

Technical Appendix 8.2

Kirkton Energy Park

Bat Survey

Kirkton Wind Farm Ltd.

wind2

November 2022



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1 Introduction

1.1 Terms of Reference

In August 2020, Atmos Consulting Ltd. (Atmos) was commissioned by Kirkton Wind Farm Ltd. to undertake bat survey work to inform the proposed layout of the Kirkton Energy Park, located approximately 2.1km south of Melvich, Sutherland (hereafter referred to as the "site").

1.2 Site Location and Description

The site is situated approximately 2.1km south of the village of Melvich, in the Scottish Highlands with an approximate grid reference of NC 87999 59788 (Appendix A, Figure 8.2.1 refers).

The site is located in an area of grazing land, planted native woodland and blanket bog ranging in altitude from 20 to 160m Above Ordnance Datum (AOD). The highest area to the south comprises of large, nearly flat expanses of blanket bog.

The north of the site is rougly split into east and west sectors by the burn Allt na h-Eaglaise and its tributaries. The slopes to the west of this rise to a large block of commercial conifer plantation, and those to the east rise to a long hill at an altitude of approximately 100m AOD. An access track runs south from Kirkton Farm and along the eastern hill.

The south of the site is split by the burns Allt nan Gall and Allt an Tigh-choinneimh that drain east into the Halladale River.

The site is used mainly for sheep and cattle grazing, although there is also some planted and semi-natural woodland. There is some evidence of grazing pressure from deer. The survey area contains a variety of plant communities including blanket bog, wet heath, dry heath, acid grassland, acid flush, areas of continuous bracken, broadleaved woodland, acid grassland, improved grassland and marshy grassland.

There are two fields located immediately adjacent to the A836 that have been identified as suitable for the creation of turning areas: turning area A is located to the north west of the main site, adjacent to the building at Strathroy; and turning area B is located at the western edge of Melvich, adjacent to the road junction between the A836 and the road to Portskerra. Turning area A supports an improved grassland habitat and turning area B supports an improved grassland mosaic.

1.3 Proposed Development

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

Associated infrastructure includes hard standing areas for erecting cranes at each turbine location, on-site access tracks and turning heads, an on-site substation



compound with control building and battery storage, and a temporary construction compound. The proposed development would be time limited to 30 years from the date of final commission.

1.4 Objectives

The principal objectives of this Technical Appendix are as follows:

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



2 Context

2.1 Legislation and Policy

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

It is an offence to deliberately or recklessly:

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

It is also an offence of strict liability to:

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

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

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

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



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

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

2.2 Impacts of Wind Turbines on Bat Species

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

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

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

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

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

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

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



3 Methodology

3.1 Desk Study

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

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

3.2 Site Surveys

All methodology follows the current guidance in relation to bats and onshore wind turbines (Hundt, 2012; Collins, 2016; Scottish Natural Heritage (SNH), 2019) unless otherwise specified.

Habitat Assessment Surveys of the site and the immediate surrounding area were undertaken in September / October 2020 by experienced Atmos Consulting Ltd. ecologists. Deployment of static bat detectors was undertaken at various times between May and August 2021 (Section 3.2.2 refers).

3.2.1 Habitat Assessment

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

3.2.2 Activity Surveys – Static Recorders

In line with current guidance in relation to onshore wind energy projects (SNH, 2019), activity surveys were limited to the deployment of automated static detectors.

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

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



		Deployment Location (Turbine			Detector Failure Date	Minimum		
Survey Visit	Detector ID and Model	Number, Grid Reference)	Deployment Date	Collection Date		Number of Active Nights	Scheduled Start / End Time	Total Time Recorded
1	1 Wildlife Acoustic SM2	Turbine 10 287835 959068	18/05/2021	07/06/2021	07/06/2021	20	21:09 / 04:41	150 hrs 40 mins
	2 Wildlife Acoustic SM2	Turbine 4 287927 960225	17/05/2021	07/06/2021	07/06/2021	21	21:09 / 04:41	158 hrs 12 mins
	3 Wildlife Acoustic SM2	Turbine 9 288619 959369	18/05/2021	07/06/2021	07/06/2021	20	21:09 / 04:41	150 hrs 40 mins
	4 Wildlife Acoustic SM2	Turbine 11 288463 958801	18/05/2021	07/06/2021	06/06/2021	19	21:09 / 04:41	143 hrs 8 mins
	5 Wildlife Acoustic SM2	Turbine 6 288016 959810	18/05/2021	21/06/2021	18/06/2021	31	21:09 / 04:41	233 hrs 32 mins
	6 Wildlife Acoustic SM2	Turbine 8 288199 959466	18/05/2021	07/06/2021	05/06/2021	18	21:09 / 04:41	135 hrs 36 mins
	7 Wildlife Acoustic SM2	Turbine 2 287984 960728	17/05/2021	07/06/2021	07/06/2021	21	21:09 / 04:41	158 hrs 12 mins
	8 Wildlife Acoustic SM2	Turbine 7 288783 959732	18/05/2021	07/06/2021	20/05/2021	2	21:09 / 04:41	15 hrs 4 mins
	9	Turbine 5	18/05/2021	07/06/2021	04/06/2021	17	21:09 / 04:41	128 hrs 4 mins

