

Appendix 6-3 Bat Survey Report - 2018



Preliminary Bat Activity Survey Report 2018

Carrownagowan Wind Farm



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1 INTRODUCTION

Malachy Walsh and Partners (MWP) has been commissioned by Coillte Cuideachta Ghníomhaíochta Ainmnithe, hereafter Coillte, to prepare an Environmental Impact Assessment Report (EIAR) to accompany a planning application for the proposed Carrownagowan Wind Farm in Co. Clare.

This report provides the details of the bat surveys carried out at the study area and the results of the same.

The bat surveys described in report were conducted between June and October 2018. 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 within and adjacent to the site, to identify the level of bat activity at the location. Automated bat surveys included monitoring at ground level at six locations, and from height at the met mast.

1.1 PURPOSE OF THE SURVEYS

Bats are legally protected by Irish and European legislation designed to maintain and restore these protected species to a situation where their populations are in a favourable conservation status. To ensure that bats are protected, an assessment of impacts of the proposed development is required.

1.2 SCOPE OF THE BAT SURVEYS

This report provides the results of the preliminary baseline bat activity surveys completed in 2018, and the bat roosting opportunity in the study area. 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:
 - An automated monitoring of bat activity conducted at six separate locations at ground level within the site, where the SMZC bat detector units were deployed on two occasions in July 2018, and repeated in late August/early September 2018, for a minimum period of seven consecutive nights.
 - Automated Bat Surveys at Height (Met Mast): An automated bat survey from height was conducted at the Carrownagowan Met Mast, between September and November 2018, for a period of 67 consecutive nights, to provide a sample of the bat activity at turbine height over the survey period.
 - 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.

Along with visual observations, results of the bat activity monitoring at the Carrownagowan site were analysed to describe the bat activity at the site during time of survey.

2 STUDY AREA

The proposed wind farm is located within forested lands on the northern slopes of Slieve Bernagh Mountain, approximately 4 km northeast of the village of Broadford, 7 km north-west of Killaloe and 2.5 km south of the village of Bodyke. Lough Derg lies approximately 4 km to the east of the proposed development area (see Figure 1, below).

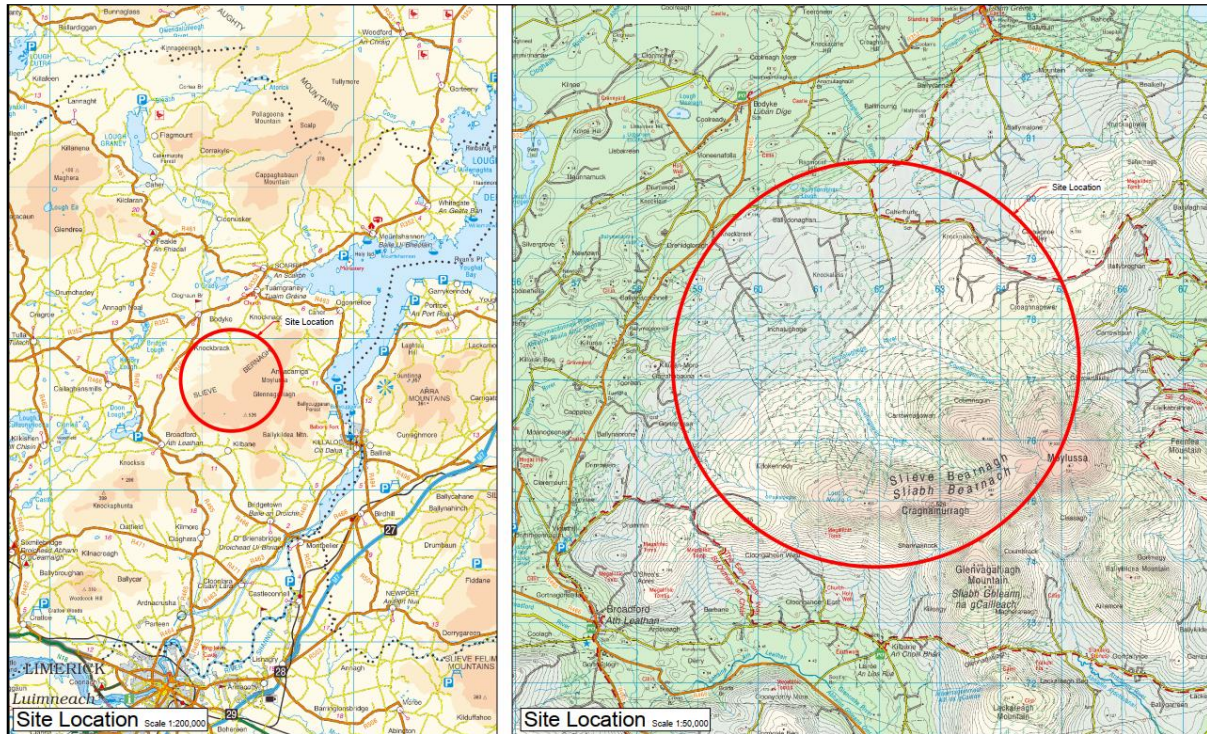


Figure 1: Proposed wind farm location

The development site is situated in an upland area (approx. 200-420m OD), on the north-western slopes of Slieve Bernagh Mountains. The proposed turbines, 19 in total, are situated at elevations ranging from approximately 150 m to 420 m (Above Ordnance Datum) and mostly above 200m.

