.20%
Myotis species	35	81%	239	3.30%
Nathusius pipistrelle	2	5%	2	0.03%
Brown long-eared	6	14%	9	0.12%
Greater horseshoe	1	2%	1	0.01%
Lesser horseshoe	2	5%	2	0.03%
<b>Total</b>			<b>7,236</b>	<b>100.00%</b>

3.2.9 Bats were recorded on 83% of combined nights (successful nights of bat recordings at each monitoring station combined). MS3 recorded the most bat passes, with a total of 4,166. MS2 recorded bats on the most nights, with 53.5%. MS3 had the highest percentage distribution with 57.6% of bat passes recorded over just 18 nights. These are summarised in **Table 3.6**.

<sup>16</sup> Percentage of nights bats were recorded within the 43 sampled nights.



**Table 3.6: Bat activity survey results per monitoring station (MS)<sup>17</sup>**

Detector ID	No. Nights Sampled	No. of nights Bats were Recorded	Percentage of Nights Bats were Recorded	Total No. Passes Recorded	Percentage Distribution of No. Bats
MS1	43	22	51.2%	1,418	19.60%
MS2	43	23	53.5%	1,652	22.83%
MS3	43	20	46.5%	4,166	57.57%
<b>Total</b>	<b>129</b>	<b>65</b>	<b>50.4%</b>	<b>7,236</b>	<b>100%</b>

3.2.10 Bat activity was recorded within the potential emergence time<sup>18</sup> for all three monitoring locations, indicating potential roosts within the vicinity of the Site. This is detailed in **Table 3.7**.

3.2.11 Common pipistrelle was recorded within the potential emergence time during the majority of nights in spring at all monitoring locations; including every recording night at MS2. Common pipistrelle was not recorded within the potential emergence time however during summer or autumn.

3.2.12 Soprano pipistrelle was recorded within the potential emergence time during 16 nights in spring at MS1 only, and during 17 and 10 nights at MS2 and MS3 in autumn respectively.

3.2.13 *Nyctalus* species and *Myotis* species were recorded within the potential emergence time during multiple nights in autumn at all monitoring stations and also during spring at MS1 and MS3 respectively.

3.2.14 Brown long-eared was recorded within the potential emergence at MS1 and MS3 during autumn. This equated to a single recording night (the same night) of just one bat pass likely being the same individual bat passing both monitoring stations.

**Table 3.7: Bat activity recorded within the species-specific emergence time.**

Detector ID	Species / Genus	Nights Recorded	Peak Count	Season of Peak Count
MS1	Common pipistrelle	25	160	Spring
MS1	Soprano pipistrelle	16	26	Spring
MS1	<i>Nyctalus</i> species	12	9	Spring and Autumn
MS1	<i>Myotis</i> species	1	1	Autumn
MS1	Brown long-eared	1	1	Autumn
MS2	Common pipistrelle	32	65	Spring
MS2	Soprano pipistrelle	17	11	Autumn
MS2	<i>Nyctalus</i> species	20	14	Autumn
MS2	<i>Myotis</i> species	6	2	Autumn
MS3	Common pipistrelle	26	98	Spring
MS3	Soprano pipistrelle	10	19	Autumn
MS3	<i>Nyctalus</i> species	23	63	Autumn
MS3	<i>Myotis</i> species	8	3	Spring and Autumn
MS3	Brown long-eared	1	1	Autumn

<sup>17</sup> The number of dates sampled is the number of nights each detector was operational for throughout the survey period, taking account of detector failures and unsuitable weather conditions.

<sup>18</sup> 15 mins before to 90 minutes after sunset.

## High Collision Risk Species

3.2.15 **Table 3.8** presents the total number of nights that bat activity, for high collision risk species, fell under each relative activity band (**Table 2.4**) between High to Low activity.

**Table 3.8: Number of nights recorded bat activity fell into each activity band per species.**

Species/Species Group	High Activity	Moderate/ High Activity	Moderate Activity	Low/ Moderate Activity	Low Activity
Common pipistrelle	14	12	10	4	1
Soprano pipistrelle	7	7	9	4	7
Nyctalus species	3	8	11	7	8

3.2.16 **Table 3.9** presents the percentiles, confidence intervals (CI) and key metrics outputs of in-house data analysis for each high collision risk species.