Table 3: Summary of automated static detector deployment



Survey Visit	Detector ID and Model	Deployment Location (Turbine Number, Grid Reference)	Deployment Date	Collection Date	Detector Failure Date	Minimum Number of Active Nights	Scheduled Start / End Time	Total Time Recorded
	Wildlife Acoustic SM2	288589 960133						
	10 Wildlife Acoustic SM2	Turbine 12 287914 958659	18/05/2021	07/06/2021	07/06/2021	20	21:14 / 04:41	150 hrs 40 mins
	11 Wildlife Acoustic SM2	Turbine 1 288077 961091	18/05/2021	07/06/2021	21/05/2021	3	21:14 / 04:41	22 hrs 36 mins
	12 Wildlife Acoustic SM2	Turbine 3 288578 960462	18/05/2021	07/06/2021	07/06/2021	20	21:14 / 04:41	150 hrs 40 mins
2	1 Wildlife Acoustic Song Meter Mini	Turbine 2 287984 960728	07/06/2021	21/06/2021	21/06/2021	14	21:49 / 04:36	94 hrs 58 mins
	2 Wildlife Acoustic Song Meter Mini	Turbine 3 288578 960462	07/06/2021	21/06/2021	21/06/2021	14	21:49 / 04:36	94 hrs 58 mins
	3 Wildlife Acoustic Song Meter Mini	Turbine 4 287927 960225	07/06/2021	21/06/2021	21/06/2021	14	21:49 / 04:36	94 hrs 58 mins
	4 Wildlife Acoustic Song Meter Mini	Turbine 5 288589 960133	07/06/2021	21/06/2021	21/06/2021	14	21:49 / 04:36	94 hrs 58 mins
	5 Wildlife Acoustic Song Meter Mini	Turbine 6 288016 959810	07/06/2021	21/06/2021	21/06/2021	14	21:49 / 04:36	94 hrs 58 mins
	6	Turbine 7	07/06/2021	21/06/2021	21/06/2021	14	21:49 / 04:36	94 hrs 58 mins



		Deployment Location (Turbine			Detector Failure Date	Minimum		
Survey Visit	Detector ID and Model	Number, Grid Reference)	Deployment Date	Collection Date		Number of Active Nights	Scheduled Start / End Time	Total Time Recorded
	Wildlife Acoustic Song Meter Mini	288783 959732						
	7 Wildlife Acoustic Song Meter Mini	Turbine 8 288199 959466	07/06/2021	21/06/2021	21/06/2021	14	21:49 / 04:36	94 hrs 58 mins
	8 Wildlife Acoustic Song Meter Mini	Turbine 9 288619 959369	07/06/2021	21/06/2021	21/06/2021	14	21:49 / 04:36	94 hrs 58 mins
	9 Wildlife Acoustic Song Meter Mini	Turbine 10 287835 959068	07/06/2021	21/06/2021	21/06/2021	14	21:49 / 04:36	94 hrs 58 mins
	10 Wildlife Acoustic Song Meter Mini	Turbine 11 288463 958801	07/06/2021	21/06/2021	21/06/2021	14	21:49 / 04:36	94 hrs 58 mins
	11 Wildlife Acoustic Song Meter Mini	Turbine 12 287914 958659	07/06/2021	21/06/2021	21/06/2021	14	21:49 / 04:36	94 hrs 58 mins
	12 Wildlife Acoustic Song Meter Mini	Turbine 13 288324 958385	07/06/2021	21/06/2021	21/06/2021	14	21:49 / 04:36	94 hrs 58 mins
	13 Wildlife Acoustic Song Meter Mini	Turbine 14 287912 957942	07/06/2021	21/06/2021	21/06/2021	14	21:49 / 04:36	94 hrs 58 mins
3	1 Wildlife Acoustic Song Meter Mini	Turbine 1 288077 961091	16/08/2021	31/08/2021	31/08/2021	15	20:26 / 06:42	154 hrs 0 mins
	2	Turbine 3	16/08/2021	31/08/2021	31/08/2021	15	20:26 / 06:42	154 hrs 0 mins