The proposed development site (the area within the red line planning boundary) principally consists of conifer plantation of varying age profiles including clear fell, pre and post-thicket phases and mature closed canopy. Remnant areas of cutover bog and wet heath also occur but these are quite discontinuous and fragmented due to the development and expansion of forestry. While some of the remnant areas of bog retain some of the original peat mass most are significantly degraded as a result of the impacts, particularly, on ground water flows, caused by the forestry operations. A number of wet grassland fields are also present. These appear to be reverting from a state where they were once improved forms of agricultural grassland subject to intensive management for at least some period of time.

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 landcover, 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 between June and October 2018, which are described in the following sections. Bat surveys included:

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

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, and 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.

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 August, and revisited in October and November of 2018. 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. 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 Automated Bat Survey

An unmanned automated bat survey was completed at six locations, within/adjacent the site. The Song Meter SMZC Bat Detector, and the SM3 BAT (Wildlife Acoustics, MA, USA) were deployed at six 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 18th and 24th July 2018. The automated survey was repeated at the same locations between the 29th August and 7th September 2018. The detector 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.

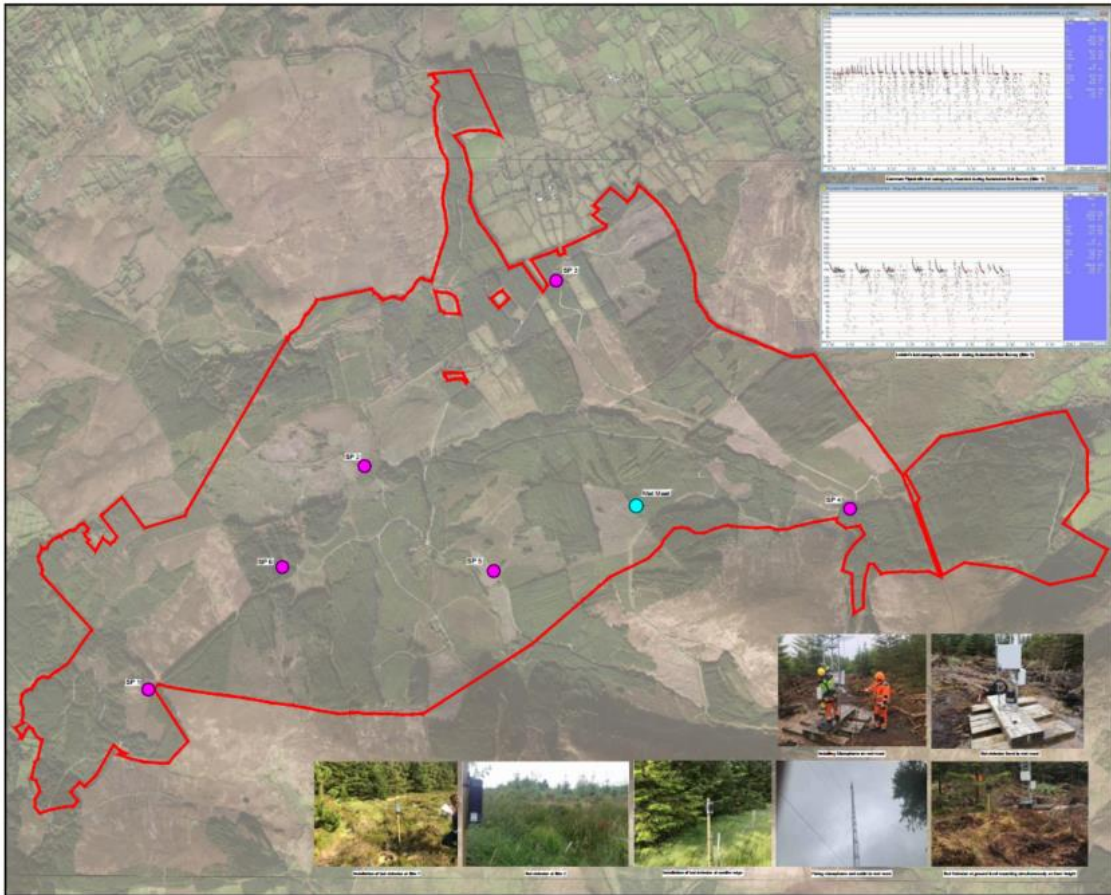


Figure 2: Static bat detector locations (purple dot = ground level, blue dot = at height)

3.2.5 Automated Bat Survey (at Height)

Guidance on good practice for bat surveys at proposed on-shore windfarm sites (Bat Conservation Trust 2011) recommends that where possible, static automated bat detectors be installed at turbine height (or as close as possible).