**Table 3.9: Percentiles and passes per night for each species.**

Species/Species Group	Total Passes	BAI (Passes per Hour, per Night)		Median Percentile <sup>19</sup>	95% CIs <sup>20</sup>	Max Percentile <sup>21</sup>	Recording Nights (Excluding Absences)	Recording Hours (Excluding Absences)
		Including Absences	Excluding Absences					
Common pipistrelle	5,693	13.82	15.27	70	64 - 75	99	41	389
Soprano pipistrelle	914	2.22	2.89	54	47 - 67	99	34	316.5
Nyctalus species	376	0.91	1.13	42	36 - 48	91	37	333.75

3.2.17 **Table 3.10** presents the Median and Mean BAI both including and excluding ‘absences’. When including absences, the Median and Mean are compared to all recording nights, including nights no bats were recorded, resulting in a lower BAI. When excluding absences, the Median and Mean are compared to nights that bats were recorded only, resulting in a higher BAI.

**Table 3.10: Median and Mean bat pass rate per species, per detector.**

Species	Detector ID	Total Bat Passes	Median Pass Rate (passes per hour/night)		Mean Pass Rate (passes per hour/night)	
			Incl. Absences	Excl. Absences	Incl. Absences	Excl. Absences
Common pipistrelle	MS1	1,094	1.1	1.56	3.84	4.39
	MS2	1,214	1.45	1.73	3.06	3.38
	MS3	3,385	2	2.27	10.89	11.61

<sup>19</sup> A numerical representation of average activity levels relative to 4 sites between 2019 - 2023 located within 200km of the Site.

<sup>20</sup> An indication of the confidence in the median percentile.

<sup>21</sup> A numerical representation of maximum activity levels on any one night relative to 4 sites between 2019 - 2023 located within 200km of the Site.

Species	Detector ID	Total Bat Passes	Median Pass Rate (passes per hour/night)		Mean Pass Rate (passes per hour/night)	
			Incl. Absences	Excl. Absences	Incl. Absences	Excl. Absences
Soprano pipistrelle	MS1	142	0.18	0.53	0.47	0.72
	MS2	230	0.13	0.52	0.52	0.77
	MS3	542	0.11	0.13	1.59	2.98
Nyctalus species	MS1	128	0.09	0.24	0.45	0.8
	MS2	88	0.11	0.25	0.21	0.37
	MS3	160	0.25	0.33	0.55	0.76

3.2.18 **Table 3.11** presents the relative bat activity levels (percentiles) per detector, per species.

**Table 3.11: Percentiles for each species per detector location for the whole survey period.**

Species / Genus	Detector ID	Median Percentile	95% CIs	Max Percentile	Nights Recorded	Activity Level (Median Percentile)	Activity Level (Max Percentile)
Common pipistrelle	MS1	67	62 - 76	98	28	Moderate to High	High
	MS2	69	61 - 77	95	40	Moderate to High	High
	MS3	72	69 - 85	100	30	Moderate to High	High
Soprano pipistrelle	MS1	74	62 - 79	98	21	Moderate to High	High
	MS2	73	64 - 83	98	29	Moderate to High	High
	MS3	40	39 - 69	100	17	Low to Moderate	High
Nyctalus species	MS1	32	10 - 50	96	18	Low to Moderate	High
	MS2	42	32 - 48	82	25	Moderate	High
	MS3	51	42 - 57	97	23	Moderate	High

3.2.19 A summary of results per season is provided in **Table 3.12**.

**Table 3.12: Percentiles for each species per month for the whole monitoring period.**

Species / Genus	Month	Median Percentile	95% CIs	Max Percentile	Nights Recorded	Activity Level (Median Percentile)	Activity Level (Max Percentile)
Common pipistrelle	Spring	90	73 - 93	99	15	High	High
	Summer	61	56 - 70	89	14	Moderate to High	High
	Autumn	66	57 - 79	99	12	Moderate to High	High
Soprano pipistrelle	Spring	58	52 - 71	97	13	Moderate	High
	Summer	29	15 - 38	62	9	Low to Moderate	Moderate to High