		Deployment Location (Turbine			Detector Failure Date	Minimum		
Survey Visit	Detector ID and Model	Number, Grid Reference)	Deployment Date	Collection Date		Number of Active Nights	Scheduled Start / End Time	Total Time Recorded
	Wildlife Acoustic Song Meter Mini	288578 960462						
	3 Wildlife Acoustic Song Meter Mini	Turbine 4 287927 960225	16/08/2021	31/08/2021	31/08/2021	15	20:26 / 06:42	154 hrs 0 mins
	4 Wildlife Acoustic Song Meter Mini	Turbine 5 288589 960133	16/08/2021	31/08/2021	31/08/2021	15	20:26 / 06:42	154 hrs 0 mins
	5 Wildlife Acoustic Song Meter Mini	Turbine 6 288016 959810	16/08/2021	31/08/2021	31/08/2021	15	20:26 / 06:42	154 hrs 0 mins
	6 Wildlife Acoustic Song Meter Mini	Turbine 7 288783 959732	16/08/2021	31/08/2021	31/08/2021	15	20:26 / 06:42	154 hrs 0 mins
	7 Wildlife Acoustic Song Meter Mini	Turbine 8 288199 959466	17/08/2021	31/08/2021	31/08/2021	14	20:26 / 06:42	143 hrs 44 mins
	8 Wildlife Acoustic Song Meter Mini	Turbine 9 288619 959369	17/08/2021	31/08/2021	31/08/2021	14	20:26 / 06:42	143 hrs 44 mins
	9 Wildlife Acoustic Song Meter Mini	Turbine 10 287835 959068	17/08/2021	31/08/2021	31/08/2021	14	20:26 / 06:42	143 hrs 44 mins
	10 Wildlife Acoustic Song Meter Mini	Turbine 11 288463 958801	17/08/2021	31/08/2021	31/08/2021	14	20:26 / 06:42	143 hrs 44 mins
	11	Turbine 12	17/08/2021	31/08/2021	31/08/2021	14	20:26 / 06:42	143 hrs 44 mins



Survey Visit	Detector ID and Model	Deployment Location (Turbine Number, Grid Reference)	Deployment Date	Collection Date	Detector Failure Date	Minimum Number of Active Nights	Scheduled Start / End Time	Total Time Recorded
	Wildlife Acoustic Song Meter Mini	287914 958659						
	12 Wildlife Acoustic Song Meter Mini	Turbine 13 288324 958385	17/08/2021	31/08/2021	31/08/2021	14	20:26 / 06:42	143 hrs 44 mins



The proposed development is for 11 turbines, and in line with current guidance (SNH, 2019), twelve detectors (thirteen during Survey 2) were utilised.

A number of limitations (Section 3.4 refers) were experienced in relation to the placement and performance of the static detectors, particularly during Survey 1. This resulted in a number of the detectors not recording for the full deployment period.

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

3.3 Sonogram Analysis

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

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

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

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

Table 4: Criteria for Determining Bat Activity Levels

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

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



time duration (sunset to sunrise) and days of deployment (adjusted to each detectors period of functioning).

3.4 Limitations

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

- The deployed weather station did not function correctly with data not logged. As a result, no site specific data was obtained. This represents a significant limitation when attempting to draw conclusions on the influence of weather on activity levels. Proxy data from approximately 8.15km to the north west of the site was utilised to provide good estimates of wind and temperature, but rainfall from this location would not be particularly relevant.
- Some static detectors deployed (particularly during Survey 1) functioned for varying times with some units recording for only a small number of days. The reasons for this are unclear but is likely to be a result of the effect of cold temperatures on batteries. This reduces the survey duration and results in variable survey durations at different locations. For any detailed analysis, data is adjusted to a per unit time measure removing the majority of this limitation, however, some locations did not record the recommended number of nights resulting in a limitation.
- During late 2021 a number of design iterations took place which resulted in removal and movement of proposed turbine locations, in some cases away from static recording positions. This is particularly pertinent with the removal of turbines along the eastern flank, with the finalised design being a linear approach of 11 turbines. Whilst this limitation on data must be kept in mind during analysis, it is not considered that it significantly affects the robustness of the data gathered, or the ability to draw conclusions from the data regarding the relative levels of bat activity across the site. The evolution of the site layout design is shown on Figure 8.2.2 (Appendix A refers).

