



ARECLEOCH WINDFARM EXTENSION
Bat Survey Report (2015 Surveys)
Technical Appendix 8.3B

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EXECUTIVE SUMMARY

MacArthur Green was commissioned by ScottishPower Renewables to undertake bat surveys at the proposed Arecleoch Windfarm Extension (hereafter referred to as the ‘proposed Development’).

The surveys were undertaken to inform the ecological assessment for the proposed Development’s Environmental Impact Assessment Report (EIA Report).

This report presents the results of the bat survey work undertaken between 27 May and 6 October 2015 (inclusive) at the study area.

Five bat species were recorded during the temporal and spatial surveys: soprano pipistrelle (*Pipistrellus pygmaeus*), common pipistrelle (*Pipistrellus Pipistrellus*), *Myotis* sp., brown long-eared (*Plecotus auritus*) and *Nyctalus* sp.. Records such as pipistrelle species¹ and unknown bat are not included in the overall number of species recorded for the study area.

An activity index was used to calculate bat registrations per hour in order to analyse bat activity in the study area (Bat Activity Index - BAI/hr). Spatial surveys which were carried out at dusk recorded 25.7 BAI/hr, which is considered to be a high activity rate post-emergence. The temporal surveys recorded a lower overall activity of 6.78 BAI/hr.

The overall bat activity index (BAI/hr) when combining spatial and temporal surveys for species at risk of collision, is considered to be low for species at high risk (*Nyctalus* sp.), and low for species at low risk (*Myotis* sp. and brown long-eared bat). For medium risk species (common pipistrelle, soprano pipistrelle and pipistrelle species) activity levels were assessed to be moderate.

No roosts were recorded within the study area. However, three railway buildings were considered to be potential bat roosts and were recorded as target notes. It is unknown if these buildings are suitable for bats as they were not surveyed due to being over 200 m from a proposed turbine and not adjacent to any proposed access track.

¹ It should be noted that *Pipistrelle* sp. is a bat call that overlaps between a soprano pipistrelle and common pipistrelle which can only be classified to genus level. For the purposes of this report it is not included in the overall number of species recorded for the study area.

1 INTRODUCTION

MacArthur Green was commissioned by ScottishPower Renewables to undertake bat surveys at the proposed Arecleoch Windfarm Extension (hereafter referred to as the 'proposed Development'). The proposed Development is located to the southwest of the village of Barrhill in South Ayrshire.

A survey plan for bats was conducted during the period of 27 May to the 6 October 2015. The survey plan included:

- daytime Inspection of the study area;
- spatial (point count) transect surveys; and
- temporal (static) surveys.

The aim of the surveys was to identify roosting potential, quantify study area usage and variation of activity levels within the study area. Spatial and temporal surveys were carried out during the main bat activity period and in optimum weather conditions in order to maximise the likelihood of recording bats (see Annex 7).

These surveys were undertaken to inform the ecological assessment for the proposed Development's Environmental Impact Assessment Report (EIA Report).

2 THE STUDY AREA

The study area in which bat surveys were carried out encompassed the application boundary (refer to Figure 8.3B-1). The study area is located around 2km southwest of the village of Barrhill in South Ayrshire and near the border of Dumfries and Galloway. The study area encompasses the Arecleoch Forest at Shiel Hill and Knockshin. The majority of the study area supports commercial plantation, with large areas of clear fell interspersed between the forestry blocks. The forestry rides support mire habitat. There is a large powerline that intersects the northern section of the study area from west to east. There is also a railway line which runs through the study area from west to east. The connectivity of the study area to surrounding habitats is supported by watercourses. There are several watercourses present in the study area, including the Water of Tig to the north and west and the Laggish Burn to the southeast. The White Loan feeds into the Cross Water to the east of the study area. There are also a number of unnamed burns present in the study area.

The highest point is located on Shiel Hill located in the northern section of the study area at an elevation of 230m. The majority of the study area is at a lower elevation.

3 BATS AND WINDFARMS

3.1 Policy and Guidance

All bats species are protected under the following legislation shown below. A person commits an offence if he/she: deliberately or recklessly captures, injures or kills a bat. It is also an offence to disturb, damage or destroy a place of shelter i.e. a roost. Details pertaining to the legal status of bats are included within Annex 1.

- The Habitats Directive 92/43/EEC.
- Conservation (Natural Habitats, &c.) Regulations 1994 (as amended).
- the Wildlife and Countryside Act 1981 (as amended).
- the Nature Conservation (Scotland) Act 2004 (as amended).

In the UK, guidelines have been produced with regards to assessing the ecological impact upon bats from windfarm developments. These guidelines aid in producing mitigation and compensation strategies to minimise any negative impact upon local bat populations. The following guidance documents have been used in the preparation of this report:

- Natural England (2014) Bats and onshore wind turbines: interim guidance. TIN051. Third Edition.
- Hundt, L. (2012) Bat Surveys: Good Practice Guidelines, 2nd Edition, Bat Conservation Trust.
- Rodrigues L., *et al.* (2014) Guidelines for consideration of bats in windfarm projects, revision 2014. EUROBATs Publication Series No. 6.

3.2 Potential Impacts

It is now understood that, in some circumstances, bats may be at a greater risk of death from wind turbines than birds because they are affected by barotrauma as well as direct collision from blades (Baerwald *et al.* 2008) with a wind turbine in Europe and North America killing on average 2.3 birds and 2.9 bats per year (Rydell *et al.* 2012).

In the UK three taxa groups have been identified as high risk from collision with 98 % of bat mortality predominantly among taxa adapted to open-air foraging such as: *Nyctalus*, *Pipistrellus* and *Eptesicus* (Rydell *et al.* 2010).

Natural England interim guidance (2014) includes a collision risk assessment for British bat species. This is divided into two parts: (i) bat species likely to be threatened due to impacts from wind turbines and (ii) bat populations likely to be threatened due to impacts from wind turbines (shown in Table 3-1 and Table 3-2). Different bat species are considered to be at different levels of risk depending on their habitat preferences, flight behaviour and population status. Surveys have therefore been carried out for all bat species.

Natural England (2014) has identified the species of bats considered to be at low, medium and high risk (refer to Table 3-1 and Table 3-2).

Table 3-1 Bats likely to be at risk from wind turbines (taken from Natural England, 2014)

| Low Risk | Medium Risk | High Risk |
|-----------------------|---------------------|-----------------------|
| <i>Myotis</i> species | Common pipistrelle | Noctule |
| Long-eared bats | Serotine | Leisler's |
| Horseshoe bats | Soprano pipistrelle | Nathusius pipistrelle |
| | Barbastelle | |

Table 3-2 Populations likely to be threatened due to impacts from wind turbines (taken from Natural England, 2014)

| Low Risk | Medium Risk | High Risk |
|-----------------------|-------------|-----------------------|
| <i>Myotis</i> species | Serotine | Noctule |
| Long-eared bats | Barbastelle | Leisler's |
| Horseshoe bats | | Nathusius pipistrelle |
| Soprano pipistrelle | | |
| Common pipistrelle | | |

Bats travel between hibernacula sites to summer roosts in spring and autumn and therefore could be impacted negatively if windfarms were positioned between these two areas.

A recent synthesis of European and American data by the Swedish Vindval research programme concluded the following habitats to be high risk locations for windfarms; coasts, wetlands, hills and ridges. Turbines sited along linear landscapes such as lake shores, rivers, treelines, hedgerows, etc., are also considered to increase the likelihood of collision (Rydell *et al.*, 2012).

3.3 Study Area Assessment

The appropriate level of effort for a bat survey at a proposed windfarm development depends on the scale of its likely impact, which in turn depends on the size of the site and the quality of the habitat. Bat Conservation Trust (BCT) guidance (Hundt, 2012) provides recommendations of minimum standards of survey effort in instances where sampling is required. To determine the survey effort the site must be assigned a high, medium or low value. Annex 2 contains the BCT assessment table “*Factors to consider when determining the survey effort and site risk*”, which was used to determine the survey effort for this study area (as per Hundt, 2012).

Based on the geographical location of the study area in relation to high risk species (*Nyctalus* spp.), and its low to medium foraging and commuting suitability, it is considered to most closely fit the description of a medium value site (Hundt, 2012). For a medium value site, BCT guidelines recommend a minimum survey effort of at least one visit per transect per month between April and October for spatial surveys. For temporal surveys, the guidelines recommend five consecutive nights for each static location within the study area between April and October (see Annex 3 of this report for BCT bat survey minimum requirements).

Nyctalus species were identified during the desk-study search with one record located within 20 km of the study area. The record is 9 km from the study area a ‘at height’ surveys were not recommended for this Site.

4 SURVEY METHODS

4.1 Desk-based Study

A desk-based study was undertaken in order to inform subsequent field surveys and assessment with regards the presence of species of interest within the study area and its environs.

This study consisted of a search for *Nyctalus* records sourced from the ‘Scottish Leisler’s Bat Project’ which were supplied to MacArthur Green by John Haddow in May 2015. The data set contains records of *Nyctalus* species in southern Scotland collected from long-term monitoring at proposed windfarms, other developments, and on-going research work being carried out by the ‘Scottish Leisler’s Bat Project’ from 2010 to the end of the bat season in 2014.

A desk-based study was also undertaken to investigate the study area and its suitability to support bats using aerial photography. Potential features such as trees and buildings within the study area were noted. The information gained from this search was used to create the survey design i.e. spatial (point counts) and temporal (static) surveys.

4.2 Spatial Surveys - Point Counts and Transect

Spatial point count surveys were carried out over the main period of bat activity with surveys starting in May and finishing in September 2015; totalling five surveys (five surveys over five separate visits). The study area was divided into two transects and 33 point counts (see Figure 8.3B-1). Initially, 35 point counts were present along the transects, although two point counts were removed after the first two survey visits due to their positioning in clear-fell which caused a health and safety issue. For the dusk surveys, each surveyor started their survey 30 minutes before sunset with each transect taking between 2 hours 42 minutes and 3 hours 48 minutes to complete. The start and finish points were rotated in every survey. Five minutes of static monitoring was undertaken at each of the listening points. Each surveyor carried calibrated bat detectors of the same type and model (Anabat SD 2 and Bat Box). The Anabat bat detector was coupled with a GPS device so that records were georeferenced. Survey effort is summarised in Table 4-1.

Table 4-1 Summary of Spatial Survey Effort.

| Survey Date | Transect | Survey Type | Total Survey Time (hrs:mins) |
|-----------------------|----------|-------------------------|------------------------------|
| 27/05/2015 | 1 | Dusk | 03:05 |
| | 2 | Dusk | 03:20 |
| 30/06/2015 | 1 | Dusk | 03:48 |
| | 2 | Dusk | 02:53 |
| 14/07/2015 | 1 | Dusk | 03:01 |
| | 2 | Dusk | 02:54 |
| 06/08/2015 | 1 | Dusk | 03:39 |
| | 2 | Dusk | 02:54 |
| 29/09/2015 | 1 | Dusk | 03:44 |
| | 2 | Dusk | 02:42 |
| Total Survey (nights) | 5 | Total Survey (hrs:mins) | 32:00 |

The transect routes sampled a range of habitat types representative of the study area. This is considered to provide data of onsite bat habitats, and to provide contextual information relating to bat activity within the wider area.

4.3 Temporal Surveys – Static Detectors

Temporal surveys involved leaving static Anabat SD2 detectors within the study area in order to record activity overnight and over prolonged periods of time. Six Anabat detectors were placed at six different locations (refer to Figure 8.3B-1).

The locations of the static detectors were selected based on the following criteria:

- to allow comparison of temporal variation between open, edge and steam habitats within the study area;
- to identify the fidelity of bats to particular foraging areas and commuting routes; and
- to identify migratory patterns across the study area.

Calibrated detectors were left out at these locations once a month for a minimum of five nights. As the Anabat SD2 microphones are directional, the microphones were positioned according to compass bearings. Anabats were not paired during the surveys. In line with Hundt (2012) guidance for medium habitat quality sites, surveys were undertaken every month between May and September inclusive, and therefore covered spring, summer and autumn seasons. Each detector recorded bats from dusk to dawn with detectors starting 30 minutes before dusk and finishing 30 minutes after dawn.

The placement of the static detectors covered a variety of habitats across the Site as shown in Figure 8.3B-1. Temporal survey effort is summarised in Table 4-2. Total automated survey effort is considered sufficient to provide a representative sample of bat activity within the study area.

Table 4-2 Summary of Temporal Surveys.

| Survey Date | Time Parameter | Locations | Total Survey (hrs:mins:sec) | Total Number of Complete Nights |
|---------------------------------------|----------------|--------------|-----------------------------|---------------------------------|
| May – June 27/05-03/06/2015 | 21:11-05:22 | 1 | 32:32:58 | 3 |
| | | 2 | 57:16:39 | 7 |
| | | 3 | 57:16:53 | 7 |
| | | 4 | 16:17:49 | 1 |
| | | 5 | 35:10:54 | 4 |
| | | 6 | 57:16:53 | 7 |
| | | Total | 255:52:06 | 29 |
| June – July 30/06-06/07/2015 | 21:32-05:13 | 1 | 46:05:53 | 6 |
| | | 2 | 46:05:54 | 6 |
| | | 3 | 26:10:56 | 3 |
| | | 4 | 46:05:42 | 6 |
| | | 5 | 46:05:42 | 6 |
| | | 6 | 00:00:00 | 0 |
| | | Total | 210:34:07 | 27 |
| July 14-20/07/2015 | 21:21-05:28 | 1 | 48:41:54 | 6 |
| | | 2 | 48:41:52 | 6 |
| | | 3 | 48:41:48 | 6 |
| | | 4 | 48:41:42 | 6 |
| | | 5 | 48:41:48 | 6 |
| | | 6 | 48:41:48 | 6 |
| | | Total | 292:10:52 | 36 |
| August 06-11/08/2015 | 20:43-06:08 | 1 | 47:04:50 | 5 |
| | | 2 | 47:04:50 | 5 |
| | | 3 | 47:04:45 | 5 |
| | | 4 | 47:04:55 | 5 |
| | | 5 | 47:04:55 | 5 |
| | | 6 | 47:04:55 | 5 |
| | | Total | 282:29:10 | 30 |
| September-October 29/09-06/10/2015 | 18:31-07:49 | 1 | 54:30:29 | 3 |
| | | 2 | 54:36:58 | 4 |
| | | 3 | 53:17:22 | 3 |
| | | 4 | 71:06:49 | 5 |
| | | 5 | 36:22:33 | 2 |
| | | 6 | 67:25:44 | 4 |
| | | Total | 337:19:55 | 21 |

| Survey Date | Time Parameter | Locations | Total Survey (hrs:mins:sec) | Total Number of Complete Nights |
|----------------------------------|----------------|-----------|-----------------------------|---------------------------------|
| Total Survey Time (hrs:mins:sec) | 1378:26:10 | | Total Survey Nights | 143 |

4.4 Method of Analysis

A bat registration is a sequence of bat pulses which is captured on a 15 second Anabat sound file. One sound file is counted as one bat registration. Different species within the same 15 second sound file are counted as different bat registrations.

An individual bat can pass a feature on several occasions while foraging. It is therefore not possible to estimate the number of individual bats. In accordance with BCT guidance (Hundt, 2012), an activity index is used to calculate bat registrations per hour which allows analysis of bat activity to estimate abundance and/or activity.

Bat Activity Index (BAI) (per hour) = Total number of bat ‘registrations’ / number of hours of recording

5 BAT SURVEY LIMITATIONS

The survey design and effort were devised in accordance to Hundt (2012) guidelines as shown in Annexes 2 and 3. The surveys carried out are considered to be sufficient to meet the guideline standards. The survey design was continually assessed with point count data analysed post-survey visit to determine if the design was appropriate to the number and species of bats encountered within the study area.

The main bat activity season is from April through to October, with breeding usually taking place in June and July. BCT guidance (Hundt, 2012) for proposed windfarm sites indicates that the survey period is from April and October. However, in Scotland bat activity can commence later and be limited at the end of the survey period due to the colder weather. Scotland experienced a colder and wetter than average spring² in 2015 which is likely to have delayed the emergence and activity levels of bats in the region. Therefore, surveys started in May and continued until September which covered the spring, summer and autumn bat activity periods (i.e. the main breeding and juvenile dispersal periods).

During the fourth spatial visit to the study area, a small section of the second transect route varied at point count 26. This was due to dense coniferous woodland cover. This is not seen to have affected the survey results as the same habitat type was sampled and it was adjacent to the original transect route and point count (refer to Figure 8.3B-2).

The spatial point count surveys were mostly carried out in optimal survey conditions. On some occasions the temperature dropped below 10 degrees Celsius (°C) during visits one, three and five, with the suboptimal temperature on these occasions from 7.9-9.6 °C for part of the survey period. Rain showers were encountered during visits one and two with these showers lasting 5 to 20 minutes long with the majority of the surveys carried out in dry weather. Bats are often active below temperatures of 10 °C in Scotland and as the showers were brief and/or light, these sub-optimal conditions are not seen as significant and are unlikely to have altered the outcome of the survey results (refer to Annex 7 for spatial survey weather data).

The automated static detectors are powered by 12-volt batteries and on some occasions the battery charge was not sufficient to complete a full survey period, or the equipment malfunctioned. It is possible that the cold weather or the longer night length at the start and end of the survey season may have affected the battery life. The loss of data is not considered to be significant in the context of the amount of data collected with 143 nights of data collected over five visits (see Table 4-2). The placement of the static detectors covered a variety of habitats across the study area as shown in Figure 8.3B-1. Total automated survey effort is considered sufficient to provide a representative sample of bat activity within the study area.

There is some overlap between the frequency calls of the common and soprano pipistrelle’s which echolocate at a peak frequency of approximately 45 kHz and 55 kHz respectively. In instances where pipistrelle calls overlapped between 50 kHz and 50.9 kHz, they were recorded as *Pipistrelle* species.

Myotis species calls often overlap depending on their surrounding environs i.e. cluttered or open space. This often makes it difficult to identify *Myotis* bats to species level. If *Myotis* calls could not be identified to species level, they were recorded as *Myotis* species.

Nyctalus species calls (noctule and Leisler’s bats) can be difficult to identify to species level as their calls overlap. Given that both these species have been assigned a high-risk level for both collision and population risk, and given that they can be difficult to identify to species level, they were classified only to genus level.

² Met Office weather summaries, accessed via: <http://www.metoffice.gov.uk/climate/uk/summaries/2015/spring>

‘Unknown’ calls were recorded during the spatial and temporal surveys. For spatial surveys this was due to very faint or fast calls which the surveyor could not identify in the field and the call was not recorded on the Anabat SD2 (directional microphone). For temporal surveys, bat calls were assigned an unknown value if the call was faint and could not be identified to genus level on Analook Software.

Anabat detectors are the preferred bat detector for acoustic monitoring at windfarm sites (Kunz *et al.* 2007); however, Anabat detectors have limitations and will only monitor bat activity within a limited area, usually around 30m³. Furthermore, the detection rate of bat calls varies with a bias towards loud bat calls with quieter calls, such as those from brown long-eared bats, potentially being under recorded. As a result of equipment limitations, only relative rather than direct statistical comparisons of bat activity can be made between species and only a set area within the study area can be sampled.

