

APPENDIX D-5

Bat Survey Report 2018

**Drumnahough Baseline Bat Survey Report
(Preliminary Bat Activity Surveys 2018)
Bat Roost Surveys**



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1 INTRODUCTION

Malachy Walsh and Partners were commissioned by SSE Renewables Ltd. to carry out baseline bat surveys at the proposed Drumnaough Wind Farm site.

Bat surveys included a preliminary roost survey, bat activity surveys, including transects within, and adjacent to the site and automated bat surveys. Bat roost surveys were conducted within and adjacent to the site, noting and investigating roosting opportunity. Bat transects were carried out at/adjacent to the site, on two separate occasions, to identify the level of bat activity at the location. Automated bat surveys included monitoring at ground level at four locations.

The bat activity surveys described in report were conducted in the summer of 2018. Preliminary bat roost surveys were completed in the summer of 2018, and winter period of 2019.

This report provides the results of the baseline bat monitoring surveys conducted at the study area, and provides an insight into bat populations, foraging/commuting activity patterns and roost surveys at the study area.

1.1 SCOPE OF THE BAT SURVEYS

Bat surveys involved the following:

- Desktop study undertaken to gain an understanding of bat activity within the area and the suitability of the site for certain species,
- Preliminary bat roost survey (visual daytime search),
- Bat activity surveys conducted to determine the level bat activity at the study area, and included:
 - A Frequency Division AnaBat Detector System (AnaBat SD2 Flash Card Bat Detector) utilised to assess the bat activity during walked and driven transects within and adjacent to the site.
 - An automated monitoring of bat activity conducted at four separate locations within the site, where the SMZC units were deployed in late August/September, for a period of 14 consecutive nights.
 - Along with visual observations, results of the bat activity monitoring at the Drumnaough site were analysed to describe the bat activity at the site during time of survey.

This report provides the results of the preliminary baseline bat activity surveys completed in 2018, and the bat roosting opportunity in the study area.

2 STUDY AREA

The study area is situated in the town lands of Drumnahough, Cark, Treankeel, Tullyhonour, Tooslenagh, and Carrickalangan, approximately 13km to the southwest of Letterkenny in County Donegal.

The site is situated in an upland area, ranging from 341m (OD), to 230m (OD). Cark Mountain to the west has a peak elevation of 364m (OD), and Tullytresna to the south rises to 304m (OD). The site is dominated by commercial forestry (of different age profiles/felled areas), planted on bog land. The remainder of the site is open bog land with sections of upland blanket bog, and heath land, more over on the higher areas. The site mainly drains to the Elatagh River, a tributary of the Finn. The surrounding landscape is a mixture of upland blanket bog, commercial forestry plantation, agriculture, and a number of existing wind farms in the wider region.

Figure 1 below shows site location and layout of proposed wind farm.

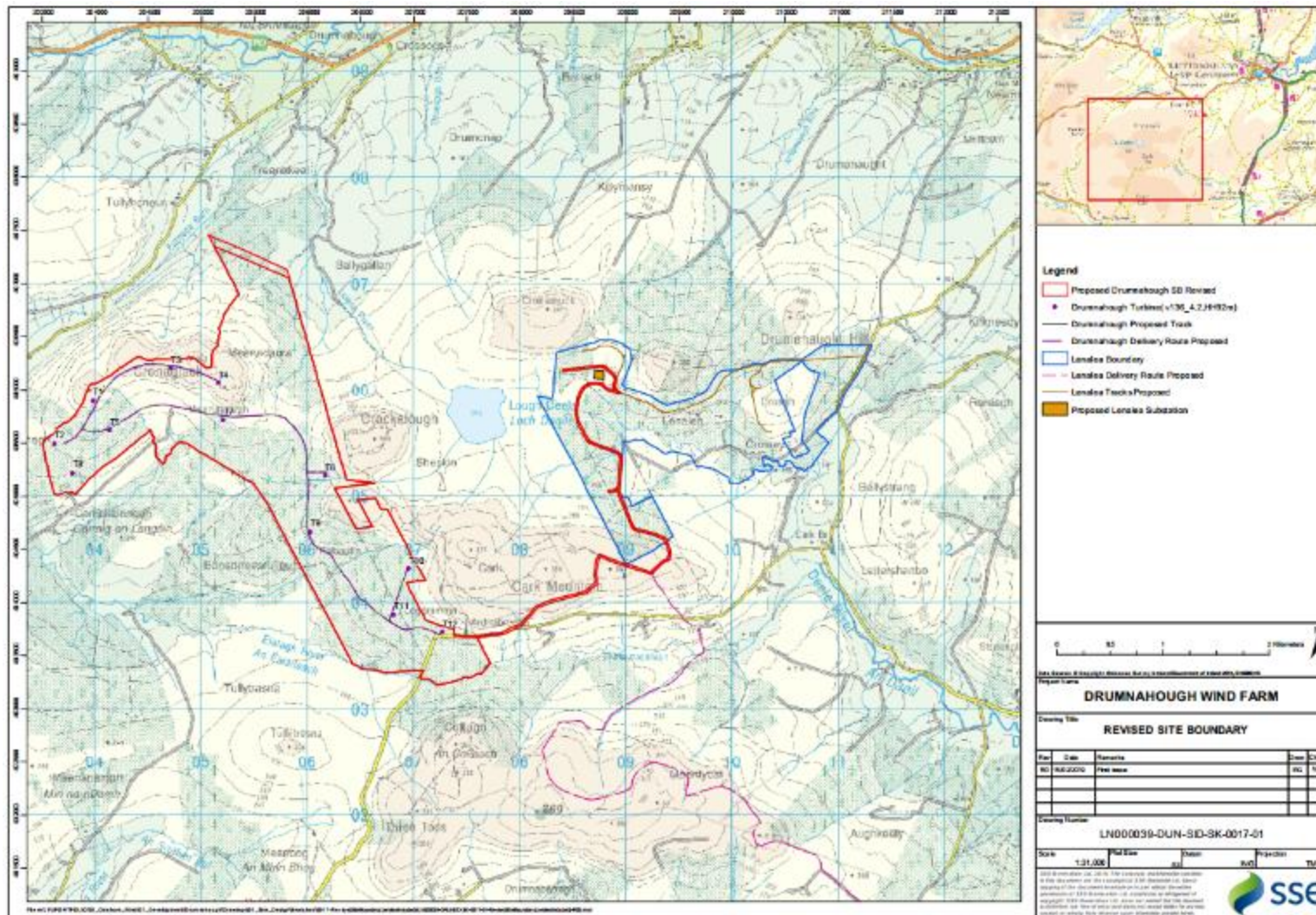


Figure 1: Site location

3 METHODOLOGY

3.1 DESK STUDY

A desk study was carried out to collate available information on the bat species to be surveyed and on the site's natural environment and to identify features of ecological importance within the study area and surrounding region.

This desk study comprised a review of the following publications and datasets:

- Hundt, L. (2012) *Bat Surveys: Good Practice Guidelines*, 2nd edition. Bat Conservation Trust.
- Collins, J. (ed) (2016). *Bat Surveys for Professional Ecologists: Good Practice Guidelines*, 3rd Edition, Bat conservation Trust, London.
- *Bat Survey Guidelines: Traditional Farm Buildings Scheme* (2008) Tina Aughney, Conor Kelleher & Donna Mullen. The Heritage Council, Áras na hOidhreachta, Church Lane, Kilkenny.
- *Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes* (National Road Authority (NRA, 2006a).
- *Bat Mitigation Guidelines for Ireland. Irish Wildlife Manuals*, No. 25 (National Parks and Wildlife Service 2006).
- *NRA Guidelines for treatment of Bats During Construction of National Road Schemes* (2005) NPWS, Natura, Tina Aughney.
- OSI Aerial photography and 1:50000 mapping.
- National Parks and Wildlife Service (NPWS).
- Bat Conservation Ireland publications and website.
- National Biodiversity Centre (NBDC) (on-line map-viewer).