In total 67 consecutive nights (of which 52 nights were during bat active period) of bat survey was carried out at c.70m in height using the Temporary Met Mast at Carrownagowan. Surveys were carried out between September and November 2018.

A weather-resistant SMM-U1 ultrasonic microphone was attached to a bird deterrent unit, and fixed to the Carrownagowan Temporary Met Mast, at a height of approximately 70m, above ground level. An electronic cable, connected to an SM3BAT Bat Song Meter, at ground level. The SM3BAT Song Meter unit was installed, and secured, on September 10th 2018, and was removed on the 12th November 2018. Prior to deployment, the SM3 Bat detector was calibrated with an ultrasonic calibrator, to ensure that the microphone and the detector were performing properly. The SM3 Bat

detector was equipped with secured digital (SD) memory cards to store call data. The detector was programmed to record both zero-crossing and full spectrum call files simultaneously. Following the survey period the data was downloaded using Kaleidascope and Analook software, to view and analyse any bat sonograms. The unit was checked frequently during the survey period, replacing batteries at regular intervals and making sure the device was working appropriately.

3.2.6 Bat Activity Surveys (Transects)

Bat activity surveys (transect surveys) conducted at the study area consisted of driven transects, within the site. The series of representative transect routes were designed to survey the site and adjacent lands. The transect routes intersected and followed foraging and commuting habitats present, particularly those associated with linear features such as roadside margins, hedgerow, and treelines, vegetated linear strips, scrub, and woodland and 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 co-ordinates 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 on the 18th July 2018, and repeated on the 29th August, and 2nd October 2018. Surveys commenced approximately 30 minutes before dusk, and continued for approximately 2 hours. Post survey, the species of each individual bat pass/contact was identified, and the recording was labelled. The GPS location was 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 are shown in Figure 3.