The analysis of bat data is subject to experience, therefore the Anabat data was analysed by ecologists experienced with bat call analysis using AnalookW software, version 4.3.19.

Nyctalus species are relatively more active at a height of 30m than those species with high frequency echolocation calls such as *Myotis* (Collins and Jones, 2009). A study on the difference of bat activity in relation to bat detector height found the difference between *Nyctalus* passes at the upper and lower detectors not to be statistically significant, despite proportionally more passes being recorded at height (Collins and Jones, 2009). Not all sites in the study recorded more *Nyctalus* passes at height, with two sites recording more passes at the lower detectors. The study therefore suggests that surveying from ground level can provide an accurate account of *Nyctalus* species.

The information currently available on bat behaviour in the UK is not sufficient to assess the threat that wind turbines may pose to populations. Anecdotal records of individual collisions exist but no quantified data at the colony or population level are available (Natural England, 2014).

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 experience gained through conducting similar surveys at other sites throughout Scotland.

6 SURVEY RESULTS

6.1 Desk-based Study

A search was carried out on records from the ‘Scottish Leisler’s Bat Project’ supplied to MacArthur Green by John Haddow in May 2015.

Table 6-1 shows the number of *Nyctalus* records within 20 km of the study area. One *Nyctalus* record is within 10 km of the study area. Records supplied only locate records to a 1 km grid.

Table 6-1 ‘Scottish Leisler’s Bat Project’ Records within 20km of the study area.

| Species | Location | GPS | Distance from the study area | Year | Record type |
|-----------|----------------|--------|------------------------------|------|-------------|
| Leisler’s | South Ayrshire | NX1491 | 9km | 2010 | Anabat |

6.2 Daytime Inspection

Habitat types within the study area were defined as edge, open, closed and stream habitats according to their exposed or sheltered nature. Edge habitats such as woodland/forest edge and burns are the preferred habitat of pipistrelle bats, while open habitats are more favoured by *Nyctalus* bats which can fly above woodland and fields. Woodland is the typical foraging habitats used by brown-long ears and some *Myotis* species (Russ, 2012). Daubenton’s are associated with waterways (Russ, 2012).

In accordance within BCT Guidelines (Hundt, 2012) tree/s within 200 m of a turbine or adjacent to proposed access tracks were surveyed for potential roost feature/s. There are three small railway buildings present within the study area along the railway line (Target note 1 to 3); however, these buildings are more than 200m from a proposed turbine and not adjacent to any new access track and therefore were not surveyed (target notes (TNs) shown in Annex 4 and locations are illustrated in Figure 8.8).

Habitats within the study area noted to be potentially good foraging and commuting habitat include the following: forest rides, track, small ponds and numerous burns notably the White Loan, Laggish Burn and Water of Tig.

³ Detection distances vary with frequency and loudness (amplitude) of the bat calls and atmospheric attenuation. Many bats are detected over 30m under typical conditions, while some species such as *Nyctalus* sp. which call at low frequencies may be detectable from as far as 100m. However some species such as brown long-eared bats are hard to detect from shorter distances. This is why only relative rather than direct statistical comparisons of bat activity are made between species.

As a result of the daytime inspection the medium habitat value assigned to the study area was still deemed to be a valid assessment.

6.3 Spatial Surveys – Point Counts

In total five bat species were recorded during the spatial surveys: soprano pipistrelle (s.pip or ‘55 pip’); common pipistrelle (c.pip or ‘45 pip’); brown-long eared (*Plecotus auritus*); *Myotis* sp. (My); and *Nyctalus* sp. (Nyc). Unknown bat and Pipistrelle species (pip. sp.) calls were also recorded during the surveys but are not included in the overall number of species recorded for the study area⁴.

Figure 8.8 and Table 6-2 show the number and locations of bat registrations recorded along the transect route during the survey period. Bat activity within the study area was observed along the routes of transect 1 and transect 2. The greatest bat activity recorded along transect 1 was at the following locations:

- between point counts 2 to 4 - adjacent to Kirkie Loch;
- point count 7 - Water of Tig tributary along a forestry ride;
- between point counts 8 to 9 - Water of Tig tributary along forestry ride;
- between point counts 13 to 14 – along forestry track and forestry ride; and
- point count 16 – along forestry ride.

The greatest bat activity recorded along transect 2 was at the following locations:

- between point counts 18 to 20 – along track through clear fell habitat;
- between point counts 25 to 27 – along clear fell habitat;
- point count 29 – along forestry ride; and
- between point counts 31 to 32 – along forestry track.

The total bat registrations per hour (BAI/hr) recorded for each species is shown in Table 6-2. A total of 819 bat registrations equating to a BAI/hr of 25.7 was recorded for the study area. The most commonly recorded species by BAI/hr was soprano pipistrelle (16.73 BAI/hr), followed by common pipistrelle (4.71 BAI/hr), *Pipistrelle* sp. (2.51 BAI/hr), *Nyctalus* sp. (1.26 BAI/hr), *Myotis* sp. (0.38 BAI/hr), unknown bat (0.09 BAI/hr) and brown-long eared bat (0.03 BAI/hr) as illustrated in Graph 6-1.

Table 6-2 shows a summary of the total spatial survey results. Table 6-3 to Table 6-7 show the total spatial survey results per survey visit. The composition of species recorded across the study area during the spatial survey results is shown in Graph 6-1 below, whilst the spatial activity during each survey visit is outlined in Graph 6-2.

The bats recorded were mainly commuting and feeding within the study area as shown in Annex 8. No social calls were recorded during the surveys. When surveyors could see bats flying, the flight height of bats was recorded, where this was possible. Soprano pipistrelle and *Nyctalus* species were recorded at height bands 0-5 m and 6–10 m, while common pipistrelle and unknown bat were only recorded at a height band of 6-10 m. It was also noted during the fourth visit in August that a large number of bats (>10) were feeding around large log piles at point count 19 and between point counts 19 and 18. These log piles could perhaps provide forage opportunities for bats or roosting habitats such as night time roosts.

Bat registrations steadily increased from a 0.31 BAI/hr in May to 14.81 BAI/hr in June. It further increased to 36.85 BAI/hr in July and peaked at 49.09 BAI/hr in August. Bat registrations then declined to 28.76 BAI/hr September.

Table 6-2 Summary of spatial surveys results.

| Total Activity | | | | | | | |
|-------------------------|---------|---------|---------|--------------|------|-------|---------|
| Rec. time | s. pip. | c. pip. | pip sp. | My | BLE | Nyc | Unknown |
| 31:52:00 | 533 | 150 | 80 | 12 | 1 | 40 | 3 |
| | 16.73 | 4.71 | 2.51 | 0.38 | 0.03 | 1.26 | 0.09 |
| Total bat registrations | | 819 | | Total BAI/hr | | 25.70 | |

(Abbreviations: s.pip – soprano pipistrelle; c.pip – common pipistrelle; pip. sp. pipistrelle species; My – *Myotis* sp.; ble – brown long-eared bat; Nyc - *Nyctalus* sp.)

⁴ There is an overlap in call frequency between common and soprano pipistrelle bats, and therefore calls which fall into this overlap are difficult to identify to species level. As a result, these calls were only identified to genus level and classified as ‘pip. sp.’. Given the likelihood of these calls being from either common and soprano pipistrelle bats, ‘pip. sp.’ has been removed from the overall species count for the study area.

Table 6-3 Spatial surveys results May 27/05/2015.

| Activity visit 1 - May 27/05/2015 | | | | | | | |
|-----------------------------------|---------|---------|----------|--------------|------|------|---------|
| Rec. time | s. pip. | c. pip. | pip. sp. | My | BLE | Nyc | Unknown |
| 6:25:00 | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| | 0.16 | 0.00 | 0.00 | 0.16 | 0.00 | 0.00 | 0.00 |
| Total bat registrations | | 2 | | Total BAI/hr | | 0.31 | |

(Abbreviations: s.pip – soprano pipistrelle; c.pip - common pipistrelle; pip. sp. pipistrelle species; My – *Myotis* sp.; ble – brown long-eared bat; Nyc - *Nyctalus* sp.)

Table 6-4 Spatial surveys results June 30/06/2015.

| Activity visit 2 - June 30/06/2015 | | | | | | | |
|------------------------------------|---------|---------|---------|--------------|------|-------|---------|
| Rec. time | s. pip. | c. pip. | pip sp. | My | BLE | Nyc | Unknown |
| 6:41:00 | 49 | 30 | 14 | 1 | 0 | 5 | 0 |
| | 7.33 | 4.49 | 2.09 | 0.16 | 0.00 | 0.75 | 0.00 |
| Total bat registrations | | 99 | | Total BAI/hr | | 14.81 | |

(Abbreviations: s.pip – soprano pipistrelle; c.pip - common pipistrelle; pip. sp. pipistrelle species; My – *Myotis* sp.; ble – brown long-eared bat; Nyc - *Nyctalus* sp.)

Table 6-5 Spatial surveys results July 14/07/2015.

| Activity visit 3 - July 14/07/2015 | | | | | | | |
|------------------------------------|---------|---------|---------|--------------|------|-------|---------|
| Rec. time | s. pip. | c. pip. | pip sp. | My | BLE | Nyc | Unknown |
| 5:55:00 | 124 | 39 | 25 | 8 | 1 | 19 | 2 |
| | 20.96 | 6.59 | 4.23 | 1.35 | 0.17 | 3.21 | 0.34 |
| Total bat registrations | | 218 | | Total BAI/hr | | 36.85 | |

(Abbreviations: s.pip – soprano pipistrelle; c.pip - common pipistrelle; pip. sp. pipistrelle species; My – *Myotis* sp.; ble – brown long-eared bat; Nyc - *Nyctalus* sp.)

Table 6-6 Spatial surveys results August 06/08/2015.

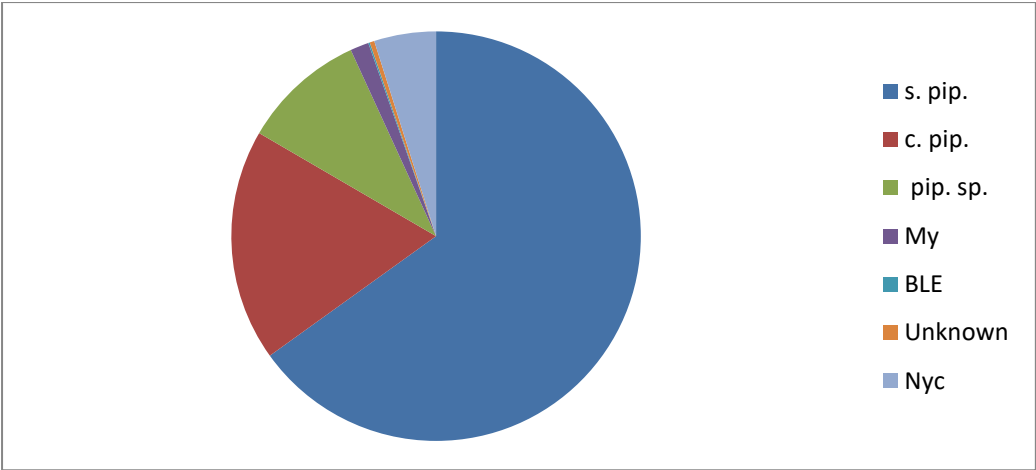
| Activity visit 4 - August 06/08/2015 | | | | | | | |
|--------------------------------------|---------|---------|---------|--------------|------|-------|---------|
| Rec. time | s. pip. | c. pip. | pip sp. | My | BLE | Nyc | Unknown |
| 6:25:00 | 193 | 67 | 38 | 1 | 0 | 15 | 1 |
| | 30.08 | 10.44 | 5.92 | 0.16 | 0.00 | 2.34 | 0.16 |
| Total bat registrations | | 315 | | Total BAI/hr | | 49.09 | |

(Abbreviations: s.pip – soprano pipistrelle; c.pip - common pipistrelle; pip. sp. pipistrelle species; My – *Myotis* sp.; ble – brown long-eared bat; Nyc - *Nyctalus* sp.)

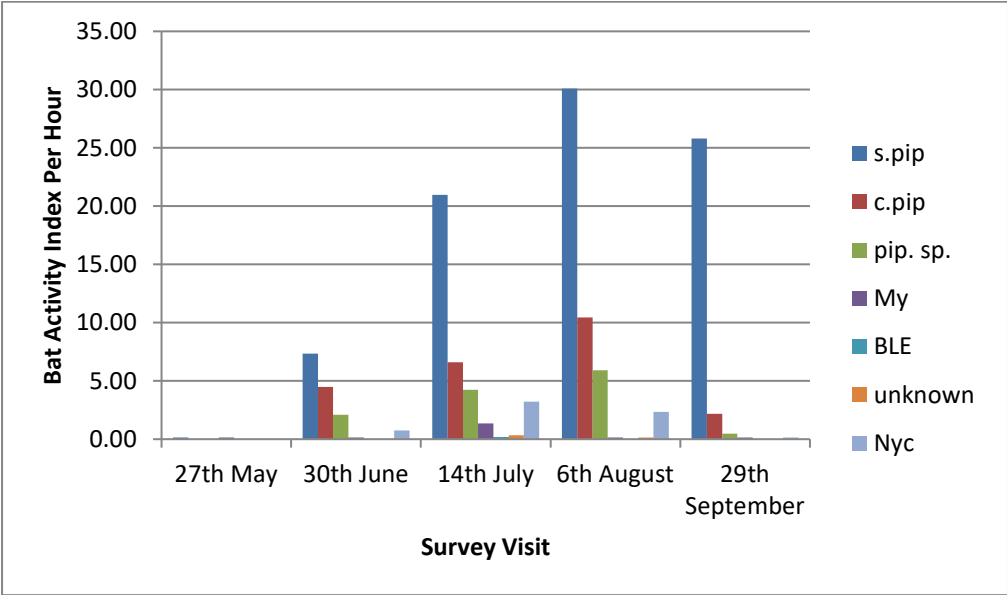
Table 6-7 Spatial surveys results September 29/09/2015.

| Activity visit 5 - September 29/09/2015 | | | | | | | |
|---|---------|---------|---------|--------------|------|-------|---------|
| Rec. time | s. pip. | c. pip. | pip sp. | My | BLE | Nyc | Unknown |
| 6:26:00 | 166 | 14 | 3 | 1 | 0 | 1 | 0 |
| | 25.80 | 2.18 | 0.47 | 0.16 | 0.00 | 0.16 | 0.00 |
| Total bat registrations | | 185 | | Total BAI/hr | | 28.76 | |

(Abbreviations: s.pip – soprano pipistrelle; c.pip - common pipistrelle; pip. sp. pipistrelle species; My – *Myotis* sp.; ble – brown long-eared bat; Nyc - *Nyctalus* sp.)

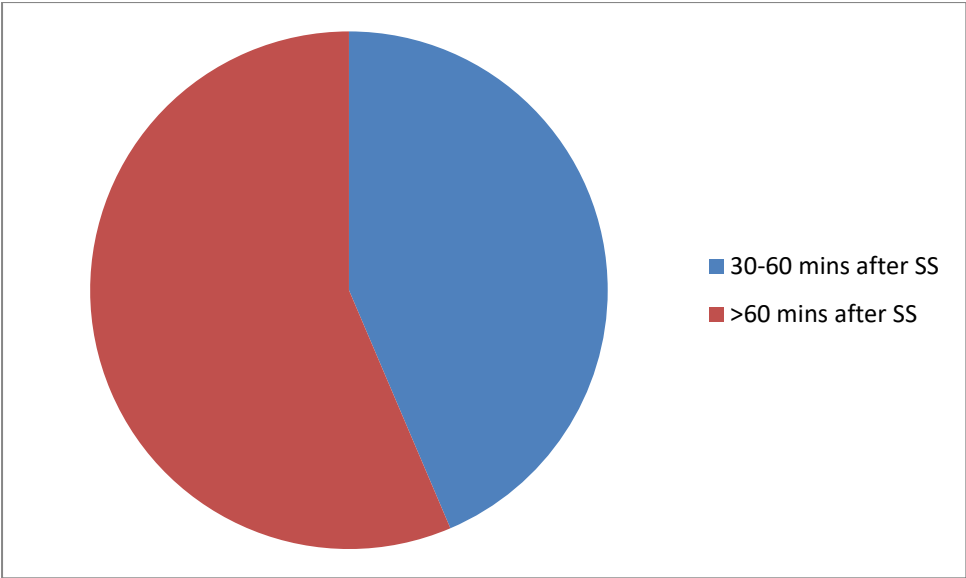


Graph 6-1 Spatial Survey Results: Species Composition within the study area (BAI/hr).



Graph 6-2 Spatial Activity in study area (BAI/hr).

Nyctalus spp., which are considered to be high risk species at both the collision and the population level, were recorded during the June, July, August and September surveys. A total of 40 *Nyctalus* registrations were recorded across all survey visits. Five *Nyctalus* registrations were recorded during the June survey visit. The majority of the registrations were recorded in July, with 19 registrations recorded. In August, 11 registrations were recorded, followed by a single registration during the September survey. Table 6-8 and Graph 6-3 show the timings of the recordings of *Nyctalus* species during the survey period in relation to sunset (SS). The timing of the bat registrations indicate that *Nyctalus* sp. are not roosting adjacent to the study area as the majority of registrations were recorded more than 60 minutes after sunset (see Graph 6-3). The earliest registration, which was in August, was recorded 00:33 to 00:39 minutes after dusk (see Table 6-8). The locations of the *Nyctalus* registrations recorded during the spatial surveys are illustrated in Figure 8.7.



Graph 6-3 Timings of Nyctalus Registrations (n=40) after Sunset (SS).