3.1.1 National Biodiversity Data Centre (NBDC)

The NBDC online map viewer includes an interactive layer which displays geographical areas in terms of a 'habitat suitability' index for bats. The bat suitability index ranges from 0 to 100, with 0 indicating areas considered least favourable for bats and 100 indicating areas considered most favourable for bats, in terms of habitats present. Several factors are incorporated into the model to give an overall estimate of the suitability of an area for bats, including land cover, topography, climate, soil pH and riparian habitat (Lundy, et al., 2011). The suitability index is presented for all bat species overall, as well as by individual species.

3.1.2 Designated sites

This desk study included the identification of all designated and/or sensitive areas within a 15km radius of the study area.

3.2 FIELD SURVEYS

3.2.1 Introduction

Bats in Ireland feed exclusively on insects, and in the summer they generally emerge from their roosts at dusk to feed. The distances covered while foraging varies considerably between species. They are known to use a number of different foraging sites in the same night, and move between

them to locate areas of high insect density. They are also known to exhibit a level of site loyalty and will frequently return to the same foraging sites night after night (JNCC, 2001).

Information on bat activity at the study area was collated from field surveys, conducted in July and August 2018, which are described in the following sections. Bat surveys included:

- Bat Roost Surveys (daytime visual search, within the study area),
- Bat Activity Surveys (bat transects), and
- Automated Bat Surveys (from ground level).

3.2.2 Baseline Environment (Habitat Study)

While conducting the daytime surveys, habitats within the study area and the immediate surroundings were noted. This was done to assess bat foraging/commuting habitat availability, and to record the presence of significant landscape features, particularly linear features that provide wildlife corridors for commuting bats.

The study area was visited during daytime, prior to night time transect surveys, in order to ensure that transect routes followed, and intersected with foraging and commuting habitats present within and adjacent to the site. This part of the survey included;

3.2.3 Bat Roost Survey (Visual Daytime Search)

3.2.3.1 Structure/tree survey (Visual daytime searching)

The preliminary bat roost survey conducted at the site included the following;

The site was visited in July and August 2018, and revisited in February 2019, and visited again in July 2019. The subject site and immediate adjacent lands were searched for potential bat roost sites. During site visits structures and trees were assessed for their potential to support roosting bats. A number of potential roost sites occurring within and adjacent to the site were subject to a preliminary roost assessment. This included an inspection of the exterior and interior (if accessible) searching for evidence of bat usage, including any bat specimens, droppings, staining, feeding remains, etc. Trees within and adjacent to the site were checked for holes, cracks, crevices and openings in both living, and any dead trees. Trees were inspected from ground level using binoculars, for external signs of damage, or evidence of the presence of holes or cavities. Where/if required, an endoscope was on hand, to investigate cracks and crevices present on trees, checking for evidence of bats.

Transect routes were driven in daylight hours to determine if suitable roost habitat sites such as old farmyard buildings or derelict houses were available or present within/adjacent to the site. The bat roost survey was based on; 'Bat Survey Guidelines: Traditional Farm Buildings Scheme', Aughney, T., Kelleher, C. & Mullen, D. (2008), and guidelines outlined in Hundt (2012), and Collins (2016).

3.2.4 Bat Activity Surveys (Transects)

Bat activity surveys (transect surveys) conducted at the study area consisted of driven transects, within the site, and areas surrounding/extending away from the site. The series of representative transect routes were designed to survey the site and adjacent lands. The transect routes intersected/followed foraging and commuting habitats present, particularly those associated with

linear features such as roadside margins, hedgerow/tree lines, vegetated linear strips, scrub, and woodland/forestry edges. The aim of these surveys was to identify bat species using the site, and any important features used by bats.

The activity survey was conducted using the Frequency Division AnaBat Detector System (AnaBat SD2 Flash Card Bat Detector) in conjunction with the BatNav KML Generator, which generates GPS coordinates for each bat pass recorded. The AnaBat detector records bat ultrasonic calls on a continuous basis, and stores the information onto an internal CF card. Frequency Division is a technique used to convert the inaudible bat echolocation calls, to audible sounds. The AnaBat unit also uses Zero-Crossing Analysis (ZCA), to make the real-time recorded calls visible for display purposes. It is these sonograms (2-d sound pictures) that are digitally stored on the CF card, and downloaded for analysis. Each time a bat is detected, an individual time-stamped (date and time to the second) file is recorded. The GPS location of each call is also recorded.

Levels of bat activity are strongly correlated to climatic conditions, and due to the influence that these factors have on abundance of prey items, the surveyor noted temperature, the prevailing weather conditions, and the level of insect/moth activity during each survey session.

Driven transects were carried out with the use of a four by four vehicle, based on methodology outlined by Roche et al (2012). The AnaBat detector was connected to a specially adapted microphone, mounted to the roof of the vehicle. Where possible, species identification was made in the field and any relevant information was also recorded, i.e. numbers of bats, habitats used, bat behaviour such as foraging etc.

The transect surveys were complete once in July, and repeated in August 2019. Surveys commenced approximately 30 minutes before dusk, and continued for approximately 2 hours.

Post survey, the species of each individual bat pass/contact is identified, and the recording is labelled. The GPS location is appended to each bat pass and the distribution mapping of bat activity along the survey route can be generated on GIS platforms, and on Google Earth. These formats provide easy and quick access to detailed distribution mapping of any activity recorded. Repeated surveys can be overlaid, or multiple surveyors' results can be plotted to visualise a large site.

Bat activity surveys were carried out, where weather conditions met the requirement set out in standard survey methodology guidance documents (Bat conservation Ireland 2012¹; Hundt, 2012²; Mitchell-Jones and Mcleish 2004³). Recommended guidelines state that surveys are appropriate, when nocturnal temperatures are greater than 7°C, avoiding prolonged or heavy precipitation.

Prior to survey, transect routes were walked during daylight hours, to make note, and to be avoid potential hazards during surveys. A hand held 'Sat Map' navigational device/mobile phone GIS apps, which incorporated aerial photography of the study area transect routes, further aided in the navigation during darkness. Transect routes can be viewed in Figure 2 below.

¹ Bat Conservation Ireland (2012) Wind turbine / windfarm development bat guidelines, Version 2.8, December 2012.

² Bat Surveys: Good Practice Guidelines, 2nd Edition, Bat conservation Trust.

³ The Bat Workers' Manual, 3rd Edition. JNCC, Peterborough.

3.2.5 Automated Bat Survey

An unmanned automated bat survey was completed at four locations, within/adjacent the site. The Song Meter SMZC Bat Detector (Wildlife Acoustics, MA, USA) was deployed at the four locations that were selected for their proximity to habitats, or features potentially valuable to bats, at strategic locations within/adjacent the subject site. The bat detectors were deployed between the 25th July, and 8th August, 2018. The SMZC settings used were those recommended by the manufacturer for recording bats. The Song Meter automatically adjusts to sunset and sunrise times, when GPS coordinates are inputted to the detectors.