Although a number of limitations exist the data obtained provides a clear picture of bat activity across the site and wider environs, and as a result it is not anticipated that the limitations affect the robustness of the results to a significant degree.



4 Results

4.1 Desk Study

4.1.1 Designated Sites

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

4.1.2 Species Records

According to the publicly held datasets on the National Biodiversity Network (NBN) Atlas, there are no records of any bat species within 5km of the approximate centre of the site (NC 87999 59788) for the past 15 years.

4.1.3 Review of Existing Bat Survey Data from Wind Energy Projects

Six wind farm developments are located within 10km of the site (The Highland Council, 2021), and each of these was reviewed with respect to the level of bat activity, and likely significant effects (Table 5 refers).

Wind Farm Development	Details	Status	Approx. Distance from Site at its closest point	Bat Species Present	Likely Significant Effect
Limekiln \$36 Variation	19 turbines	Consented	7.46km to the east	Common pipistrelle at low level	None
Armadale Wind Farm	12 turbines	In Planning	6.64km to the west north west	No survey information present	Unknown
Strathy North	33 turbines	Constructe d	4.47km to the south west	No survey information present	Unknown
Strathy Wood	13 turbines	Consented	4.60km to the south west	Common pipistrelle at low level Soprano pipistrelle at very low level	None
Strathy South	35 turbines	Consented	7.95km to the south west	No survey information present	Unknown
Melvich Wind Energy Hub	13 turbines	Scoping	Immediately adjacent to the north	No survey information present	Unknown

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



4.2 Habitat Assessment

The site is located in a predominantly upland setting with the habitats within the turbine envelope dominated by blanket bog and heathland with topography ranging in altitude from 30 to 120m Above Ordnance Datum (AOD).

Very few relevant landscape features exist within the site itself. Deer and post-and-wire livestock fencing are scattered throughout. In the north of the site, the burn Allt na h-Eaglaise (and associated tributaries) divide the area into east and west sectors, with slopes to the west rising to a large block of commercial conifer plantation, and those to the east rising to a long hill at an altitude of approximately 100m AOD. In the south of the site, the burns Allt nan Gall and Allt an Tigh-choinneimh drain east into the Halladale River. Although such features may represent navigation aids for bats, they do not represent valuable foraging or commuting habitat.

Elements of broad-leaved woodland (plantation and semi-natural) are scattered about with the main elements located adjacent to the lower reaches of the Allt nan Gall watercourse in the east of the site, with further woodland adjacent to the lower reaches of the Allt na h-Eaglaise (and tributaries) in the north of the site.

The woodland is dominated by downy birch Betula pubescens with scattered / occasional rowan Sorbus aucuparia, alder Alnus glutinosa, grey willow Salix cinerea, goat willow Salix caprea, silver birch Betula pendula, and hazel Corylus avellana. It is noted that the woodland is not mature in age meaning that the trees generally support little to no potential bat roost features such as upward developing rot holes. Nevertheless, and due to the relative scarcity of native woodland in Caithness and Sutherland, it is recognised that these woodland features may form a locally important foraging resource for bats.

The Halladale River is located outwith the site to the east and is generally a wide, meandering river with a number of scattered pools along its length. This provides sheltered foraging habitat for specialist aquatic foragers such as Daunbenton's as well as more generalist species such as pipistrelles. Adjacent habitat along the river's corridor is generally agricultural fields with scattered farms and houses providing potential roosting and foraging habitat.

4.2.1 Wider Habitat and Connectivity

The wider environs can generally be split into the lowland coastal strip to the north along the A836, with rivers such as the Halladale River extending inland with relatively intensive agricultural fields immediately adjacent. To the south and west of the site the landscapes are dominated by open upland habitats forming the characteristic Flow Country.

The northern latitude and generally open habitats of low suitability result in local bat populations generally being at low density with low species diversity.

4.3 Bat Activity Survey

4.3.1 Weather

Current guidance (SNH, 2019) stipulates that surveys should capture a sufficient number of nights with appropriate weather conditions for bat activity. Lower temperature



requirements are identified for Scotland with a minimum recommended temperature of 8°C at dusk. Due to malfunctions with the on-site weather station, the nearest reliable historical weather data was used as a proxy for conditions on site. The weather station was located at Strathy, approximately 8.15km to the north west of the site at approximately 68m above sea level (asl), allowing broad comparisons to be made for the site in the absence of site specific weather data.