Table 6-8 Nyctalus Species Registrations Recorded across all Spatial Survey Visits.

| Date | Time of Recording | Dusk | Passes | Time of Recording from Dusk (+/-) |
|------------|-------------------|-------|--------|-----------------------------------|
| 30/06/2015 | 22:46 | 22:03 | 1 | +00:43 |
| 30/06/2015 | 23:26 | 22:03 | 2 | +01:23 |
| 30/06/2015 | 23:30 | 22:03 | 1 | +01:27 |
| 30/06/2015 | 00:22 | 22:03 | 1 | +02:19 |
| 14/07/2015 | 22:43 | 21:51 | 2 | +00:52 |
| 14/07/2015 | 23:04 | 21:51 | 1 | +01:13 |
| 14/07/2015 | 23:21 | 21:51 | 1 | +01:30 |
| 14/07/2015 | 23:22 | 21:51 | 1 | +01:31 |
| 14/07/2015 | 23:25 | 21:51 | 1 | +01:34 |
| 14/07/2015 | 22:33 | 21:51 | 1 | +00:42 |
| 14/07/2015 | 22:34 | 21:51 | 2 | +00:43 |
| 14/07/2015 | 22:36 | 21:51 | 1 | +00:45 |
| 14/07/2015 | 22:38 | 21:51 | 1 | +00:47 |
| 14/07/2015 | 23:17 | 21:51 | 1 | +01:26 |
| 14/07/2015 | 23:35 | 21:51 | 1 | +01:44 |
| 14/07/2015 | 23:36 | 21:51 | 2 | +01:45 |
| 14/07/2015 | 00:01 | 21:51 | 1 | +02:10 |
| 14/07/2015 | 00:03 | 21:51 | 1 | +02:12 |
| 14/07/2015 | 00:04 | 21:51 | 2 | +02:13 |
| 06/08/2015 | 21:46 – 21:52 | 21:13 | 3 | + 00:33 – 00:39 |
| 06/08/2015 | 21:52 – 21:57 | 21:13 | 1 | + 00:39 – 00:44 |
| 06/08/2015 | 22:12 | 21:13 | 1 | +00:59 |
| 06/08/2015 | 22:23 | 21:13 | 1 | +01:10 |
| 06/08/2015 | 22:24 | 21:13 | 2 | +01:11 |
| 06/08/2015 | 22:25 | 21:13 | 2 | +01:12 |
| 06/08/2015 | 22:48 | 21:13 | 1 | +01:35 |
| 06/08/2015 | 21:51 | 21:13 | 1 | +00:38 |
| 06/08/2015 | 21:57 | 21:13 | 1 | +00:44 |

| Date | Time of Recording | Dusk | Passes | Time of Recording from Dusk (+/-) |
|------------|-------------------|-------|--------|-----------------------------------|
| 06/08/2015 | 21:59 | 21:13 | 1 | +00:46 |
| 06/08/2015 | 22:00 | 21:13 | 1 | +00:47 |
| 29/09/2015 | 20:31 | 19:01 | 1 | +01:30 |

6.4 Temporal Surveys – Static Detectors

The total BAI/hr recorded for each species is shown in Table 6-9 and is illustrated on Graph 6-4 and Figure 8.3B-2. In total five bat species were recorded during the surveys: soprano pipistrelle, common pipistrelle, brown-long eared, *Myotis* sp.; and *Nyctalus* sp., with a total BAI/hr of 6.78 for the study area. As with the spatial survey results, unknown bat and *Pipistrelle* sp. are not included in the overall number of species recorded for the study area. The most commonly recorded species, by BAI/hr, was soprano pipistrelle (4.26 BAI/hr), followed by common pipistrelle (2.39 BAI/hr), *Nyctalus* spp. (0.05 BAI/hr), pipistrelle species (0.05 BAI/hr), *Myotis* sp. (0.03 BAI/hr) and brown long-eared bat (0.01 BAI/hr). The habitat type that recorded the greatest BAI per hour was location 4 (forest-ride) (20.63 BAI/hr), followed by: location 3 (forest ride) (10.97 BAI/hr); location 2 (forest ride) (6.69 BAI/hr); location 1 (open forest ride near burn) (0.89 BAI/hr); location 5 (forest ride near burn) (0.44 BAI/hr); and location 6 (clear-fell near burn) (0.34 BAI/hr).

A summary of the temporal data results recorded during all survey visits are shown in Table 6-9. Analysis of the temporal data for each survey visit is shown in Table 6-10 to Table 6-14 and are illustrated in Graph 6-5. The bat activity index remained consistently low throughout all the survey visits apart from the final visit. Activity peaked during visit five (September/October) with 21.79 BAI/hr. This was mainly attributed to the bat activity that was recorded at location 4 (forest ride) and location 3 (forest ride) which recorded 60.5 BAI/hr and 44.7 BAI/hr, respectively.

Table 6-9 Summary of temporal surveys results.

| Loc. | Habitat type | time | c. pip. | s. pip. | pip. sp. | My | BLE | Nyc | Unk. | Total Reg. | BAI/hr |
|---------------------|------------------------------|------------|---------|---------|----------|------|------|------|-------|------------|--------|
| 1 | Open forestry ride near burn | 228:56:04 | 47 | 135 | 5 | 2 | 1 | 13 | 0 | 203 | 0.89 |
| 2 | Forestry ride | 253:46:13 | 475 | 1176 | 19 | 14 | 5 | 6 | 2 | 1697 | 6.69 |
| 3 | Forestry ride | 232:31:44 | 1012 | 1503 | 25 | 9 | 0 | 2 | 0 | 2551 | 10.97 |
| 4 | Forestry ride | 229:16:57 | 1693 | 2990 | 22 | 9 | 0 | 17 | 0 | 4731 | 20.63 |
| 5 | Forestry ride near burn | 213:25:52 | 37 | 19 | 0 | 0 | 2 | 34 | 1 | 93 | 0.44 |
| 6 | Clear-fell near burn | 220:29:20 | 24 | 43 | 1 | 6 | 0 | 2 | 0 | 76 | 0.34 |
| Total Registrations | | 1378:26:10 | 3288 | 5866 | 72 | 40 | 8 | 74 | 3 | 9351 | 6.78 |
| Total BAI/hr | | | 2.39 | 4.26 | 0.05 | 0.03 | 0.01 | 0.05 | 0.002 | 6.78 | |

(Abbreviations: s.pip - c.pip - common pipistrelle; soprano pipistrelle; pip. sp. - pipistrelle species; My - *Myotis* sp.; BLE - brown long-eared bat; Nyc - *Nyctalus* sp.; Unk. - unknown bat; Reg. - registrations)

Table 6-10 Summary of activity totals May- June 27/05-03/06/2015.

| Activity visit 1 - May to June 27/05-03/06/2015 | | | | | | | | | | | |
|---|------------------------------|----------|---------|---------|--------------|------|------|------|------|------------|--------|
| Loc. | Habitat type | time | c. pip. | s. pip. | pip. sp. | My | BLE | Nyc | Unk. | Total Reg. | BAI/hr |
| 1 | Open forestry ride near burn | 32:32:58 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.00 |
| 2 | Forestry ride | 57:16:39 | 0 | 1 | 0 | 0 | 5 | 0 | 0 | 6 | 0.10 |
| 3 | Forestry ride | 57:16:53 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0.02 |
| 4 | Forestry ride | 16:17:49 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.00 |
| 5 | Forestry ride near burn | 35:10:54 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0.03 |
| 6 | Clear-fell near burn | 57:16:53 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 3 | 0.05 |
| Total Registrations | | | 1 | 2 | 0 | 3 | 5 | 0 | 0 | 11 | |
| Total BAI/hr | | | 0.004 | 0.01 | 0.00 | 0.01 | 0.02 | 0.00 | 0.00 | | |
| Total Bat Passes | | | | 11 | Total BAI/hr | | | | | 0.04 | |

(Abbreviations: s.pip - c.pip - common pipistrelle; soprano pipistrelle; pip. sp. - pipistrelle species; My - *Myotis* sp.; BLE - brown long-eared bat; Nyc - *Nyctalus* sp.; Unk. - unknown bat; Reg. - registrations)

Table 6-11 Summary of activity totals June- July 30/06-06/07/2015.

| Activity visit 2 - June - July 30/06-06/07/2015 | | | | | | | | | | | |
|---|------------------------------|----------|-------------|-------------|-------------|---------------------|-------------|-------------|--------------|-------------|--------|
| Loc. | Habitat type | time | c. pip. | s. pip. | pip. sp. | My | BLE | Nyc | Unk. | Total Reg. | BAI/hr |
| 1 | Open forestry ride near burn | 46:05:53 | 37 | 59 | 5 | 1 | 1 | 12 | 0 | 115 | 2.49 |
| 2 | Forestry ride | 46:05:54 | 260 | 321 | 9 | 5 | 0 | 0 | 1 | 596 | 12.9 |
| 3 | Forestry ride | 26:10:56 | 23 | 39 | 1 | 3 | 0 | 1 | 0 | 67 | 2.56 |
| 4 | Forestry ride | 46:05:42 | 76 | 68 | 0 | 2 | 0 | 11 | 0 | 157 | 3.41 |
| 5 | Forestry ride near burn | 46:05:42 | 16 | 6 | 0 | 0 | 2 | 9 | 0 | 33 | 0.72 |
| 6 | Clear-fell near burn | 0:00:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.00 |
| | Total Registrations | | 412 | 493 | 15 | 11 | 3 | 33 | 1 | 968 | |
| | Total BAI/hr | | 1.96 | 2.34 | 0.07 | 0.05 | 0.01 | 0.16 | 0.005 | | |
| | Total Bat Passes | | | 968 | | Total BAI/hr | | | | 4.60 | |

(Abbreviations: s.pip - c.pip - common pipistrelle; soprano pipistrelle; pip. sp. - pipistrelle species; My - *Myotis* sp.; BLE - brown long-eared bat; Nyc - *Nyctalus* sp.; Unk. - unknown bat; Reg. - registrations)

risk (*Nyctalus* spp.), and low for species at low risk (*Myotis* spp. and brown long-eared bat). For medium risk species (common pipistrelle, soprano pipistrelle and pipistrelle species) activity levels were seen to be moderate.

Nyctalus are an early emerging species. The closest time to dusk that *Nyctalus* species were recorded during the spatial surveys was 38 minutes after sunset, which would be considered a late emergence for *Nyctalus* spp., and this would suggest that a roost is not immediately adjacent to the study area. The temporal surveys recorded *Nyctalus* species at all locations.

The greatest activity (brph) seen throughout the spatial and temporal survey was from medium risk species such as common pipistrelle and soprano pipistrelle. The overall brph for common and soprano pipistrelle species was seen to be moderate with a value of 7.08 brph.

Table 6-12 Summary of activity totals July 14-20/07/2015.

| Activity visit 3 - July 14-20/07/2015 | | | | | | | | | | | |
|---------------------------------------|------------------------------|----------|-------------|-------------|--------------|---------------------|-------------|------------|--------------|-------------|--------|
| Loc. | Habitat type | time | c. pip. | s. pip. | pip. sp. | My | BLE | Nyc | Unk. | Total Reg. | BAI/hr |
| 1 | Open forestry ride near burn | 48:41:54 | 1 | 23 | 0 | 1 | 0 | 0 | 0 | 25 | 0.51 |
| 2 | Forestry ride | 48:41:52 | 60 | 232 | 1 | 2 | 0 | 1 | 0 | 296 | 6.08 |
| 3 | Forestry ride | 48:41:48 | 27 | 55 | 0 | 0 | 0 | 1 | 0 | 83 | 1.70 |
| 4 | Forestry ride | 48:41:42 | 143 | 65 | 0 | 0 | 0 | 3 | 0 | 211 | 4.33 |
| 5 | Forestry ride near burn | 48:41:48 | 14 | 5 | 0 | 0 | 0 | 22 | 1 | 42 | 0.86 |
| 6 | Clear-fell near burn | 48:41:48 | 10 | 20 | 0 | 0 | 0 | 2 | 0 | 32 | 0.66 |
| | Total Registrations | | 255 | 400 | 1 | 3 | 0 | 29 | 1 | 689 | |
| | Total BAI/hr | | 0.87 | 1.37 | 0.003 | 0.01 | 0.00 | 0.1 | 0.003 | | |
| | Total Bat Passes | | | 689 | | Total BAI/hr | | | | 2.36 | |

(Abbreviations: s.pip - c.pip - common pipistrelle; soprano pipistrelle; pip. sp. - pipistrelle species; My - *Myotis* sp.; BLE - brown long-eared bat; Nyc - *Nyctalus* sp.; Unk. - unknown bat; Reg. - registrations)

Table 6-13 Summary of activity totals August 06-11/08/2015.

| Activity visit 4 - August 06-11/08/2015 | | | | | | | | | | | |
|---|------------------------------|----------|------------|------------|----------|----------|----------|----------|----------|------------|--------|
| Loc. | Habitat type | time | c. pip. | s. pip. | pip. sp. | My | BLE | Nyc | Unk. | Total Reg. | BAI/hr |
| 1 | Open forestry ride near burn | 47:04:50 | 4 | 3 | 0 | 0 | 0 | 1 | 0 | 8 | 0.17 |
| 2 | Forestry ride | 47:04:50 | 68 | 128 | 2 | 1 | 0 | 5 | 1 | 205 | 4.35 |
| 3 | Forestry ride | 47:04:45 | 13 | 6 | 0 | 1 | 0 | 0 | 0 | 20 | 0.42 |
| 4 | Forestry ride | 47:04:55 | 50 | 7 | 0 | 0 | 0 | 1 | 0 | 58 | 1.23 |
| 5 | Forestry ride near burn | 47:04:55 | 3 | 4 | 0 | 0 | 0 | 1 | 0 | 8 | 0.17 |
| 6 | Clear-fell near burn | 47:04:55 | 13 | 19 | 1 | 0 | 0 | 0 | 0 | 33 | 0.70 |
| | Total Registrations | | 151 | 167 | 3 | 2 | 0 | 8 | 1 | 332 | |

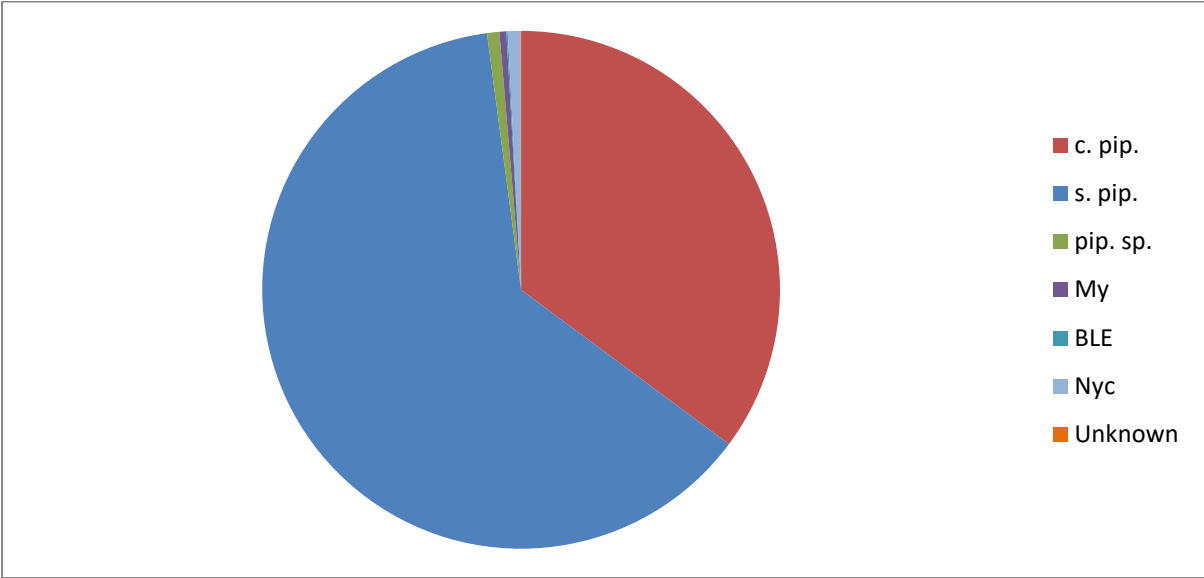
| Activity visit 4 - August 06-11/08/2015 | | | | | | | | | | | |
|---|------------------|------|---------|---------|----------|--------------|------|------|-------|------------|--------|
| Loc. | Habitat type | time | c. pip. | s. pip. | pip. sp. | My | BLE | Nyc | Unk. | Total Reg. | BAI/hr |
| | Total BAI/hr | | 0.53 | 0.59 | 0.01 | 0.01 | 0.00 | 0.03 | 0.004 | | |
| | Total Bat Passes | | | 332 | | Total BAI/hr | | | | 1.18 | |

(Abbreviations: s.pip - c.pip - common pipistrelle; soprano pipistrelle; pip. sp. - pipistrelle species; My - *Myotis* sp.; BLE - brown long-eared bat; Nyc - *Nyctalus* sp.; Unk. - unknown bat; Reg. - registrations)

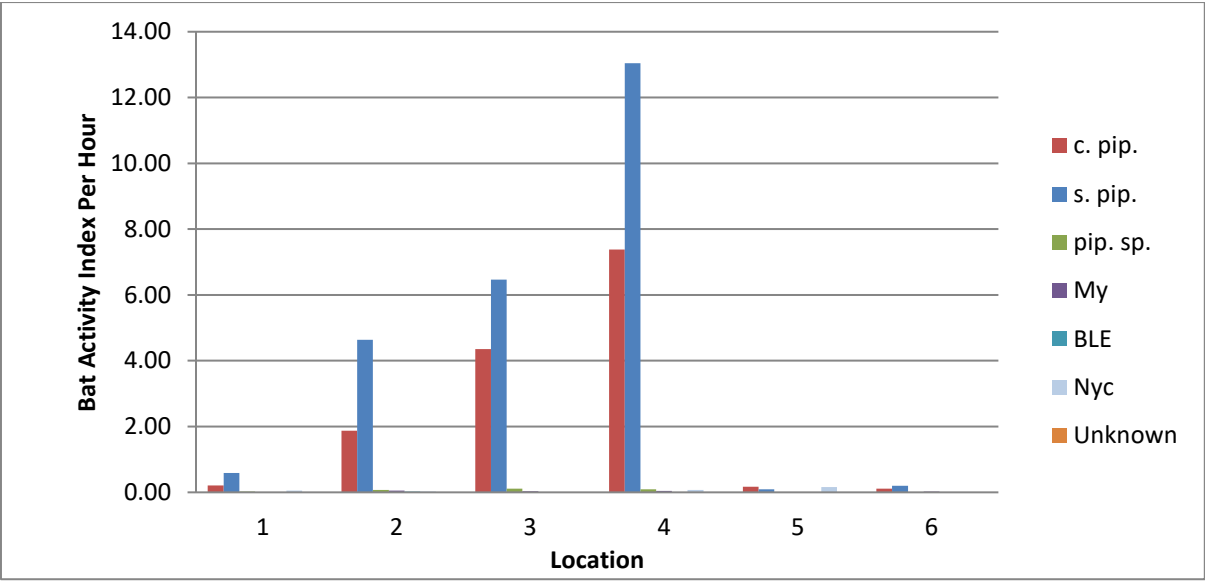
Table 6-14 Summary of activity totals September-October 29/09-06/10/2015.

| Activity visit 5 - September - October 29/09-06/10/2015 | | | | | | | | | | | |
|---|------------------------------|-----------|---------|---------|----------|--------------|------|------|------|------------|--------|
| Loc. | Habitat type | Rec. time | c. pip. | s. pip. | pip. sp. | My | BLE | Nyc | Unk | Total Reg. | BAI/hr |
| 1 | Open forestry ride near burn | 54:30:29 | 5 | 50 | 0 | 0 | 0 | 0 | 0 | 55 | 1.01 |
| 2 | Forestry ride | 54:36:58 | 87 | 494 | 7 | 6 | 0 | 0 | 0 | 594 | 10.9 |
| 3 | Forestry ride | 53:17:22 | 949 | 1402 | 24 | 5 | 0 | 0 | 0 | 2380 | 44.7 |
| 4 | Forestry ride | 71:06:49 | 1424 | 2850 | 22 | 7 | 0 | 2 | 0 | 4305 | 60.5 |
| 5 | Forestry ride near burn | 36:22:33 | 3 | 4 | 0 | 0 | 0 | 2 | 0 | 9 | 0.25 |
| 6 | Clear-fell near burn | 67:25:44 | 1 | 4 | 0 | 3 | 0 | 0 | 0 | 8 | 0.12 |
| | Total Registrations | | 2469 | 4804 | 53 | 21 | 0 | 4 | 0 | 7351 | |
| | Total BAI/hr | | 7.32 | 14.2 | 0.16 | 0.06 | 0.00 | 0.01 | 0.00 | | |
| | Total Bat Passes | | | 7351 | | Total BAI/hr | | | | 21.79 | |

(Abbreviations: s.pip - c.pip - common pipistrelle; soprano pipistrelle; pip. sp. - pipistrelle species; My - *Myotis* sp.; BLE - brown long-eared bat; Nyc - *Nyctalus* sp.; Unk. - unknown bat; Reg. - registrations)



Graph 6-4 Temporal Survey Results: Species Composition of study area (BAI/hr).