Calls emitted by bats that passed in the proximity to the SMZC detectors are recorded and their calls stored for later analysis. The SMZC detector system records bat ultrasonic calls on a continuous basis, and stores the information onto internal SD cards. The bat detector is effectively used as a bat activity data logger. The locations of the automated bat surveys at ground level can be viewed in Figure 3 below.



Figure 2: Transect Routes (illustrated in yellow), and preliminary site boundary (Blue)

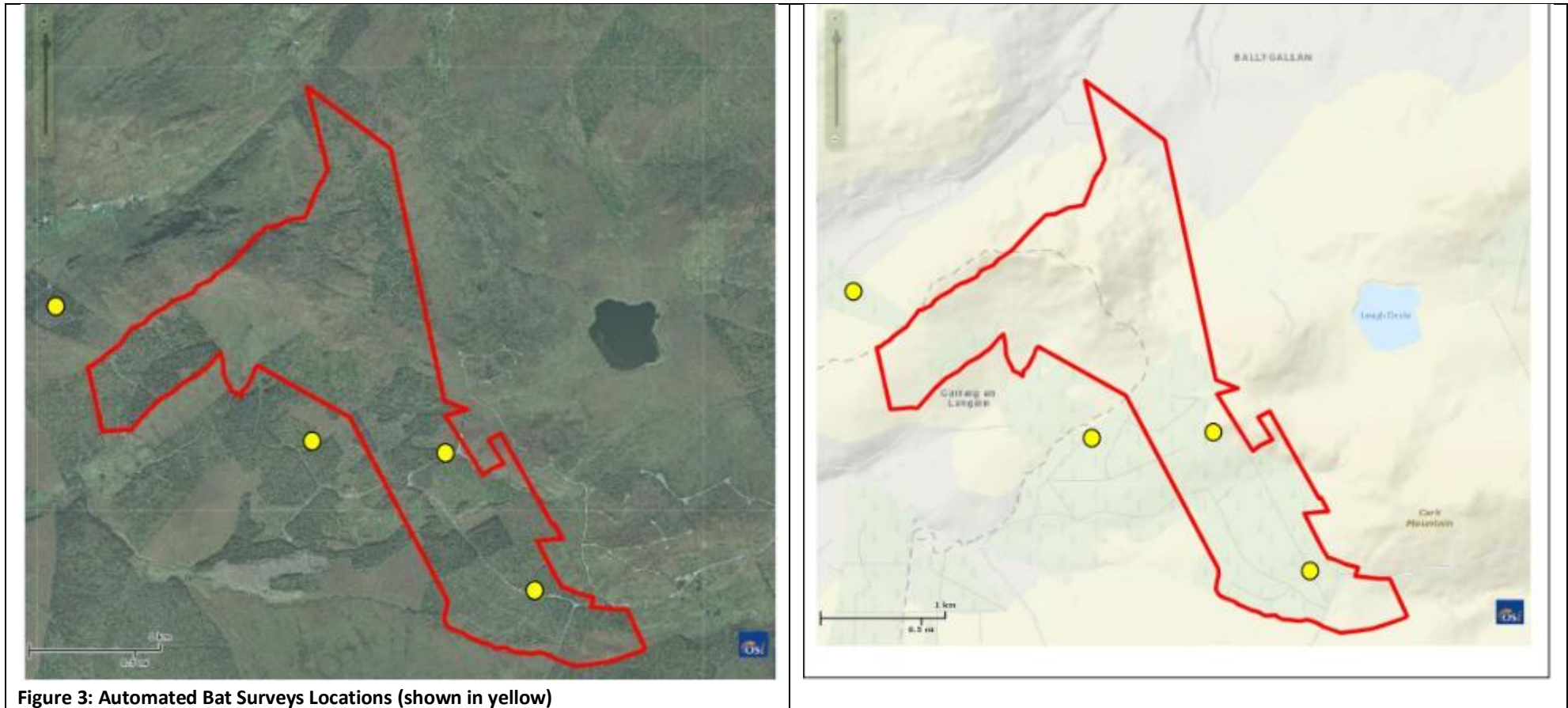


Figure 3: Automated Bat Surveys Locations (shown in yellow)

3.2.6 Survey Data Collation and Analysis

All data collected during bat activity surveys (transects, and automated surveys) was downloaded and analysed using Kaleidoscope and Analook software. Each time-stamped bat file was analysed. A single sound file can have bat passes from more than one species as well as calls from more than one bat of the same species. Where this occurs a bat pass was noted for each species. (e.g. two species identified in a time-stamped file).

Each bat sequence (series of echolocation pulses starting with a search phase, and ending with the catch phase) is noted as a bat pass. Each bat pass does not correlate to an individual bat, but is representative of bat activity levels. Some species such as the pipistrelles will continuously fly around a habitat, and therefore, it is possible that a series of bat passes within a similar time frame is one individual bat. On the other hand, Leisler's bats tend to travel through an area quickly and therefore an individual sequence or bat pass, is more likely to be indicative of individual bats.

The sound files collected were converted zero crossing for sound analysis within Kaleidoscope software. This software can automatically sort sound files that contain only non-bat 'noise' from sound files that contain bat passes. The software can also 'tag' each call with a potential identification, according to similarities in call shape to archetypal call clusters within the database. This approach allows identification of bats to genus level for *Myotis* species, and to species level for other bats found in Ireland. Separation of *Myotis* species is complicated by the high degree of overlap between call characteristics.

Following Kaleidoscope download, the bat tags were then checked using Analook software, and confirmed or corrected manually, since automatic classification is not yet accurate enough to rely upon in isolation for most species (Waters & Barlow, 2013). The manual identification was carried out by comparison with call parameters as set out in Russ (2012) and Barataud (2015).

Species identification of recordings was determined independently, by a minimum of two observers, if calls were not characteristic, and easily identifiable.

The following species abbreviations for bat species are used in this report:

- PIPI: common pipistrelle (*Pipistrellus pipistrellus*)
- PIPY: soprano pipistrelle (*Pipistrellus pygmaeus*)
- NYLE: Leisler's bat (*Nyctalus leisleri*)
- MYsp: A bat of the genus *Myotis*

3.3 BAT SURVEY CONSTRAINTS/LIMITATIONS

Bat surveys were carried out within the optimal bat survey period, therefore were no constraints regarding the bat survey period. Historical weather data available for the location indicated that the weather conditions during time of survey were broadly typical for the location, and therefore did not pose a significant constraint to the survey.

Ecological surveys are limited by a variety of factors which affect the presence of flora and fauna such as season, climate, migration patterns and species behaviour. Even if evidence of bats is not

discovered during tree inspections, this does not mean that bats are not present, or that they will not be present in the future.

4 BATS

4.1 BACKGROUND

In Ireland there are 9 known resident bat species of two families (*Rhinolophidae* and *Vespertilionidae*). These species are:

- ***Rhinolophidae*:**
 - Lesser Horseshoe bat (*Rhinolophus hipposideros*)
- ***Vespertilionidae*:**
 - Daubenton's bat (*Myotis daubentoni*)
 - Whiskered bat (*Myotis mystacinus*)
 - Natterer's bat (*Myotis nattereri*)
 - Nathusius' pipistrelle (*Pipistrellus nathusii*)
 - Common pipistrelle (*Pipistrellus pipistrellus*)
 - Soprano pipistrelle (*Pipistrellus pygmaeus*)
 - Leisler's bat (*Nyctalus leisleri*)
 - Brown long-eared bat (*Plecotus auritus*)

4.2 LEGISLATIVE CONTEXT

4.2.1 The Wildlife Acts 1976 and 2000

All bat species are protected under the Wildlife Act (1976) and Wildlife [Amendment] Act (2000) which make it an offence to wilfully interfere with or destroy the breeding or resting place of these species; however, the Acts permit limited exemptions for certain kinds of development.

