

Technical Appendix 8.6 Bat Survey Report 2018





BAT SURVEY

EUCHANHEAD WINDFARM







DATE: 02 NOVEMBER 2018 CONTRACT REF: SCP04.18.1646 SITE LOCATION: SANQUHAR, DUMFRIES AND GALLOWAY CENTRAL OS GRID REF: NS 678 054 CLIENT: SCOTTISH POWER RENEWABLES

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Document Control

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Executive Summary

Euchanhead Windfarm is located to the south-west of Sanquhar in Dumfries and Galloway, central OS grid reference NS 678 054. It is the intention of Scottish Power Renewables, subject to planning permission being approved, to install nine wind turbines on the high ground between Ryegrain Rig, Greystone Hill and Euchanhead, along with associated access tracks.

Echoes Ecology Ltd were contracted by Scottish Power Renewables to carry out a baseline assessment for bats of the land proposed for the construction of Euchanhead Windfarm to identify the presence of any bats within the proposed areas of development.

A survey programme relating to bat activity took place during the period 30.04.18 to 01.10.18. Seasonal bat activity surveys were carried out in May (Spring), July (Summer) and September (Autumn) 2018 using automated bat detector surveys. The terrain was considered unsafe to carry out walked transect surveys on.

Bats were found to use the habitats within the site for commuting and foraging, although the levels of activity were considered to be very low. The bat activity was spread across the four habitat types recorded in. Water / Edge had the highest activity level (2.62 BPpH), followed by Edge habitat (0.20 BPpH), Open (0.16 BPpH) and Closed had the lowest activity recorded (0.01 BPpH).

Soprano (*Pipistrellus pygmaeus*) and Common pipistrelle (*P. pipistrellus*) were the most abundant species recorded during the surveys, comprising over 90% of total bat passes. Unidentified pipistrelle, *Myotis* species, *Nyctalus* species and brown long-eared bats were recorded in small numbers.

With the levels of activity for high (< 0.00 BPpH for risk to populations and individual bats) and moderate risk (0.38 BPpH for risk to individual bats) bat activity being very low the windfarm development does not pose a significant impact on bats.

Section 1 - Introduction

1.1 Contract Overview

- 1.1.1 Euchanhead Windfarm is located to the south-west of Sanquhar in Dumfries and Galloway, central OS grid reference NS 678 054. The site consists of commercial coniferous plantation and open moorland. For a plan of the site as it currently exists, along with the proposed locations of the wind turbines refer to Appendix I.
- 1.1.2 It is the intention of Scottish Power Renewables, subject to planning permission being approved, to install nine wind turbines on the high ground between Ryegrain Rig, Greystone Hill and Euchanhead, along with associated access tracks.
- 1.1.3 Echoes Ecology Ltd were appointed by Scottish Power Renewables to carry out a baseline assessment for bats of the land proposed for the construction of Euchanhead Windfarm.
- 1.1.4 The following documents have been provided to Echoes Ecology Ltd in order to assist in carrying out this contract:
 - Site Plan
 - Proposed locations of wind turbines.

1.2 Survey Aims

- 1.2.1 The aims of the survey and subsequent impact assessment were:
 - To carry out remote detector surveys to assess the usage of the site by bats, identify which species are present.
 - To identify the requirement for further surveys
 - To assess the potential impacts of the development on bats