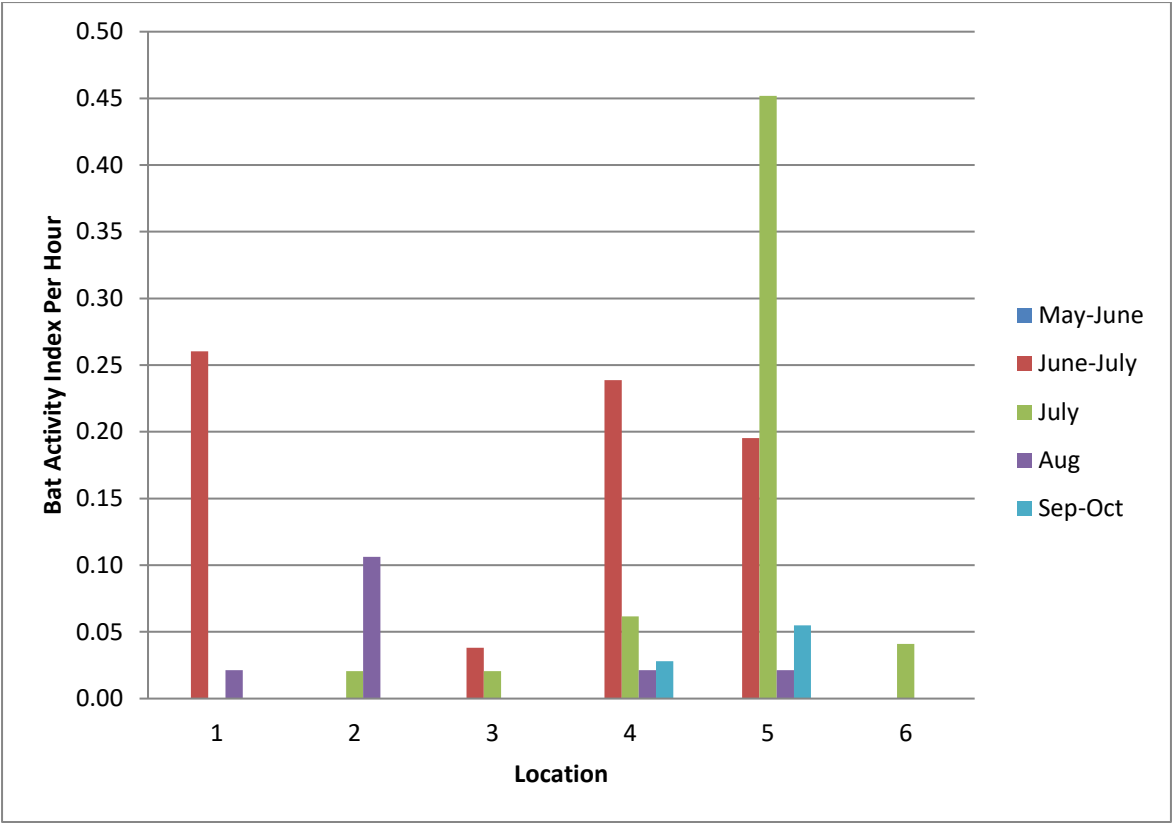


Graph 6-5 Temporal Activity of study area (BAI/hr)

All static locations deployed within the study area recorded *Nyctalus* registrations (Figure 8.3B-2). Temporal activity of *Nyctalus* sp. per location is shown in Graph 6-6. Low levels of *Nyctalus* sp. were recorded from visit two onwards. The location with the most registrations was location 5 which recorded registrations in visit two (June/July), visit three (July), visit four (August) and visit five (September/October). The temporal activity of *Nyctalus* sp. per survey visit is outlined within Table 6-15, below.

Table 6-15 Temporal Activity of *Nyctalus* sp. as BAI/hr per visit.

| Location | Visit 1 May/June | Visit 2 June/July | Visit 3 July | Visit 4 August | Visit 5 September/October | Total BAI/hr per Location |
|------------------------|---------------------|----------------------|-----------------|-------------------|------------------------------|---------------------------|
| 1 | 0.00 | 0.26 | 0 | 0.02 | 0.00 | 0.28 |
| 2 | 0.00 | 0.00 | 0.02 | 0.11 | 0.00 | 0.13 |
| 3 | 0.00 | 0.04 | 0.02 | 0.00 | 0.00 | 0.06 |
| 4 | 0.00 | 0.24 | 0.06 | 0.02 | 0.03 | 0.35 |
| 5 | 0.00 | 0.20 | 0.45 | 0.02 | 0.05 | 0.72 |
| 6 | 0.00 | 0.00 | 0.04 | 0.00 | 0.00 | 0.04 |
| Total BAI/hr per Visit | 0.00 | 0.74 | 0.59 | 0.17 | 0.08 | |



Graph 6-6 Temporal Activity of *Nyctalus* spp. per visit (BAI/hr).

6.5 Collision Risk

Table 6-16 represents the total BAI per hour for high, medium and low risk species. The total BAI for individual bat species has been achieved by combining the temporal and static survey results; the total BAI/hr for which is then calculated to total survey time. The combined total BAI/hr figure for unknown bat species is 0.004 which is not represented in the table below as it cannot be assigned a risk level..

Table 6-16 Overall BAI/hr for Species at Risk of Collision

| Species | High Risk (BAI/hr) | Medium Risk (BAI/hr) | Low Risk (BAI/hr) |
|---------------------|--------------------|----------------------|-------------------|
| s. pipistrelle | | 4.54 | |
| c. pipistrelle | | 2.44 | |
| Pipistrelle sp. | | 0.11 | |
| <i>Myotis</i> sp. | | | 0.04 |
| Brown long-eared | | | 0.006 |
| <i>Nyctalus</i> sp. | 0.08 | | |
| Total BAI/hr | 0.08 | 7.08 | 0.04 |

7 DISCUSSION

7.1 Survey Overview

In total five bat species were recorded during the temporal and spatial surveys: soprano pipistrelle; common pipistrelle; brown-long eared; *Myotis* sp. and *Nyctalus* sp. Records such as pipistrelle species (pip. sp.) and unknown bat (Unk.) are not included in the overall number of species recorded for the study area. The most commonly recorded bat species within the study area were common and soprano pipistrelles.

The spatial surveys recorded bat activity as 25.7 BAI/hr which is considered to be a high activity rate. Bat species are most active at dusk and dawn, with the average time spent outside the roost in northeast Scotland varying between 2 and 5 hours during the summer for common pipistrelles (Swift, 1980). This activity is a result of the correlation with the activity of a bat's bimodal prey species.

The results of the spatial surveys show that the highest BAI/hr present throughout the study area was concentrated around the following habitat types; Kirkie Loch, Water of Tig, tributary along the forest ride, along forest tracks, along forest rides and along clear-fell habitat. It is worth noting that due to ongoing felling/forestry activity, the aerial imagery shown on the results figures does not accurately portray the status of commercial forestry, e.g. whether it has been felled or re-planted.

The increase and decrease in bat activity during the spatial surveys was mainly attributed to the rise and fall of soprano and common pipistrelle numbers. The peak numbers recorded in August could be attributed to juvenile bats leaving maternity roosts. This, along with the high activity rate recorded overall during the spatial surveys could indicate that maternity roosts are adjacent to the study area, perhaps in Barrhill.

Temporal surveys recorded a total BAI/hr of 6.78 for the study area for all locations. When analysing each location in turn, the results of the temporal surveys show the highest areas of activity (BAI) were present at location 4 with 20.63 BAI/hr (shown in Figure 8.3B-2), followed by location 3 with 10.97 BAI/hr, both of which are present along forest rides and therefore considered edge habitat. The rest of the locations throughout the study area recorded lower activity rates.

When comparing the periods of highest activity during the spatial and temporal surveys, BAI/hr peaked in August during the spatial surveys, whilst for temporal surveys, BAI/hr peaked in September/October.

The spatial surveys, which record only during the length of the transect survey, recorded a much higher total activity (25.7 BAI/hr) than that of the temporal surveys (6.78 BAI/hr), which record bats from 30 minutes before dusk to 30 minutes after dawn. This difference is attributed to the difference in survey effort between the two survey types. Although a direct comparison of the activity between the two survey types cannot be made, the spatial surveys suggest that there is a high amount of activity at the times the surveys were conducted i.e. the time around dusk. This is to be expected as bats emerge at dusk and often feed for a few hours before returning to their roost. They may also re-emerge and feed before dawn. Activity studies on common pipistrelle bats in north east Scotland showed that during pregnancy in May and June, most bats leave the roost once each night soon after dusk and return between midnight and dawn (Swift, 1980). After parturition in late June, the activity pattern becomes bimodal and the number of bats outside the roost show peaks after dusk and immediately before dawn. After weaning in August, the activity pattern gradually ceases to be bimodal, and the number of flights per bat falls to between one and two. The average time spent outside the roost varies between 2 and 5 hours during the summer (Swift, 1980).

Variation in bat activity existed between survey visits and between location for both the spatial and temporal surveys. Much of the variation in activity can be accounted for by changes in weather but also by the fidelity of bats to particular foraging areas and commuting routes.

Nyctalus species were recorded in low numbers during the spatial and temporal surveys. *Nyctalus* are considered to be an early emerging species. The closest time to dusk that *Nyctalus* species were recorded during the spatial surveys was 38 minutes after sunset, which would be considered a late emergence for *Nyctalus* spp., and this would suggest that a roost is not immediately adjacent to the study area. The temporal surveys recorded *Nyctalus* species at all locations. The location with the greatest *Nyctalus* BAI/hr was location 5 (forest ride close to a burn) which recorded registrations in June/July, July, August and September/October. *Nyctalus* species are known to fly high above woodlands but are also known to perform deep diving close to the water surface to hunt for insects (Russ, 2012).

When considering all of the results of the surveys undertaken within the study area, the BAI/hr for high and low collision risk species is considered to be low. For medium collision risk species, BAI/hr is considered to be moderate.

All of the species recorded within the study area are on the Scottish Biodiversity List: all pipistrelle species, Daubenton's bat (*Myotis daubentonii*), noctule (*Nyctalus noctula*), and brown long-eared bat. Three are UK Biodiversity Action Plan (UKBAP) species; noctule bats, brown long-eared bat, and soprano pipistrelle. Noctule, common pipistrelle and soprano pipistrelle are also recognised as priority species under the Local Biodiversity Action Plan (LBAP) for South Ayrshire (2007 - 2010) (South Ayrshire Council, 2008).

7.2 High Collision Risk Species

Nyctalus species are classed as being at high risk of collision and at high risk at their population level (Natural England, 2014). This is because their flight behaviour means that they often fly fast and straight, high above the ground (Russ, 2012).

Leisler and noctule bats predominantly feed in open woodland, parkland, pasture, woodland edge and above water (Waters *et al.*, 1999; Mackie and Racey, 2007).

Studies in southern Britain have shown Leisler's to fly up to 4.2 km from their roosts (Waters *et al.* 1999), while studies in Ireland have shown Leisler's to commute directly to foraging sites up to 13.4 km away at speeds often exceeding 40 km/h (Shiel *et al.*, 1999).

Noctule bats can forage up to 10 km from their roost, and Mackie and Racey (2007) found a mean maximum foraging range of about 4 km where noctules were feeding over deciduous woodland and pasture in Britain.

Nyctalus sp. were recorded during the spatial and temporal surveys. The overall BAI/hr for *Nyctalus* species as seen in Table 6-16 is low at 0.08 BAI/hr. The results show that *Nyctalus* species are present within the study area frequently, but at low numbers.

7.3 Medium Collision Risk Species

The greatest activity (BAI/hr) seen throughout the spatial and temporal survey was from medium risk species such as common pipistrelle and soprano pipistrelle. These bat species are classed as being at medium risk of collision but are at low risk at the population level due to their distribution and abundance within the UK (Natural England, 2014). Population estimates for common pipistrelle and soprano pipistrelle bats in the UK in 2005 were 2,430,000 and 1,300,000 respectively (JNCC, 2007).

Bat activity for these species was recorded around edge habitat such as burns, lochs, clear-fell and forest rides.

The overall BAI/hr for common and soprano pipistrelle species is seen to be moderate with a value of 7.08 BAI/hr (refer to Table 6-16).

7.4 Low Collision Risk Species

Only low numbers of *Myotis* sp. which were mainly Daubenton’s bats were recorded within the study area with an overall BAI/hr of 0.08, as seen in Table 6-16.

Brown long-eared bats were also recorded within the study area. The overall BAI for this species is seen to be low at 0.006 BAI/hr, as shown in Table 6-16. However, due to the echolocation of this species only being detected at a close range, it is likely that it is under recorded throughout the study area.

Myotis species favour habitats such as burns, plantation edge and woodland while brown long-eared bats are associated with woodland habitats. These species are less likely to be recorded in open habitats.

Myotis species and brown long-eared bats are at low risk for collision and also at low risk at the population level (Natural England, 2014).

8 MITIGATION PROPOSALS

8.1 Potential Bat Roosts

If it is proposed to place turbines within 200m of the three buildings (TNs 1 to 3) that have bat roost potential then further survey will be required to ascertain if a roost is present (following Collins, 2016). If a roost is present mitigation measures are likely to be required and any licencing requirements must be discussed with Scottish Natural Heritage.

8.2 Buffers from Turbines

Following Natural England guidance (2014), it is recommended that a 50m buffer from turbine blade tip to habitat feature is adhered to in areas with edge habitat such as burns, lochs, or woodland edges, including forest rides.

As medium risk species recorded a moderate BAI per hour, and activity was distributed throughout the study area, no descriptive buffer zones will be allocated and instead any edge habitat must be 50m away from the tip of a turbine blade as discussed above.

Furthermore, on-going research work at Stirling University is finding that bat activity increases in felled forest habitat (Lucinda Kirkpatrick, BCT Conference 2013, pers. comms.) as well as around key-holed turbines. In line with best practice guidelines (Natural England, 2014), the 50m buffer from turbine blade tip to the surrounding edge habitat must also be adhered to when felling and replanting, including habitat plans for turbine key holes.

The calculation to determine the distance between the turbine and the habitat feature in order to maintain this buffer is shown below and is illustrated in Annex 5.

The edge of the rotor-swept area needs to be at least 50m from the nearest part, usually the highest point, of the habitat feature. Guidelines (Natural England, 2014) suggest a calculation, as shown below:

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

blade length (bl), the hub height (hh) and feature height (fh)

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Annex 1. Protected Species Legal Status

All **bat** species receive protection under the Conservation Regulations (1994) (as amended) only⁵.

Conservation (Natural Habitats, &c.) Regulations 1994 (as amended)

Under Regulation 39 (1) it is an offence to:

- a) deliberately or recklessly to capture, injure or kill a wild animal of a European protected species;
- b) deliberately or recklessly:
 - i. to harass a wild animal or group of wild animals of a European protected species;
 - ii. to disturb such an animal while it is occupying a structure or place which it uses for shelter or protection;
 - iii. to disturb such an animal while it is rearing or otherwise caring for its young;
 - iv. to obstruct access to a breeding site or resting place of such an animal, or otherwise to deny the animal use of the breeding site or resting place (i.e. roost sites);
 - v. to disturb such an animal 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; or
 - vi. to disturb such an animal 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;
- c) deliberately or recklessly to take or destroy the eggs of such an animal; or
- d) to damage or destroy a breeding site or resting place of such an animal.

Regulation 44 (2e) allows a licence to be granted for the activities noted in Regulation 39 such that:

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.

⁵ The Conservation Amendment (Scotland) Regulations (2007) removed EPA from Schedule 5 and 8 of the Wildlife and Countryside Act.

Legal and Conservation Status of UK Bat Species taken from Bat Conservation Trust

Source: <http://www.bats.org.uk>

| Species | Legislation / Convention | | | | | | | | | | | | | |
|-------------------------|-----------------------------|-----------------------------|-----|-----------------------------|-----------------------------|--------------------------------------|--|-------------------------------------|---------------|---------------|-----------------------------|-------------------------|----------------|--------------------|
| | Bern Convention Appendix II | Bonn Convention Appendix II | WCA | Habitats Directive Annex IV | Habitats Directive Annex II | Habs Regs 1994 (as amended) Scotland | Conservation of Habs & Species Regs 2010 | Conservation Regs (NI Ireland) 1995 | CROW Act 2000 | NERC Act 2006 | Wild Mammals Protection Act | UK BAP Priority species | IUCN Red List* | EUROBATS Agreement |
| Greater horseshoe bat | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | LC | ✓ |
| Lesser horseshoe bat | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | LC | ✓ |
| Daubenton's bat | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | LC | ✓ |
| Natterer's bat | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | LC | ✓ |
| Whiskered bat | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | LC | ✓ |
| Brandt's bat | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | LC | ✓ |
| Bechstein's bat | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | NT | ✓ |
| Alcathoe bat | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | DD | ✓ |
| Noctule | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | LC | ✓ |
| Leisler's bat | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | LC | ✓ |
| Serotine | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | LC | ✓ |
| Common pipistrelle | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | LC | ✓ |
| Soprano pipistrelle | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | LC | ✓ |
| Nathusius' pipistrelle | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | LC | ✓ |
| Brown long-eared bat | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | LC | ✓ |
| Grey long-eared bat | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | LC | ✓ |
| Barbastelle | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | NT | ✓ |
| Greater mouse-eared bat | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | LC | ✓ |

*IUCN categories: LC is Least Concern, NT is Near Threatened, DD is Data deficient; see www.iucnredlist.org for more details.