All species of bats in Ireland are listed on Schedule 5 of the 1976 Act, and are therefore subject to the provisions of Section 23, which make it an offence to:

- Intentionally kill, injure or take a bat;
- Possess or control any live or dead specimen or anything derived from a bat;
- Wilfully interfere with any structure or place used for breeding or resting by a bat;
- Wilfully interfere with a bat while it is occupying a structure or place which it uses for that purpose

4.2.2 The Habitats Regulations 1997-2005

The EC Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (Habitats Directive 92/43/EEC) seeks to protect rare and vulnerable species, including all species of bats and their habitats and requires that appropriate monitoring of populations be undertaken. All species of bat found in Ireland are listed on Annex IV of the Directive, while the lesser horseshoe bat is further protected under Annex II. The latter Annex relates to the designation of Special Areas of Conservation (SACs). Inclusion on Annex IV ('European protected species') means that member states are required to put in place a system of strict protection as outlined in Article 12. The Habitats Directive is transposed into Irish law by the European Communities (Birds and Natural Habitats)

Regulations 2011. These Regulations substantially strengthen the protection provided by the Wildlife Acts, and in particular they remove all of the exemptions provided in Section 23(7) of the Wildlife Act insofar as they relate to Annex IV species, including all species of bats. All bat species are listed on the First Schedule and Section 23 of the Regulations making it an offence to:

- Deliberately capture or kill a bat;
- Deliberately disturb a bat;
- Damage or destroy a breeding site or resting place of a bat.

4.2.3 International Conventions

Across Europe, bats are further protected under the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention 1982), which, in relation to bats, exists to conserve all species and their habitats. The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention 1979, enacted 1983) was instigated to protect migrant species across all European boundaries. The Irish government has ratified both conventions.

4.3 CONSERVATION STATUS

The overall conservation status for all resident bat species in Ireland, except *Nathusius' pipistrelle* (*P. nathusii*) is 'Favourable' as is the evaluation of the individual attributes assessed, namely, Range, Population, Suitable Habitat and Future Prospects (NPWS, 2013). For *Nathusius' pipistrelle* the overall conservation status is 'Unknown' due to data deficiencies regarding Range and Population Attributes (NPWS, 2013).

4.3.1 Criteria for Bat Roosts of National or International Importance

There are no clear guidelines as to the nature of a bat roost of international importance. All of the largest roosts of lesser horseshoe bats in Ireland would be of international importance and it is expected that all large Leisler's bat roosts (in excess of 100) would also have international significance. The following table (Table 1) shows the working guidelines developed by the Bat Expert Panel of the Heritage Council in 2003 to provide a basis for comparing the importance of different building roosts nationally and international.

Table 1: Level of importance of different buildings roosts for bat species⁴

Species	Indicator	Significance
Lesser Horseshoe Bat	Special Areas of Conservation (SACs) have been created for this species, throughout its European range.	Very significant
	If present	Significant
Whiskered	>10	Very significant
	If present	Significant
Natterer's	>10	Very significant
	If present	Significant
Daubenton's	Maternity roost	Very significant
Leisler's	Maternity roost	Very significant
Common pipistrelle	Maternity roost	Significant
Soprano pipistrelle	Maternity roost	Significant

⁴ Adapted from (NRA, 2005): Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes

Species	Indicator	Significance
Brown Long-eared	Maternity roost	Significant

5 RESULTS OF DESK STUDY/DATA REQUEST

5.1 BAT CONSERVATION IRELAND DATA REQUEST

A data request was made to BCI for any documented bat data that they may have within 10km of the Drumnaough site. During time of writing this report, BCI had not yet responded.

5.2 DESIGNATED SITES

The National Parks and Wildlife Service (NPWS) map viewer and website provide information on rare and protected species, sites designated for nature conservation and their conservation objectives. A search was undertaken of sites, specifically designated for the conservation of bats, within a 10 km radius of the Study Area (Hundt, 2012). This included European designated sites, i.e. SACs, and nationally designated sites, i.e. NHAs and pNHAs. In Ireland, the lesser horseshoe bat is the only bat species that requires the designation of Special Areas of Conservation (SACs). Natural Heritage Areas (NHAs) and proposed Natural Heritage Areas (pNHAs) may include a designation for bat species.

A search of NHAs and pNHAs within a 10 km radius of the Study Area found no sites designated for the conservation of bats. The study area is not situated within known range for Lesser horseshoe bat.

5.3 HABITATS ASSOCIATIONS OF IRISH BATS

Bats can use a variety of landscapes or habitats throughout the year for foraging, roosting and commuting. They use hunting grounds or foraging habitats to find food and commuting habitats to travel between roosts and foraging habitats. Bats are the only mammal that is capable of true flight. In Europe there are 47 species, with 9 species of bats currently known to be resident in Ireland. Irish bats are classified into two families, namely *Rhinolophidae* and *Vespertilionidae*. Bats can use a variety of roosts, including resting sites, mating sites, giving birth and hibernation. The following table, Table 2 summarises the foraging and roost habitat associations of Irish bats.

Table 2: Summary of foraging and roost habitat associations of Irish bat species

Species	Foraging habitat	Roost habitat	Emergence times	Flying range
Brown long eared bat	Foraging habitat includes broad-leaved woodlands, tree lines, scrub, conifer plantations, gardens with mature trees, parkland, and orchards	Roosts in close association with foraging habitats, but avoids roosting in mixed agricultural areas, bog, marsh, heath and natural grassland. In Ireland, large open attics, tree holes, ruins, houses, churches and farm buildings.	Approx.1 hour after sunset	1/2km from roosts generally
Common pipistrelle/soprano pipistrelle	Broad foraging niches (Russ 1999) which reflect their widespread occurrence in Ireland. Highly adaptive to changing landscape conditions and can occupy a range of different habitat types from urban areas to woodlands.	Houses, although they also roost in other locations such as tree holes, can be found in most habitat types except for very exposed areas. Confined areas in houses, behind hanging tiles, soffit boards or between roofing felt and roof tiles, rather than the main attic space.	Approx. 30 minutes after sunset	3/4km from roosts
Nathusius' pipistrelle	The Nathusius' pipistrelle often forages over water or along forest tracks. Mainly forest dwelling bat species. Forests including deciduous woodlands to dry coniferous forests. Use parks, farmland and woodland edges, rarely seen in urban settlements than other bat species. Prefer lowland areas.	Nursery roosts for their young can be found in tree cracks, crevices in building's walls and in caves, they sometimes share these roosts with common pipistrelle. Males tend to remain alone or may form small groups in the summer months. Winter hibernation roosts are established in more covered areas of cliff crevices, caves and tree hollows.	Approx. 30 minutes after sunset	Poorly known
Lesser horseshoe bat	Sheltered valleys near wooded countryside. Distribution in the west is strongly linked with broadleaved and mixed woodland and it usually forages in woodland and scrub.	Mainly in roofs of old houses or in outhouses, stables or old cottages. In winter this species hibernates in caves, disused cellars, mines and underground structures.	Approx 30-50 minutes after sunset	Typically feeds within 2km of roosts
Leisler's bat	Forages over a range of habitat types including over pasture, rivers, lakes, canals and forestry. It also hunts around streetlights and floodlights.	In Ireland, nursery roosts are chiefly located in attic spaces of buildings. There are also a few records of nursery roosts in trees.	Approx 15 minutes after sunset	Can feed up to 14 km of roots
Daubenton's bat	Surface of lakes, slow-moving rivers and canals.	Usual roost sites are under stone bridges, in ruins, canal tunnels, trees and damp caves.	40-60 minutes after sunset	6-10km from roosts
Natterer's bat	Can be found in woodland, mature hedgerows and pasture habitats.	Usual roost sites are in tree holes, old stone buildings such as churches and barns, and under bridges.	40-70 minutes after sunset	Generally 3km from roosts
Brandt's bat/Whiskered bat	Typically forages along forest tracks, over mixed woodland, along hedgerows or over fresh water bodies.	Can be found roosting in attics of old buildings. Very few confirmed roosts in Ireland. It is also sometimes found roosting in crevices under stone bridges and in trees.	Approx.30 minutes after sunset	Poorly known

5.4 NBDC BAT HABITAT SUITABILITY INDEX

The National Biodiversity Data Centre (NBDC) online bat habitat suitability index layer was viewed on the 24th July 2018.

