Cush Wind Farm

Environmental Impact Assessment Report

Annex 5.3: Baseline Bat Report

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Baseline Bat Report

Cush Wind Farm

Cush Wind Limited

Galros West Co. Offaly

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1.0 Introduction

1.1 Background

SLR Consulting Ireland Ltd (hereafter 'SLR') was commissioned by Cush Wind Ltd in July 2021 to undertake baseline bat surveys necessary to inform the Environmental Impact Assessment (EIA) for the proposed Cush Wind Farm (hereafter 'the proposed project'). The proposed project will be situated in west County Offaly, ca. 4km north of Birr and ca. 29km west of Tullamore (hereafter "the project site"). This baseline report provides the results of surveys for bats, carried out between July to September 2021.

1.2 Proposed Project

The proposed project comprises a wind farm, including all associated development works to accommodate its construction, installation, operation, maintenance and the export of electrical power to the national grid. This will include:-

- 8 no. wind turbines with a hub height of 114 meters (m), a rotor diameter of 172m, and an overall tip height of 200m;
- All associated turbine foundations and crane hardstanding areas;
- All associated underground internal electrical and communications cabling;
- Provision of new internal wind farm site access tracks and use of, and upgrades to, existing agricultural/forestry tracks;
- Upgrade of 2 no. site entrances from the N62 national route for use during the construction phase of the project only;
- Construction of 2 no. site entrances from the L30033 and L300321 local road network for the operational phase of the project only;
- 1 no. guy-wired meteorological mast with an overall height of 30 metres;
- 2 no. temporary construction compounds;
- The storage, as required, of excavated material at 3 no. dedicated spoil deposition areas;
- Temporary upgrade works to public roads along the turbine component haul route;
- A 110 kilovolt (kV) 'Tail Fed' Air-Insulated Switchgear (AIS) electrical substation and all associated electrical equipment including an Electricity Storage System;
- The installation of 5.6km of underground grid connection to facilitate connection of the proposed electricity substation to the existing 110kV substation at Clondallow, Co. Offaly;
- Felling of up to 23 hectares (ha) of forestry to facilitate the construction and operation of wind farm infrastructure;
- The planting of 23ha of commercial forestry on lands in the townlands of Drumagelvin, Drumleek South, Lisdonny and Moy, Co. Monaghan; and

- All associated and ancillary site development, excavation, construction, landscaping and reinstatement works, including provision of site drainage infrastructure and environmental mitigation measures.

The proposed project lies within the administrative boundary of Co. Offaly.

1.3 Site Description

The project site is centred on Irish Transverse Mercator (ITM) reference 710122.26, 607496.84, approximately 4km north of the town of Birr and c. 28km south-west of Tullamore, Co. Offaly.

The project site is located in the townlands of Cush, Galros West, Boolinarig Big, and Eglish, Co. Offaly. It includes the proposed haul route upgrade works to the N52/562 junction at Kennedy's cross, which are located in the townland of Ballindown, Co. Offaly.

The N62 national secondary route bisects the project site.

The project site and surrounding topography are typical of the Midlands Region and comprise a generally flat landscape with occasional gentle undulations. Current land use within the project site is made up of peat bogs, agricultural pasture and forestry, including commercial woodland planting and scrub. Areas to the north and northwest of the project site comprise cutover private boglands, areas to the east and west of the N62 exhibit commercial and woodland forestry plantation and areas to the south and southeast are predominantly agricultural pasture. The wider landscape is characterised by large tracts of commercial cutover peatlands and scrub; however, improved agricultural pasture is dominant in areas bordering the east and west of the project site. The Rapemills River runs from east to west, along the southern and eastern fringes of the project site.

The local area is typical of this part of Ireland, with settlement patterns largely comprising dispersed rural dwellings often accompanied by agricultural holdings and buildings. In total, there are 106 no. dwellings located within 2km of a proposed wind turbine.

1.4 Scope of Study

The main aim of the surveys is to provide baseline data to inform the wind farm design process and inform the Environmental Impact Assessment (EIA) Report. More specifically, this report aims to:

- Identify the locations of any bat roosts, swarming sites, and key commuting or foraging habitat features that could be affected by the project;
- Determine the bat assemblage using the project site for foraging or commuting purposes;

- Compare levels of bat activity between recording locations both within the project site and between seasons, to identify locations that may be of most importance to commuting or foraging bats, or indicate the nearby presence of a roost; and
- Undertake analysis to determine, if possible, relative levels of activity compared with other sites, using the online Ecobat tool[1].