Annex 2. Determining Site Risk

(Sourced from Hundt, 2012)

| Factors to consider when determining the survey effort and site risk | | | |
|---|--|--|-------------------------------------|
| Quality of habitat and number of habitat features likely to affect bat mortality rates if altered by development* | Species likely to use the site* | Importance of roosts, of species likely to use site, which may be affected by development* | Potential risk level of development |
| No potential habitat for roosting, foraging or commuting bats. | None | Local | Lowest |
| Small number of potential roost features, of low quality. Low quality foraging habitat that could be used by small numbers of foraging bats Isolated site not connected to the wider landscape by prominent linear features. | Low number, single low risk species. High number, several low risk species. | Parish | Low |
| Buildings, trees or other structures with moderate high potential as roost sites on or near the site. Habitat could be used extensively by foraging bats. Site is connected to the wider landscape by linear features such as scrub, tree lines and streams. | Low number, medium risk species. High number, medium risk species. | DistrictCounty | Medium |
| Numerous suitable buildings, trees (particularly mature ancient woodland) or other structures with moderate-high potential as roost sites on or near the site, and/or confirmed roosts present close to or on the site. Extensive and diverse habitat mosaic of high quality for foraging bats. Site is connected to the wider landscape by a network of strong linear features such as rivers, blocks of woodland and mature hedgerows. | High number, single high risk species. High number, several high risk species. High number, all high risk species. | NationalInternational | High |

*As outlined in current scientific research, SNCO guidance and illustrated in (Wray *et al*, 2010).

Annex 3. Risk Level and Minimum Survey Requirements

(Taken from Hundt, 2012)

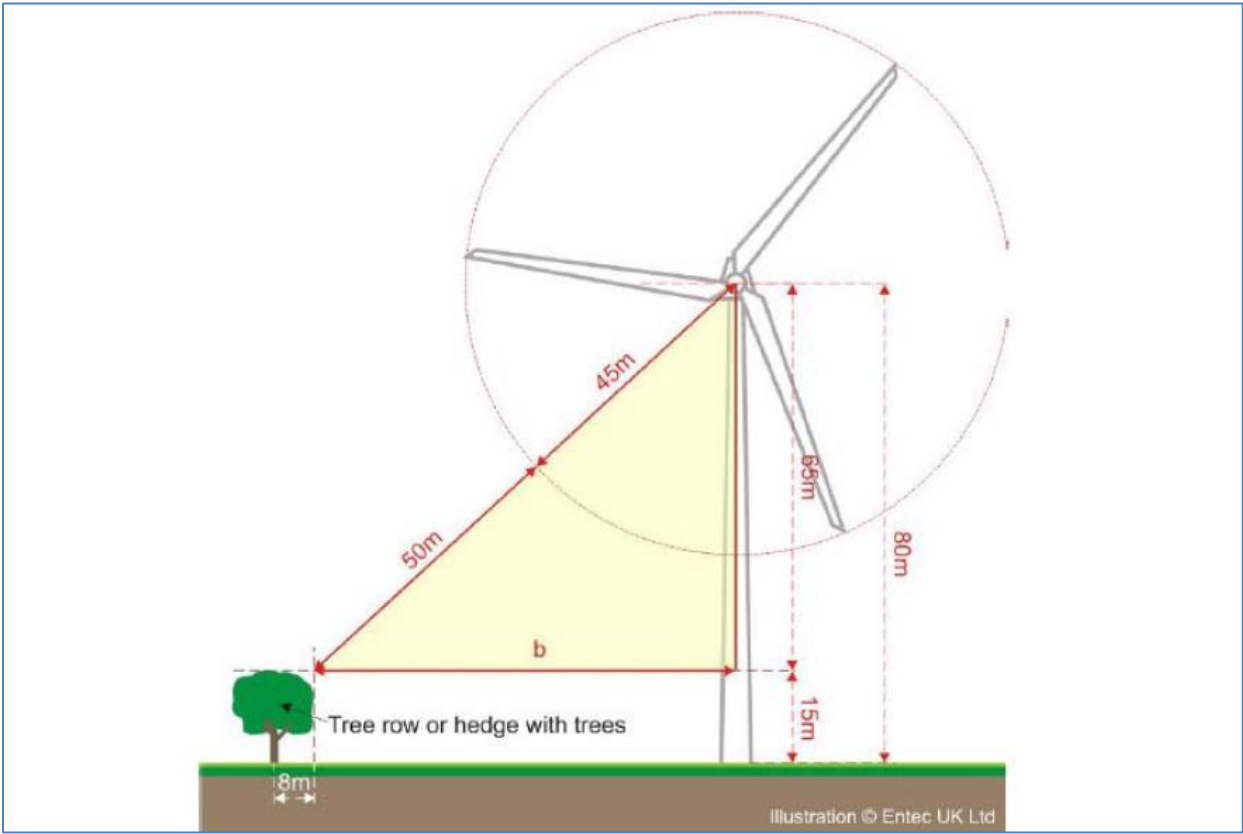
| | Site Risk Level | | |
|--|---|---|---|
| | Low risk | Medium risk | High risk |
| | Roost survey | | |
| Selection of roosts requiring further survey | If evidence of roosting by medium or high-risk species and/or roosts of district importance is found, further survey should follow SNCO guidance and Hundt (2012) guidelines wherever possible. | | |
| Survey period | Surveys should provide data for one season as a minimum. | | |
| Survey area | Up to 200m + rotor radius from turbine locations or potential turbine locations | Up to 200m + rotor radius from turbine locations or potential turbine locations | Up to 200m + rotor radius from turbine locations or potential turbine locations |
| Ground level transect surveys | One visit per transect each season (spring, summer and autumn) | One visit per transect each month (April-Oct) | Up to two visits per transect each month may be required (April-Oct) |
| Automated surveys at ground level | 5 consecutive nights for each single or pair of locations within the survey area, per season | 5 consecutive nights for each single or pair of locations within the survey area, per month | Up to 2 sets of 5 consecutive nights for each single or pair of locations within the survey area, per month |
| Automated surveys at height | For situations where at-height survey may be appropriate For surveys undertaken from masts (met mast or other) survey effort is as outlined above for surveys at ground level. | | |

Annex 4. Target Notes

| TN | Feature | Date | Surveyor | Description/Sign | Grid Ref | Assessment |
|----|-----------|------------|----------|--|---------------|-------------------|
| 1 | Buildings | 21/05/2015 | EM | Small building near railway. Seen at a distance. Assessment not possible. Proposed turbines not within 200m of a so no further survey work required. | NX21010 80243 | Unknown potential |
| 2 | Buildings | 21/05/2015 | EM | Small building near railway. Seen at a distance. Assessment not possible. Proposed turbines not within 200m of a so no further survey work required. | NX20244 79472 | Unknown potential |
| 3 | Buildings | 21/05/2015 | EM | Small building near railway. Seen at a distance. Assessment not possible. Proposed turbines not within 200m of a so no further survey work required. | NX20044 78256 | Unknown potential |

Annex 5. Illustration to Show 50 m Buffer Zone

(Taken from Natural England, 2014)



Annex 6. Spatial Raw Data

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---------------------|------------------------------|------------|------------|--------------|------------|--------------------|-----------------|-------|---------------|-------|-----------|-------------|------------|-------------|-----------|-------|-----------------|------------|---|-------|------------|------|--------------|-------|------------|-------|-------------|-------|-----------|-------|-------------|-------|-----------|-------|----------------|-------|--------------|------------|
| Site name: | Arecleoch Windfarm Extension | | | Date: | 27/05/2015 | | | | | | | | Transect 1 | Trans ect 2 | | | | Entered by | Euan Murray 02/05/2015 Leanne 10/12/2015 | | | | | | | | | | | | | | | | | | | |
| Recorder(s): | LC + LNF | | | Sunset : | 20:50 | | Sunrise | | | | | Start time | 21:20 | 21:22 | | | | QA | | | | | | | | | | | | | | | | | | | | |
| Survey Type: | Dusk | | | SS parameter | 20:20 | | SR parameter | | | 00:30 | | Finish time | 00:25 | 00:42 | | | Final Anabat QA | | | | | | | | | | | | | | | | | | | | | |
| Point count | Recorder | Date | start time | finish time | Total time | Total decimal time | pipistr elle sp | bp ph | pipistr ellus | bp ph | pygmg eus | bpph | nathu sius | bp ph | leisl eri | bp ph | noct ula | bp ph | nycta lus | bp ph | myo tis sp | bpph | dauben tonii | bp ph | natte reri | bp ph | mystac inus | bp ph | bran dtii | bp ph | mys/br andt | bp ph | Pleco tus | bp ph | Unkn ow bat sp | bp ph | Tot al pas s | Total bpph |
| | | | | | | | pass | | pass | | pass | | pass | | pass | | pass | | pass | | pass | | pass | | pass | | pass | | pass | | pass | | pass | | pass | | | |
| 1 | LC | 27/05/2015 | 21:20 | 21:25 | 00:05 | 0.08 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 0 | 0 | 0 | |
| Between n 1 and 2 | LC | 27/05/2015 | 21:25 | 21:30 | 00:05 | 0.08 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 0 | 0 | 0 | |
| 2 | LC | 27/05/2015 | 21:30 | 21:35 | 00:05 | 0.08 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 0 | 0 | 0 | |
| Between n 2 and 3 | LC | 27/05/2015 | 21:35 | 21:43 | 00:08 | 0.13 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 0 | 0 | 0 | |
| 3 | LC | 27/05/2015 | 21:43 | 21:48 | 00:05 | 0.08 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 0 | 0 | 0 | |
| Between n 3 and 4 | LC | 27/05/2015 | 21:48 | 22:00 | 00:12 | 0.20 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 0 | 0 | 0 | |
| 4 | LC | 27/05/2015 | 22:00 | 22:05 | 00:05 | 0.08 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 0 | 0 | 0 | |
| Between n 4 and 5 | LC | 27/05/2015 | 22:05 | 22:13 | 00:08 | 0.13 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 0 | 0 | 0 | |
| 5 | LC | 27/05/2015 | 22:13 | 22:18 | 00:05 | 0.08 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 0 | 0 | 0 | |
| Between n 5 and 6 | LC | 27/05/2015 | 22:18 | 22:26 | 00:08 | 0.13 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 0 | 0 | 0 | |
| 6 | LC | 27/05/2015 | 22:26 | 22:31 | 00:05 | 0.08 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 0 | 0 | 0 | |
| Between n 6 and 7 | LC | 27/05/2015 | 22:31 | 22:40 | 00:09 | 0.15 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 0 | 0 | 0 | |
| 7 | LC | 27/05/2015 | 22:40 | 22:45 | 00:05 | 0.08 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 0 | 0 | 0 | |
| Between n 7 and 8 | LC | 27/05/2015 | 22:45 | 22:53 | 00:08 | 0.13 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 0 | 0 | 0 | |
| 8 | LC | 27/05/2015 | 22:53 | 22:58 | 00:05 | 0.08 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 0 | 0 | 0 | |
| Between n 8 and 9 | LC | 27/05/2015 | 22:58 | 23:00 | 00:02 | 0.03 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 0 | 0 | 0 | |
| 9 | LC | 27/05/2015 | 23:00 | 23:05 | 00:05 | 0.08 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 0 | 0 | 0 | |
| Between n 9 and 10 | LC | 27/05/2015 | 23:05 | 23:13 | 00:08 | 0.13 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 0 | 0 | 0 | |
| 10 | LC | 27/05/2015 | 23:13 | 23:18 | 00:05 | 0.08 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 0 | 0 | 0 | |
| Between n 10 and 11 | LC | 27/05/2015 | 23:18 | 23:24 | 00:06 | 0.10 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 0 | 0 | 0 | |
| 11 | LC | 27/05/2015 | 23:24 | 23:29 | 00:05 | 0.08 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 0 | 0 | 0 | |
| Between n 11 and 12 | LC | 27/05/2015 | 23:29 | 23:32 | 00:03 | 0.05 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 0 | 0 | 0 | |
| 12 | LC | 27/05/2015 | 23:32 | 23:37 | 00:05 | 0.08 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 0 | 0 | 0 | |

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|-------------------|----|-------------|--------|-------|---------------|----------------|-----------------|------------|---------------|------------|-----------|------------|------------|--------------|-----------|--------------|----------|--------------|-----------|--------------|------------|------------|--------------|--------------|------------|--------------|-------------|------------|-----------|--------------|-------------|------------|-----------|------------|----------------|--------------|------------|------------|-----------|---|----|---|
| Between 25 and 26 | EM | 30/06/ 2015 | 23: 05 | 23:13 | 00:08 | 0.13 | | 0 | 3 | 22.5 | 3 | 22.5 | | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 6 | 45 | |
| 26 | EM | 30/06/ 2015 | 23: 00 | 23:05 | 00:05 | 0.08 | | 0 | | 0 | | 0 | | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | 0 | 0 |
| Between 26 and 27 | EM | 30/06/ 2015 | 22: 54 | 23:00 | 00:06 | 0.10 | | 0 | | 0 | | 0 | | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | 0 | 0 |
| 27 | EM | 30/06/ 2015 | 22: 49 | 22:54 | 00:05 | 0.08 | | 0 | | 0 | | 0 | | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | 0 | 0 |
| Between 27 and 28 | EM | 30/06/ 2015 | 22: 45 | 22:49 | 00:04 | 0.07 | | 0 | | 0 | | 0 | | 0 | 0 | 1 | 15 | | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 1 | 15 | |
| 28 | EM | 30/06/ 2015 | 22: 40 | 22:45 | 00:05 | 0.08 | | 0 | | 0 | | 0 | | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | 0 | 0 |
| Between 28 and 29 | EM | 30/06/ 2015 | 22: 35 | 22:40 | 00:05 | 0.08 | | 0 | | 0 | | 0 | | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | 0 | 0 |
| 29 | EM | 30/06/ 2015 | 22: 30 | 22:35 | 00:05 | 0.08 | | 0 | | 0 | | 0 | | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | 0 | 0 |
| Between 29 and 30 | EM | 30/06/ 2015 | 22: 25 | 22:30 | 00:05 | 0.08 | | 0 | | 0 | | 0 | | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | 0 | 0 |
| 30 | EM | 30/06/ 2015 | 22: 20 | 22:25 | 00:05 | 0.08 | | 0 | | 0 | | 0 | | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | 0 | 0 |
| Between 30 and 31 | EM | 30/06/ 2015 | 22: 15 | 22:20 | 00:05 | 0.08 | | 0 | | 0 | | 0 | | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | 0 | 0 |
| 31 | EM | 30/06/ 2015 | 22: 10 | 22:15 | 00:05 | 0.08 | | 0 | | 0 | | 0 | | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | 0 | 0 |
| Between 31 and 32 | EM | 30/06/ 2015 | 22: 06 | 22:10 | 00:04 | 0.07 | | 0 | | 0 | | 0 | | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | 0 | 0 |
| 32 | EM | 30/06/ 2015 | 22: 01 | 22:06 | 00:05 | 0.08 | | 0 | | 0 | | 0 | | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | 0 | 0 |
| Between 32 and 33 | EM | 30/06/ 2015 | 21: 57 | 22:01 | 00:04 | 0.07 | | 0 | | 0 | | 0 | | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | 0 | 0 |
| 33 | EM | 30/06/ 2015 | 21: 52 | 21:57 | 00:05 | 0.08 | | 0 | | 0 | | 0 | | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | 0 | 0 |
| Between 33 and 34 | EM | 30/06/ 2015 | 21: 48 | 21:52 | 00:04 | 0.07 | | 0 | | 0 | | 0 | | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | 0 | 0 |
| 34 | EM | 30/06/ 2015 | 21: 43 | 21:48 | 00:05 | 0.08 | | 0 | | 0 | | 0 | | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | 0 | 0 |
| Between 34 and 35 | EM | 30/06/ 2015 | 21: 38 | 21:43 | 00:05 | 0.08 | | 0 | | 0 | | 0 | | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | 0 | 0 |
| 35 | EM | 30/06/ 2015 | 21: 33 | 21:38 | 00:05 | 0.08 | | 0 | | 0 | | 0 | | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | 0 | 0 |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | decima l time | total hrs/mi n | pipist relle sp | Total bpph | pipistr ellus | Total bpph | pygm geus | Total bpph | nathu sius | To tal bp ph | leis leri | To tal bp ph | noctul a | To tal bp ph | nyct alus | Tota l bpp h | my otis sp | Total bpph | daube ntonii | To tal bp ph | natt ereri | To tal bp ph | mysta cinus | Total bpph | bran dtii | To tal bp ph | mys/b randt | Total bpph | Plec otus | Total bpph | Unk now bat sp | To tal bp ph | Total bats | Total bpph | | | | |
| | | | | | 6.68 | 06:41 | 14 | 2.09 | 30 | 4.49 | 49 | 7.33 | 0 | 0 | 0 | 0 | 0 | 5 | 0.74 813 | 1 | 0.14 9626 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 99 | 14.81 297 | | | |