Species / Genus	Month	Median Percentile	95% CIs	Max Percentile	Nights Recorded	Activity Level (Median Percentile)	Activity Level (Max Percentile)
	Autumn	71	49 - 86	99	12	Moderate to High	High
Nyctalus species	Spring	26	25 - 69	90	13	Low to Moderate	High
	Summer	42	42 - 54	85	14	Moderate	High
	Autumn	44	6 - 70	91	10	Moderate	High

3.2.20 A summary of peak hours of bat passes per monitoring station per season are summarised in **Table 3.13**.

3.2.21 Activity of common pipistrelle peaked in spring at all three monitoring stations between the hours of 21:00 – 23:00hrs. Activity of soprano pipistrelle was more varied with numbers peaking in spring at MS1 and autumn at MS2 and MS3 between the hours of 21:00 – 03:00hrs. Activity of *Nyctalus* species was also more varied with numbers peaking in spring at MS1 and autumn at MS2 and MS3 between the hours of 20:00 – 23:00hrs. Combined species activity peaked in spring at all three monitoring stations between the hours of 21:00 – 23:00hrs.

**Table 3.13: Peak hours of bat passes for high collision risk species both individually and combined.**

Detector ID	Season	Peak Hour (hrs)	Passes within Peak Hour
<b>Common pipistrelle</b>			
MS1	Spring	21:00 - 22:00	530
	Summer	22:00 - 23:00	19
	Autumn	20:00 - 21:00	35
MS2	Spring	21:00 - 22:00	170
	Summer	22:00 - 23:00	111
	Autumn	01:00 - 02:00	90
MS3	Spring	22:00 - 23:00	354
	Summer	22:00 - 23:00	110
	Autumn	22:00 - 23:00	250
<b>Soprano pipistrelle</b>			
MS1	Spring	22:00 - 23:00	35
	Summer	22:00 - 23:00	3
	Autumn	21:00 - 22:00	11
MS2	Spring	23:00 - 00:00	11
	Summer	22:00 - 23:00	6
	Autumn	23:00 - 00:00	44
MS3	Spring	04:00 - 05:00	16
	Summer	22:00 - 23:00	2
	Autumn	02:00 - 03:00	109
<b>Nyctalus species</b>			
MS1	Spring	22:00 - 23:00	43
	Summer	03:00 - 04:00	16
	Autumn	20:00 - 21:00	16
MS2	Spring	21:00 - 22:00	14

	Summer	22:00 - 23:00	10
	Autumn	20:00 - 21:00	35
	Spring	21:00 - 22:00	22
MS3	Summer	22:00 - 23:00	36
	Autumn	20:00 - 21:00	72
<b>Combined species</b>			
MS1	Spring	21:00 - 22:00	585
	Summer	22:00 - 23:00	22
	Autumn	20:00 - 21:00	59
MS2	Spring	21:00 - 22:00	187
	Summer	22:00 - 23:00	127
	Autumn	20:00 - 21:00	141
MS3	Spring	22:00 - 23:00	364
	Summer	22:00 - 23:00	148
	Autumn	21:00 - 22:00	272

#### Other species

3.2.22 The BAI per season and per static for other species recorded within the Site, not deemed as high collision risk species or species that are high collision risk, but not recorded in significant enough numbers to include in the bat database (*Nathusius pipistrelle*), are summarised below.

#### *Nathusius pipistrelle*

3.2.23 A total of two bat passes of *Nathusius pipistrelle* were recorded during the three recording periods; with a peak BAI per static of 0.09 at MS1 and MS2 and a peak BAI per season of 0.09 during autumn. No activity was recorded at MS3 or during spring and summer. All bat activity had a BAI of <0.1.

3.2.24 BAI at each static, for each season and for each static per season are summarised in **Table 3.14**, **Table 3.15** and **Table 3.16**.