The survey methodology was designed in accordance with current NatureScot wind farm-specific guidance[2] (hereafter 'NS'; while this guidance is Scottish, the guidance has been adopted in Ireland as industry-standard) and CIEEM-recommended bat survey methodology[3] (see Section 2.5 for specific limitations). In addition, Bat Conservation Ireland guidance published in 2012[4] was also used where NS guidance was considered inappropriate in an Irish context e.g. defining the appropriate weather conditions for bat activity.

This report presents the findings of the bat surveys only. The assessment of impacts resulting from the proposed wind farm and the subsequent application of the mitigation hierarchy is beyond the scope of this report but will be addressed in the EIAR.

NS guidance[2] suggests a standardised format for presenting bat data and specifically, quantifying activity and species vulnerability, which relies on use of the Ecobat tool. As the Ecobat tool was not available at the time of writing, some of the risk assessment matrices could not be used. Consequently, the structure of this report deviates slightly from that suggested by NS guidance.

1.5 Relevant Legislation

1.5.1 Irish Legislation

Under Schedule 5 of the Wildlife Acts 1976 to 2021[5] (and as strengthened by the Wildlife Amendment Act, 2000[6]), all bat species and their roosts are protected by law. It is an offence

[1] The Mammal Society. EcoBat. An EcoStat tool. Available online: http://www.mammal.org.uk/science-research/ecostat/ [Last accessed 10/11/2023].

[2] NatureScot (formerly 'Scottish Natural Heritage' or SNH), Natural England, Natural Resources Wales, RenewableUK, Scottish Power Renewables, Ecotricity Ltd, University of Exeter & Bat Conservation Trust (2021) Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation. Available online at: https://www.nature.scot/doc/bats-and-onshore-wind-turbines-survey-assessment-and-mitigation [Last accessed 10/11/2023]

[3] Collins, J. (ed.) (2016) Bat Surveys for Professional Ecologists: Good Practice Guidance (3rd edn). The Bat Conservation Trust, London. This was the latest guidance at the time of surveys, recognising that the 4th edn has recently been published in September 2023. However, analysis of findings consulted the 4th edn of the guidelines.

[4] Bat Conservation Ireland (2012) Wind Turbine/Wind Farm Development Bat Survey Guidance, Version 2.8, December 2012. Bat Conservation Ireland, www.batconservationireland.org.

[5] https://www.irishstatutebook.ie/eli/1976/act/39/enacted/en/html#zza39y1976 [Last accessed 10/11/2023]

[6] https://www.irishstatutebook.ie/eli/2000/act/38/enacted/en/print.html [Last accessed 10/11/2023]

to disturb bats or their roosts without an appropriate licence from the National Parks and Wildlife Service (NPWS).

The Wildlife Amendment Act (2000) is also the legal instrument through which Natural Heritage Areas (NHAs) are protected. These are areas containing habitats or species that require legal protection from damage, which can include bats. Not all NHAs have received statutory designation, and these are termed proposed Natural Heritage Areas (pNHAs). While lacking the same level of legal protection as NHAs, pNHAs are subject to limited protection via agri-environmental planning schemes and the recognition of the ecological value of pNHAs by planning and licencing authorities.

1.5.2 EU Legislation

Under the Habitats Directive 1992 (92/43/EEC)[7], member states of the European Union must designate Special Areas of Conservation (SACs), which form part of the EU-wide Natura 2000 protected area network. The aim of this network is to safeguard biodiversity against potentially damaging developments. SACs are designated based on the presence of habitats or species (known as 'qualifying interests' or QIs) listed under Annex I or Annex II of the Habitats Directives, respectively. The only species of bat in Ireland that is listed under Annex II of the Habitats Directives is the lesser horseshoe bat *Rhinolophus hipposideros*.

While strict protection is afforded SACs, all species of bat in Ireland also receive additional protection under Annex IV of the Habitats Directive. This prohibits the deliberate disturbance of bat species (particularly during the periods of breeding, nursing, and hibernation), as well as the deterioration and/or destruction of roosts across their entire natural range within the EU, both within and outside Natura 2000 sites.

1.5.3 Other International Legislation

Ireland has ratified two international wildlife laws pertaining to bats:

- The Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention, 1982)[8]. Part of this convention stipulates that all bat species and their habitats are conserved; and
- The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention, 1979)[9]. The aim of this convention was to protect migratory species (which includes some species of bats) across all European borders.

[7] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:31992L0043 [Last accessed 10/11/2023]

[8] https://www.coe.int/en/web/bern-convention?_sm_au_=iVVtWnJSVsMSFDZ5 [Last accessed 10/11/2023]

[9] https://www.cms.int/ [Last accessed 10/11/2023]

2.0 Methodology

2.1 Desk Study

A desk-based study has been undertaken to identify sources of pre-existing ecological data of relevance that could inform the EIA.