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| | | | | | 5.92 | 05:5 5 | 25 | 4.23 | 39 | 6.59 | 124 | 20.95 775 | 0 | 0 | 0 | 0 | 0 | 0 | 19 | 3.211 268 | 8 | 5 | 1.3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0.169 014 | 2 | 0.3 4 | 21 8 | 36.84 507 |
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| Site name: | Areleoch Windfarm Extension | | | Date: | 06/08/2015 | | | | | | | Trans ect 1 | Trans ect 2 | | | | Entered by | Ashleigh Wylie 22/09/2015 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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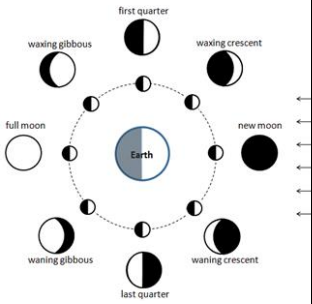
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| 7 | LnF | 29/05/ 2015 | 19: 53 | 19:58 | 00:0 5 | 0.08 | | 0 | | 0 | 3 | 36 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 3 | 36 |
| Between n 7 and 8 | LnF | 29/05/ 2015 | 19: 58 | 20:10 | 00:1 2 | 0.20 | 1 | 5 | 1 | 5 | 4 | 20 | | 0 | | 0 | | 0 | 1 | 5 | | 0 | | 0 | | 0 | | 0 | | 0 | 7 | 35 |
| 8 | LnF | 29/05/ 2015 | 20: 10 | 20:15 | 00:0 5 | 0.08 | | 0 | | 0 | 6 | 72 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 6 | 72 |
| Between n 8 and 9 | LnF | 29/05/ 2015 | 20: 15 | 20:28 | 00:1 3 | 0.22 | | 0 | | 0 | 29 | 133.8 462 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 29 | 133.8 462 |
| 9 | LnF | 29/05/ 2015 | 20: 28 | 20:33 | 00:0 5 | 0.08 | | 0 | | 0 | 24 | 288 | | 0 | | 0 | | 0 | 1 | 12 | | 0 | | 0 | | 0 | | 0 | | 0 | 25 | 300 |
| Between n 9 and 10 | LnF | 29/05/ 2015 | 20: 33 | 20:40 | 00:0 7 | 0.12 | | 0 | | 0 | 12 | 102.8 571 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 12 | 102.8 571 |
| 10 | LnF | 29/05/ 2015 | 20: 40 | 20:45 | 00:0 5 | 0.08 | | 0 | 4 | 48 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 4 | 48 |
| Between n 10 and 11 | LnF | 29/05/ 2015 | 20: 45 | 20:51 | 00:0 6 | 0.10 | | 0 | | 0 | 3 | 30 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 3 | 30 |
| 11 | LnF | 29/05/ 2015 | 20: 51 | 20:56 | 00:0 5 | 0.08 | | 0 | | 0 | 5 | 60 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 5 | 60 |
| Between n 11 and 12 | LnF | 29/05/ 2015 | 20: 56 | 21:02 | 00:0 6 | 0.10 | | 0 | | 0 | 4 | 40 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 4 | 40 |
| 12 | LnF | 29/05/ 2015 | 21: 02 | 21:07 | 00:0 5 | 0.08 | | 0 | | 0 | 5 | 60 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 5 | 60 |
| Between n 12 and 13 | LnF | 29/05/ 2015 | 21: 07 | 21:16 | 00:0 9 | 0.15 | 1 | 6.666 667 | | 0 | 16 | 106.6 667 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 17 | 113.3 333 |
| 13 | LnF | 29/05/ 2015 | 21: 16 | 21:21 | 00:0 5 | 0.08 | 1 | 12 | 7 | 84 | 7 | 84 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 15 | 180 |
| Between n 13 and 14 | LnF | 29/05/ 2015 | 21: 21 | 21:29 | 00:0 8 | 0.13 | | 0 | 1 | 7.5 | 15 | 112.5 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 16 | 120 |
| 14 | LnF | 29/05/ 2015 | 21: 29 | 21:34 | 00:0 5 | 0.08 | | 0 | | 0 | 3 | 36 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 3 | 36 |
| Between n 14 and 15 | LnF | 29/05/ 2015 | 21: 34 | 21:42 | 00:0 8 | 0.13 | | 0 | | 0 | 1 | 7.5 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 1 | 7.5 |
| 15 | LnF | 29/05/ 2015 | 21: 42 | 21:47 | 00:0 5 | 0.08 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 0 | 0 |
| Between n 15 and 16 | LnF | 29/05/ 2015 | 21: 47 | 21:57 | 00:1 0 | 0.17 | | 0 | | 0 | 9 | 54 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 9 | 54 |
| 16 | LnF | 29/05/ 2015 | 21: 57 | 22:02 | 00:0 5 | 0.08 | | 0 | | 0 | 8 | 96 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 8 | 96 |
| Between n 16 and 17 | LnF | 29/05/ 2015 | 22: 02 | 22:10 | 00:0 8 | 0.13 | | 0 | 1 | 7.5 | 7 | 52.5 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 8 | 60 |
| 17 | LnF | 29/05/ 2015 | 22: 10 | 22:15 | 00:0 5 | 0.08 | | 0 | | 0 | 2 | 24 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 2 | 24 |
| 18 | LC | 29/09/ 2015 | 18: 31 | 18:36 | 00:0 5 | 0.08 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 0 | 0 |
| Between n 18 and 19 | LC | 29/09/ 2015 | 18: 36 | 18:40 | 00:0 4 | 0.07 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 0 | 0 |
| 19 | LC | 29/09/ 2015 | 18: 40 | 18:45 | 00:0 5 | 0.08 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 0 | 0 |
| Between n 19 and 20 | LC | 29/09/ 2015 | 18: 45 | 18:49 | 00:0 4 | 0.07 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 0 | 0 |
| 20 | LC | 29/09/ 2015 | 18: 49 | 18:54 | 00:0 5 | 0.08 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 0 | 0 |
| Between n 20 and 21 | LC | 29/09/ 2015 | 18: 54 | 18:58 | 00:0 4 | 0.07 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 0 | 0 |
| 21 | LC | 29/09/ 2015 | 18: 58 | 19:03 | 00:0 5 | 0.08 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 0 | 0 |
| Between n 21 and 22 | LC | 29/09/ 2015 | 19: 03 | 19:07 | 00:0 4 | 0.07 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 0 | 0 |
| 22 | LC | 29/09/ 2015 | 19: 07 | 19:12 | 00:0 5 | 0.08 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 0 | 0 |

[illegible]

Annex 7. Weather Data (Spatial Surveys)

Criteria used in Recording Weather Conditions during the Spatial Surveys

| Wind Speed | | | | Wind Direction (using 16-point compass) | Rain | | Cloud Cover (in eighths) | | | Cloud Height (m) | | Moon Phase | |
|-----------------|---|---------------|----|---|---------------|---|--------------------------|-----|-----------|------------------|-----------------|------------|--|
| Calm | 0 | Moderate gale | 7 | N | None | 0 | No clouds | 0/8 | <150 m | 0 | New Moon | 0 | |
| Light air | 1 | Fresh gale | 8 | NNE | Drizzle/Mist | 1 | Half Sky | 4/8 | 150-500 m | 1 | Waning Crescent | 1 | |
| Light breeze | 2 | Strong gale | 9 | NNW | Light showers | 2 | Full Sky | 8/8 | >500 m | 2 | Last Quarter | 2 | |
| Gentle breeze | 3 | Whole gale | 10 | NE | Heavy showers | 3 | Etc. | | | | Waning Gibbous | 3 | |
| Moderate breeze | 4 | Storm | 11 | NW | Heavy rain | 4 | | | | | Full Moon | 4 | |
| Fresh breeze | 5 | Hurricane | 12 | Etc. | | | | | | | Waxing Gibbous | 5 | |
| Strong breeze | 6 | | | | | | | | | | First Quarter | 6 | |
| | | | | | | | | | | | Waxing Crescent | 7 | |



Weather Data Recorded During Spatial Surveys (see Table above for condition criteria)

| Date | Transect | Surveyor | Start Time | Finish Time | Hour | Temperature | Relative Humidity | Wind Speed | Wind Direction | Moon phase | Rain | Cloud Cover | Cloud Height | Notes |
|------------|----------|----------|------------|-------------|------|-------------|-------------------|-------------------|----------------|---------------|--------|-------------|--------------|--|
| 27/05/2015 | 1 | LC | 21:20 | 00:25 | 1 | 8.3 | 89.1 | 0 calm | n/a | first quarter | 0 none | 4/8' | 2 >500m | Gusting to 7 |
| 27/05/2015 | 1 | LC | 21:20 | 00:25 | 2 | 8.1 | 87.2 | 0 calm | n/a | first quarter | 0 none | 4/8' | 2 >500m | Gusting to 7 |
| 27/05/2015 | 1 | LC | 21:20 | 00:25 | 3 | 7.9 | 88.1 | 0 calm | n/a | first quarter | 0 none | 5/8' | 2 >500m | Shower at 23:33 heavy for 20 mins |
| 27/05/2015 | 1 | LC | 21:20 | 00:25 | 4 | 7.9 | 89.9 | 0 calm | n/a | first quarter | 0 none | 7/8' | 2 >500m | |
| 27/05/2015 | 2 | LNF | 21:22 | 00:42 | 1 | 8.3 | 89.1 | 5 fresh breeze | SE | first quarter | 0 none | 5/8' | 2 >500m | |
| 27/05/2015 | 2 | LNF | 21:22 | 00:42 | 2 | 8.1 | 87.2 | 4 moderate breeze | SE | first quarter | 0 none | 6/8' | 2 >500m | Wind gusts at 5 |
| 27/05/2015 | 2 | LNF | 21:22 | 00:42 | 3 | 7.9 | 88.1 | 3 gentle breeze | SE | first quarter | 0 none | 7/8' | 2 >500m | 3 times rain showers at 3, 5 mins each |

| Date | Transect | Surveyor | Start Time | Finish Time | Hour | Temperature | Relative Humidity | Wind Speed | Wind Direction | Moon phase | Rain | Cloud Cover | Cloud Height | Notes |
|------------|----------|----------|------------|-------------|------|-------------|-------------------|-----------------|----------------|----------------|----------------|-------------|--------------|---|
| 27/05/2015 | 2 | LNF | 21:22 | 00:42 | 4 | 7.9 | 89.9 | 3 gentle breeze | SE | first quarter | 1 drizzle/mist | 8/8' | 2 >500m | Wind gusts to 4 |
| | | | | | | | | | | | | | | |
| 06/08/2015 | 1 | MH | 21:06 | 00:45 | 1 | 12.3 | 92.7 | 0 calm | n/a | third quarter | 0 none | 7/8' | 2 >500m | |
| 06/08/2015 | 1 | MH | 21:06 | 00:45 | 2 | 10.9 | 97.6 | 0 calm | n/a | third quarter | 0 none | 6/8' | 2 >500m | |
| 06/08/2015 | 1 | MH | 21:06 | 00:45 | 3 | 11 | 96.1 | 0 calm | n/a | third quarter | 0 none | 7/8' | 2 >500m | |
| 06/08/2015 | 1 | MH | 21:06 | 00:45 | 4 | - | - | 0 calm | n/a | third quarter | 0 none | 7/8' | 2 >500m | |
| 06/08/2015 | 2 | LC | 20:43 | 23:37 | 1 | 12.3 | 92.7 | 0 calm | n/a | third quarter | 0 none | 8/8' | 2 >500m | Rain at 2055, very light 5 minutes. Lots of midges. |
| 06/08/2015 | 2 | LC | 20:43 | 23:37 | 2 | 10.9 | 97.6 | 0 calm | n/a | third quarter | 0 none | 8/8' | 2 >500m | Some midges |
| 06/08/2015 | 2 | LC | 20:43 | 23:37 | 3 | 11 | 96.1 | 0 calm | n/a | third quarter | 0 none | 8/8' | 2 >500m | |
| | | | | | | | | | | | | | | |
| 29/09/2015 | 1 | LNF | 18:31 | 22:15 | 1 | 14.9 | 66.2 | 0 calm | n/a | waning gibbous | 0 none | 1/8' | 2 >500m | |
| 29/09/2015 | 1 | LNF | 18:31 | 22:15 | 2 | 14.3 | 79.4 | 0 calm | n/a | waning gibbous | 0 none | 1/8' | 2 >500m | |
| 29/09/2015 | 1 | LNF | 18:31 | 22:15 | 3 | 10.6 | 83.2 | 0 calm | n/a | waning gibbous | 0 none | 1/8' | 2 >500m | |
| 29/09/2015 | 2 | LC | 18:31 | 21:13 | 1 | 13 | 82.1 | 1 Light air | n/a | waning gibbous | 0 none | 1/8' | 2 >500m | Sunny day, evening temp. dropping, midges about |
| 29/09/2015 | 2 | LC | 18:31 | 21:13 | 2 | 9.1 | 92.3 | 1 Light air | n/a | waning gibbous | 0 none | 1/8' | 2 >500m | |
| 29/09/2015 | 2 | LC | 18:31 | 21:13 | 3 | 8.6 | 94.6 | 1 Light air | n/a | waning gibbous | 0 none | 1/8' | 2 >500m | |
| | | | | | | | | | | | | | | |
| 30/06/2015 | 1 | LC | 21:33 | 01:21 | 1 | 18.6 | 82.7 | 2 light breeze | n/a | full moon | 0 none | 1/8' | 2 >500m | Warm - midges |
| 30/06/2015 | 1 | LC | 21:33 | 01:21 | 2 | 17.1 | 85.7 | 1 Light air | n/a | full moon | 0 none | 1/8' | 2 >500m | Warm - midges |
| 30/06/2015 | 1 | LC | 21:33 | 01:21 | 3 | 16.8 | 86.1 | 1 Light air | n/a | full moon | 0 none | 1/8' | 2 >500m | Warm - midges |
| 30/06/2015 | 1 | LC | 21:33 | 01:21 | 4 | 16.5 | 90.5 | 0 calm | n/a | full moon | 0 none | 1/8' | 2 >500m | Warm - midges |
| 30/06/2015 | 2 | EM | 21:33 | 00:26 | 1 | 19.6 | 76.7 | 0 calm | n/a | full moon | 0 none | 1/8' | 2 >500m | Gust 1 from NE |

| Date | Transect | Surveyor | Start Time | Finish Time | Hour | Temperature | Relative Humidity | Wind Speed | Wind Direction | Moon phase | Rain | Cloud Cover | Cloud Height | Notes |
|------------|----------|----------|------------|-------------|------|-------------|-------------------|-------------|----------------|---------------|--------|-------------|--------------|----------------------|
| 30/06/2015 | 2 | EM | 21:33 | 00:26 | 2 | 18 | 83 | 1 Light air | S | full moon | 0 none | 1/8' | 2 >500m | |
| 30/06/2015 | 2 | EM | 21:33 | 00:26 | 3 | 17.5 | 90.8 | 0 calm | n/a | full moon | 0 none | 1/8' | 2 >500m | Sheltered |
| | | | | | | | | | | | | | | |
| 14/07/2015 | 1 | EM | 21:21 | 00:22 | 1 | 14.9 | 68.3 | 0 calm | n/a | third quarter | 0 none | 4/8' | 2 >500m | |
| 14/07/2015 | 1 | EM | 21:21 | 00:22 | 2 | 10.2 | 79.6 | 0 calm | n/a | third quarter | 0 none | 3/8' | 2 >500m | Gust from 1 to South |
| 14/07/2015 | 1 | EM | 21:21 | 00:22 | 3 | 9 | 86 | 1 Light air | W | third quarter | 0 none | 3/8' | 2 >500m | |
| 14/07/2015 | 1 | EM | 21:21 | 00:22 | 4 | 9.6 | 82.1 | 0 calm | n/a | third quarter | 0 none | 4/8' | 2 >500m | |
| 14/07/2015 | 2 | LC | 21:21 | 00:15 | 1 | 11.4 | 79.5 | 0 calm | n/a | third quarter | 0 none | 3/8' | 2 >500m | Lots of midges |
| 14/07/2015 | 2 | LC | 21:21 | 00:15 | 2 | 9.3 | 89.5 | 0 calm | n/a | third quarter | 0 none | 1/8' | 2 >500m | Midges but not lots |
| 14/07/2015 | 2 | LC | 21:21 | 00:15 | 3 | 8.8 | 92.3 | 0 calm | n/a | third quarter | 0 none | 1/8' | 2 >500m | Midges but not lots |

Annex 8. Behavioural Data (Spatial Surveys)

| Visi | Date | Transect | Point count | Surveyor | Species | pass no. | Behaviour | Direction | Height | Notes |
|------|------------|----------|-------------|----------|----------------|----------|-----------|-----------|---------|---------------------------------------|
| V1 | 27/05/2015 | 1 | 16 | LC | Myotis | 1 | unknown | unknown | unknown | Taken from Analook data |
| V1 | 27/05/2015 | 2 | 32 | EM | 55 pip | 1 | unknown | unknown | unknown | Taken from Analook data |
| | | | | | | | | | | |
| V2 | 30/06/2015 | 1 | 2-1 | LC | Pipistrelle sp | 2 | unknown | unknown | unknown | Not seen |
| V2 | 30/06/2015 | 1 | 2-3 | LC | 55 pip | 13 | feeding | unknown | unknown | Not seen. Changed passes Analook data |
| V2 | 30/06/2015 | 1 | 2-3 | LC | Pipistrelle sp | 2 | unknown | unknown | unknown | Taken from Analook data |
| V2 | 30/06/2015 | 1 | 4-3 | LC | Pipistrelle sp | 1 | unknown | unknown | unknown | Not seen |
| V2 | 30/06/2015 | 1 | 4-3 | LC | 45pip | 1 | unknown | unknown | unknown | Taken from Analook data |
| V2 | 30/06/2015 | 1 | 4-3 | LC | 55pip | 1 | unknown | unknown | unknown | Taken from Analook data |
| V2 | 30/06/2015 | 1 | 4 | LC | 45pip | 1 | unknown | unknown | unknown | Taken from Analook data |

| Visi | Date | Transect | Point count | Surveyor | Species | pass no. | Behaviour | Direction | Height | Notes |
|------|------------|----------|-------------|----------|----------------|----------|--------------|-----------|---------|---|
| V2 | 30/06/2015 | 1 | 4 | LC | Myotis sp | 1 | unknown | unknown | unknown | Taken from Analook data |
| V2 | 30/06/2015 | 1 | 2 | LC | 45pip | 2 | unknown | unknown | unknown | Not seen. Changed species from pip sp. Analook data |
| V2 | 30/06/2015 | 1 | 3 | LC | 45pip | 3 | feeding | unknown | unknown | Not seen. Changed from 55pip. Analook data |
| V2 | 30/06/2015 | 1 | 3 | LC | Pipistrelle sp | 2 | unknown | unknown | unknown | Taken from Analook data |
| V2 | 30/06/2015 | 1 | 5-6 | LC | 45pip | 1 | unknown | unknown | unknown | Taken from Analook data |
| V2 | 30/06/2015 | 1 | 5-6 | LC | Pipistrelle sp | 1 | unknown | unknown | unknown | Taken from Analook data |
| V2 | 30/06/2015 | 1 | 6-7 | LC | 45 pip | 1 | unknown | unknown | unknown | Taken from Analook data |
| V2 | 30/06/2015 | 1 | 8-7 | LC | 45 pip | 1 | unknown | unknown | unknown | Not seen. Changed species data Analook |
| V2 | 30/06/2015 | 1 | 8-7 | LC | Pipistrelle sp | 1 | unknown | unknown | unknown | Not seen |
| V2 | 30/06/2015 | 1 | 8 | LC | Pipistrelle sp | 1 | unknown | unknown | unknown | Not seen |
| V2 | 30/06/2015 | 1 | 9 | LC | Pipistrelle sp | 1 | unknown | unknown | unknown | Not seen |
| V2 | 30/06/2015 | 1 | 9-8 | LC | 55 pip | 8 | unknown | unknown | unknown | Not seen. Changed species data Analook |
| V2 | 30/06/2015 | 2 | 28-27 | EM | Nyctalus sp | 1 | unknown | unknown | unknown | Not seen. Changed species from pip sp Analook |
| V2 | 30/06/2015 | 2 | 28-27 | EM | 55pip | 3 | unknown | unknown | unknown | Taken from Analook data |
| V2 | 30/06/2015 | 2 | 26-25 | EM | 45pip | 3 | feeding buzz | unknown | unknown | Not seen. Changed passes data Analook |
| V2 | 30/06/2015 | 2 | 25 | EM | Pip 55 | 12 | feeding buzz | NE | 0-5m | 2 metres flight height. Then circled |
| V2 | 30/06/2015 | 2 | 25-24 | EM | 55pip | 4 | unknown | unknown | unknown | Not seen |
| V2 | 30/06/2015 | 2 | 24 | EM | Pipistrelle sp | 2 | unknown | unknown | unknown | 2 short calls; not seen |
| V2 | 30/06/2015 | 2 | 24-23 | EM | Nyctalus sp | 1 | unknown | unknown | unknown | Taken from Analook data |
| V2 | 30/06/2015 | 2 | 23 | EM | Pip 45 | 1 | unknown | unknown | unknown | Not seen |
| V2 | 30/06/2015 | 2 | 23 | EM | Pipistrelle sp | 2 | unknown | unknown | unknown | Not seen |
| V2 | 30/06/2015 | 2 | 22-21 | EM | Pipistrelle sp | 1 | unknown | unknown | unknown | |