During the spring survey, average temperatures were generally in excess of the 8°C minimum although the night time minimums were in the region of 6 to 7°C. The summer deployment period had minimum temperatures in the region of 6 to 10°C. The autumn deployment period had minimum temperatures generally in excess of the 8°C minimum (in the region of 10 to 12°C) (Chart 1 refers).

The average wind speeds throughout the survey periods were generally around the acceptable survey maximum of 5 - 6m/s with occasional daily highs around 8 - 10m/s. Within northern Scotland the wind is generally high and the maximum wind speeds indicate that throughout the majority of the 2021 activity season strong gusts were prevalent (Chart 2 refers).

Rainfall was varied throughout the survey periods and as rainfall is likely to be more site specific than either temperature or wind speed, the details presented in Chart 3 should be viewed cautiously. However, based on the available information, significant rainfall was present during the survey periods but significant dry periods were also present. Overall, it is anticipated that the weather is likely to have affected the activity levels from bats within the Survey Area, although the weather was generally adequate and consistent with that of the region.



25 20 Temperature (degrees Celsius) 10 5 0 301 311 311 311 301 31 1 May September October June July August Date Daily Average — Daily High — Daily Low

Chart 1: Temperature (Strathy East proxy) for 2021 field season.





Chart 2: Wind speed (Strathy East proxy) for 2021 field season.





Chart 3: Average monthly rainfall (Strathy East proxy) for 2021.



4.3.2 Overall Site Activity

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

Table 6 shows the number of common pipistrelle passes per detector per location per deployment period, with this converted to bat passes per hour and median bat passes per hour (Chart 4 refers). The results are also presented in Appendix A (Figures 8.2.3a – 8.2.3c refer).

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

Survey	Detector	Location (turbine number and	Number of common pipistrelle	Total Time	Bat passes	Median bat passes	Activity
Period	ID	grid reference	passes	Recorded	per hour	per hour	level
1	1	Turbine 10 287835 959068	0	150 hrs 40 mins	0	0	Low
	2	Turbine 4 287927 960225	33	158 hrs 12 mins	0.21	2	Low
	3	Turbine 9 288619 959369	0	150 hrs 40 mins	0	0	Low
	4	Turbine 11 288463 958801	4	1 43 hrs 8 mins	0.03	1	Low
	5	Turbine 6 288016 959810	0	233 hrs 32 mins	0	0	Low
	6	Turbine 8 288199 959466	0	135 hrs 36 mins	0	0	Low
	7	Turbine 2 287984 960728	0	158 hrs 12 mins	0	0	Low
	8	Turbine 7 288783 959732	0	15 hrs 4 mins	0	0	Low
	9	Turbine 5 288589 960133	6	128 hrs 4 mins	0.05	1	Low
	10	Turbine 12 287914 958659	0	150 hrs 40 mins	0	0	Low
	11	Turbine 1 288077 961091	0	22 hrs 36 mins	0	0	Low
	12	Turbine 3 288578 960462	0	150 hrs 40 mins	0	0	Low
2	1	Turbine 2 287984 960728	2	94 hrs 58 mins	0.02	1	Low
	2	Turbine 3 288578 960462	0	94 hrs 58 mins	0	0	Low
	3	Turbine 4 287927 960225	3	94 hrs 58 mins	0.03	1	Low
	4	Turbine 5 288589 960133	0	94 hrs 58 mins	0	0	Low