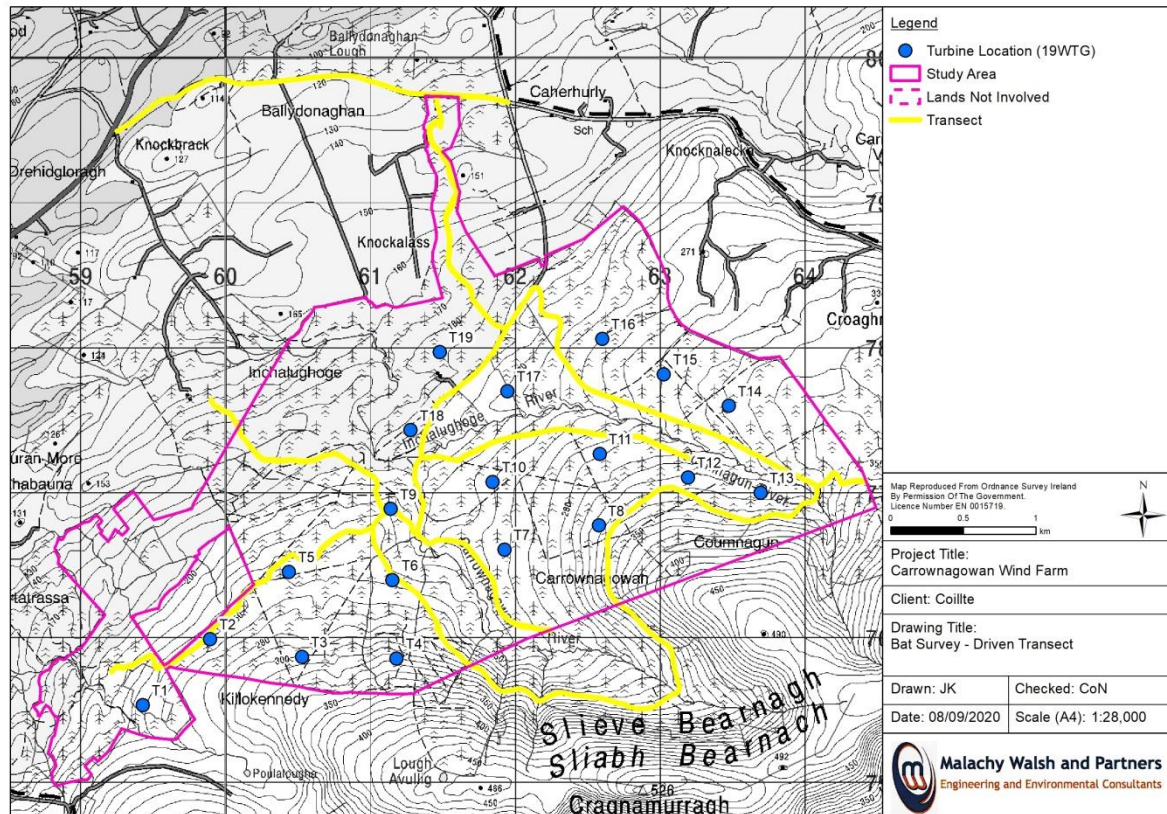


Figure 3: Driven transect routes

3.2.7 Survey Data Collation and Analysis

All data collected during bat activity surveys (transects, and automated surveys) was downloaded and analysed using Kaleidascope and Anlook 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).

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.

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 analysed using 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 Anlook 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 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*
- PLAUR: Brown long-eared bat (*Plecotus auritus*)
- RHHI: Lesser horseshoe bat [LHB] (*Rhinolophus hipposideros*)

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.

3.2.8 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 IN IRELAND

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
Brown Long-eared	Maternity roost	Significant

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

5 RESULTS OF DESK STUDY/DATA REQUEST

5.1 BAT CONSERVATION IRELAND DATA REQUEST

A database search request was submitted, in January 2019, to Bat Conservation Ireland (BCI) for all records of bat species within a 10km radius of the proposed project site retained by the organisation. BCI responded on the March 2019.

Bat Conservation Ireland documented records included roost surveys (17 records), transect surveys (3 records), records from BATLAS 2010 (10 records) and data from EIS surveys (9 records). While Grid references are provided for all these locations, due to the sensitivity of the data, they will not be reported here. However, 4 figure grid references can be provided to statutory bodies on request. While the data from the roost and transect surveys are undated those retrieved from the BATLAS 2010 and from EIS surveys are, variously, from the period 2000 to 2012. The nearest roost site is approximately 2.5 km from the project site boundary and the remainder are situated in excess of 4 km away.

These BCI records indicate that the following species are known, or, historically, have been known within the 10 km radius of the proposed project site:

- Brandt's bat (*Myotis brandtii*)
- Brown long-eared bat (*P. auritus*)
- Common pipistrelle (*P. pipistrellus*)
- Daubenton's bat (*M. daubentoni*)
- Leisler's bat (*N. leisleri*)
- Lesser horseshoe bat (*R. hipposideros*)
- Natterer's bat (*M. nattereri*)
- Whiskered bat (*M. mystacinus*)

5.2 DESIGNATED SITES

The National Parks and Wildlife Service (NPWS) map viewer and website provides 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 a number of sites designated for bats.

Table 2. Designated sites within 15km of the Carrownagowan that include bat species as Qualifying Features of Interest

Designated Site	Distance from designated site to location of nearest turbine-Grid Connection	Feature of Interest
Danes Hole, Poulnalecka SAC/pNHA (000030)	Approx 6.6km to Southwest of T1 Approx. 5.8km to southwest of Grid Connection	– Caves not open to the public [8310] – Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles [91A0] – <i>Rhinolophus hipposideros</i> (Lesser

Designated Site	Distance from designated site to location of nearest turbine-Grid Connection	Feature of Interest
		Horseshoe Bat) [1303]
Kilkishen House SAC (002319)	Approx. 11km to southwest of T1 Approx. 10.4km to west of Grid Connection	– <i>Rhinolophus hipposideros</i> (Lesser Horseshoe Bat) [1303]
Ratty River Cave SAC (002316)	Approx. 13.3km to southwest of T1 Approx. 10km to west of Grid Connection	– Caves not open to the public [8310] – <i>Rhinolophus hipposideros</i> (Lesser Horseshoe Bat) [1303]
Newgrove House SAC (002157)	Approx. 15.2km to northwest of T1 Approx 15.2km to northwest of Grid Connection	– <i>Rhinolophus hipposideros</i> (Lesser Horseshoe Bat) [1303]
pNHA Sites		
Castleconnell (Domestic Dwelling) (000433)	c. 15km to south of T1 c. 5.5km to east of Grid Connection	– Bats
Cloonlara House (000028)	c. 13.6km to south of T1 c. 6.7km to east of Grid Connection	– This bat site is located in a three-storey domestic dwelling house and contains over 100 Leisler's Bats (<i>Nyctalus leisleri</i>) during the summer months. – Although the number of bats at this site has declined in recent years, it is still one of the biggest nursery sites in Ireland and in Europe. It is a site of international importance

5.3 NBDC BAT HABITAT SUITABILITY INDEX

The bat suitability index rating available on the NBDC website indicates that the habitats within the wind farm and in the area extending away from it are of varying suitability. To the west they are assessed as being of medium-high value to bats in general with a rating of 28.11- 36.44 out of 100 for the category 'All bats'. One section on the north eastern side is assessed as being of medium-low value to bats in general with a rating of 13.00- 21.33 out of 100 for the category 'All bats' and one section to the south east is assessed as being of medium value to bats in general with a rating of 21.33- 28.11 out of 100 for the category 'All bats'. The surrounding area extending from the site is assessed as being of high value to bats in general with a rating of 36.44- 58.55 out of 100 for the category 'All bats' (NBDC, 2020).