| Vi si | Date | Tra nsec * | Point count | Surv eyor | Species | pass no. | Behavio ur | Dire ctio n | Heig ht | Notes |
|----------|------------|------------------|----------------|--------------|--------------------|-------------|----------------------|-------------------|-----------------|---|
| V2 | 30/06/2015 | 2 | 21 | EM | Pip 55 | 3 | likely commuti ng | W | 0-5m | 2 metres flight height. Changed number of passes from Analoook data |
| V2 | 30/06/2015 | 2 | 21 | EM | Pip 45 | 3 | unknow n | unk now n | unk now n | Taken from Analoook data |
| V2 | 30/06/2015 | 2 | 21 | EM | Pip sp | 1 | unknow n | unk now n | unk now n | Taken from Analoook data |
| V2 | 30/06/2015 | 2 | 21-20 | EM | Pip45 | 5 | unknow n | unk now n | unk now n | Not seen. Changed from pip sp Analoook data |
| V2 | 30/06/2015 | 2 | 20-19 | EM | 45pip | 2 | unknow n | unk now n | unk now n | Not seen. Changed from pip sp Analoook data |
| V2 | 30/06/2015 | 2 | 20-19 | EM | 55 pip | 3 | unknow n | unk now n | unk now n | Changed from pip sp Analoook data |
| V2 | 30/06/2015 | 2 | 19-18 | EM | Pip 55 | 2 | feeding buzz | unk now n | unk now n | Not seen. Changed number of passes from Analoook data |
| V2 | 30/06/2015 | 2 | 19-18 | EM | Pip45 | 3 | unknown | unk now n | unk now n | Taken from Analoook data |
| V2 | 30/06/2015 | 2 | 18 | EM | Pip 45 | 1 | feeding buzz | unk now n | unk now n | Not seen. Changed from 55 pip from Analoook data |
| V2 | 30/06/2015 | 2 | 18 | EM | Nyctalu s sp | 1 | unknow n | unk now n | unk now n | Taken from Analoook data |
| | | | | | | | | | | |
| V3 | 14/07/2015 | 1 | 7-8 | EM | Nyctalu s sp | 2 | unknow n | unk now n | unk now n | Taken from Analoook data |
| V3 | 14/07/2015 | 1 | 8 | EM | 55pip | 1 | likely commuti ng | SE | 0-5m | 3m flight height. Changed from pip sp Analoook data |
| V3 | 14/07/2015 | 1 | 8 | EM | Myotis sp | 7 | unknow n | unk now n | unk now n | Not seen. |
| V3 | 14/07/2015 | 1 | 8-9 | EM | 55 pip | 15 | unknow n | unk now n | unk now n | Taken from Analoook data |
| V3 | 14/07/2015 | 1 | 8-9 | EM | 55pip | 1 | unknow n | unk now n | unk now n | Taken from Analoook data |
| V3 | 14/07/2015 | 1 | 9 | EM | Pipistre lle sp | 2 | unknow n | unk now n | unk now n | Not seen. |
| V3 | 14/07/2015 | 1 | 9-10 | EM | Nyctalu s sp | 1 | unknow n | unk now n | unk now n | Taken from Analoook data |
| V3 | 14/07/2015 | 1 | 9-10 | EM | 45pip | 1 | unknow n | unk now n | unk now n | Taken from Analoook data |
| V3 | 14/07/2015 | 1 | 10 | EM | 2 | 11 | unknow n | unk now n | unk now n | |
| V3 | 14/07/2015 | 1 | 10 | EM | Pipistre lle sp | 2 | likely commuti ng | E | 0-5m | 2m flight height |
| V4 | 15/07/2015 | 1 | 10-11 | EM | 45pip | 2 | unknow n | unk now n | unk now n | Taken from Analoook data |

| Vi si | Date | Tra nsec * | Point count | Surv eyor | Species | pass no. | Behavio ur | Dire ctio n | Heig ht | Notes |
|----------|------------|------------------|----------------|--------------|--------------------|-------------|----------------------|-------------------|-----------------|---|
| V5 | 16/07/2015 | 1 | 10-11 | EM | Pipistre lle sp | 1 | unknow n | unk now n | unk now n | Taken from Analoook data |
| V3 | 14/07/2015 | 1 | 11 | EM | Pipistre lle sp | 2 | unknow n | unk now n | unk now n | Not seen - faint |
| V3 | 14/07/2015 | 1 | 11 | EM | Pip 55 | 2 | likely commuti ng | S | 0-5m | 5m flight height |
| V3 | 14/07/2015 | 1 | 11-12 | EM | Nyctalu s sp | 3 | unknow n | unk now n | unk now n | Taken from Analoook data |
| V3 | 14/07/2015 | 1 | 11-12 | EM | 45pip | 1 | unknow n | unk now n | unk now n | Taken from Analoook data |
| V3 | 14/07/2015 | 1 | 11-12 | EM | 55pip | 1 | unknow n | unk now n | unk now n | Taken from Analoook data |
| V3 | 14/07/2015 | 1 | 12 | EM | Pipistre lle sp | 1 | unknow n | unk now n | unk now n | Not seen |
| V3 | 14/07/2015 | 1 | 12-13 | EM | 55pip | 2 | unknow n | unk now n | unk now n | Taken from Analoook data |
| V3 | 14/07/2015 | 1 | 13 | EM | Pipistre lle sp | 2 | unknow n | unk now n | unk now n | Not seen |
| V3 | 14/07/2015 | 1 | 13 | EM | Pip 55 | 18 | unknow n | unk now n | unk now n | Not seen - 2+ bats |
| V3 | 14/07/2015 | 1 | 13-14 | EM | 45pip | 12 | unknow n | unk now n | unk now n | Taken from Analoook data |
| V3 | 14/07/2015 | 1 | 13-14 | EM | 55pip | 17 | unknow n | unk now n | unk now n | Taken from Analoook data |
| V3 | 14/07/2015 | 1 | 13-14 | EM | Pipistre lle sp | 1 | unknow n | unk now n | unk now n | Taken from Analoook data |
| V3 | 14/07/2015 | 1 | 14 | EM | Pip 55 | 17 | feeding buzz | unk now n | unk now n | Not seen - 2 bats |
| V3 | 14/07/2015 | 1 | 14 | EM | Pip 45 | 6 | unknow n | unk now n | unk now n | Not seen. Changed from pip sp from Analoook |
| V3 | 14/07/2015 | 1 | 14-15 | EM | 55pip | 9 | unknow n | unk now n | unk now n | Taken from Analoook data |
| V3 | 14/07/2015 | 1 | 14-15 | EM | Pipistre lle sp | 1 | unknow n | unk now n | unk now n | Taken from Analoook data |
| V3 | 14/07/2015 | 1 | 15 | EM | Pipistre lle sp | 1 | unknow n | unk now n | unk now n | Not seen |
| V3 | 14/07/2015 | 1 | 15-16 | EM | 55pip | 3 | unknow n | unk now n | unk now n | Taken from Analoook data |
| V3 | 14/07/2015 | 1 | 16 | EM | Pip 55 | 2 | unknow n | unk now n | unk now n | Not seen |
| V4 | 15/07/2015 | 1 | 16 | EM | Pip 45 | 4 | unknow n | unk now n | unk now n | Taken from Analoook data |
| V3 | 14/07/2015 | 1 | 16 | EM | Pipistre lle sp | 1 | unknow n | unk now n | unk now n | Not seen. Changed passes data Analoook |

| Vi si | Date | Tra nsec t | Point count | Surv eyor | Species | pass no. | Behavio ur | Dire ctio n | Heig ht | Notes |
|----------|------------|------------------|----------------|--------------|----------------|-------------|---------------|-------------------|------------|--|
| V3 | 14/07/2015 | 1 | 16 | EM | Myotis sp | 1 | unknown | unknown | unknown | Not seen |
| V3 | 14/07/2015 | 1 | 16-17 | EM | 55pip | 6 | unknown | unknown | unknown | Taken from Analoook data |
| V3 | 14/07/2015 | 1 | 16-17 | EM | Pipistrelle sp | 2 | unknown | unknown | unknown | Taken from Analoook data |
| V3 | 14/07/2015 | 1 | 17 | EM | Pipistrelle sp | 1 | unknown | unknown | unknown | Short call. Changed from unknown sp Analoook |
| V3 | 14/07/2015 | 1 | 17 | EM | Pip 55 | 2 | unknown | unknown | unknown | Not seen |
| V3 | 14/07/2015 | 2 | 24-25 | LC | 55 pip | 3 | feeding buzz | unknown | 6-10m | 6m flight height. 2 bats |
| V3 | 14/07/2015 | 2 | 24-25 | LC | Nyctalus spp | 3 | unknown | unknown | unknown | Taken from Analoook data |
| V3 | 14/07/2015 | 2 | 25 | LC | 55 pip | 1 | feeding buzz | unknown | 6-10m | 8m flight height. 2 bats. Changed passes from Analoook |
| V4 | 15/07/2015 | 2 | 25 | LC | 45 pip | 1 | unknown | unknown | unknown | Taken from Analoook data |
| V5 | 16/07/2015 | 2 | 25 | LC | Pipistrelle sp | 1 | unknown | unknown | unknown | Taken from Analoook data |
| V6 | 17/07/2015 | 2 | 25 | LC | Nyctalus sp | 2 | unknown | unknown | unknown | Taken from Analoook data |
| V3 | 14/07/2015 | 2 | 25-26 | LC | 55pip | 1 | feeding buzz | unknown | 6-10m | 8m flight height. Changed passes from Analoook |
| V3 | 14/07/2015 | 2 | 25-26 | LC | 45pip | 1 | unknown | unknown | unknown | Taken from Analoook data |
| V3 | 14/07/2015 | 2 | 25-26 | LC | Pipistrelle sp | 2 | unknown | unknown | unknown | Taken from Analoook data |
| V3 | 14/07/2015 | 2 | 27 | LC | Unkown bat | 2 | unknown | unknown | unknown | Bat? Faint call |
| V3 | 14/07/2015 | 2 | 28 | LC | Pip 55 | 1 | feeding buzz | unknown | 6-10m | 7m flight height |
| V3 | 14/07/2015 | 2 | 28 | LC | Pipistrelle sp | 2 | unknown | unknown | unknown | |
| V3 | 14/07/2015 | 2 | 28-29 | LC | Nyctalus sp | 1 | unknown | unknown | unknown | Taken from Analoook data |
| V3 | 14/07/2015 | 2 | 29 | LC | Pip 45 | 8 | feeding buzz | unknown | unknown | |
| V3 | 14/07/2015 | 2 | 29 | LC | Pip 55 | 2 | unknown | unknown | unknown | Faint call. Changed species from unknown bat - Analoook data |
| V3 | 14/07/2015 | 2 | 29-30 | LC | ble | 1 | unknown | unknown | unknown | Taken from Analoook data |
| V3 | 14/07/2015 | 2 | 30 | LC | Nyctalus sp | 3 | unknown | unknown | unknown | Taken from Analoook data |

| Vi si | Date | Tra nsec t | Point count | Surv eyor | Species | pass no. | Behavio ur | Dire ctio n | Heig ht | Notes |
|----------|------------|------------------|----------------|--------------|----------------|-------------|------------------|-------------------|------------|--|
| V3 | 14/07/2015 | 2 | 31-32 | LC | Pip 55 | 6 | feeding buzz | unknown | unknown | |
| V3 | 14/07/2015 | 2 | 32 | LC | 45pip | 1 | unknown | unknown | unknown | Taken from Analoook data |
| V3 | 14/07/2015 | 2 | 32 | LC | 55pip | 1 | unknown | unknown | unknown | Taken from Analoook data |
| V3 | 14/07/2015 | 2 | 32 | LC | Nyctalus sp | 4 | unknown | unknown | unknown | Taken from Analoook data |
| V3 | 14/07/2015 | 2 | 32-33 | LC | 55pip | 3 | unknown | unknown | unknown | Changed from 45pip - Analoook data |
| V3 | 14/07/2015 | 2 | 33 | LC | 55pip | 1 | unknown | unknown | unknown | Changed from pip sp Analoook data |
| | | | | | | | | | | |
| V4 | 06/08/2015 | 1 | 14 | MH | Unkown bat | 2 | likely commuting | NW | 6-10m | Heading from southeast to northwest. 7 metres flight height. |
| V4 | 06/08/2015 | 1 | 14-13 | MH | Nyctalus sp | 3 | feeding buzz | unknown | 0-5m | 4 metres flight height |
| V4 | 06/08/2015 | 1 | 14-13 | MH | Pipistrelle sp | 1 | unknown | unknown | unknown | Unseen. Changed passes - Analoook data |
| V4 | 06/08/2015 | 1 | 14-13 | MH | 55pip | 2 | unknown | unknown | unknown | Taken from Analoook data |
| V4 | 06/08/2015 | 1 | 13 | MH | Pip 55 | 6 | feeding buzz | unknown | 6-10m | Feeding/commuting. Numerous - constant activity hard to ID |
| V4 | 06/08/2015 | 1 | 13 | MH | Pip 45 | 6 | feeding buzz | unknown | 6-10m | Feeding/commuting. Numerous - constant activity hard to ID |
| V4 | 06/08/2015 | 1 | 13 | MH | Nyctalus sp | 1 | unknown | unknown | 6-10m | Unseen |
| V4 | 06/08/2015 | 1 | 12-11 | MH | Pip 55 | 1 | likely commuting | unknown | unknown | Unseen (commuting) |
| V4 | 06/08/2015 | 1 | 11 | MH | Nyctalus sp | 1 | unknown | unknown | unknown | Taken from Analoook data |
| V4 | 06/08/2015 | 1 | 11-10 | MH | Pip 55 | 1 | feeding buzz | unknown | unknown | |
| V4 | 06/08/2015 | 1 | 10 | MH | Nyctalus sp | 6 | unknown | unknown | unknown | Unseen. Changed from unknown sp. Analoook data |
| V4 | 06/08/2015 | 1 | 10-9 | MH | Unkown bat | 1 | unknown | unknown | unknown | Unseen. Brief encounter |
| V4 | 06/08/2015 | 1 | 9-8 | MH | 55pip | 2 | unknown | unknown | unknown | Unseen. Changed from pip sp. |
| V4 | 06/08/2015 | 1 | 8 | MH | Pip 45 | 3 | feeding buzz | unknown | unknown | |
| V4 | 06/08/2015 | 1 | 8 | MH | Pip 55 | 3 | unknown | unknown | unknown | |

| Vi si | Date | Tra nsec t | Point count | Surv eyor | Species | pass no. | Behavio ur | Dire ctio n | Heig ht | Notes |
|----------|------------|------------------|----------------|--------------|--------------------|-----------------|-----------------|-------------------|-----------------|--|
| V4 | 06/08/2015 | 1 | 8 | MH | Nyctalu s sp | 1 | unknow n | unk now n | unk now n | Taken from Analoook data |
| V4 | 06/08/2015 | 1 | 8-7 | MH | 45pip | 2 | unknow n | unk now n | unk now n | Taken from Analoook data |
| V4 | 06/08/2015 | 1 | 8-7 | MH | 55pip | 1 | unknow n | unk now n | unk now n | Taken from Analoook data |
| V4 | 06/08/2015 | 1 | 7 | MH | Pipistre lle sp | 1 | unknow n | unk now n | unk now n | Unseen |
| V4 | 06/08/2015 | 1 | 7-6 | MH | 55pip | 2 | unknow n | unk now n | unk now n | Unseen. Changed from pip sp Analoook data |
| V4 | 06/08/2015 | 1 | 6-5 | MH | Pip 55 | 3 | feeding buzz | unk now n | unk now n | |
| V4 | 06/08/2015 | 1 | 4 | MH | Pipistre lle sp | 10 | unknow n | unk now n | unk now n | |
| V4 | 06/08/2015 | 1 | 4-3 | MH | Pipistre lle sp | 1 | unknow n | unk now n | unk now n | Taken from Analoook data |
| V4 | 06/08/2015 | 1 | 4-3 | MH | 45pip | 10 | unknow n | unk now n | unk now n | Taken from Analoook data |
| V4 | 06/08/2015 | 1 | 4-3 | MH | 55pip | 25 | unknow n | unk now n | unk now n | Taken from Analoook data |
| V4 | 06/08/2015 | 1 | 3 | MH | Pip 55 | 8 | feeding buzz | unk now n | 6- 10m | Height 5-10 metres |
| V4 | 06/08/2015 | 1 | 3 | MH | 45pip | 1 | unknow n | unk now n | unk now n | Taken from Analoook data |
| V4 | 06/08/2015 | 1 | 3 | MH | Pipistre lle sp | 8 | unknow n | unk now n | unk now n | Taken from Analoook data |
| V4 | 06/08/2015 | 1 | 3-2 | MH | Pipistre lle sp | 1 | unknow n | unk now n | unk now n | pips between point 3-2. Unable to count passes etc due to concentrating on footing. Passes according to analook data |
| V4 | 06/08/2015 | 1 | 3-2 | MH | 45pip | 1 | unknow n | unk now n | unk now n | Taken from Analoook data |
| V4 | 06/08/2015 | 1 | 3-2 | MH | 55pip | 17 | unknow n | unk now n | unk now n | Taken from Analoook data |
| V4 | 06/08/2015 | 1 | 3-2 | MH | Myotis sp | 1 | unknow n | unk now n | unk now n | Taken from Analoook data |
| V4 | 06/08/2015 | 1 | 2-1 | MH | Pipistre lle sp | unk now n | unknow n | unk now n | unk now n | pips between point 2-1. Unable to count passes etc due to concentrating on footing |
| V4 | 06/08/2015 | 1 | 2 | MH | 55pip | 1 | unknow n | unk now n | unk now n | Taken from Analoook data |
| V4 | 06/08/2015 | 1 | 1 | MH | 45pip | 1 | unknow n | unk now n | unk now n | Changed from unknown sp Analoook data |
| V4 | 06/08/2015 | 2 | 28-27 | LC | 45pip | 2 | feeding buzz | unk now n | unk now n | Changed from unknown sp Analoook data |
| V4 | 06/08/2015 | 2 | 28-27 | LC | 55pip | 1 | unknow n | unk now n | unk now n | Changed from unknown sp Analoook data |

