
Lochluichart Wind Farm Extension II (LXX)

on behalf of Infinergy Limited

Appendix 10.B – Desk Study & Protected Mammals



Document Control				
Project Name:		Lochluichart Wind Farm Extension II		
Project Number:		Infin-342-1358		
Report Title		Desk Study & Protected Mammals		
Issue	Date	Notes	Prepared	Reviewed
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02	20/04/2021	Final		S Whiteley BSc (Hons) MCIEEM

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1 INTRODUCTION

1.1 Background

1.1.1 This report details the results of a desk study and protected mammal surveys undertaken for the Lochluichart Wind Farm Extension II. The following terms are used throughout this report:

- Site – land encompassing the Proposed Development, as shown on **Figure 10.1**.
- Study Areas – defined as relevant within survey methodologies.

1.1.2 The proposed turbines are located north of Lochluichart Wind Farm and Extension ('Operational Schemes') and west of Corriemoillie Wind Farm.

2 OVERVIEW

2.1 Aims and Objectives

2.1.1 The aim of this report is to describe and assess the presence, or likely presence, of protected and notable species (excluding plants, which are provided within **Appendix 10.A**) within the Site, or of those that could be impacted by the development in the locality. The objectives were to:

- Undertake a desk study to identify existing protected species records within the Site and surrounding area;
- Undertake field surveys to identify field evidence and/or potential of any protected species within the Site and a predefined buffer zone; and,
- Analyse field signs identified to gain an understanding of the ecology and behaviour of protected species within the Site.

3 METHODOLOGY

3.1 Personnel

3.1.1 All field surveys were completed by Mr A Carroll, Mr P. Carroll, Mr R. Jenkins and Mr M. Wood, all highly experienced and competent ecological surveyors.

3.1.2 Bat sound analysis has been undertaken by Ms S. Whiteley BSc MCIEEM who has completed specific training on bat sound analysis (training by Dr S. Sowler MCIEEM) and has over 9 years' experience conducting sound analysis for sites across the UK and 10 years' experience completing bat surveys.

3.2 Desk Study

3.2.1 A desk study was undertaken to collate existing information on the presence of designated sites for nature conservation and existing records of protected and notable faunal species within the Site and surrounding area.

3.2.2 The following key sources were consulted:

- Scottish Natural Heritage (SNH) Sitelink (<http://gateway.snh.gov.uk/sitelink/>);

- National Biodiversity Network (NBN) Database – records within a 5km radius from online portal; and,
- Highland Biological Recording Group (HBRG) – records for NH37 11km grid square.

3.3 Field Surveys

3.3.1 This report details the methodology and results of the following protected species surveys:

- Bat activity surveys:
 - Manual transects; and,
 - Automated recording.
- Otter survey;
- Water vole survey;
- Pine marten survey;
- Wildcat survey; and,
- Badger survey.

4 BAT SURVEYS

4.1 Aims and Objectives

4.1.1 With reference to Chapter 10 of Hundt, 2012¹ (applicable at the time of survey), the objectives of the surveys were to:

- Determine the presence of bat species within the Site.
- Provide an indication of bat utilisation across the Site.
- Determine the level of activity of all bat species, where possible.

4.1.2 Bat survey methodology and subsequent interpretation of results made reference to the following guidance documents:

- Collins, J. (ed.) (2016). *Bat Surveys for Professional Ecologists: Good Practice Guidelines* (3rd Edition). The Bat Conservation Trust, London.
- Mitchell-Jones, A. J. & McLeish, A. P. (2004). *Bat Workers Manual. 3rd Edition*. Joint Nature Conservation Committee, Peterborough.
- Russ, J. (2012). *British Bat Calls: A Guide to Species Identification*. Pelagic Publishing, Exeter.

¹ Hundt (2012) Bat Survey Guidelines (2nd Edition). The Bat Conservation Trust, London. This guidance was replaced in 2016 by Collins, J. (ed.) (2016). *Bat Surveys for Professional Ecologists: Good Practice Guidelines* (3rd Edition). The Bat Conservation Trust, London, however the survey methodology remains valid.

- 4.1.3 **Table 4.1** summarises the survey methodologies adopted and the following sections provide full details:

Table 4.1: Bat survey methodologies

Method	Survey Date(s)	Survey Area
Walked Transects	September and October 2015	Included habitats representative of turbine locations. Figure 10.3.
Automated Monitoring	August and October 2015	Included habitats representative of turbine locations. Figure 10.3.

4.2 Methodology – Walked Transects

- 4.2.1 Two walked transects were undertaken within the Site, as detailed within **Table 4.2**. Weather conditions during each survey were conducive to bat activity, being mild and dry without high wind speeds.