As can be seen from Table 3 with regard to the area within the proposed project site the ratings for all bat species are very low, with the surrounding landscape having a somewhat higher suitability rating. These habitat suitability index ratings for individual species below strongly suggest that while activity by certain species is reasonably foreseeable the levels of activity are unlikely to be significant. It is also evident that the ratings for the wider geographical area, denoted as 'Surrounds' in the table, are higher than for the area within the proposed wind farm site. This is consistent with

that characteristics of the surrounding area which is at lower elevation, a factor which influences air temperature, and which is often characterised by a more ecologically and structurally diverse habitats than is the case within the project site.

Table 3. Bat Habitat Suitability Index Rating by Species

Species	Suitability Index Rating				Irish red list status Legal Protection
	West	North East	South East	Surrounds	
All bats	29	18.89	23.56	41.78	
Nathusius' pipistrelle (<i>P. nathusii</i>)	0	0	0	5	Annex IV Least Concern
Whiskered bat (<i>M. mystacinus</i>)	22	8	15	26	Annex IV Near Threatened
Daubenton's bat (<i>M. daubentonii</i>);	28	14	19	48	Annex IV Least Concern
Natterer's bat (<i>M. nattereri</i>)	48	36	39	64	Annex IV Least Concern
Common pipistrelle (<i>P. pipistrellus</i>);	44	35	40	56	Annex IV Least Concern
Leisler's bat (<i>N. leisleri</i>)	34	23	28	52	Annex IV Least Concern
Soprano pipistrelle (<i>P. pygmaeus</i>)	40	27	33	50	Annex IV Least Concern
Brown long-eared bat (<i>P. auritus</i>)	41	25	36	63	Annex IV Least Concern
Lesser horseshoe bat (<i>R. hipposideros</i>)	4	2	2	12	Annex IV Annex II Least Concern

6 RESULTS OF FIELD SURVEYS

6.1 PRELIMINARY DAYTIME VISUAL ROOST SURVEY

Within the Carrownagowan site there are a number of structures located towards the north central part of the site. Due to access these were not visited during time of survey. These will require further survey. Outside of this there are no obvious structures that would support roosting bats. Watercourses within the site are culverted piped crossings, and do not provide optimum roosting habitat for bats. The majority of the site is best described as conifer plantation, bogland mostly/historically used for peat harvesting (within the site), heathland, and some wet/agricultural grassland. Outside of the conifer plantation, these habitat types are not optimal for roosting bats.

The trees/sections of conifer plantation that occur within the Carrownagowan site are not mature enough to support optimal bat roost habitat. During the daytime survey on the 18th June 2018, and 29th August 2018 some individual trees/conifer plantation trees were investigated, with 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 woodland within the site boundary has a low potential value as roosting habitat for bat species and is therefore primarily used as foraging/commuting habitat, rather than for roosting.

The Carrownagowan Wind Farm site is situated in remote upland area. The roost potential within the site is Low, with little, to no structures within c.1km of a turbine. A number of scattered dwellings and agricultural farm sheds occur outside this. In the greater area, and along the proposed grid connection cable route, bat roosts may occur in the dwelling houses, masonry bridges, structures, farm buildings or derelict buildings that occur in the greater area extending away from the site.

6.1.1 Automated Bat Activity Survey (Ground Level)

The SMZC bat detectors were deployed on the 18th of July 2018, and recorded for 7 consecutive nights. Habitats chosen within the site were those considered as suitable bat foraging and commuting habitat. The automated survey was repeated between the nights of 29th of August 2018, and 7th of September 2018. Table 4 through to Table 9 below, summarises the results of the automated bat surveys at ground level, and the durations of the deployment at each location.

On the basis of sonogram analysis the 2018 surveys determined that the following species were present at the sampling point locations within the proposed development site:

- Common pipistrelle
- Soprano pipistrelle
- Leisler's bat
- Brown long-eared bat
- Lesser horseshoe bat
- Myotis Species

Table 4. Results of automated bat survey at Site 1

Automated Bat Survey (Site 1)			
SMZC Grid Ref.	Habitats	Summary of results (Bat passes)	
		18/7/2018-25/07/2018	29/08/2018-7/09/2018
R61753 76535	Juvenile conifer plantation	PIPI: 49	PIPI: 170
		PIPY: 8	PIPY: 42
		NYLE: 71	NYLE: 93
		MYsp: 3	MYsp: 26
		PLAUR: 3	PLAUR: 82
		RHHI: 0	RHHI: 6
		No Id: 2	No Id:8
Total bat passes		133	427