This included examination of:

- Recent satellite maps and Environmental Sensitivity Mapper to identify features of potential value to bats at the Project Site:
    - Obtained via satellite images available on https://earth.google.com/web/ and Environmental Sensitivity Mapper (ESM) https://airomaps.geohive.ie/ESM/ [Last accessed 10/11/2023]. This was used to conduct an Initial Site Risk Assessment, assigning the habitats within the Project Site to a risk category (low, moderate or high) using criteria provided within NatureScot guidance and reproduced in Appendix B. Habitat suitability was assigned to individual features with the exception of areas of conifer plantation that were described as a block. Satellite images and the ESM were also searched for any potential roost features (e.g. buildings/structures, caves or trees) within 200 m of the Project Site boundary plus rotor radius (i.e. 200 + 79.35 = 279.35 m).
- The bat landscapes suitability index for the Project Site[10]:
    - The index ranks landscapes from least (0) to most favourable (100) using records held by Bat Conservation Ireland (BCI) and landscape features to train a predictive model that identifies geographical areas suitable for individual bat species;
- Bat species and roost records within 10 km from the Project Site[11];
- Maps of nationally and internationally designated sites for bats within 10 km from the Project Site[12];
- The location of the Project Site in relation to the edge of bat species' known Irish ranges[13];
- The location of wind energy developments and other projects within 10 km from the Project Site that could contribute to cumulative effects on local bat populations[14]; and
- The Environmental Statements (ES) of wind energy developments or other projects within 10 km of the Project Site containing information relating to bats[14].

[10] Obtained via Biodiversity Ireland https://maps.biodiversityireland.ie/Map [Last accessed 10/11/2023].

[11] Obtained via data request from Bat Conservation Ireland (BCI) received 25/11/2022 and a search of the records contained in 10 km grid squares N00, N01, N10, N11 by the National Biodiversity Data Centre (NBDC) https://maps.biodiversityireland.ie/Map [Last accessed 10/11/2023].

[12] Obtained via EPA map viewer https://gis.epa.ie/EPAMaps/ [Last accessed 10/11/2023].

[13] Obtained via maps contained under Article 17 reporting https://www.npws.ie/publications/article-17-reports/article-17-reports-2019 [Last accessed 10/11/2023].

[14] Obtained via the EIA portal https://housinggovie.maps.arcgis.com/apps/webappviewer/index.html?id=d7d5a3d48f104ecbb206e7e5f84b71f1, myplan: https://myplan.ie/national-planning-application-map-viewer/

Wind Energy Ireland: https://windenergyireland.com/about-wind/interactve-map
Offaly County Council https://www.eplanning.ie/OffalyCC/searchexact [all last accessed 10/11/2023].

2.2 Field Survey Methodology and Rationale

The field survey methodology was designed with reference to current wind farm specific guidance[2]. It comprises deployment of a suite of automated full spectrum detectors at eight turbine locations at ground level and one at-height, transect surveys, and habitat appraisal for winter and summer roosts.

Similarly, the guidance states that the use of walked transects should be discretionary and site-specific[2]. The choice of methods must be appropriate to identify connections between nearby roosts, linear features and potential key foraging areas across the development footprint. As known bat roosts were identified during the habitat appraisal and desk-search, transect surveys were judged as necessary to complement the information gained from the other surveys.

Full details of each survey type are provided below; where the methodology deviates from the guidance, a rationale has been provided.

2.2.1 Survey Area

The survey area boundary, transect locations and static detector locations are shown in **Figure 1**.

2.2.1.1 Habitat Appraisal for Potential Bat Roost Features and Assessment of Habitat Risk

NS guidance[2] states that ideally, key feature for supporting maternity roosts and significant hibernation/and or swarming sites within 200m plus rotor radius (79.35m) of the project site should be surveyed, including an assessment of the habitat risk of the project site. Access issues constrained the survey to areas within optioned lands only, though public roads within the search area (279.35m) were also accessible. In addition, all watercourse crossings along the grid connection route (GCR) and turbine delivery route (TDR) were surveyed for bat roost potential.

2.2.1.2 Activity Survey – Transect Survey

NS guidance states that transects must identify connections between nearby roosts, linear features and potential key foraging areas across the development footprint. CIEEM-recommended guidance[3] also states that ideally, all habitats represented on site should be sampled. Two transects were chosen in the northern and southern part of the project site, which were representative of all habitats thought to be of greatest importance for commuting and foraging bats. The adjacent habitats were Sitka spruce conifer plantation, improved agricultural grassland, broadleaved woodland.