		Location	Number of			Median	
Survey Period	Detector ID	(turbine) number and grid reference	common pipistrelle passes	Total Time Recorded	Bat passes per hour	bat passes per hour	Activity level
	5	Turbine 6	0	94 hrs	0	0	Low
		288016 959810		58 mins			
	6	Turbine 7	0	94 hrs	0	0	Low
	7	288/83 959/32	0	58 mins	0	0	
	/	101010E 8	0	94 hrs 58 mins	0	0	Low
	8	Turbine 9	0	94 hrs	0	0	low
	0	288619 959369	0	58 mins	0	Ŭ	2011
	9	Turbine 10	0	94 hrs	0	0	Low
		287835 959068		58 mins			
	10	Turbine 11	0	94 hrs	0	0	Low
		288463 958801		58 mins			
	11	Turbine 12	0	94 hrs	0	0	Low
		287914 958659		58 mins			
	12	Turbine 13	0	94 hrs	0	0	Low
	13	200324 730303	0	94 brs	0	0	
	10	287912 957942	0	58 mins	0	0	LOW
3	1	Turbine 1	14	154 hrs	0.09]	Low
		288077 961091		0 mins			
	2	Turbine 3	5	154 hrs	0.03	1	Low
		288578 960462		0 mins			
	3	Turbine 4	3	154 hrs	0.02	1	Low
		287927 960225		0 mins			
	4	Turbine 5	2	154 hrs	0.01	1	Low
	F	288589 960133	4	U MINS	0.02	1	Lovi
	5	10rDine 6	4	154 hrs 0 mins	0.03	I	LOW
	6	Turbine 7	2	1.54 hrs	0.01	1	low
	0	288783 959732	L	0 mins	0.01		2011
	7	Turbine 8	2	143 hrs	0.01	1	Low
		288199 959466		44 mins			
	8	Turbine 9	7	143 hrs	0.05	1	Low
		288619 959369		44 mins			
	9	Turbine 10	1	143 hrs	0.01	1	Low
		287835 959068		44 mins			
	10	Iurbine 11	2	143 hrs	0.01	1	Low
	11	200403 7300UI	0	44 [[]][]S	0	0	Low
	11	287914 958659	0	44 mins	0	0	LOW
	12	Turbine 13	1	143 hrs	0.01	1	Low
		288324 958385		44 mins			

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0.25





As can be seen in Table 6 and Chart 4, the number of bat passes recorded within each deployment period was low with a high of 33 recorded at the original location of turbine 4 during the spring deployment phase. When converted to bat passes per hour, it is clear that activity across the site is low reflecting it's exposed, upland geographical location with little to no potential roosting and / or foraging habitat.

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

4.3.3 Spatial Variation

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

4.3.4 Temporal Variation

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

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



5 Discussion

The Kirkton Energy Park site is characterised by an area of upland, exposed habitat which offers sub-optimal habitat for bats in terms of foraging and commuting. With respect to roosting, the site offers no significant potential due to a lack of structures and mature deciduous woodland habitat.

Activity levels across the site were very low with a total of 91 bat passes across all detectors over three deployment occasions, in line with expectations. It is worth noting that the Halladale River is located approximately 0.46km to the east of the site boundary and 1.28km east of the nearest turbine location. The river provides both high quality commuting and foraging habitat with sheltered foraging areas in an otherwise exposed landscape.

Common pipistrelle are considered to be a species of medium risk from wind turbine mortality. However, based upon these results, it is concluded that the frequency of use of the site and specifically the turbine envelope is low enough that the risk of killing and injury of bats from the wind turbines is very low. This risk is further reduced due to the open nature of the site and lack of features such as mature deciduous woodland.



6 References

Collins, J. (Ed). (2016). Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd Edn).

Hundt, L. (ed). (2012). Bat Surveys Good Practice Guidelines, 2nd ed. Bat Conservation Trust.

Lintott, P. & Mathews, F. (2018). Reviewing the evidence on mitigation strategies for bats in buildings: informing best-practice for policy makers and practitioners. CIEEM.

Russ, J. (2012). British Bat Calls: A Guide to Species Identification. Pelagic Publishing.

Scottish Natural Heritage (2019). Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation.

The Highland Council (2021). Highland Council Wind Turbine Map https://www.highland.gov.uk/info/198/planning_-_long_term_and_area_policies/152/ renewable_energy/4 (accessed 02 December 2021)



Appendices

Appendix A. Figures

Figure 8.2.1	-	Site Location
Figure 8.2.2	-	Bat Detectors and Site Layout Iterations
Figure 8.2.3a	-	Bat Activity Survey Results – Spring
Figure 8.2.3b	-	Bat Activity Survey Results – Summer
Figure 8.2.3c	-	Bat Activity Survey Results – Autumn





Kirkton Energy Park

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Figure 8.2.2 Bat Detectors and Site Layout Iterations

<u>Key</u>

- Site boundary
- 🗼 Proposed turbine
- Proposed infrastructure

Bat detectors

- O Bat Detector Location -Spring
- Bat Detector Location -Summer
- Bat Detector Location Autumn



0 0.125 0.25 Kilometers

Scale @ A3:

1:15,000

A

0.5



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Drawn by: JT	Checked by: TH	Approved by: JW