**Table 3.14: BAI per static for *Nathusius pipistrelle***

Detector ID	Total Passes	Passes per Night/Hour (BAI)		Recording Hours (Including Absences)	Recording Hours (Excluding Absences)
		Including Absences	Excluding Absences		
MS1	1	0.003	0.09	306	11.75
MS2	1	0.003	0.09	392.25	11.5
MS3	0	-	-	267	0
<b>Total</b>	<b>2</b>	<b>0.002</b>	<b>0.09</b>	<b>965.25</b>	<b>23.25</b>

**Table 3.15: BAI per season for *Natusius pipistrelle***

Detector ID	Total Passes	Passes per Night/Hour (BAI)		Recording Hours (Including Absences)	Recording Hours (Excluding Absences)
		Including Absences	Excluding Absences		
Spring	0	-	-	128.75	0
Summer	0	-	-	116.25	0
Autumn	2	0.01	0.09	147.25	23.25
<b>Total</b>	<b>2</b>	<b>0.005</b>	<b>0.09</b>	<b>392.25</b>	<b>23.25</b>

**Table 3.16: BAI per static per season for *Nathusius pipistrelle***

Detector ID	Season	Total Passes	Passes per Night/Hour (BAI)		Recording Hours (Including Absences)	Recording Hours (Excluding Absences)
			Including Absences	Excluding Absences		
MS1	Spring	0	-	-	128.75	0
	Summer	0	-	-	30	0
	Autumn	1	0.007	0.09	147.25	11.75
MS2	Spring	0	-	-	128.75	0
	Summer	0	-	-	116.25	0
	Autumn	1	0.007	0.09	147.25	11.50
MS3	Spring	0	-	-	128.75	0
	Summer	0	-	-	116.25	0
	Autumn	0	-	-	22	0
<b>Total</b>		<b>2</b>	<b>0.002</b>	<b>0.09</b>	<b>965.25</b>	<b>23.25</b>

### *Myotis species*

3.2.25 A total of 239 bat passes of *Myotis* species were recorded during the three recording periods; with a peak BAI per static of 0.50 at MS2 and a peak BAI per season of 1 during autumn.

3.2.26 Activity was recorded at all monitoring stations during all seasons, with MS3 during autumn having the highest with a BAI of 1.55. Except for MS3 during autumn all other activity had a BAI of <1.

3.2.27 BAI at each static, for each season and for each static per season are summarised in **Table 3.17**, **Table 3.18** and **Table 3.19**.

**Table 3.17: BAI per static for *Myotis* species**

Detector ID	Total Passes	Passes per Night/Hour (BAI)		Recording Hours (Including Absences)	Recording Hours (Excluding Absences)
		Including Absences	Excluding Absences		
MS1	51	0.17	0.25	306	206.75
MS2	114	0.29	0.50	392.25	228.50
MS3	74	0.44	0.28	267	169
<b>Total</b>	<b>239</b>	<b>0.25</b>	<b>0.40</b>	<b>965.25</b>	<b>604.25</b>

**Table 3.18: BAI per season for *Myotis* species**

Detector ID	Total Passes	Passes per Night/Hour (BAI)		Recording Hours (Including Absences)	Recording Hours (Excluding Absences)
		Including Absences	Excluding Absences		
Spring	57	0.44	0.56	128.75	102.5
Summer	29	0.25	0.38	116.25	77
Autumn	153	1	1	147.25	147.25
<b>Total</b>	<b>239</b>	<b>0.61</b>	<b>0.73</b>	<b>392.25</b>	<b>326.75</b>

**Table 3.19: BAI per static per season for *Myotis* species**

Detector ID	Season	Total Passes	Passes per Night/Hour (BAI)		Recording Hours (Including Absences)	Recording Hours (Excluding Absences)
			Including Absences	Excluding Absences		
MS1	Spring	23	0.18	0.24	128.75	94.25
	Summer	0	-	-	30	0
	Autumn	28	0.19	0.25	147.25	112.5
MS2	Spring	8	0.06	0.19	128.75	42.75
	Summer	15	0.13	0.39	116.25	38.5
	Autumn	91	0.62	0.62	147.25	147.25
MS3	Spring	26	0.20	0.30	128.75	85.25
	Summer	14	0.12	0.23	116.25	61.75
	Autumn	34	1.55	1.55	22	22
<b>Total</b>		<b>239</b>	<b>0.25</b>	<b>0.40</b>	<b>965.25</b>	<b>604.25</b>

*Brown long-eared*

3.2.28 A total of nine bat passes of brown long-eared were recorded during the three recording periods; with a peak BAI per static of 0.18 at MS1 and a peak BAI per season of 0.16 during autumn.