Both transects were ca. 2km in length (1km each way), each with fourteen to eighteen pre-determined stopping points.

2.2.1.3 Activity Survey – Static Detector Surveys (Ground-Level)

NS guidance states that survey effort should be focused in areas of the development site where turbines are likely to be located. Detectors should be placed at or close to all known turbine locations at wind farms containing less than ten proposed turbines. Where there are more than ten proposed turbines, detectors should be placed at ten turbine locations plus a third of additional potential turbine sites for up to a maximum of 40 detectors for the largest developments.

The project originally comprised 11 turbines. As such, 10 static detectors were deployed at T1, T2, T4, T5, T6, T7, T8, T9, T10, and T11. In 2023 (i.e. following completion of static detector (ground-level) surveys), the Project layout was revised to an eight turbine layout, with the omission of T9-T11. As such, the requirement as per NS guidance is that all eight turbine locations should be surveyed. However, T3 had not been included in the surveys which were based on a 10-turbine layout.

This bat survey report will present the results of the seven turbines surveyed as part of the eight turbine layout. A static detector was deployed to T3 in September 2023 and will be deployed again in Spring 2024, and Summer 2024. This report will be resubmitted with the results of that survey included.

2.2.1.4 Activity Survey – Static Detector Surveys (At Height)

A full spectrum bat detector (SM4Bat, Wildlife Acoustics) deployed at the met mast and a microphone with a 50m long extension cable was placed within the rotor-swept area (further information is provided in Section 2.3.4).

2.2.2 Habitat Appraisal for Potential Bat Roost Features and Assessment of Habitat Risk

A desk study was conducted using aerial maps to identify potential roosts and foraging habitats within the project site and along the grid route. The survey area was also walked during daylight hours on 06th – 08th April 2022 and 11th May 2022. The purpose of this was to search for potential winter and summer bat roost features according to guidance[2,3], and to undertake an initial site risk assessment following NS guidance, assigning the habitat within the survey area to a risk category (low, moderate or high) as reproduced in **Appendix B.**

All buildings, bridges and suitable trees were closely inspected externally from ground level using binoculars and a high-powered torch following CIEEM-recommended guidelines. The

categories used to classify the bat roost suitability of any features found are detailed in **Table 1**.

Table 1 Categories of bat roost suitability (Collins, 2016)

Suitability	Typical roosting features
Negligible	Negligible habitat features on site likely to be used by roosting bats.
Low	A structure with one or more potential roost sites that could be used by individual bats opportunistically. However, these potential roost sites do not provide enough space, shelter, protection, appropriate conditions and/or suitable surrounding habitat to be used on a regular basis or by larger numbers of bats (i.e., unlikely to be suitable for maternity or hibernation). A tree of sufficient size and age to contain potential roost features but with none seen from the ground or features seen with only very limited roosting potential.
Moderate	A structure or tree with one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions, and surrounding habitat but unlikely to support a roost of high conservation status (with respect to roost type only – the assessments in this table are made irrespective of species conservation status, which is established after presence is confirmed).
High	A structure or tree with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis & potentially for longer periods of time due to their size, shelter, protection, conditions, and surrounding habitat.

2.2.3 Activity Survey – Transect Survey

Activity surveys were carried out once per season (spring, summer and autumn) at two transects in each turbine cluster. Transects were conducted simultaneously using BatLogger-M detectors to record calls. Each surveyor walked along the transect slowly and at a constant pace, stopping at predetermined 'stopping points' for five minutes per stop. Surveys lasted two hours in duration. Target notes were made on flight lines, the assemblage of species present and the use of the surrounding habitats. Details of the surveys are shown below in **Table 2**. Weather conditions were acceptable for bat surveys according to NS guidance[2] (no or very light rain, maximum ground-level wind speed <5 m/s and temperatures above 7 °C) for every single survey night.

Table 2 Survey Dates and Weather Conditions - Transect Surveys

Season	Date	Sunset	Time of survey	Weather
Spring	18/05/2022	21:28	Start: 21:28 End: 23:28	Sunset temperature 11°C, Wind = 4 m/s, Rain: None

Season	Date	Sunset	Time of survey	Weather
Summer	21/07/2022	21:43	Start: 21:43 End: 23:43	Sunset temperature 15°C, Wind: 1.7 m/s, Rain: None
Autumn	27/09/2022	19:18	Start: 19:18 End: 21:18	Sunset temperature 20°C, Wind: 4m/s Rain: None

2.2.4 Activity Survey – Static Detector Survey (Ground Level)

Table 3 presents the deployment dates for the static detector (ground level) survey.