Table 5. Results of automated bat survey at Site 2

Automated Bat Survey (Site 2)			
SMZC Grid Ref.	Habitats	Summary of results (Bat passes)	
		18/7/2018-25/07/2018	29/08/2018-7/09/2018
X560351, Y676600	Conifer plantation edge. Open bogland	PIPI: 183	PIPI: 275
		PIPY: 58	PIPY: 170
		NYLE: 61	NYLE: 46
		MYNA: 64	MYNA: 71
		PLAUR: 0	PLAUR: 9
		No Id: 3	No Id: 17
Total bat passes		369	588

Table 6. Results of automated bat survey at Site 3

Automated Bat Survey (Site 3)			
SMZC Grid Ref.	Habitats	Summary of results (Bat passes)	
		18/7/2018-25/07/2018	29/08/2018-7/09/2018
X559489, Y675812	Conifer edge, cutover bog. Forest access track. K	PIPI: 124	PIPI: 662
		PIPY: 49	PIPY: 112
		NYLE: 32	NYLE: 19
		MYsp: 12	MYsp: 6
		PLAUR: 3	PLAUR: 3
		No Id: 3	No Id: 6
Total bat passes		223	808

Table 7. Results of automated bat survey at Site 4

Automated Bat Survey (Site 4)			
SMZC Grid Ref.	Habitats	Summary of results (Bat passes)	
		18/7/2018-25/07/2018	29/08/2018-7/09/2018
X560880, Y677250	Deployed at conifer edge between juvenile and mature conifer plantation, and willow scrub.	PIPI: 157	PIPI: 318
		PIPY: 165	PIPY: 57
		NYLE: 3	NYLE: 10
		MYsp: 0	MYsp: 5
		PLAUR: 4	PLAUR: 2
		No Id: 4	No Id: 16
Total bat passes		333	408

Table 8. Results of automated bat survey at Site 5

Automated Bat Survey (Site 5)			
SMZC Grid Ref.	Habitats	Summary of results (Bat passes)	
		18/7/2018-25/07/2018	29/08/2018-7/09/2018
R62155 78404	Deployed at conifer edge and access track	PIPI	PIPI: 77
		PIPY	PIPY: 24
		NYLE	NYLE: 77
		MYNA	MYsp: 12
		PLAUR	PLAUR: 4
		No Id: 2	
Total bat passes		Did not work	196

Table 9. Results of automated bat survey at Site 6

Automated Bat Survey (Site 6)			
SMZC Grid Ref.	Habitats	Summary of results (Bat passes)	
		18/7/2018-25/07/2018	29/08/2018-7/09/2018
R64047 76936	Deployed at recently felled conifer plantation, rides of heath and scrub. Adjacent to small stream.	PIPI	PIPI: 107
		PIPY	PIPY: 33
		NYLE	NYLE: 44
		MYNA	MYsp: 19
		PLAUR	PLAUR: 14
Total bat passes		Did not work	217

6.1.2 Automated Bat Activity Survey from Height (at Met Mast)

In total 67 consecutive nights (of which 50 nights were during bat active period) of bat survey was carried out at c.70m in height using the Temporary Met Mast at Carrownagowan. Surveys were carried out between September and November 2018.

In total 5,102 noise files were created. Over the survey period, 26 bat contacts of Leisler's bat were recorded, and five common pipistrelle bat contacts were recorded. Nine passes were recorded on the 27th September 2018, which were the most contacts recorded on any one night. The level of activity recorded is Low particularly given that the survey effort was conducted nightly over a sustained seven week period, over the bat active season.

6.2 ACTIVITY SURVEYS (TRANSECTS)

Transect surveys were completed on the nights of the 18th July 2018, 29th August 2018, and the 2nd October 2018. Species recorded were:

- Leisler'bat
- Common pipistrelle
- Soprano pipistrelle

The level of activity recorded during the months of July and August 2018 was significantly higher than results of the October survey. The transect survey did not detect Myotis species or brown long eared bat. Figures 4 to 6 below illustrate the results of the bat transects completed in October, July and August 2018.