The results, outlined in Table 3 below, indicate that the habitats within the majority of the overall site are of relatively low value to bats in general, with an index of 12.56 within the majority of the site, and 16.78 towards the northern part of the site.

The highest rating for bat species for the study area, in terms of the habitat suitability index, was found to be soprano pipistrelle, with a maximum index of 34. The lowest rating for species across the site in terms of the habitat suitability index was for lesser horseshoe and Nathusius' pipistrelle, with an index of 0.

Table 3 below describes bat Habitat Suitability Index for the study area.

Table 3: Bat habitat suitability index rating for the Drumnaough Site

Species	Bat Suitability Index Southern	Bat Suitability Index Northern
All bats	12.56	16.78
Soprano Pipistrelle	25	34
Leisler's bat	20	30
Common pipistrelle	19	24
Daubenton's bat	15	20
Natterer's bat	14	18
Brown long-eared bat	13	18
Whiskered bat	7	7
Nathusius' Pipistrelle	0	0
Lesser Horseshoe bat	0	0

5.5 CURRENT SPECIES DISTRIBUTIONS

Current species distribution mapping is included in the Department of the Environment, Heritage and Local Government's most recently published report to the European Commission on the Conservation Status in Ireland of Habitats and Species listed in the European Council Directive on the Conservation of Habitats, Flora and Fauna 92/43/EEC (NPWS, 2013).

The following table (Table 4) shows the current known or estimated distribution and range for bat species within the 10km OSI grid squares that includes the Drumnaough site (C00).

Table 4: Current species distributions within the relevant 10km grid square, encompassing the Drumnaough site (NPWS, 2013⁵)

Species	Current Distribution includes Grid Square COO	Current Range includes Grid Square COO
Common pipistrelle	Yes	Yes
Soprano pipistrelle ⁶	Yes	Yes
Leisler's bat	Yes	Yes
Daubenton's bat	Yes	Yes
Brown long eared bat	No	Yes
Natterer's bat	No	No
Whiskered bat	No	No
Nathusius' pipistrelle	No	No
Lesser horseshoe bat	No	No

5.6 NATIONAL BIODIVERSITY DATA CENTER BAT RECORDS

The on-line mapping resource of the NBDC6, allows users to search almost 2 million records available across 80 datasets. Data analysis tools enable users to refine data base searches by selecting 1km, 2km or 10km grid squares on the interactive map. All species records for the selected grid square are then available for download. The overall study area, encompassing the Drumnaough site is situated within the C00 10km OSI grid square. The results of a search of the area within the C00 10km OSI grid squares, is outlined in Table 5 below.

Table 5: National Biodiversity Data Centre bat records

Species	Grid Square (10km)
	COO
Common pipistrelle	Yes
Soprano pipistrelle	Yes
Leisler's Bat	Yes
Daubenton's Bat	Yes
Brown Long-eared Bat	No
Natterer's Bat	No
Whiskered/Brandt's bat	No
Nathusius' pipistrelle	No
Lesser horseshoe bat	No

5.6.1 Summary of Current Bat Species Distribution

Based on the current known distribution/range of the species, NPWS data, and the bat habitat suitability Index for bat species, indicates that common pipistrelle, soprano pipistrelle, Leisler's bat, and Daubenton's Bat are most likely to occur in the area. Brown Long-eared Bat may also use the area.

⁵ http://www.npws.ie/sites/default/files/publications/pdf/Article_17_Print_Vol_3_report_species_v1_1_0.pdf

⁶ Based on the known or best estimate of distribution (NPWS, 2008)

6 RESULTS OF FIELD SURVEYS

6.1 STUDY AREA HABITAT DESCRIPTIONS (BASELINE ENVIRONMENT)

The surrounding landscape is a mixture of commercial forestry plantation, upland blanket bog/cutover bog, agriculture, and a number of existing wind farms in the wider area.

Within the site habitats are dominated by conifer plantation of various stages. During time of survey (Summer 2018, felling, and replanting operations were ongoing. Sections of upland blanket bog occur within the site, but the forestry drainage regime would have altered this habitat occurring to some extent. Bog land and acid grassland dominate the more elevated areas of the site; these habitats are used mainly for sheep farming. Tributary streams of the Elatagh River drain the site, mainly in an east west direction. Extending away from the site conifer plantation, agricultural grassland, bounded by hedgerow/tree line and cutover bog dominate the landscape.

Sections of scrub can be found throughout the Drumnahough site. These areas are not subject to rigorous maintenance and scrub habitat would appear to be mainly growing along the perimeter of conifer plantations, and forestry firebreaks.

6.2 PRELIMINARY DAYTIME VISUAL ROOST SURVEY

Within the Drumnahough site there is an old/unused house towards the north centre of the site, situated c. 450m to the west of T8. Outside of this there no other structures within the site boundary that would be considered optimal for roosting bats. Watercourses within the site are culverted/piped crossings, and do not provide optimum roosting habitat for bats.

The old house towards the north centre of the site was visited on three occasions, in August 2018, February, 2019, and again in July 2019. GPS Point: X604669, Y905795.

During the surveys a derelict/dilapidated house situated within the site boundary c. 450m to the west of T8 (/closest site infrastructure) was identified. This was revisited in the period February to March 2019 and, again, on 2 occasions during the summer 2019 survey period. Daytime visual surveys did not identify any evidence of roosting bats or of any use by bats, and the structure is not considered optimal as significant bat roost such as maternity roost/other significant roost for bat species (see 2018 Report). In addition, the structure is not well connected to habitats extending away, as it is situated in isolation. It must be noted that the development site is situated in a remote upland area, and the availability of roosts in the immediate area are not great. Extending further away from the site, bat roosting potential includes one off dwelling houses, masonry bridges/structures, farm buildings or derelict buildings that occur in the greater area. The BCI data request response did not identify any documented bat roost sites in the proximity of the Drumnahough site (closest are in the area around Ballybofey approximately 10 km away

This is a one storey A roof structure and would have been unoccupied for some time. The roof is corrugated asbestos fixed to timber batons supported by timber rafters. No sheeting (such as felt) occurs between the timber rafters and the asbestos sheeting. The windows and doors have fallen away. Chimneys exist towards either gable end. The exterior and interior walls are plastered (plastered stone walls), with little to no cracks present. The onetime living space of this structure is

not ideal for roosting bats, and there was no evidence of roosting bats during time of surveys. Timber laths/sheeting form the ceiling of the onetime living area of this structure, sometimes falling away, allowing access to the attic space. The attic space cannot be accessed from the exterior, and the spaces between the corrugated roof have been plastered/sealed. The attic space was investigated in July 20219 The stone walls can be seen in the attic space, however these have been pointed for the most part, and there was no evidence of roosting bats during time of survey. As discussed, there is no sheeting between the asbestos sheeting and rafters and batons which makes the roof structure less optimal for roosting bats. A void space occurs between the gable walls and the end rafter at either gable wall, however there was no evidence of roosting bats in this space during time of survey, and the space that occurs would be draughty, as a baton occurs between the sheeting and the rafters, making the void space less optimal for roosting bats. During time of survey, there was no evidence of roosting bats in this structure. The house is situated on an unmaintained grassland area, with a conifer tree line lining the northern and eastern boundary line of this structure. The odd broadleaf tree occurs. The structure is not well connected to habitats extending away, as it is situated in isolation, with no linear features such as hedgerow leading up to the house. The following photographic plates were taken during time of surveys.