Table 4.2: Manual activity survey dates and timing

Date	Sunrise/sunset	Start	Finish	Rain	Temperature (degrees)	Wind
08/09/2015	20:01	19:31	21:30	0	10	South easterly, light
14/10/2015	18:17	17:47	20:25	0	8	Westerly, light air

- 4.2.2 The walked transect comprised 10 listening points, as shown in **Figure 10.3**. Five minutes of static monitoring was undertaken at each listening point.
- 4.2.3 The transect aimed to provide data that were representative of all habitats present within the Site, incorporating a range of bat habitat features of both high and low interest to bats.
- 4.2.4 The transect was walked and activity recorded on to an ‘Anabat SD2’ bat detector. All activity either observed or heard via audio output from the bat detector was noted and cross-referenced on to a field map, along with observations relating to the number of bats and their activity type (i.e. foraging or commuting).

4.3 Methodology – Automated Monitoring

- 4.3.1 Six monitoring stations were deployed. Detector locations are detailed within **Table 4.4** and shown in **Figure 10.3**.

Table 4.4: Automated monitoring survey locations

Monitoring Station Location	Approximate Grid Reference	Habitat
MS1	NH3218968837	Wet heath / blanket bog.
MS2	NH3253869126	Blanket bog

Monitoring Station Location	Approximate Grid Reference	Habitat
MS3	NH3290569142	Blanket bog / plantation woodland
MS4	NH3259068597	Wet heath / acid grassland mosaic
MS5	NH3306668716	Wet heath / blanket bog
MS6	NH3355768586	Blanket bog

- 4.3.2 Each monitoring station comprised a single SM2 bat detector attached to a wooden stake and fitted with a single omnidirectional microphone positioned at approximately 1m height.
- 4.3.3 Static monitoring was undertaken between July and October 2015. **Table 4.5** presents the dates and total hours of survey effort completed at each monitoring station.
- 4.3.4 Monitoring was undertaken between the time period spanning approximately half an hour before sunset and half an hour after sunrise. Monitoring equipment was set up to record simultaneously, to allow comparison of activity recorded at monitoring stations located within different habitats.

Table 4.5: Automated survey effort

Monitoring Location	Start and End Dates	Number of nights recording attained	Total Recording Time (hours)
MS1	04/08/15-16/08/15	13	121.5
	-*	-	-
MS2	14/07/15-03/08/15	21	199.6
	-*	-	-
MS3	04/08/15-16/08/15	13	121.5
	08/10/15-18/10/15	7	159
MS4	04/08/15-16/08/15	13	121.5
	08/10/15-18/10/15	7	159
MS5	28/07/15-16/08/15	13	121.5
	08/10/15-18/10/15	7	159
MS6	28/07/15-16/08/15	13	121.5
	08/10/15-13/10/15	6	85.6

*MS1 and MS2 failed to record in October 2015.

4.4 Data Analysis and Assumptions of Bat Activity

- 4.4.1 Data analysis and interpretation of results followed the principles presented in the BCT guidance *Bat Surveys for Professional Ecologists 3rd Edition* (Collins, 2016) which updated Hundt (2012).
- 4.4.2 The surveys recorded data to digital media for subsequent analysis using 'Analook' (Titley Electronics) and Kaleidoscope Pro (Wildlife Acoustics) software. All data was processed through Kaleidoscope Pro to separate out noise files. The remaining sonograms are then automatically identified by the software. A selection of sonograms from each species or species group is manually checked with particular attention given to non-pipistrelle species.

- 4.4.3 Bat species have been identified using characteristic features associated with species echolocation calls. Diagnostic features used in this analysis include characteristic frequency, slope, call duration, time between calls, minimum length of the body of the call and smoothness.
- 4.4.4 Bat detectors record the passage of echolocating bats during surveys, enabling an estimation of relative bat activity levels for assessment. It is recognised, however, that there are limitations to the use of this method for determining bat activity levels.
- 4.4.5 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 (Collins, 2016) guidance, is defined as follows:

BAI (per night/hour) = Total number of bat ‘registered calls’ / number of nights of recording

- 4.4.6 For analysis purposes, bat activity is recorded as the number of ‘bat registered calls’ (a sequence of echolocation calls consisting of two or more call notes (pulse of frequency) from one bat, not separated by more than one second (White and Gehrt, 2001, Gannon *et al.*, 2003) with a minimum call note length of >= two milliseconds (Weller, Cryan and O’Shea, 2009)) from which the activity index is calculated.