Table 3 Static Bat Detector Deployment

Season	Sampling Location(s)	Dates of Deployment	Length of Recording Period
Spring 2022	T1, T2, T4, T5, T6, T7, T8	10/05/2022 – 23/05/2022	14 nights
Summer 2022	T1, T2, T4, T5, T6, T7, T8	12/07/2022 – 25/07/2022	14 nights
Autumn 2022	T1, T4, T5, T7, T8	28/09/2022 – 10/10/2022	13 nights
	T2	28/09/2022 – 10/10/2022	11 nights
	T6	28/09/2022 – 10/10/2022	12 nights

Detectors (Anabat Swift) were deployed with microphones attached to wooden stakes or trees approximately 1-2m above ground level, with detectors programmed to record from 30 minutes before sunset until 30 minutes after sunrise.

The locations of each static detector are shown in **Figure 1** and described in more detail in **Table 4**.

Table 4 Static Bat Detector Locations – Description

Sample Point	Co-ordinates (TIM)		Description	Distance from Nearest Turbine Location
T1	606797	710446	Improved agricultural grassland.	At proposed turbine location.

Sample Point	Co-ordinates (TIM)		Description	Distance from Nearest Turbine Location
T2	606341	709878	At edge of bog woodland and improved agricultural grassland.	55m. Proposed turbine located within closed habitat. Detector was placed at the nearest opening.
T4	607151	710034	At verge of track adjacent to Mixed broadleaved/conifer woodland.	89m Proposed turbine located within closed habitat. Detector was placed at the nearest opening.
T5	607872	710573	On verge of conifer plantation, adjacent to cutover bog.	116m Proposed turbine located within closed habitat. Detector was placed at the nearest opening.
T6	607838	709921	On verge of conifer plantation, adjacent to cutover bog.	46m Proposed turbine located within closed habitat. Detector was placed at the nearest opening.
T7	608286	709735	Improved agricultural grassland.	At proposed turbine location.
T8	608427	710195	Improved agricultural grassland.	At proposed turbine location.

2.2.4.1 Weather Data and Survey Dates

The NS guidance states that 10 nights of data per season should be collected, within appropriate weather conditions, specifically with a sunset temperature of 10°C or above, ground level wind speed of 5m/s or lower, and no rain or very light rain. This guidance is for Scotland, and for Ireland Bat Conservation Ireland guidance[4] state that sunset temperatures should be 7°C or above.

The NS guidance also states that while surveys should aim for 10 consecutive nights, in practice weather conditions may preclude this, particularly early or late in the year and in more northerly latitudes. The guidance also goes on to say that in more northerly latitudes, there will be limitations on the number of suitable nights and some surveys may need to take place over longer periods which sample a range of conditions. In such cases, the survey period should be planned and justified by the ecologist and the effect on bat behaviours considered taking account of weather forecasts.

The reading closest to sunset for each night was used to assess the suitability of temperature following the methodology outlined in NS and CIEEM-recommended guidance.

For wind, an average per night was determined based on the period between sunset and sunrise. This period was then used to work out the average nightly wind speed. If the average was less than 5m/s the night was considered suitable for bat surveys.

For the purposes of this assessment, light rain has been classified as total nightly rainfall less than 2 mm and/or less than 1 mm of rainfall in any one-hour period throughout the night. The same protocol for determining night length across deployments was used as described above.

The details of the weather conditions are detailed in **Table 5**.

Table 5 Survey Dates and Weather Conditions – Static Detectors

Survey Nights Used for Analysis	Sunset - Sunrise	Temperature at Sunset	Nightly Average Wind Speed (m/s)	No rain or light rain
Spring session - deployment dates: 10th May 2022 – 23rd May 2022 (12 nights)				
12/05/2022	21:18-05:36	10	4	Dry
13/05/2022	21:20-05:34	12	5	Dry
14/05/2022	21:22-05:33	14	3	Light rain
15/05/2022	21:23-05:31	14	5	Dry
16/05/2022	21:25-05:30	15	5	Dry
17/05/2022	21:27-05:28	10	5	Dry
18/05/2022	21:28-05:27	11	7	Dry
19/05/2022	21:30-05:25	14	5	Dry
20/05/2022	21:31-05:24	13	4	Dry
21/05/2022	21:33-05:22	14	4	Light rain
22/05/2022	21:34- 05:21	12	3	Dry
23/05/2022	21:36- 05:20	11	4	Dry
Summer session - deployment dates: 12th July 2022 – 25th July 2022 (14 nights)				
12/07/2022	21:53-05:21	14	5	Light rain
13/07/2022	21:52-05:22	15	1	Dry
14/07/2022	21:51-05:23	16	3	Dry
15/07/2022	21:50-05:25	16	2	Dry
16/07/2022	21:49-05:26	20	5	Dry
17/07/2022	21:48-05:27	22	4	Dry
18/07/2022	21:47-05:29	23	6	Dry
19/07/2022	24:45-05:30	14	7	Dry