Section 2 - Relevant Legislation and Policy

2.1 Legal Considerations

- 2.1.1 Bats and their roosts are protected under UK and European Legislation. In Scotland, this is mainly provided by the Conservation (Natural Habitats, &c.) Regulations 1994, as amended (known as the Habitats Regulations). Under this legislation, bats are regarded as European Protected Species (EPS).
- 2.1.2 It is an offence to deliberately or recklessly:
 - capture, injure or kill a bat
 - harass a bat
 - disturb a bat while it is occupying a roost (any place of shelter or protection)
 - disturb a bat while it is rearing or otherwise caring for its young
 - obstruct access to a roost or deny a bat use of a roost
 - disturb a bat in a way which is likely to significantly affect the local distribution or abundance of the species
 - disturb a bat in a way that is likely to impair its ability to survive, breed or reproduce, or rear or care for its young
 - disturb a bat while it is migrating or hibernating.
- 2.1.3 It is a strict liability offence to damage or destroy a bat roost. A bat roost is protected at all times irrespective as to whether any bats are using the roost at a given time.
- 2.1.4 If the work proposed is to affect bats or their roosts, an EPS licence, issued by the licensing authority SNH under Regulation 44 of the Habitats Regulations, will be required so as to permit an otherwise illegal activity. There are three tests that must be satisfied before a licence will be granted, in addition to which mitigation and/or compensation will almost certainly be required. The three tests are:
 - The activity must fall within one of the licensable purposes listed in Regulation 44 (including
 preserving public health or public safety or other imperative reasons of overriding public
 interest including those of a social or economic nature and beneficial consequences of
 primary importance for the environment)
 - There must be no satisfactory alternative
 - The action authorised will not be detrimental to the maintenance of the population of the species at a favourable conservation status in their natural range.

2.2 Scottish Biodiversity Strategy

- 2.2.1 The Nature Conservation (Scotland) Act 2004 places a 'Biodiversity Duty' on public bodies to further the conservation of biodiversity and it requires Scottish Ministers to designate one or more strategies for the conservation of biodiversity as the Scottish Biodiversity Strategy. 'Scotland's Biodiversity: It's in Your Hands A strategy for the conservation and enhancement of biodiversity in Scotland' (Scottish Executive, 2004) and '2020 Challenge for Scotland's Biodiversity' (Scottish Government, 2013a) together form the Scottish Biodiversity Strategy.
- 2.2.2 'Scotland's Biodiversity: It's in Your Hands A strategy for the conservation and enhancement of biodiversity in Scotland' sets out a 25-year strategy to assist government, the private and public sectors, non-governmental bodies and individual members of the public to conserve and enhance biodiversity in Scotland. The document '2020 Challenge for Scotland's Biodiversity' was published in response to the Aichi Targets set by the United Nations Convention on Biological Diversity (2010) and the European Union's Biodiversity Strategy for 2020 (2011).

2.3 Scottish Biodiversity List

2.3.1 The Scottish Biodiversity List (SBL) was published in 2005 and last updated in 2012 (Scottish Government, 2013b). The aim of the list is to help public bodies carry out their 'Biodiversity Duty', as required by the Nature Conservation (Scotland) Act 2004, by identifying the species and

habitats which are the highest priority for biodiversity conservation in Scotland. Nine species of bat are included on the SBL as detailed below:

- Brandt's bat (Myotis brandtii)
- Daubenton's bat (Myotis daubentonii)
- Whiskered bat (Myotis mystacinus)
- Natterer's bat (*Myotis nattereri*)
- Noctule (*Nyctalus noctula*)
- Nathusius' pipistrelle (*Pipistrellus nathusii*)
- Common pipistrelle (Pipistrellus pipistrellus)
- Soprano pipistrelle (*Pipistrellus pygmaeus*)
- Brown long-eared bat (Plecotus auritus).

2.4 Local Biodiversity Action Plan

2.4.1 Local Biodiversity Action Plan Partnerships were established in the UK following the ratification of the Convention on Biological Diversity in 1992. Each local partnership publishes biodiversity action plans which identify the habitats or species selected as priorities for targeted conservation work. The survey area lies within Dumfries and Galloway, for which the Dumfries and Galloway Biodiversity Partnership has published a list of local habitat action plans and key species (Dumfries and Galloway Biodiversity Partnership, 2009).

Section 3 - Methodology

3.1 Desk Study Methods

- 3.1.1 A desk study was carried out to obtain baseline data of bat activity in or near to the study area. This desk study allowed for data within a 5km radius of the site to be considered (10km for high risk species of bat such as *Nyctalus* species and Nathusius' pipistrelle (*Pipistrellus nathusii*)). The following resources were consulted:
 - Dumfries and Galloway Local Biodiversity Action Plan (LBAP) (2009)
 - SiteLink (SNH, 2018)
 - NBN Atlas (NBN Atlas Partnership, 2018)
 - Distribution Atlas of Bats in Britain and Ireland 1980-1999 (Richardson, 2000)
 - Echoes Ecology Ltd's 'ScoMam' Database (a database of over 5,000 mammal records collected by Echoes Ecology Ltd and associate surveyors over 10 years of surveys).