4.5 Survey Limitations

- 4.5.1 Bat surveys provide only a snapshot of bat activity and are intended to provide an overview to inform planning.
- 4.5.2 Although the use of bat detectors is the most widely used method for undertaking automated monitoring, it is naturally biased: frontal detection distances vary between species due to differences in the frequency and loudness (amplitude) of the bat echolocation calls. Species which call quietly (‘whispering bats’) are less likely to be recorded from a distance. Additionally, higher frequency bat calls do not travel as far as calls emitted at lower frequencies and species with highly directional calls are also less likely to be detected.
- 4.5.3 All bats have been identified by their echolocation calls. It should be noted that physical and environmental factors (e.g. weather conditions and habitat type) as well as a bats age, sex or behaviour can all influence the echolocation calls (e.g. a social call of a soprano pipistrelle *Pipistrellus pygmaeus* has been known to display similar characteristics to a low clarity noctule call). Therefore, professional judgement has been used and in some cases it is not possible to safely assign an individual bat call to a species. To this end, species have been grouped where appropriate, in keeping with normal protocols. The identification of those calls assigned to individual species is done so on the basis of judgement and experience.
- 4.5.4 In the absence of any recognised criteria to define levels of bat activity (e.g. what quantifies low, medium or high activity) professional judgement has been used, taking into consideration geographical location and knowledge and experience gained through conducting similar surveys at other sites.
- 4.5.5 MS1 and MS2 failed to record in October 2015. These recording periods are therefore excluded from analysis on a precautionary basis to avoid skewing the BAI calculations. The data set gathered was considered to be extensive and robust, so the limited equipment failures (typical of such devices) do not represent a constraint to the analysis of results or subsequent interpretation.

4.6 Results – Walked Transects

- 4.6.1 No bats were recorded during the walked transect surveys in September or October 2015.

4.7 Results – Automated Monitoring

- 4.7.1 A total of 400 call registrations were recorded in July/August 2015. All bats were recorded on MS2, MS5 and MS6. No bats were recorded on MS1-3 and no bats were recorded during October 2015 surveys, from any monitoring station. Only two species of bat were recorded, common pipistrelle and soprano pipistrelle.
- 4.7.2 A total of 358 common pipistrelle calls were recorded during all survey periods. 352 of the calls were recorded at MS2 in July 2015, with 2 calls at MS5 and 4 at MS6 in August 2015. Overall BAI for common pipistrelle was 0.26 per hour from 1,369.7 recording hours; 1.76 BAI per hour at MS2, 0.03 at MS5 and <0.01 per hour at MS6 in summer 2015.
- 4.7.3 A total of 42 soprano pipistrelle bat calls were recorded; 40 at MS2 in July 2015 and 2 at MS6 in August 2015. No other activity was recorded. Overall BAI for soprano pipistrelle was 0.03 per hour from 1369.7 recording hours; 0.2 BAI per hour at MS2 and 0.02BAI per hour at MS6 in summer 2015.
- 4.7.4 The highest bat activity was recorded at MS2 which was located at the Allt na Beinne Leithe Bige watercourse. This most likely represents foraging activity along this section. MS5 and MS6 were not located adjacent to watercourses and were in open bog. Activity at these locations was very low and likely pertaining to infrequent foraging or passing bats.
- 4.7.5 Activity recorded at MS2 during July averaged at 35.2 calls per night for common pipistrelles and 4 calls per night between 14th – 23rd July 2015. No bats were recorded during the remainder of the survey period.
- 4.7.6 No activity was recorded in October from any monitoring station therefore it is difficult to make comparisons but the habitats within the Site do not appear to be have been used by bats during this period.
- 4.7.7 Overall, activity for both species of pipistrelle at all monitoring stations is determined to be low to very low.
- 4.7.8 Survey results are discussed for each species separately, below.

Common pipistrelle

- 4.7.9 **Table 6.1** presents the common pipistrelle bat activity index (BAI) for each monitoring station and survey period. A total of 358 common pipistrelle registered calls were recorded over the entire survey period.

Table 6.1: common pipistrelle bat activity. BAI: Bat Activity Index (registered calls per hour). MS: Monitoring Station

Monitoring Station	MS1	MS2	MS3	MS4	MS5	MS6	Total
Summer	0	1.76	0	0	0.02	0.03	0.44
Autumn	0	0	0	0	0	0	0
Total	0	1.76	0	0	0.02	0.03	0.26

Soprano pipistrelle

- 4.7.10 **Table 6.2** presents the soprano pipistrelle bat activity index (BAI) for each monitoring station and survey period. A total of 42 soprano pipistrelle registered calls were recorded over the entire survey period.