	
<p>Rear of structure, facing west</p>	<p>Southern gable</p>
	
<p>Front of structure, doors and windows falling away</p>	<p>Interior, ontime living space</p>



Timber lat ceiling

Timber lats in ceiling, sometimes falling away



Attic gables



Derelict house with treeline towards north center of site.

A ruin of stone walls occurs outside the site boundary, just to the west central part of the site. This was likely used as dwelling and farmhouses many years ago; however, little more than a skeleton of stone walls remains. No evidence of roosting bats was observed at this location, and the walls are open to the elements, making them less optimal for roosting bats.



Stone wall ruin situated to west of site boundary

Stone wall ruin situated to west of site boundary

The majority of the site is best described as conifer plantation, bog land, and grassland. Outside of the conifer plantation, these habitat types are not optimal for roosting bats.

It is considered that the trees/sections of conifer plantation that occur within the Drumnahough site are not mature enough to support optimal bat roost habitat. During the daytime surveys on July 25th, and August 8th 2018, there were no signs of roosting bats. Trees less than 80 years old are less likely to be selected as roosting sites by bats (FCEW, 2005), and conifers are less likely to be selected as

roosting sites than broadleaf varieties (Kelleher et al., 2006). It is considered therefore that given the age profile and the type of trees within the site boundary, the forestry present has a low potential value as roosting habitat for bat species (see also Table 2, above), and is considered therefore available as foraging/commuting habitat, rather than for roosting.

The Drumnahough site is situated in remote upland area. The roost potential immediately adjacent the site is not great, with little/no occupied dwellings immediately bounding the site. A number of agricultural/farm sheds occur. A number of these structures were visited during time of survey August 2018, and February 2019, with no evidence of bats observed. In the greater area, bat roosts may occur in the dwelling houses, masonry bridges/structures, farm buildings or derelict buildings that occur in the greater area, outside site.

6.3 ACTIVITY SURVEYS (TRANSECTS)

On the night of the 25th July 2018, driven bat transects were carried out within and around the Drumnahough site. Surveys were repeated on the 8th August 2018. A summary of the results can be viewed in Table 6 and Table 7 below. Figure 4 and Figure 5 below, shows the bat activity encountered along transect routes.

Table 6: Results of bat activity surveys (transects) 25/07/2018

Drumnahough Bat Transect Survey (25/07/2018)								
Date	Time	Temp	Rain	Cloud	wind	Species	Bat activity (passes)	Other comments
Night of 25/07/18	21.30 - 23.30	17°C	No	3/8	<F1 SW	PIPI	4	Dark night, little to no moth/insect activity.
						PIPY	10	
Totals						2	14	
Transect route descriptions within the site								
Within the site transect followed conifer plantation access track.								Approx 6km
Transect route descriptions outside the site								
Transect routes were carried out around the site. Transect routes followed Hedgerow/treeline bounding public road, and existing access track. Existing access track/public road adjacent to conifer edge. Existing road bounding grassland (no hedgerow/treeline), scrub, watercourse crossings.								Approx 18km
Total overall								Approx. 24km

Table 7: Results of bat activity surveys (transects) 08/08/2018

Drumnaough Bat Transect Survey (08/08/2018)								
Date	Time	Temp	Rain	Cloud	wind	Species	Bat activity (passes)	Other comments
Night of 08/08/18	21.12 - 00.20	12°C	No	3/8	No	PIPI	5	Dark night, little to no moth/insect activity.
						PIPY	5	
						NYLE	6	
Totals						3	16	
Transect route descriptions within the site								
Within the site transect followed conifer plantation access track.								Approx 6km
Transect route descriptions outside the site								
Transect routes were carried out around the site. Transect routes followed Hedgerow/treeline bounding public road, and existing access track. Existing access track/public road adjacent to conifer edge. Existing road bounding grassland (no hedgerow/treeline), scrub, watercourse crossings.								Approx 18km
Total overall								Approx. 24km

Transects conducted at the study area had a combined length of approximately of approximately 24 km. Bat transect surveys were designed to include potentially suitable foraging and commuting habitats for bat species. Transect routes within the site followed existing access tracks, conifer plantation, open felled forestry, and adjacent to watercourse. Transect routes conducted outside the site mainly followed public road bounded by hedgerows, individual trees, and tree line. The surveys were designed to include the spread of habitats throughout the study area. Species encountered included soprano pipistrelle, common pipistrelle and Leisler's bat.

On the night of the 25th July; five passes of soprano pipistrelle were encountered within/immediately adjacent the site (along access within conifer plantation). The majority of the bat activity was recorded outside the site, on public road adjacent to open bog land, and agricultural grassland, bounded by hedgerow/tree line.

On the night of the 8th August 2018, a low number of bat passes of soprano pipistrelle, and one bat pass of Leisler's bat were encountered within the site (conifer plantation at Drumnaough). Again, the majority of the bat activity occurred outside the site, along public road, adjacent to grassland.

During bat activity surveys outside the site, along public road, bat activity increased as hedgerow/tree line became denser and along forestry edge.

Overall, it is considered that bat activity encountered during surveys was low, considering the transect survey effort/lengths of route.

Figure 4 and Figure 5 below show bat activity encountered at the subject site during bat transect surveys in July/August 2018.



Figure 4: Bat Transect Routes and bat activity encountered during bat transect surveys at study area (July 25th 2018)



Figure 5: Bat Transect Routes and bat activity encountered during bat transect surveys at study area (August 8th 2018)

6.3.1 Automated Bat Activity Survey

An unmanned passive bat activity survey was completed at four different locations within/adjacent to the Drumnahough site. Site No.1, is located towards the southern part of the site, site No. 2 is located towards the west central part of the site, Site No. 3 is located to the north of the site, and site No.4 is located towards the east central part of the site (See Figure 6 below). The SMZC bat detectors were deployed on the 25th of July 2018, and recorded for 14 consecutive nights. Habitats chosen within the site were those considered as suitable bat foraging and commuting habitat.

Table 8 through to Table 11, below, summarises the results of the automated bat surveys, they include the locations where the SMZC bat detectors were deployed, and the durations of the deployment at each location.

Figure 6 below illustrates locations of the automated surveys carried out at the site.