3.2 Daytime Assessment

3.2.1 A walkover assessment of the site was conducted on 30.04.18 to determine the locations for the ground level automated surveys. Nine detectors were requested by the client to be installed near turbine locations. During the walkover assessment no suitable roosting locations were found for bats.

3.3 Ground Level Automated Surveys

3.3.1 Ground automated recorders (AnaBat Express bat detectors with omni-directional microphone) were positioned at nine locations throughout the site for a minimum of 30 nights per season (spring, summer and autumn) totalling 810 nights of data. The detectors recorded between sunset and sunrise.

3.4 Automated Bat Detector Locations

3.4.1 The detectors were placed in the vicinity of the proposed turbine locations. For a table of the locations of the remote detectors please see Appendix I, Table I.1.

3.5 Analysis Methodology

- 3.5.1 Bat activity was downloaded, converted and analysed using AnalookW software. Each call was individually analysed and marked with a species tag, by a trained member of staff, using AnalookW. Once the analysis was complete the data was extracted into a text file using AnalookW's Count Label tool. The text document was then reviewed and a minimum of 20% of the calls went through a QA process by a highly experienced member of staff to ensure the quality of the analysis. All high-risk species (from Nathusius' pipistrelle, noctule or Leisler's bats) were also further checked. No auto-ID software was used during the analysis process, because there can be inaccuracies in the resultant outputs.
- 3.5.2 Once the data was finalised the count files were processed through an inhouse excel spreadsheet (EchoCollation) to give results within graphs and tables.

3.6 Limitations to Survey Work

3.6.1 There are limitations with regards to the identification of bat species using sound analysis. For example, a pipistrelle bat calling at 50kHz could be either a common or a soprano pipistrelle because their frequency ranges overlap; this would be termed an unidentified pipistrelle. The echolocation calls of Myotis bats are notoriously difficult to narrow down to a species (Russ, 2012). Additional information such as habitat the bat was recorded in and geographical location may help to narrow down the potential species in question.

- 3.6.2 The survey methods employed were not taken from 'Bat Surveys Good Practice Guidelines, 2nd Edition' (Hundt, 2012) as due to the nature of the habitat on site it would have been unsafe to undertake walked transects. So, an increased survey effort of static detectors was instead opted for.
- 3.6.3 Due to the prolonged recording sessions of the static detectors and the distance to the site, data was not able to be assessed until the detectors had been retrieved at the end of each session. This resulted in 97% of nights recorded out of the total number of nights required. The loss of the 3% of data does not affect the conclusions of the report due to the overall low levels of bat activity recorded throughout the site.

Section 4 - Results

4.1 Desk Study Results

- 4.1.1 The following bat species are listed as key species on the Dumfries and Galloway Local Biodiversity Action Plan:
 - Daubenton's bat (*Myotis daubentonii*)
 - Whiskered bat (Myotis mystacinus)
 - Natterer's bat (Myotis nattereri)
 - Leisler's bat (Nyctalus leisleri)
 - Noctule (*Nyctalus noctula*)
 - Common pipistrelle (Pipistrellus pipistrellus)
 - Soprano pipistrelle (Pipistrellus pygmaeus)
 - Brown long-eared bat (*Plecotus auritus*).
- 4.1.2 Habitat Action Plans are in place within this Local Biodiversity Action Plan. Those which may be relevant to the protection of bats at the study site are as follows:
 - Acid grasslands
 - Conifer plantations
 - River headwaters
 - Upland heaths.
- 4.1.3 There are no designated sites relating to bat within 10km of the site (Scottish Natural Heritage, 2018).
- 4.1.4 A resources and database search was carried out during October 2018. The results are shown in Table 4.1 below. Where no records exist for a particular species, the Bat Distribution Atlas (Richardson, 2000) has been consulted to identify species known to occur in the area.