3.2.29 Activity was recorded at all monitoring stations during autumn and MS3 during spring. MS1 during autumn recording the highest BAI of 0.25. All bat activity had a BAI of <1.

3.2.30 BAI at each static, for each season and for each static per season are summarised in **Table 3.20**, **Table 3.21** and **Table 3.22**.

**Table 3.20: BAI per static for *Brown long-eared***

Detector ID	Total Passes	Passes per Night/Hour (BAI)		Recording Hours (Including Absences)	Recording Hours (Excluding Absences)
		Including Absences	Excluding Absences		
MS1	2	0.007	0.18	306	11
MS2	4	0.01	0.09	392.25	44.75
MS3	3	0.01	0.11	267	28
<b>Total</b>	<b>9</b>	<b>0.009</b>	<b>0.11</b>	<b>965.25</b>	<b>83.75</b>

**Table 3.21: BAI per season for *Brown long-eared***

Detector ID	Total Passes	Passes per Night/Hour (BAI)		Recording Hours (Including Absences)	Recording Hours (Excluding Absences)
		Including Absences	Excluding Absences		
Spring	2	0.02	0.12	128.75	17
Summer	0	-	-	116.25	0
Autumn	7	0.05	0.16	147.25	44.75
<b>Total</b>	<b>9</b>	<b>0.02</b>	<b>0.15</b>	<b>392.25</b>	<b>61.75</b>

**Table 3.22: BAI per static per season for *Brown long-eared***

Detector ID	Season	Total Passes	Passes per Night/Hour (BAI)		
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			Including Absences	Excluding Absences	Recording Hours (Including Absences)	Recording Hours (Excluding Absences)
MS1	Spring	0	-	-	128.75	0
	Summer	0	-	-	30	0
	Autumn	2	0.006	0.25	147.25	11
MS2	Spring	0	-	-	128.75	0
	Summer	0	-	-	116.25	0
	Autumn	4	0.002	0.09	147.25	44.75
MS3	Spring	2	0.02	0.12	128.75	17
	Summer	0	-	-	116.25	0
	Autumn	1	0.05	0.09	22	11
<b>Total</b>		<b>9</b>	<b>0.009</b>	<b>0.11</b>	<b>965.25</b>	<b>83.75</b>

### *Greater horseshoe*

3.2.31 A total of one bat pass of greater horseshoe were recorded during the three recording periods; with a peak BAI per static of 0.09 at MS2 and a peak BAI per season of 0.09 during autumn. No activity was recorded at MS1 and MS3 during spring and summer.

3.2.32 BAI at each static, for each season and for each static per season are summarised in **Table 3.23**, **Table 3.24** and **Table 3.25**.

**Table 3.23: BAI per static for Greater horseshoe**

Detector ID	Total Passes	Passes per Night/Hour (BAI)		Recording Hours (Including Absences)	Recording Hours (Excluding Absences)
		Including Absences	Excluding Absences		
MS1	0	-	-	306	0
MS2	1	0.003	0.09	392.25	11.25
MS3	0	-	-	267	0
<b>Total</b>	<b>1</b>	<b>0.001</b>	<b>0.09</b>	<b>965.25</b>	<b>11.25</b>

**Table 3.24: BAI per season for Greater horseshoe**

Detector ID	Total Passes	Passes per Night/Hour (BAI)		Recording Hours (Including Absences)	Recording Hours (Excluding Absences)
		Including Absences	Excluding Absences		
Spring	0	-	-	128.75	-
Summer	0	-	-	116.25	-
Autumn	1	0.007	0.09	147.25	11.25
<b>Total</b>	<b>1</b>	<b>0.003</b>	<b>0.09</b>	<b>392.25</b>	<b>11.25</b>