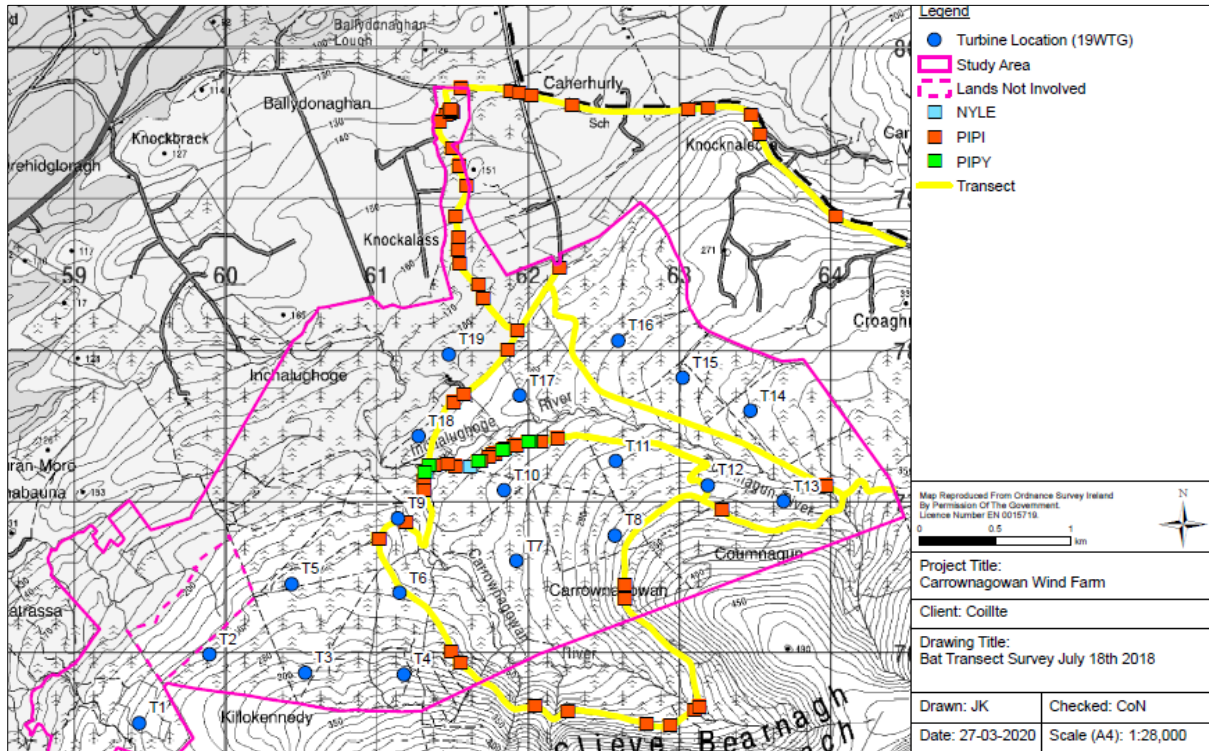


Figure 4: Results of bat transects July 2018

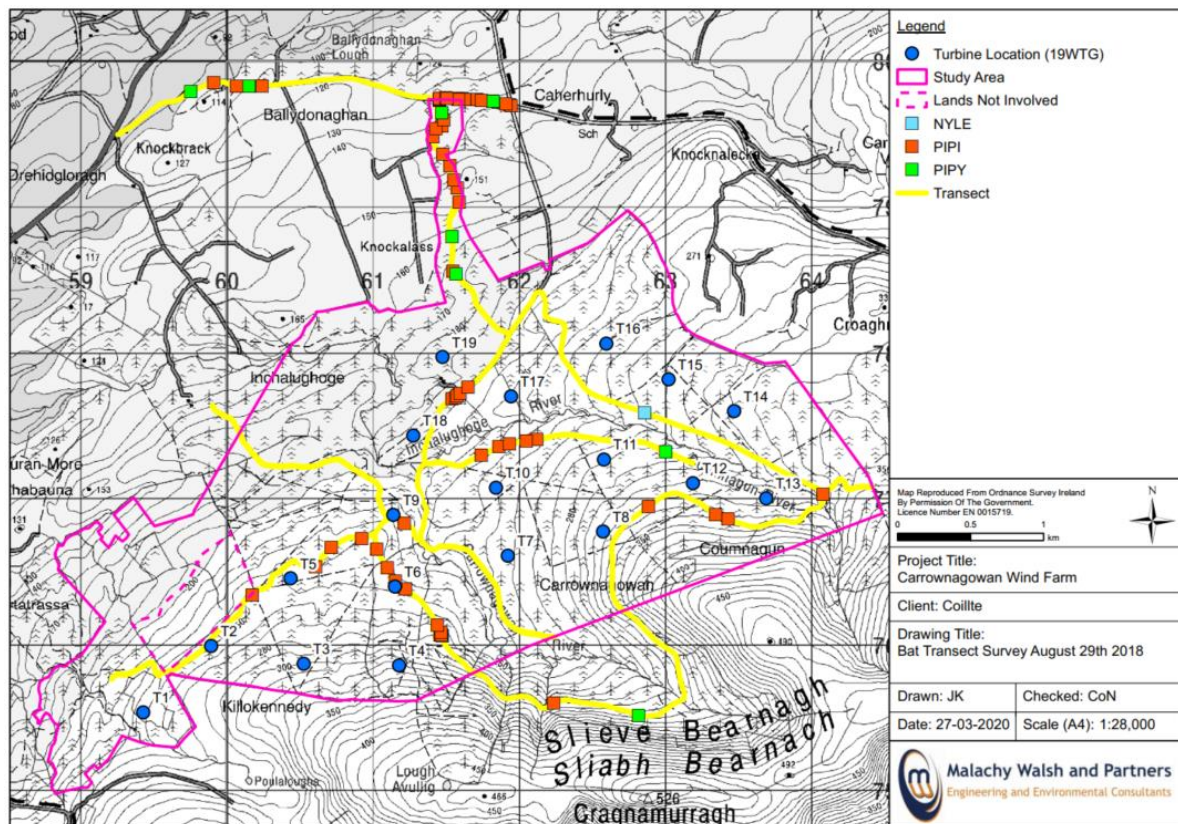


Figure 5: Results of bat transects August 2018

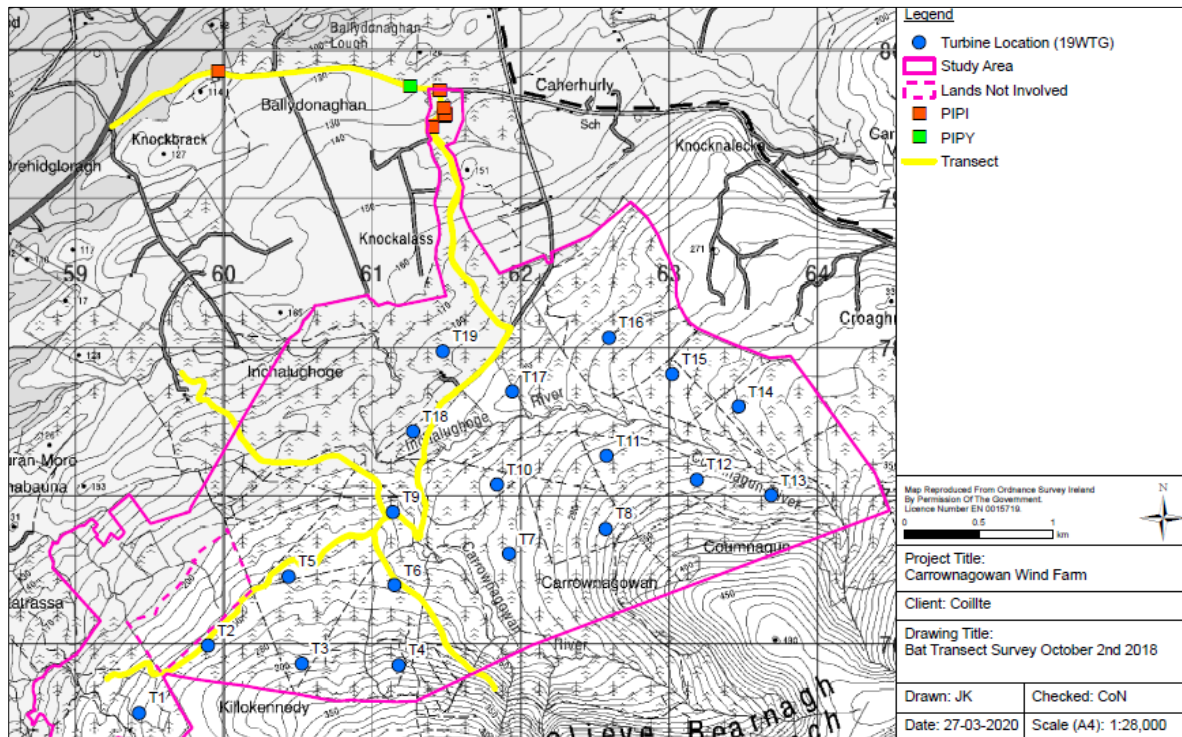


Figure 6: Results of bat transects October 2018

7 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 Carrownagowan site; Common pipistrelle, Soprano pipistrelle, Leisler's bat, Brown long-eared bat Myotis species and lesser horseshoe bat.
- Baseline bat surveys conducted in 2018 did not identify any large populations of bats using the site.
- With regard to lesser horseshoe bats, this species was recorded at Site 1, with 6 passes recorded during automated surveys completed between 29th August 2018, and the 7th September 2018. The survey results indicate that this species is a rare user of the site.
- Overall the level of bat activity at the study area was relatively low.
- The forestry edges, hedgerows/treelines occurring offer foraging and commuting routes for bats, albeit in low numbers.
- The structures towards the north centre of the site will require further investigation.
- The trees within the conifer plantation do not provide optimal conditions, to harbour roosting bats.
- The Carrownagowan 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, and farm buildings that occur in the greater area.

8 RECOMMENDATIONS

During time of compiling this report Scottish Natural Heritage had recently 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 surveys to be completed in 2019; ensure the 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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