Species	Potential Roosting within Structures and trees at the Site*	Record Type	Location
Chiroptera species (exact species unknown)	High	ScoMam roost (building) record	Within 8km north-east of the site
Soprano pipistrelle (<i>Pipistrellus</i> pygmaeus)	High	ScoMam field record	Within 5km south-east of the site
Common pipistrelle (<i>P. pipistrellus</i>)	High	ScoMam field record	Within 5km south-east of the site
Nathusius' pipistrelle (<i>P. nathusii</i>)	Low		Known to occur in this area
<i>Nyctalus</i> species (exact species unknown)	Moderate	ScoMam field record	Within 10km north-west of the site
Leisler's bat (<i>Nyctalus. leisleri</i>)	Moderate	Records provided by Scottish Natural Heritage, accessed through NBN Atlas website (dataset covered by an Open Government Licence (OGL):	Within 10km west of the site

Table 4.1 - Resources and database search results

Species	Potential Roosting within Structures and trees at the Site*	Record Type	Location	
		http://www.nationalarchives.gov.uk/doc/op en-government-licence/version/3/)**		
Noctule (<i>N. noctula</i>)	Moderate		Known to occur in this area) 1
Daubenton's bat (<i>Myotis</i> <i>daubentonii</i>)	Moderate		Known to occur in this area	נו
Natterer's bat (<i>M. nattereri</i>)	Low		Known to occur in this area	נ ו
Whiskered bat (<i>M. mystacinus</i>)	Low		Known to occur in this area	נ ו
Brown long-eared bat (<i>Plecotus</i> <i>auritus</i>)	Low		Known to occur in this area	ว า

Notes:

The lack of bat records in any given area should by no means be interpreted as an indication that no bats and/or roosts exist.

*The potential for the species to be found at the site takes into account not just the geographic species distribution but also the habitat in and around the site.

** The Data Provider, Original Recorder [where identified], and the NBN Trust bear no responsibility for any further analysis or interpretation of that material, data and/or information.

4.2 Automated Detector Results

- 4.2.1 Nine automated detectors were placed out on site for around 30 nights each over three seasonal sessions (May, June and September) during the period 30.04.18 to 01.10.18. Over the survey period a total of 846 nights (in excess of 7,000 hours) was achieved using this approach which exceeded the minimum amount required. The location of each detector is described and shown in the map presented in Appendix I, Figure I.1.
- 4.2.2 Within Table 4.2 the total bat passes for each species are shown as collected on the automated bat detectors. In total 2,944 bat passes were collected during the 846 nights that the automated bat detectors were on site. The results from the automated detector surveys show that soprano pipistrelle were the most commonly encountered species (51.53%). Common pipistrelle were the next most frequently encountered species (40.25%). *Myotis, Nyctalus,* brown long-eared bat, unidentified pipistrelle and unidentified bats were recorded at much lower activity levels. *Myotis* made up 4.35% of the total passes, brown long-eared 1.94% and *Nyctalus* were the lowest at 1.15% of the total calls.

Table 4.2 - Total bat passes and bat activity (bat passes per nour	Table 4.2 - Total bat passes and bat activity (bat passes per boy
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	Open Habitat	Edge Habitat	Closed Habitat	Water / Edge Habitat	Total
Survey Minutes	47,823	207,585	95,646	47,823	398.877
Minutes converted to Hours	797h 03mins	3959h 45mins	1594h 06mins	797h 03mins	6647h 57mins
Common pipistrelle	22	283	0	880	1,185 (40.25%)
Soprano pipistrelle	21	301	0	1,195	1,517 (51.53%)
Unidentified pipistrelle	1	17	0	2	20 (0.68%)
<i>Myotis</i> species	57	68	0	3	128 (4.35%)
<i>Nyctalus</i> species	5	21	2	6	34 (1.15%)
Brown long- eared bat	19	38	0	0	57 (1.94%)
Unidentified bat	0	1	0	2	3 (0.1%)
Total Bat Passes	125	729	2	2,088	2,944
Bat Passes per Hour	0.16	0.21	0.00	2.62	0.44