**Table 3.25: BAI per static per season for Greater horseshoe**

Detector ID	Season	Total Passes	Passes per Night/Hour (BAI)		Recording Hours (Including Absences)	Recording Hours (Excluding Absences)
			Including Absences	Excluding Absences		
MS1	Spring	0	-	-	128.75	0
	Summer	0	-	-	30	0
	Autumn	0	-	-	147.25	0



MS2	Spring	0	-	-	128.75	0
	Summer	0	-	-	116.25	0
	Autumn	1	0.007	0.09	147.25	11.25
MS3	Spring	0	-	-	128.75	0
	Summer	0	-	-	116.25	0
	Autumn	0	-	-	22	0
<b>Total</b>		<b>1</b>	<b>0.001</b>	<b>0.09</b>	<b>965.25</b>	<b>11.25</b>

### *Lesser horseshoe*

3.2.33 A total of two bat passes of lesser horseshoe were recorded during the three recording periods; with a peak BAI per static of 0.1 at MS3 and a peak BAI per season of 0.12 during spring.

3.2.34 Activity was recorded at MS3 only during autumn and spring, with all bat activity with a BAI of <1.

3.2.35 BAI at each static, for each season and for each static per season are summarised in **Table 3.26**, **Table 3.27** and **Table 3.29**.

**Table 3.26: BAI per static for Lesser horseshoe**

Detector ID	Total Passes	Passes per Night/Hour (BAI)		Recording Hours (Including Absences)	Recording Hours (Excluding Absences)
		Including Absences	Excluding Absences		
MS1	0	-	-	306	0
MS2	0	-	-	392.25	0
MS3	2	0.01	0.1	267	19.5
<b>Total</b>	<b>2</b>	<b>0.002</b>	<b>0.10</b>	<b>965.25</b>	<b>19.5</b>

**Table 3.27: BAI per season for Lesser horseshoe**

Detector ID	Total Passes	Passes per Night/Hour (BAI)		Recording Hours (Including Absences)	Recording Hours (Excluding Absences)
		Including Absences	Excluding Absences		
Spring	1	0.01	0.12	128.75	8.5
Summer	0	-	-	116.25	0
Autumn	1	0.01	0.09	147.25	11
<b>Total</b>	<b>2</b>	<b>0.005</b>	<b>0.10</b>	<b>392.25</b>	<b>19.5</b>

**Table 3.28: BAI per static per season for Lesser horseshoe**

Detector ID	Season	Total Passes	Passes per Night/Hour (BAI)		Recording Hours (Including Absences)	Recording Hours (Excluding Absences)
			Including Absences	Excluding Absences		
MS1	Spring	0	-	-	128.75	0
	Summer	0	-	-	30	0
	Autumn	0	-	-	147.25	0
MS2	Spring	0	-	-	128.75	0
	Summer	0	-	-	116.25	0
	Autumn	0	-	-	147.25	0
MS3	Spring	1	0.01	0.12	128.75	8.5
	Summer	0	-	-	116.25	0

Detector ID	Season	Total Passes	Passes per Night/Hour (BAI)		Recording Hours (Including Absences)	Recording Hours (Excluding Absences)
			Including Absences	Excluding Absences		
	Autumn	1	0.05	0.09	22	11
<b>Total</b>		<b>2</b>	<b>0.002</b>	<b>0.10</b>	<b>965.25</b>	<b>19.5</b>