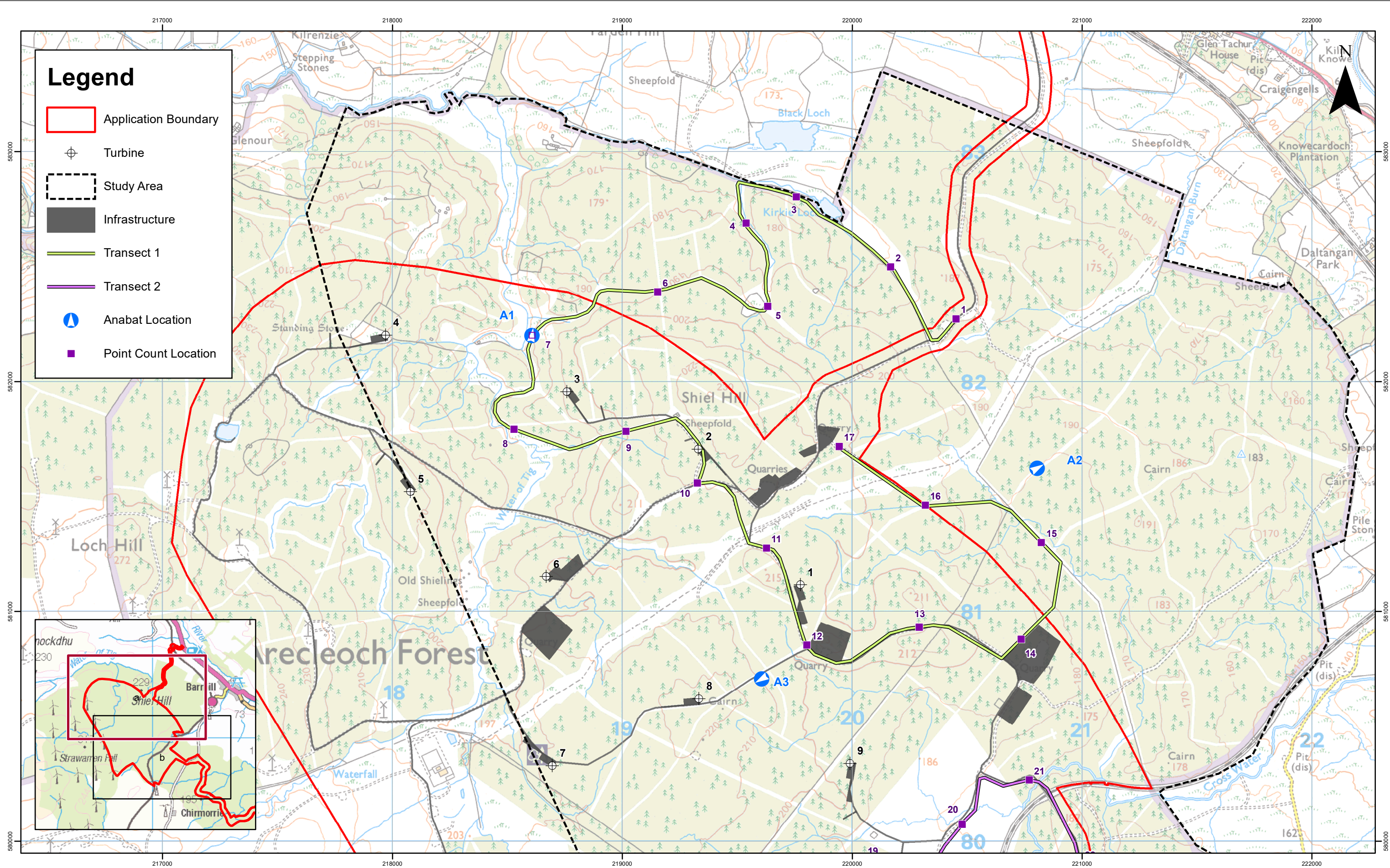
| Vi si | Date | Tra nsec t | Point count | Surv eyor | Species | pass no. | Behavio ur | Dire ctio n | Heig ht | Notes |
|----------|------------|------------------|----------------|--------------|--------------------|-------------|-----------------|-------------------|-----------------|--|
| V4 | 06/08/2015 | 2 | 27 | LC | Pipistre lle sp | 1 | feeding buzz | Circli ng | 6- 10m | 4 bats feeding over clear fell. 9 metres flight height. Changed passes - Analoook data |
| V4 | 06/08/2015 | 2 | 27 | LC | 45pip | 2 | unknow n | unk now n | unk now n | Changed from pip sp passes Analoook data |
| V4 | 06/08/2015 | 2 | 27 | LC | 55pip | 1 | unknow n | unk now n | unk now n | Changed from pip sp passes Analoook data |
| V4 | 06/08/2015 | 2 | 27 | LC | Nyctalu s sp | 1 | unknow n | unk now n | unk now n | Taken from Analoook data |
| V4 | 06/08/2015 | 2 | 27-26 | LC | Pipistre lle sp | 2 | feeding buzz | Circli ng | 6- 10m | 4 bats feeding over clear fell. 9 metre flight height. Changed passes Analoook data |
| V4 | 06/08/2015 | 2 | 27-26 | LC | 45pip | 5 | unknow n | unk now n | unk now n | Taken from Analoook data |
| V4 | 06/08/2015 | 2 | 27-26 | LC | 55pip | 10 | unknow n | unk now n | unk now n | Taken from Analoook data |
| V4 | 06/08/2015 | 2 | 27-26 | LC | Nyctalu s sp | 2 | unknow n | unk now n | unk now n | Taken from Analoook data |
| V4 | 06/08/2015 | 2 | 26 | LC | Pipistre lle sp | 2 | feeding buzz | Circli ng | 6- 10m | Approx 4 bats feeding over clear fell. Changed passes Analoook data |
| V4 | 06/08/2015 | 2 | 26 | LC | 45pip | 12 | unknow n | unk now n | unk now n | Taken from Analoook data |
| V4 | 06/08/2015 | 2 | 26 | LC | 55pip | 11 | unknow n | unk now n | unk now n | Taken from Analoook data |
| V4 | 06/08/2015 | 2 | 26-25 | LC | 55pip | 12 | feeding buzz | Circli ng | 6- 10m | Flight height 7 - 10 metres. Changed from pip sp Analoook data |
| V4 | 06/08/2015 | 2 | 25 | LC | Pipistre lle sp | 1 | unknow n | unk now n | unk now n | |
| V4 | 06/08/2015 | 2 | 25-24 | LC | Pipistre lle sp | 2 | unknow n | unk now n | unk now n | |
| V4 | 06/08/2015 | 2 | 24-23 | LC | Pipistre lle sp | 4 | feeding buzz | unk now n | unk now n | Not seen |
| V4 | 06/08/2015 | 2 | 23 | LC | pip 55 | 20 | feeding buzz | Circli ng | 6- 10m | Flight height 7 - 10 metres. More than one bat |
| V4 | 06/08/2015 | 2 | 23-22 | LC | 45pip | 3 | unknow n | unk now n | unk now n | Changed passes Analoook data |
| V4 | 06/08/2015 | 2 | 23-22 | LC | 55pip | 5 | unknow n | unk now n | unk now n | Taken from Analoook data |
| V4 | 06/08/2015 | 2 | 22 | LC | 55pip | 4 | unknow n | unk now n | unk now n | Not seen. Changed from pip sp Analoook data |
| V4 | 06/08/2015 | 2 | 22-21 | LC | 45pip | 2 | unknow n | unk now n | unk now n | Not seen. Changed from pip sp Analoook data |
| V4 | 06/08/2015 | 2 | 21 | LC | 55pip | 5 | unknow n | unk now n | unk now n | Changed passes Analoook data |
| V4 | 06/08/2015 | 2 | 21 | LC | 45pip | 4 | unknow n | unk now n | unk now n | Changed passes Analoook data |
| V4 | 06/08/2015 | 2 | 21-20 | LC | Pipistre lle sp | 1 | unknow n | unk now n | unk now n | Not seen - too dark. Changed number of passes Analoook data |
| V4 | 06/08/2015 | 2 | 21-20 | LC | 55pip | 3 | unknow n | unk now n | unk now n | Taken from Analoook data |

| Vi si | Date | Tra nsec + | Point count | Surv eyor | Species | pass no. | Behavio ur | Dire ctio n | Heig ht | Notes |
|----------|------------|------------------|----------------|--------------|--------------------|-------------|----------------------|-------------------|-----------------|--|
| V4 | 06/08/2015 | 2 | 20 | LC | 45pip | 3 | feeding buzz | unk now n | unk now n | Not seen - too dark. Changed number of passes from pip sp Analook data |
| V4 | 06/08/2015 | 2 | 20 | LC | 55pip | 1 | unknow n | unk now n | unk now n | Not seen - too dark. Changed number of passes from pip sp Analook data |
| V4 | 06/08/2015 | 2 | 20-19 | LC | 55pip | 5 | unknow n | unk now n | unk now n | Taken from Analook data |
| v4 | 06/08/2015 | 2 | 20-19 | LC | Pipistre lle sp | 1 | feeding buzz | unk now n | unk now n | Not seen - too dark. Changed from passes Analook data |
| V4 | 06/08/2015 | 2 | 19 | LC | 55 pip | 23 | feeding buzz | unk now n | unk now n | More than 4 bats. Changed from pip sp |
| V4 | 06/08/2015 | 2 | 19 | LC | Pipistre lle sp | 1 | unknow n | unk now n | unk now n | Changed number of passes Analook data |
| V4 | 06/08/2015 | 2 | 19-18 | LC | 45pip | 7 | unknow n | unk now n | unk now n | Changed from pip sp Analook data |
| V4 | 06/08/2015 | 2 | 19-18 | LC | 55pip | 21 | feeding buzz | unk now n | 0- 5m | More than 4 bats. Flight height 4 metres. Changed from pip sp and passes. Analook data |
| | | | | | | | | | | |
| V5 | 29/09/2015 | 1 | 6-7 | LnF | 55pip | 1 | unknow n | unk now n | unk now n | Taken from Analook data |
| V5 | 29/09/2015 | 1 | 7 | LnF | Pip 55 | 3 | feeding buzz | unk now n | unk now n | Feeding/commuting. Heard not seen |
| V5 | 29/09/2015 | 1 | 7-8 | LnF | Pip 55 | 4 | likely commuti ng | unk now n | unk now n | Changed passes Analook data |
| V5 | 29/09/2015 | 1 | 7-8 | LnF | Pip 45 | 1 | unknow n | unk now n | unk now n | Changed passes Analook data |
| V5 | 29/09/2015 | 1 | 7-8 | LnF | Pipistre lle sp | 1 | unknow n | unk now n | unk now n | Changed passes Analook data |
| V5 | 29/09/2015 | 1 | 7-8 | LnF | Myotis sp | 1 | unknow n | unk now n | unk now n | Taken from Analook data |
| V5 | 29/09/2015 | 1 | 8 | LnF | Pip 55 | 6 | feeding buzz | unk now n | unk now n | Feeding/commuting. 1 bat possibly a second bat |
| V5 | 29/09/2015 | 1 | 8-9 | LnF | Pip 55 | 29 | feeding buzz | unk now n | unk now n | Throughout transect and every minute |
| V5 | 29/09/2015 | 1 | 9 | LnF | Pip 55 | 24 | feeding buzz | unk now n | unk now n | |
| V5 | 29/09/2015 | 1 | 9 | LnF | Nyctalu s sp | 1 | unknow n | unk now n | unk now n | Taken from Analook data |
| V5 | 29/09/2015 | 1 | 9-10 | LnF | Pip 55 | 12 | feeding buzz | unk now n | unk now n | Only in ride from 9 to NE |
| V5 | 29/09/2015 | 1 | 10 | LnF | Pip 45 | 4 | likely commuti ng | unk now n | unk now n | Very faint signal |
| V5 | 29/09/2015 | 1 | 10-11 | LnF | Bat + Pip 55 | 3 | likely commuti ng | unk now n | unk now n | Very faint signal |

| Vi si | Date | Tra nsec + | Point count | Surv eyor | Species | pass no. | Behavio ur | Dire ctio n | Heig ht | Notes |
|----------|------------|------------------|----------------|--------------|-----------------------|-------------|----------------------|-------------------|-----------------|---|
| V5 | 29/09/2015 | 1 | 11 | LnF | Bat + Pip 55 | 5 | likely commuti ng | unk now n | unk now n | Very faint signal and 1 very strong |
| V5 | 29/09/2015 | 1 | 11-12 | LnF | Pip 55 | 4 | likely commuti ng | unk now n | unk now n | Faint |
| V5 | 29/09/2015 | 1 | 12 | LnF | Pip 55 | 5 | likely commuti ng | unk now n | unk now n | Not seen |
| V5 | 29/09/2015 | 1 | 12-13 | LnF | Pip 55 | 16 | unknow n | unk now n | unk now n | Higher activity beside clear fell |
| V5 | 29/09/2015 | 1 | 12-13 | LnF | Pipistre lle sp | 1 | unknow n | unk now n | unk now n | Taken from Analook data |
| V5 | 29/09/2015 | 1 | 13 | LnF | Pip 55 + 45 pip | 14 | feeding buzz | unk now n | unk now n | Feeding/commuting beside clear fell |
| V5 | 29/09/2015 | 1 | 13 | LnF | Pipistre lle sp | 1 | unknow n | unk now n | unk now n | Taken from Analook data |
| V5 | 29/09/2015 | 1 | 13-14 | LnF | Pip 55 | 15 | feeding buzz | unk now n | unk now n | Higher activity beside clear fell. Commuting and 3 bats feeding . Changed passes Analook data |
| V5 | 29/09/2015 | 1 | 13-14 | LnF | Pip 45 | 1 | unknow n | unk now n | unk now n | Taken from Analook data |
| V5 | 29/09/2015 | 1 | 14 | LnF | 55pip | 3 | unknow n | unk now n | unk now n | Very faint |
| V5 | 29/09/2015 | 1 | 14-15 | LnF | Pip 55 | 1 | likely commuti ng | unk now n | unk now n | In ride approaching point 15 |
| V5 | 29/09/2015 | 1 | 15-16 | LnF | Pip 55 | 9 | likely commuti ng | unk now n | unk now n | In ride approaching point 16 |
| V5 | 29/09/2015 | 1 | 16 | LnF | Pip 55 | 8 | likely commuti ng | unk now n | unk now n | |
| V5 | 29/09/2015 | 1 | 16-17 | LnF | Pip 55 | 7 | unknow n | unk now n | unk now n | |
| V5 | 29/09/2015 | 1 | 16-17 | LnF | 45 pip | 1 | unknow n | unk now n | unk now n | Taken from Analook data |
| V5 | 29/09/2015 | 1 | 17 | LnF | 55pip | 2 | unknow n | unk now n | unk now n | Very faint signal. Changed form unknown bat sp Analook data |
| V5 | 29/09/2015 | 2 | 27 | LC | 55pip | 1 | unknow n | unk now n | unk now n | Taken from Analook data |
| V5 | 29/09/2015 | 2 | 27-28 | LC | 55pip | 1 | unknow n | unk now n | unk now n | Taken from Analook data |

Annex 9. Temporal Raw Data

Due to the amount of data recorded during the temporal surveys (9,351 registrations), it has not been included here. If required, this data can be provided upon request.





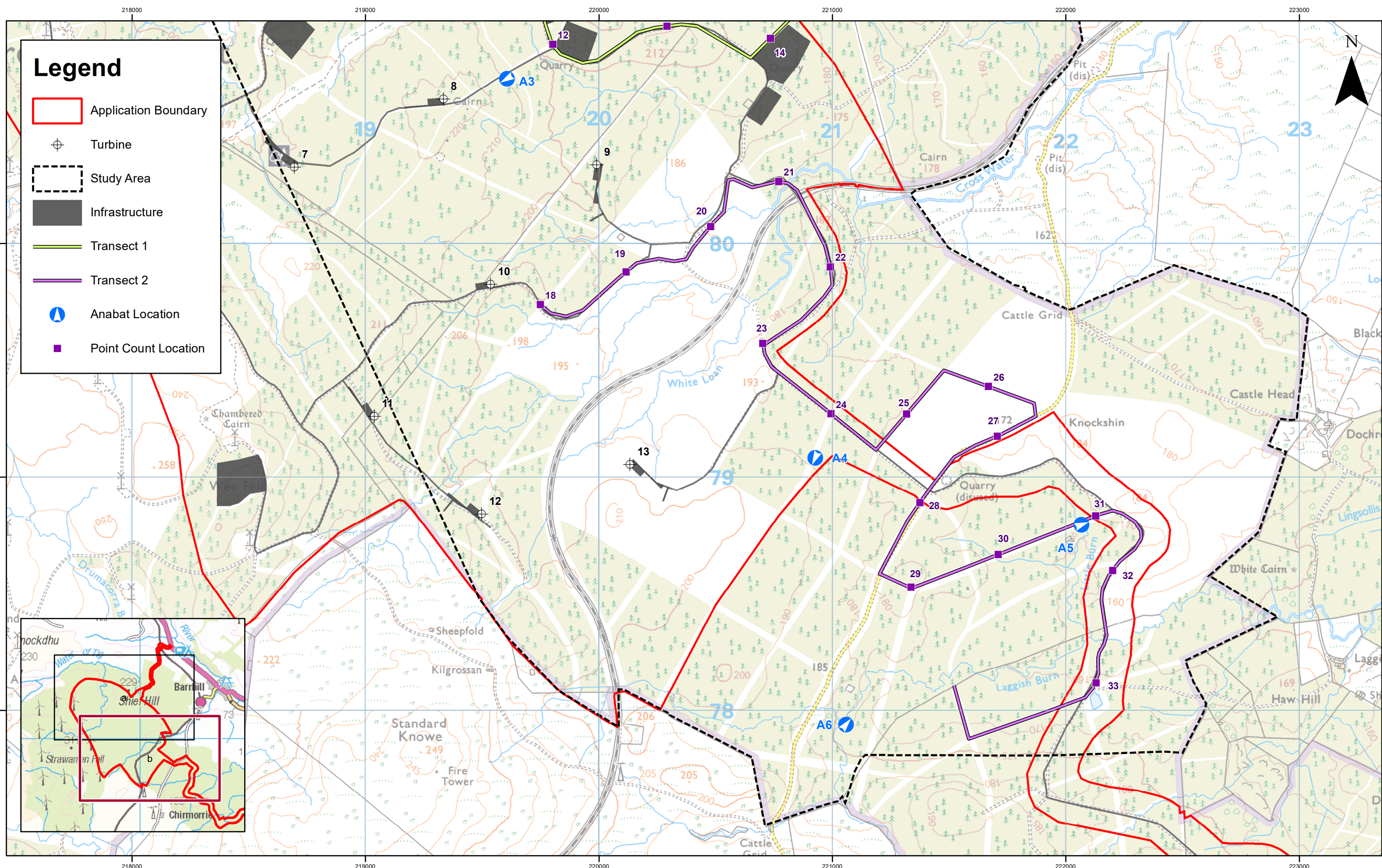
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| Rev | Date | By | Comment |
| A | 15/05/19 | ATA | First Issue. |


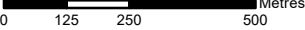
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Arecleoch Windfarm Extension
Bat Survey Study Area: 2015

| | | | |
|--------|--|------------------|--|
| Drg No | E_EIAR_Fig8.3B1_BatSurveyAreas2015_AHE | | |
| Rev | A | Datum: OSGB36 | |
| Date | 15/05/19 | Projection: OSNG | |
| Figure | 8.3B-1a | | |



| | | | | | | | | | |
|---|-------------|-----------|----------------|--|---|--|---|--------------------------|---|
|  | | | | 1:15,000 Scale @ A3 |  | | Arecleoch Windfarm Extension Bat Survey Study Area: 2015 | | Drg No E_EIAR_Fig8.3B1_BatSurveyAreas2015_AHE |
| A | 15/05/19 | ATA | First Issue. | © Crown Copyright 2019. All rights reserved. Ordnance Survey Licence 0100031673. Contains Ordnance Survey data © Crown copyright and database right 2019. | | | | Rev A | Datum: OSGB36 |
| Rev | Date | By | Comment | | | | | Date 15/05/19 | Projection: OSNG |
| | | | | | | | | Figure 8.3B-1b | |