- 4.2.3 When the activity rate (in Bat Passes per Hour, BPpH to 2 decimal places) is broken down by survey session (as shown in Table 4.3), it can be seen that bat activity was highest in summer with 1.42 BPpH. The activity for spring and autumn was much less, with 0.09 BPpH in spring and 0.01 BPpH in autumn.
- 4.2.4 Table 4.3 also describes bat activity as split by each survey session, automated bat detector location and by habitat. This table shows that activity was at its highest at Location 2 during the summer, with most other detectors recording a peak of activity during summer also. Due to the higher levels of activity at Location 2 in the summer this makes Water / Edge the habitat with the highest activity recorded at 2.62 BPpH. The closed habitat locations recorded a very small amount of activity (0.01 BPpH).

Table 4.3 - Survey sessions (all bats recorded, BPpH) compared against each automated detector location and habitat.

Habitat Type	Open	Water / Edge	Edge					Clo	sed	BPpH
Session	Loc1	Loc2	Loc3	Loc4	Loc5	Loc6	Loc9	Loc7	Loc8	
May (Spring)	0.32	0.04	0.07	0.14	0.11	0.00	0.00	0.00	0.00	0.09
June (Summer)	0.10	9.68	0.97	0.87	0.51	0.20	0.41	0.00	0.00	1.42
September (Autumn)	0.06	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.01
ВРрН	0.16	2.62	0.35	0.28	0.20	0.08	0.12	0.00	0.00	0.44
Total BPpH per Habitat	0.16	2.62			0.21			0.	01	0.44

4.2.5 Figure 4.1 provides a chart of the bat activity levels (BPpH) for all of the automated surveys within the different time slots of the survey. The peak within the middle of the evening shows that bats are most likely using the site for foraging. Bat activity drops off towards dawn to almost no activity. This suggest bats are leaving the site to return back to their roosting locations.



Figure 4.1 - Overnight activity pattern (BPpH) (all automated surveys combined)

4.3 Assemblage of Bat Species at Euchanhead

4.3.1 Soprano pipistrelle, common pipistrelle, unidentified pipistrelle, *Myotis*, *Nyctalus* and brown longeared bats were all encountered within Euchanhead. The presence of these species is now examined to investigate the likelihood of risk for each species group, noting higher, medium and lower risk species groups (Table 4.4).

Table 4.4 - Potential risks to bats (individuals and populations) (adapted from Mitchell-Jones and Carlin, 2014). The species in bold show those potentially active in or around this site

			-
Bats likely to be at individual risk from wind turbines	<i>Myotis</i> species Long-eared bats Horseshoe bats	Soprano pipistrelle* Common pipistrelle* Serotine* Barbastelle	Noctule Leisler's Nathusius' pipistrelle
Bat Populations likely to be threatened due to the impacts from wind turbines	Myotis species Long-eared bats Horseshoe bats Soprano pipistrelle* Common pipistrelle*	Serotine* Barbastelle	Noctule Leisler's Nathusius' pipistrelle

* On a case by case basis, these species may require to be raised to a higher level of risk dependent upon their geographic distribution, local abundance, locality of known roosts, as well as the proposed wind turbine dimensions and overall wind farm site design.

4.4 Risk to Individual Bats

4.4.1 Within the assemblage of species found to occur at the site, the activity rate of soprano, common and unidentified pipistrelle species was 0.41 BPpH; these species are at medium risk from an individual bat perspective and were the most commonly encounter species on the site. *Myotis* and brown long-eared bats were both recorded and had an activity rate of 0.03 BPpH; these species are at low risk from an individual bat perspective. *Nyctalus* bats were recorded and had

a very low activity rate of >0.00 BPpH; these species are at high risk from an individual bat perspective and were the least recorded on site (Table 4.5).

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	Low Risk	Medium Risk	High Risk
Open Habitat	0.10	0.06	0.01
Edge Habitat	0.03	0.17	0.01
Closed Habitat	0.00	0.00	0.00
Water/Edge Habitat	0.00	2.61	0.01
Total Passes per Hour	0.03	0.41	0.00

Table 4.5 - Total BPpH Surveyed - Rick to Individual Bats

4.5 Risk to Bat Populations

4.5.1 Within the assemblage of species found to occur on site, *Nyctalus* bats are the only bats which are at high risk from a population perspective and had an activity rate of >0.00 BPpH. All the other species (common, soprano, unidentified pipistrelle, brown long-eared and *Myotis* bats) are at low risk from a population perspective and had an activity rate of 0.44 BPpH (Table 4.6).