Survey Nights Used for Analysis	Sunset - Sunrise	Temperature at Sunset	Nightly Average Wind Speed (m/s)	No rain or light rain
20/07/2022	21:44-05:32	14	1	Dry
21/07/2022	21:43-05:33	15	2	Dry
22/07/2022	21:41-05:34	16	4	Dry
23/07/2022	21:40-05:36	17	10	Light rain
24/07/2022	21:39-05:37	16	5	Light rain
25/07/2022	21:37-05:39	13	6	Dry
Autumn session - deployment dates: 28th September 2022 – 10th October 2022 (13 nights).				
28/09/2022	19:15-07:29	11	4	Light rain
29/09/2022	19:13-07:31	14	2	Dry
30/09/2022	19:11-07:32	13	6	Dry
01/10/2022	19:08-07:34	12	4	Dry
02/10/2022	19:06-07:36	13	2	Dry
03/10/2022	19:03-07:38	16	5	Dry
04/10/2022	19:01-07:39	14	5	Light rain
05/10/2022	18:59-07:41	9	5	Light rain
06/10/2022	18:56-07:43	14	10	Dry
07/10/2022	18:54-07:45	10	3	Dry
08/10/2022	18:52-07:47	11	6	Dry
09/10/2022	18:49-07:48	10	5	Light rain
10/10/2022	18:47-07:50	9	1	Dry

2.2.5 Activity Survey – Static Detector Survey (At Height)

NS guidance states that automated static surveys at height should be used at proposed key-holed sites when the following circumstances apply:

- Other supporting evidence suggest a high level of bat activity within the height of the rotor-swept area;
- Existing infrastructure allows and is representative of the proposed changes; and
- A meteorological (met) mast is present or will be erected.

The project will involve key-hole felling to accommodate turbines within forestry and woodland and a met mast was present. Therefore, an at-height survey was judged to be required for the current proposed project.

A full spectrum bat detector (SM4Bat, Wildlife Acoustics) was deployed at the met mast (**Figure 1**) and recorded for the periods 18th May – 07th June 2022 (21 nights), 01st July – 04th September 2022 (66 nights), and 29th September – 18th October 2022 (19 nights). This involved placing the detector at ca. 2m above ground-level and securely connecting the microphone on a 50m long extension cable attached to the met mast, within potential collision heights. The detector was left to record continuously, and batteries were replaced periodically i.e. the level of survey effort was opportunistic and dependant on battery lifespan. Unlike for ground-level static detector surveys, NS guidance[2] does not prescribe a minimum level of effort for at-height bat surveys and it does not specify that all three seasons require sampling.

The location of the met mast is c. 130m west of turbine T3 and is located within cutover bog.

2.2.5.1 Weather Data and Survey Dates

Throughout the deployment of the at-height detector, 82 out of 107 survey nights had appropriate weather conditions.

The dates used in the analysis, along with details of the weather conditions on those dates, are detailed in **Table 6**.

Table 6 Survey Dates and Weather Conditions – Static Detector (At-Height)

Survey Nights Used for Analysis	Sunset - Sunrise	Temperature at Sunset, °C	Nightly Average Wind Speed (m/s)	Dry or Light Rain?
Round 1 – deployment dates: 18th May 2022 – 07th June 2022 (21 nights) for single met mast sample location				
18/05/2022	21:28- 05:27	11	7	Light rain
19/05/2022	21:30-05:25	14	6	Dry
20/05/2022	21:31-05:24	13	7	Dry
21/05/2022	21:33-05:22	14	5	Dry
22/05/2022	21:34- 05:21	12	5	Light rain
23/05/2022	21:36- 05:20	11	4	Dry
24/05/2022	21:37-05:19	12	4	Light rain
25/05/2022	21:38-05:17	11	7	Dry
26/05/2022	21:40-05:16	11	7	Light rain
27/05/2022	21:41-05:15	11	4	Dry
28/05/2022	21:43-05:15	12	3	Dry
29/05/2022	21:44-05:13	10	4	Dry
30/05/2022	21:45-05:12	8	3	Light rain
31/05/2022	21:46-05:11	10	4	Light rain
01/06/2022	21:47-05:10	16	3	Light rain