## 4 ASSESSMENT OF THE POTENTIAL RISKS TO BATS

### 4.1 Stage 1 – Initial Site Risk Assessment

- 4.1.1 In accordance with NatureScot guidance (2021), an assessment of the potential risk level of the Proposed Development has been undertaken based on a consideration of both habitat and development-related features detailed in Table 3a of the NatureScot guidance (2021).
- 4.1.2 The values and classification criteria provided within Table 3a of NatureScot guidance (2021) are intended to be taken as a guide, with habitat and development-related features at proposed wind farm sites rarely matching rigid descriptions. Professional judgement has therefore been applied to interpret and assign risk categories, and to conclude on the overall risk level for the Site.
- 4.1.3 The Site has been assessed as having an ‘Initial Site Risk’ of **2**, representing a **Low Site Risk**:
- The Site ‘Habitat Risk’ is classified as **Low**.
- 4.1.4 The Site ‘Project Size’ is classified as being **Medium**, comprising a development of 3 turbines of up to 150.3m tip height, with three other operational wind farm developments with tip heights >50m (Pen Bryn Oer, Pengarnddu Industrial Estate and Tafaranaubach Industrial Estate), and an additional two consented wind farm developments with tip heights >50m (Cwmbargoed Disposal Point and Pengarnddu Industrial Estate) located within 5km of the Site (distances measured between the nearest turbines).

### 4.2 Stage 2 – Overall Risk Assessment

- 4.2.1 In accordance with NatureScot guidance (2021), Stage 2 should be carried out separately for all high collision risk species recorded, which includes the following species recorded during bat activity surveys for the Proposed Development:
- Common pipistrelle
  - Soprano pipistrelle; and,
  - *Nyctalus* species.
- 4.2.2 In order to derive an ‘Overall Risk Assessment’ the determined Bat Activity Category derived from the substitute of *Ecobat* produced by AEL is compared against the Site Risk Level (Stage 1) using the matrix presented in Table 3b in NatureScot (2021) to determine the level of Overall Risk.
- 4.2.3 As calculated using NatureScot (2021) guidance, ‘Overall Risk Assessment’ for each species recorded on-Site, both spatially and temporally, is presented in **Table 5.1** and **Table 5.2**.
- 4.2.4 In considering Overall Risk Assessment per detector location (**Table 5.1**) Overall Risk Assessment falls under ‘Medium Site Risk’ when using the median and max percentile for common pipistrelle, and ‘Medium Site Risk’ when using the median percentile and max percentile for soprano pipistrelle and ‘Medium Site Risk’ using the median percentile and max percentile for *Nyctalus* species.

- 4.2.5 In considering Overall Risk Assessment per season (**Table 5.2**), the Overall Risk Assessment falls under 'Medium Site Risk' when using the median and max percentile for common pipistrelle, 'Medium Site Risk' when using the median and maximum percentile for soprano pipistrelle and 'Medium Site Risk' when using the median and maximum percentile for *Nyctalus* species.

**Table 5.1: Overall Risk Assessment per MS location for both the Median and Max Percentiles (Table 3b from NatureScot (2021) guidance). Key: Green = Low, Amber = Medium, Red = High**

Species / Genus	MS	Median Percentile	Percentile Category	Overall Risk Assessment (Stage 2)		Species / Genus	MS	Max Percentile	Percentile Category	Overall Risk Assessment (Stage 2)
Common pipistrelle	MS1	67	Moderate to High	Medium (8)		Common pipistrelle	MS1	98	High	Medium (10)
	MS2	69	Moderate to High	Medium (8)			MS2	95	High	Medium (10)
	MS3	72	Moderate to High	Medium (8)			MS3	100	High	Medium (10)
Soprano pipistrelle	MS1	74	Moderate to High	Medium (8)		Soprano pipistrelle	MS1	98	High	Medium (10)
	MS2	73	Moderate to High	Medium (8)			MS2	98	High	Medium (10)
	MS3	40	Low to Moderate	Low (4)			MS3	100	High	Medium (10)
Nyctalus species	MS1	32	Low to Moderate	Low (4)		Nyctalus species	MS1	96	High	Medium (10)
	MS2	42	Moderate	Medium (6)			MS2	82	High	Medium (10)
	MS3	51	Moderate	Medium (6)			MS3	97	High	Medium (10)

**Table 5.2: Overall Risk Assessment per month for both the Median and Max Percentiles (Table 3b from SNH (2021) guidance). Key: Green = Low, Amber = Medium, Red = High**