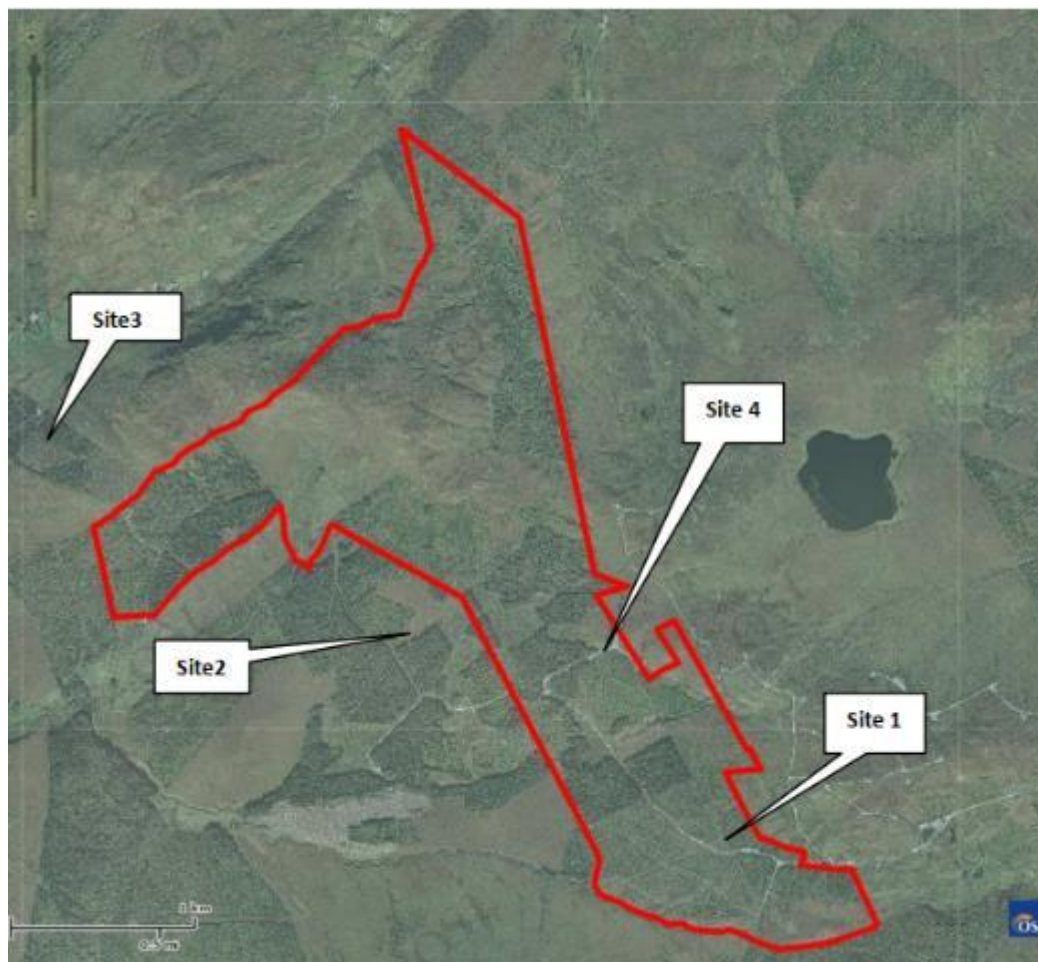






Figure 6: Location of automated bat surveys

Table 8: Summary of automated bat survey at Site No.1

Drumnahough Automated Bat Survey (Site 1)			
SMZC Grid Ref.	Dates surveyed	Habitats	Summary of results (Bat passes)
C06944, 03777	25/07/2018 - 08/08/2018	Bat unit was deployed at conifer edge/firebreak. Sitka spruce dominant, 25" trees. Purple moor grass and <i>Juncus</i> dominant species in firebreak. No thinning and no canopy present.	PIPI: 4
			PIPY: 5
			NYLE: 46
			MYsp.: 3
			No ID: 1
Total bat passes			59
The weather during the survey period was broadly typical for the location ⁷ . Therefore the weather did not pose a significant constraint to the survey			
			
Site 1: Looking east		Site 1: Looking north	

⁷ <http://www.accuweather.com/en/ie/Cark207642/july-August-weather/207642>

Table 9: Summary of automated bat survey at Site No.2

Drumnahough Automated Bat Survey (Site 2)			
SMZC Grid Ref.	Dates surveyed	Habitats	Summary of results (Bat passes)
C03159, 04809	25/07/2018 - 08/08/2018	SMZC bat unit deployed conifer edge, and access track, section of open bog land and felled forestry to south.	PIPI: 11
			PIPY: 11
			NYLE: 32
			MYsp.: 15
Total bat passes			71
The weather during the survey period was broadly typical for the location ⁸ . Therefore the weather did not pose a significant constraint to the survey			
			
Site 2: Looking northeast		Site 2: Looking east/northeast	

⁸ [Hhttp://www.accuweather.com/en/ie/Cark207642/july-August-weather/207642](http://www.accuweather.com/en/ie/Cark207642/july-August-weather/207642)

Table 10: Summary of automated bat survey at Site No.3

Drumnahough Automated Bat Survey (Site 3)			
SMZC Grid Ref.	Dates surveyed	Habitats	Summary of results (Bat passes)
C03161, 05989	25/07/2018 - 08/08/2018	SMZC bat unit deployed in unplanted area in conifer plantation and access track. Sitka and lodge pole pine. 25' high.	PIPI: 32
			PIPY: 19
			NYLE: 19
			MYspp.: 20
Total bat passes			92

The weather during the survey period was broadly typical for the location⁹. Therefore the weather did not pose a significant constraint to the survey



Site 3: Looking south/southeast

⁹ [Hhttp://www.accuweather.com/en/ie/Cark207642/july-August-weather/207642](http://www.accuweather.com/en/ie/Cark207642/july-August-weather/207642)

Table 11: Summary of automated bat survey at Site No.4

Drumnahough Automated Bat Survey (Site 4)			
SMZC Grid Ref.	Dates surveyed	Habitats	Summary of results (Bat passes)
C06279, 04846	25/07/2018 - 08/08/2018	SMZC bat unit deployed at conifer plantation edge and open bog land.	PIPI: 1
			PIPY: 0
			NYLE: 14
			MYsp.: 2
Total bat passes			16
The weather during the survey period was broadly typical for the location ¹⁰ . Therefore the weather did not pose a significant constraint to the survey			
			
Looking east/northeast			

The SMZC bat detectors at the Drumnahough site recorded the following species: soprano pipistrelle, common pipistrelle, Leisler's bat and *Myotis* species. Bat activity was recorded at all four sites. Fourteen consecutive nights of automated bat surveys were carried out at each location, which resulted in 238 bat passes. Leisler's bat was the most common recorded species, with a total of 111 bat passes, followed by common pipistrelle and soprano pipistrelle, with 48 passes, and 36 passes respectively. Over the fourteen nights of survey there were 40 passes of *Myotis* species.

It must be noted that each bat pass does not correlate to an individual bat, but is representative of bat activity levels/species present at locations surveyed.

¹⁰ [Hhttp://www.accuweather.com/en/ie/Cark207642/july-August-westher/207642](http://www.accuweather.com/en/ie/Cark207642/july-August-westher/207642)

7 DISCUSSION

Baseline bat surveys were carried out at the study area to identify the level of bat activity using the Drumnahough site. The dominant habitats at the site include conifer plantation, bog land and agricultural grassland extending away from the site. It should be noted that while water features are an important feature for bat species within any landscape the majority of those draining the development site are considered sub-optimal for bats as they consist mainly of small narrow streams. Some, albeit limited and marginally more optimal, riparian habitat is present in unmaintained areas; these are not, however well connected to the wider area.

During transect surveys at the study area, bat activity was considered low. The amount of bat activity can be considered relatively low considering the distance of surveys routes travelled, conducted during optimal weather conditions for bats.