Table 6.2: soprano pipistrelle bat activity. BAI: Bat Activity Index (registered calls per hour). MS: Monitoring Station

Monitoring Station	MS1	MS2	MS3	MS4	MS5	MS6	Total
Summer	0	0.2	0	0	0	0.02	0.05
Autumn	0	0	0	0	0	0	0
Total	0	0.2	0	0	0	0.02	0.03

4.8 Summary and Conclusions

- 4.8.1 Analysis of data recorded during bat automated and manual activity surveys identified calls with the characteristics of common and soprano pipistrelle, species considered to be at high risk of collision impacts from wind turbine developments and medium population impacts (SNH, 2019).
- 4.8.2 Overall bat activity recorded has been very low, with little activity recorded during automated surveys and no bats recorded during the walked transect surveys.
- 4.8.3 Habitat structure within the Site was considered to be generally poor for bats, with the open nature of the landscape lacking suitable foraging and commuting features. Moorland and heathland habitats are typically poor for bats (JNCC, 2001²) but wetter areas and particularly under the shelter of plantation forestry can provide some foraging opportunities. Nearby forestry and more sheltered valleys are likely to provide higher value habitat features for bats in the local landscape.
- 4.8.4 No favoured foraging areas or commuting routes were identified and it is considered unlikely that the habitats within the Site are important for local bat populations.
- 4.8.5 With reference to more recent NatureScot guidance (SNH, 2019), the habitats within the Site would best align with the description for a Low Habitat Risk Site. The number of turbines would best align with a Small Project Size. Overall the Site Risk Level (Stage 1), in accordance with Table 3a of the guidance is determined to be a Low Risk Site (1).
- 4.8.6 Although Ecobat analysis has not been undertaken in recognition of the age of data (pre-dating the guidance), due to the low levels of bat activity recorded the Overall Site Assessment (Stage 2) is unlikely to be greater than **Low**.

² http://jncc.defra.gov.uk/pdf/Habitat_Management_for_bats.pdf

5 PROTECTED MAMMALS

5.1.1 Searches for other terrestrial mammals were undertaken across two dates in September and October 2017. The initial September visit identified recent heavy rainfall which could have removed some visible evidence of species presence. Therefore a second visit was undertaken in October 2017. Camera traps were also placed out within the Site in 2017 between July and September 2017.

5.1.2 Walkovers were undertaken on:

- 1st September 2017 – 09:05 – 15:45. Undertaken in calm, dry and warm conditions. It was evident during the survey that there has been recent heavy rainfall therefore another survey was arranged for October 2017.
- 26th October 2017 – 08:00 – 14:30. Undertaken in dry, calm conditions.

5.1.3 Camera traps were set out at three locations within the Site on 28th July 2017:

- NH3324769138 – an open area between two woodland stands;
- NH3317569233 – adjacent to a burn looking down the embankment; and,
- NH3305369648 – looking at a ride in the forestry plantation.

5.2 Methodology - Otter

5.2.1 Otter *Lutra lutra* are fully protected under Schedule 5 of The Wildlife and Countryside Act (1981, as amended) are classed as a European Protected Species (EPS) under the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) and is a UKBAP Priority Species.

5.2.2 In accordance with SNH guidance (2017d³) an otter survey was undertaken within the Site, extended to include all watercourses within 200m of development infrastructure. Field evidence searched for included spraints, prints, feeding, paths and holts.

5.3 Methodology - Water Vole

5.3.1 Water vole are fully protected under Schedule 5 of The Wildlife and Countryside Act 1981 (as amended) in respect of Section 9(4) and are a UK BAP Priority Species. The Nature Conservation (Scotland) Act 2004 enhanced this protection by inclusion of the term 'recklessly' in the offences section.

5.3.2 In accordance with SNH guidance (2017e⁴) guidance a water vole survey was undertaken within the Site, extended to include all watercourses within 200m of development infrastructure.

5.3.3 The survey aimed to identify field evidence and locate burrows along watercourses. Habitat up to at least 5m either side from the water's edge was surveyed. The survey searched for field signs including faeces, runways, burrows, nests, feeding stations, lawns and footprints.

5.3.4 Given known predation on water vole by American mink *Mustela vison*, all signs of mink were recorded. Field signs include spraints, footprints and prey remains.

³ SNH (2017d) SNH Protected Species Advice for Developments: Otter. SNH, Inverness.

⁴ SNH (2017e) SNH Protected Species Advice for Developments: Water vole. SNH, Inverness.