Survey Nights Used for Analysis	Sunset - Sunrise	Temperature at Sunset, °C	Nightly Average Wind Speed (m/s)	Dry or Light Rain?
02/06/2022	21:49-05:10	NA	3	Dry
03/06/2022	21:50-05:09	NA	4	Dry
04/06/2022	21:51-05:08	12	7	Dry
05/06/2022	21:52-05:08	10	4	Dry
06/06/2022	21:53-05:07	11	3	Dry
07/06/2022	21:54-05:06	13	3	Light rain
Round 2 – deployment dates: 01st July 2022 – 04th September 2022 (66 nights) for single met mast sample location				
01/07/2022	22:01-05:10	12	4	Dry
02/07/2022	22:00-05:11	14	5	Light Rain
03/07/2022	22:00-05:12	12	5	Light rain
04/07/2022	21:59-05:12	16	5	Dry
05/07/2022	21:59-05:13	16	5	Dry
06/07/2022	21:58-05:14	15	5	Dry
07/07/2022	21:57-05:15	17	5	Dry
08/07/2022	21:57-05:16	17	4	Dry
09/07/2022	21:56-05:17	18	3	Dry
10/07/2022	21:55-05:19	18	3	Dry
11/07/2022	21:54-05:20	19	4	Light rain
12/07/2022	21:53-05:21	14	5	Light rain
13/07/2022	21:52-05:22	15	4	Dry
14/07/2022	21:51-05:23	16	4	Dry
15/07/2022	21:50-05:25	16	4	Dry
16/07/2022	21:49-05:26	20	3	Dry
17/07/2022	21:48-05:27	22	4	Dry
18/07/2022	21:47-05:29	23	5	Dry
19/07/2022	24:45-05:30	14	4	Dry
20/07/2022	21:44-05:32	14	4	Dry
21/07/2022	21:43-05:33	15	3	Dry
22/07/2022	21:41-05:34	16	3	Dry
23/07/2022	21:40-05:36	17	6	Light rain
24/07/2022	21:39-05:37	16	5	Light rain
25/07/2022	21:37-05:39	13	5	Dry
26/07/2022	21:35-05:40	14	3	Dry
27/07/2022	21:34-05:42	13	2	Light rain
28/07/2022	21:32-05:44	14	3	Dry

Survey Nights Used for Analysis	Sunset - Sunrise	Temperature at Sunset, °C	Nightly Average Wind Speed (m/s)	Dry or Light Rain?
29/07/2022	21:31-05:45	17	4	Light rain
30/07/2022	21:29-05:47	17	4	Light rain
31/07/2022	21:27-05:48	13	4	Light rain
01/08/2022	21:26-05:50	19	5	Light rain
02/08/2022	21:24-05:52	17	8	Light rain
03/08/2022	21:22-05:53	14	6	Light rain
04/08/2022	21:20-05:55	13	5	Light rain
05/08/2022	21:18-05:57	14	4	Dry
06/08/2022	21:16-05:58	16	4	Dry
07/08/2022	21:14-06:00	17	4	Dry
08/08/2022	21:13-06:02	17	3	Dry
09/08/2022	21:11-06:03	19	2	Dry
10/08/2022	21:09-06:05	20	2	Dry
11/08/2022	21:05-06:07	22	3	Dry
12/08/2022	21:05-06:08	22	5	Dry
13/08/2022	21:03-06:10	21	5	Dry
14/08/2022	21:00-06:12	20	3	Dry
15/08/2022	20:58-06:14	17	4	Light rain
16/08/2022	20:56-06:15	13	5	Dry
17/08/2022	20:45-06:17	15	5	Dry
18/08/2022	20:52-06:19	14	5	Light rain
19/08/2022	20:50-06:20	14	5	Dry
20/08/2022	20:48-06:22	14	6	Light rain
21/08/2022	20:45-06:24	16	4	Dry
22/08/2022	20:43-06:25	17	4	Light rain
23/08/2022	20:41-06:27	17	3	Light rain
24/08/2022	20:39-06:29	13	4	Light rain
25/08/2022	20:36-06:31	16	4	Dry
26/08/2022	20:34-06:32	12	4	Light rain
27/08/2022	20:32-06:34	18	3	Dry
28/08/2022	20:30-06:36	15	4	Light rain
29/08/2022	20:27-06:37	17	4	Dry
30/08/2022	20:25-06:39	16	4	Dry
31/08/2022	20:23-06:41	16	5	Dry
01/09/2022	20:20-06:43	17	4	Dry