The results of the automated monitoring system yielded the highest amount of bat passes, due to the greater survey effort using this method. The automated monitoring allowed for surveys to be carried out over extended periods of time, and results gave a more complete level of bat usage at the locations surveyed. The results of the automated bat surveys are discussed in the following paragraphs without any visual observations during the night's surveys. These are extrapolated opinions, referring to likely behaviour, in relation to commuting/foraging bats.

During the automated survey period, sunset for the survey dates ranged from 21.46hrs – 21:19hrs, while sunrise for the area was approximately 05.40hrs.

Site No. 1 is situated towards the southern end of the site, where the bat detector was deployed adjacent to conifer edge, and firebreak. Bat activity was recorded during all of the fourteen nights of survey. Overall bat activity was considered relatively low, considering the survey effort of 14 consecutive nights, with a total 59 bat passes recorded. For the most part bat activity began approximately 60 minutes to 70 minutes after sunset with some scattered clusters of passes throughout the middle of the survey nights. Where bat activity ran through the entire night, passes usually ceased approximately 04.15hrs. The results of the automated bat survey at Site No.1 indicated that bat species used the location in small numbers. The results did not indicate the presence of a nearby bat roost for the bat species detected during time of survey.

Site No.2 is situated towards the west central part of the study area site. The detector was deployed in front conifer plantation, and open bogland. At site No.2 bat activity was recorded twelve of the fourteen nights surveyed. In total 71 bat passes were recorded at Site No.2. It must be noted again that each bat pass does not correlate to an individual bat, but is representative of bat activity levels/species present at locations surveyed. Species recorded included common pipistrelle (n=11), soprano pipistrelle (11), Leisler's bat (32), and *Myotis* species (n=15). The highest numbers of bat passes recorded in one night was 18 passes on the 4th August, 2018. As noted earlier, during the automated survey period, sunset for the survey dates ranged from 21.46hrs – 21:19hrs, while sunrise for the area was approximately 05.40hrs. The recordings started on most nights approximately 22:35hrs (approx. 50 minutes after sunset), and bat activity usually ceased at 04:20hrs (approximately 100 minutes before sunrise), which would indicate that there was not a roost nearby. Single bat passes were more frequently recorded towards the beginning and end of

each of the night's surveys, indicating commuting bats. The results of the automated bat survey at Site No.2 indicated that the habitats at this location provide commuting/foraging routes for bats, albeit in low numbers. The start time and end time for the bat activity did not indicate the presence of a bat roost at the location of the detector, and from visual observations during time of survey, none occurs.

The automated survey at site No.3 is located towards the northern end of the site. The bat detector was deployed on small open clearing in conifer plantation adjacent to access track. Bat activity was very low during the fourteen nights of survey at Site No. 3, with a total of 92 bat passes recorded. Bat activity was recorded during twelve of the fourteen nights of survey. Only one bat pass was recorded on two night of survey (6th and 7th August). The highest level of activity was on the 25th July with 50 bat passes recorded. For the most part, bat activity began well over an hour after sunset, and ceased approximately 1.5 hour before sunrise, indicating that a bat roost site is not nearby. Common pipistrelle was the most commonly recorded species at this location (n=32), followed soprano pipistrelle and Leisler's bat, (n=19). *Myotis* species accounted for 20 bat passes at this location over the survey period.

The automated survey at site No.4 is located towards the east/central part of the site. Bat activity was recorded on five of the fourteen nights surveyed, with no regular start, or end time, with bat passes occurring towards the middle of the nights surveyed. In total sixteen bat passes were recorded, which is considered very low for the survey effort completed. This site rises to approximately 300m OD, and is open to the predominant weather, which may account for the low bat activity at this location. Again it must be noted that the weather conditions during survey period, were broadly typical for the historical weather data for the location.

Overall the level of bat activity recorded during the automated bat survey is low, particularly given that the survey effort was conducted nightly over fourteen consecutive nights, during which time weather conditions were favourable for bat activity. Leisler's bat was the most common recorded species (during automated surveys), with a total of 111, bat passes, followed by common pipistrelle and soprano pipistrelle, with 48 passes, and 36 passes respectively. Over the fourteen nights of survey there were 40 passes of *Myotis* species.

With regard to roosting bats, daytime visual bat roost surveys were completed at the old dwelling towards the north centre of the site. During time of surveys there was no evidence of roosting bats within this structure. It is considered that during time of surveys that this site was not used as significant roost site, such as a maternity roost, and was not used by bats during the winter period. It is noted that this structure occurs in isolation, and is not connected by features such as treeline and hedger to the surrounding habitats.

The structure described above is situated c.450m from any proposed turbine. During survey completed at the site a roost suitability survey was completed which did not highlight any structure that would be optimal for roosting bats within the distance outlined by SNH 2019. It must be noted that the development site is situated in a remote upland area, and the availability of roosts in the immediate area are not great. Extending further away from the site, bat roosting potential includes one off dwelling houses, masonry bridges/structures, farm buildings or derelict buildings that occur in the greater area. The BCI data request response did not identify any documented bat roost sites in

the proximity of the Drumnaough site (closest are in the area around Ballybofey approximately 10 km away).

The trees present are simply not old enough to harbour bats, and the forestry regime at the site is likely not to change this. The stream crossings within the site are piped/culverted, and do not offer significant roosting habitat for bats. There was no evidence of bats roosting in the farm houses/sheds in the valley to the west of the site. During bat transects, very low bat activity was recorded within the site on the two nights surveyed.

During bat activity surveys outside the site (transects), along public road, bat activity was encountered along all the survey routes taken, with increased activity as hedgerow/treeline became denser and along forestry edge.

8 CONCLUSION

The following are conclusions of bat surveys outlined in this report;

- The following species were identified during baseline bat surveys carried out at the Drumnaough site; common pipistrelle, soprano pipistrelle, Leisler's bat, and species of *Myotis*.
- Baseline bat surveys conducted in July/August 2018 did not identify any large populations of bats using the site.
- Overall the level of bat activity at the study area was low, with the majority of the bat activity occurring outside the site; hedgerows/treelines bounding the public road system/grassland habitats extending away from the site.
- The forestry edges, hedgerows/treelines occurring offer foraging and commuting routes for bats, albeit in low numbers.
- Within the site, there was no evidence that bats are using the old dwelling c.450m to the west of T8. It is considered that this site is not optimal for roosting bats, and occurs in isolation. The trees within the conifer plantation do not provide optimal conditions, to harbour roosting bats.
- The Drumnaough site is situated in a remote upland area and the availability of roosts in the immediate area are not great. Extending further away from the site, bat roosting potential includes one off dwelling houses, masonry bridges/structures, farm buildings or derelict buildings that occur in the greater area.

9 RECOMMENDATIONS

Recently, Scottish Natural Heritage published guidance for bat survey methodology for onshore windfarms (SNH, 2019). The guidance outlines the minimum level of pre-application survey required using static detector/surveys should be spread over seasons within bat active season/ Key features that could support maternity roosts and significant hibernation and/or swarming sites (both of which may attract bats from numerous colonies from a large catchment) within 200m plus rotor radius of the boundary of the proposed development should be subject to further investigation/etc.

The following surveys are recommended for the Drumnahough site, to ensure proposal is in line with recent guidance;

- Carry out Automated Bat Activity Survey for 10 consecutive nights in (1) Spring (April-May), (2) Summer (June-mid August), (3) Autumn (mid August-October).
- Bat transects can be carried out spread over bat active season.

Repeat roost survey/roost suitability survey, mainly within 200m plus rotor radius of turbines.

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