Species / Genus	Month	Median Percentile	Percentile Category	Overall Risk Assessment (Stage 2)		Species / Genus	Month	Max Percentile	Percentile Category	Overall Risk Assessment (Stage 2)
Common pipistrelle	Spring	90	High	Medium (10)		Common pipistrelle	Spring	99	High	Medium (10)
	Summer	61	Moderate to High	Medium (8)			Summer	89	High	Medium (10)
	August	66	Moderate to High	Medium (8)			August	99	High	Medium (10)
Soprano pipistrelle	Spring	58	Moderate	Medium (6)		Soprano pipistrelle	Spring	97	High	Medium (10)
	Summer	29	Low to Moderate	Low (4)			Summer	62	Moderate to High	Medium (8)
	August	71	Moderate to High	Medium (8)			August	99	High	Medium (10)
Nyctalus species	Spring	26	Low to Moderate	Low (4)		Nyctalus species	Spring	90	High	Medium (10)
	Summer	42	Moderate	Medium (6)			Summer	85	High	Medium (10)
	August	44	Moderate	Medium (6)			August	91	High	Medium (10)

## ANNEX 1: SCIENTIFIC NAMES

*Table A1.1 provides common and scientific names of bat species included in this Appendix.*

Common Name	Scientific Name
Soprano pipistrelle	<i>Pipistrellus pygmaeus</i>
Common pipistrelle	<i>Pipistrellus pipistrellus</i>
Myotis species	<i>Myotis</i> spp.
Whiskered bat	<i>Myotis mystacinus</i>
Natterer's bat	<i>Myotis nattereri</i>
Daubenton's bat	<i>Myotis daubentonii</i>
Brandt's bat	<i>Myotis brandtii</i>
Nyctalus species	<i>Nyctalus</i> spp.
Noctule	<i>Nyctalus noctula</i>
Leisler's bat	<i>Nyctalus leisleri</i>
Serotine	<i>Eptesicus serotinus</i>
Greater horseshoe	<i>Rhinolophus ferrumequinum</i>
Lesser horseshoe	<i>Rhinolophus hipposideros</i>
Brown long-eared	<i>Plecotus auritus</i>

## ANNEX 2: SURVEY WEATHER CONDITIONS

Table A2.1 below provides weather conditions for Bat Activity Survey periods. Those values in **red font** represent less suitable weather conditions for bats (above average for the category).

Date	Temp at Dusk (°C)	Rainfall (mm)	Maximum Wind Speed (m/s)
04/05/2023	11	1	3.33
05/05/2023	10	0	1.94
06/05/2023	10	0	2.78
07/05/2023	10	0	1.94
08/05/2023	11	0.7	1.67
09/05/2023	10	0	3.33
10/05/2023	10	0	4.72
11/05/2023	10	0	2.78
12/05/2023	11	0	5.56
13/05/2023	12	0	1.67
14/05/2023	10	0	1.94
15/05/2023	9	0	3.33
16/05/2023	9	0	2.22
17/05/2023	10	0	2.22
18/05/2023	10	0	2.50
19/05/2023	11	0	1.94
07/07/2023	21.3	0	0.50
08/07/2023	15.6	0	0.25
09/07/2023	16.1	0	0.36
10/07/2023	14	0	0.61
11/07/2023	14.2	0	0.50
12/07/2023	13.8	0	0.75
13/07/2023	14.1	0	0.50
14/07/2023	13.8	0	0.86
15/07/2023	13.3	0	0.75
16/07/2023	12.7	0	0.75
17/07/2023	13	0	0.61
18/07/2023	13.1	0	0.36
19/07/2023	14.9	0	0.36
20/07/2023	14.8	0	0.25
21/07/2023	12.8	0	0.50
09/09/2023	23	0	1.11
10/09/2023	20	0	1.67

Date	Temp at Dusk (°C)	Rainfall (mm)	Maximum Wind Speed (m/s)
11/09/2023	15	0.1	1.39
12/09/2023	12	0	1.94
13/09/2023	14	0	1.67
14/09/2023	13	0	1.39
15/09/2023	16	0	1.39
16/09/2023	15	0	5.56
17/09/2023	15	0.6	7.22
18/09/2023	10	0	6.39
19/09/2023	14	0.1	10.83
20/09/2023	11	0	5.83
21/09/2023	9	0.3	1.67
22/09/2023	9	0	4.44