5.4 Methodology - Pine Marten

- 5.4.1 Pine martens are listed on Schedule 5 of the Wildlife and Countryside Act 1981 (as amended). Various methods of capturing or killing pine martens are also listed in the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended).
- 5.4.2 In accordance with SNH guidance (2017a⁵) guidance a pine marten survey was undertaken within the Site, extended to include all habitats within 250m of development infrastructure.
- 5.4.3 The survey searched for field evidence such as dens and scats, particularly on rocks, trees stumps and around woodland edge.

5.5 Methodology – Wildcat

- 5.5.1 Wildcats are classed as an EPS under the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) and is a UKBAP Priority Species.
- 5.5.2 In accordance with SNH guidance (2017b⁶) guidance a wildcat survey was undertaken within the Site. The survey included searches for scats, paw prints and claw marks. Searches were also made to locate habitat features favoured by wildcat for resting such as hollow trees, rock crevices, rabbit burrows, and disused badger setts, under fallen debris or in old fox earths.

5.6 Methodology - Badgers

- 5.6.1 Badgers *Meles meles* and their setts are fully protected under the provisions of The Protection of Badgers Act 1992, as amended by the Nature Conservation (Scotland) Act 2004.
- 5.6.2 In accordance with SNH guidance (SNH, 2017c⁷) guidance a badger survey was undertaken within the Site. The survey involved a systematic search of suitable habitat for signs of badgers, such as footprints, hair, snuffle holes, latrines and sett entrances.

⁵ SNH (2017a) SNH Protected Species Advice for Developments: Pine Marten. SNH, Inverness.

⁶ SNH (2017b) SNH Protected Species Advice for Developments: Wildcat. SNH, Inverness.

⁷ SNH (2017c) SNH Protected Species Advice for Developments: Badger. SNH, Inverness.

6 PROTECTED MAMMALS RESULTS

6.1 Desk Study

- 6.1.1 A search for biological records with HBRG within the 11km grid square NH37 identified a single mammal record: wildcat in 1913-1939. No detailed locational details are available. Due to the age of the record is not considered pertinent to the baseline.
- 6.1.2 The NBN hold records for water vole (1) wildcat (2), otter (6), pine marten (3), badger (2), brown long-eared bat (2) and red squirrel (7) within 5km of the approximate centre of the Site. All records appear to be located outside the Site, concentrated to the north by Loch Glascarnoch or to the south near Loch Luichart.

6.2 Protected Species

Otter

- 6.2.1 No evidence of otter was recorded during the surveys. The habitats within the study area (all watercourses within 200m of development infrastructure) were considered suitable to support otter, with watercourses supporting suitable foraging opportunities and prey (fish). The watercourses however largely lack suitable resting places for otter which may account for the absence of evidence found. It is considered that the species may be an infrequent visitor to the Site and it is likely that otter are present in the surrounding area.

Water Vole

- 6.2.2 During the September and October walkovers, potential water vole activity was recorded at two sections of watercourse. Numerous burrows were found at: NH3293569343 and NH 3290569233. Each location comprised >15 burrow entrances and were considered highly likely to be water vole. Many runs were also seen in the immediately surrounding habitat along the watercourse banks.
- 6.2.3 Water vole use was not as extensive as recorded during previous years in the locality (i.e. for other Operational Schemes) but the species is considered to be well established on watercourses within the Site with populations likely to be transient across the watercourse network depending on water levels and food resources.

<p>Potential water vole run at 32949,62923</p>		
<p>Possible water vole burrow at NH3230168874</p>		

Pine Marten

- 6.2.4 A pine marten scat was found at NH3280870244, alongside a watercourse, west of the existing access track. The Site does not offer suitable refuge for den locations due to a distinct lack of rocky outcrops and established woodland, but there are suitably available foraging resources.

Wildcat

- 6.2.5 No evidence suggesting the presence or potential presence of wildcat was recorded within the Site during baseline surveys in 2017 and the Site is not considered to provide suitable opportunities for den creation, such as rocky outcrops, existing mammal holes, or tree hollows.
- 6.2.6 The predominantly wet nature of habitats within the Site is also considered to lower the suitability of habitats for the species; wildcats prefer varied habitats on the edge of moorland, forestry plantation, scrub and pasture. The moorland may offer a seasonal food resource from ground nesting birds, amphibians, reptiles and insects; although these items constitute only a small part of a wildcat diet. The forestry plantation in the northern part of the Site is likely to offer a source of small mammals such as field vole *Microtus agrestis* which can form a key component of a wildcat diet.

Badger

- 6.2.7 The habitats within the Site were largely unsuitable for badger, the wet ground and bog habitats are not suitable for sett building, although there are suitably available food resources and the species could be present in the wider area.