Table 4.6 - Total BPpH Surveyed - Risk to Bat Populations

	Low Risk	Medium Risk	High Risk
Open Habitat	0.15	0.00	0.01
Edge Habitat	0.20	0.00	0.01
Closed Habitat	0.00	0.00	0.00
Water/Edge Habitat	2.61	0.00	0.01
Total Passes per Hour	0.44	0.00	0.00

Section 5 - Discussion

5.1 Automated Bat Detector Surveys

- 5.1.1 Most activity recorded on the detectors was during the summer (1.42 BPpH), with lower levels in the spring (0.08 BPpH) and the lowest in the autumn (0.01 BPpH). The higher levels of activity during summer could have been due to the increased insect activity which will have been associated with warmer weather conditions.
- 5.1.2 The most commonly encountered species was soprano pipistrelle, followed by common pipistrelle. The pipistrelle species accounted for 92.46% of the total bat passes. *Myotis, Nyctalus* and brown long-eared bats were recorded much less frequently, with *Myotis* accounting for 4.35%, *Nyctalus* for 1.94% and brown long-eared for 1.15% of the total bat passes.
- 5.1.3 Due to the nature of this type of monitoring (i.e purely acoustic) it is not possible to put a figure on the number of individual bats occurring at any one location. The results can only be interpreted as far as they show what bat activity was occurring at the time of the surveys as the surveys only take a sample of the overall activity for the year, within the range of the detectors microphone. The surveys took place as a time of year when bats are active (i.e. between April and September) and as such bats would have been recorded when they were present on site. It is apparent that the site is used by a relatively low number of bats for foraging and commuting purposes.
- 5.1.4 In particular bat activity levels were much higher in water/edge (2.62 BPpH) habitat which could suggest that the water courses and forestry edges are important for commuting and foraging bats. With this in mind, the wind farm should be designed to allow the locations of the turbines to be situated away from forestry and water features on site to minimise the risk to bats. The guidelines 'Bats and Onshore Wind Turbines: Interim Guidance' (Mitchell-Jones and Carlin, 2014) suggests a minimum buffer of 50m from rotor swept area to feature. In order to calculate the correct buffer distance from the turbine base to a habitat feature at ground level allowing for the rotor sweep buffer, a calculation, as shown below, needs to be applied. It considers the recommended minimum buffer (50m), the blade length (bl), the hub height (hh) and the feature height (fh).

buffer = $\sqrt{(50m + bl)^2 - (hh - fh)^2}$

At the time of writing this report the dimensions of the turbines were not known. Once the specifications have been decided upon the above formula should be used and the buffer calculated should be adhered to.

5.1.5 With the levels of activity for high (< 0.00 BPpH for risk to populations and individual bats) and moderate risk (0.38 BPpH for risk to individual bats) bat activity being very low the windfarm development does not pose a significant impact on bats.

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Appendix I: Detector Locations



Figure I.1- Detector Locations Map

Location No	Associated Turbine Coordinates	Detector Coordinates	Habitat	Location Description
1	NS 68453 06650	NS 68659 06385	Open	In a clear fell section of land
2	NS 67919 06321	NS 67911 06343	Water / Edge	Edge of a small burn
3	NS 68263 06116	NS 68263 06116	Edge	Within a plantation ride
4	NS 67785 05810	NS 67813 05733	Edge	Within a plantation ride
5	NS 67722 05231	NS 67832 05207	Edge	Within a plantation ride
6	NS 67277 05280	NS 67349 05300	Edge	Within a plantation ride
7	NS 67182 04649	NS 67244 04577	Closed	Within a plantation ride
8	NS 66847 04868	NS 66860 04842	Closed	Within a plantation ride
9	NS 66594 04236	NS 66611 04205	Edge	Within a plantation ride

Table 1.1 - Automated detector location	able I.1 -	- Automated	l detector	location
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