Survey Nights Used for Analysis	Sunset - Sunrise	Temperature at Sunset, °C	Nightly Average Wind Speed (m/s)	Dry or Light Rain?
02/09/2022	20:18-06:44	16	3	Dry
03/09/2022	20:16-06:46	13	4	Light rain
04/09/2022	20:13-06:48	17	6	Light rain
Round 3 – deployment dates: 29th September 2022 – 18th October 2022 (19 nights) for single met mast sample location				
09/10/2022	18:49-07:48	10	6	Light rain
05/10/2022	18:59-07:41	9	5	Light rain
02/10/2022	19:06-07:36	13	4	Dry
12/10/2022	18:42-07:54	9	5	Light rain
04/10/2022	19:01-07:39	14	8	Light rain
29/09/2022	18:06-07:25	13	7	Light rain
19/10/2022	18:27-08:07	12	9	Light rain
16/10/2022	18:33-08:01	9	6	Light rain
30/09/2022	17:04-07:27	13	8	Dry
01/10/2022	19:08-07:34	12	6	Dry
03/10/2022	19:03-07:38	16	7	Dry
06/10/2022	18:56-07:43	14	8	Dry
07/10/2022	18:54-07:45	10	7	Dry
08/10/2022	18:52-07:47	11	5	Dry
11/10/2022	18:45-07:52	11	5	Light rain
13/10/2022	18:40-07:56	12	5	Dry
14/10/2022	18:38-07:57	8	6	Dry
15/10/2022	18:36-07:59	10	6	Dry
17/10/2022	18:31-08:03	12	8	Light rain
18/10/2022	18:49-07:48	10	6	Light rain

2.2.6 Bat Sonogram Analysis

Bat calls were analysed in full spectrum format using Kaleidoscope Pro (version 5.6.3) software. An auto identification filter within Kaleidoscope Pro was used initially to assign calls to likely species, using a Bats of Europe filter (version 5.4.0) for Ireland. This software allows data to be classified automatically with bat species which fit the same call characteristics that each call file provides.

While the auto identification is efficient, it is not totally infallible, therefore the following manual checks by an experienced ecologist skilled in bat call identification were also undertaken as follows:

- All files classified as 'no ID' were manually checked to confirm identification, using call parameters within Russ (2021)[15];
- A randomly selected 10% subset of files assigned by the filter as being noise were also checked manually, to ensure no faint calls were missed;
- *Myotis* calls were identified to species level and putative Nathusius' pipistrelle calls were manually checked, all using the parameters[16] contained within Russ (2021); and
- Social calls were identified to species level using Middleton et al. (2014).

This report refers to "bat passes"; a bat pass has been defined as a single file captured by the bat detector, which contains two or more bat calls (likely attributed to the same bat). The number of bat passes does not relate to the number of bats present in one location (as one bat may make several passes); rather, it gives an indication of the level of bat activity in that location over each recording period. Note that where more than one species was identified within the same bat pass, the pass was manually split into two so an accurate number of bat passes split by species was obtained. The presentation and statistical analysis of all bat call results was completed in R version 4.1.0.

2.3 Survey and Reporting Personnel

2.3.1 Habitat Appraisal for Potential Bat Roost Features and Assessment of Habitat Risk

Sinéad Clifford carried out searches for potential bat roosts, and habitat mapping.

2.3.2 Activity Survey – Transect Survey

Transect surveys were carried out by Sinéad Clifford, Dr Jonathon Dunn, Aisling Kinsella, Faolán Linnane, and Kieran Moynihan.

2.3.3 Activity Survey – Static Bat Detector Survey (Ground-Level)

Static detectors were deployed and collected each season. This was carried out by Sinéad Clifford, Michael Bailey, Darragh Nagle, and Kieran Moynihan.

[15] Russ, J. (2021) British Bat Calls. A Guide to Species Identification. Pelagic Publishing, Exeter.

[16] Calls with a peak frequency of 41kHz or less were considered to be Nathusius' pipistrelle, which was further confirmed by detailed interrogation to check the absence of common pipistrelle calls immediately before or after the putative Nathusius' pipistrelle calls

2.3.4 Activity Survey – Static Bat Detector Survey (At-Height)

The static detector was installed and connected to the 50m cable by Sinéad Clifford. The SD cards and batteries were subsequently collected and deployed for the remainder of the survey season by Kieran Moynihan and Darragh Nagle.

2.3.5 Analysis and Reporting

Bat call analysis and reporting was undertaken by Sinéad Clifford. This report was reviewed by Jess Colebrook.

2.3.6 Personnel

2.3.6.1 Sinéad Clifford

Sinéad is an Associate Ecologist with SLR. Sinéad holds a BSc (Hons) Wildlife Biology from Institute of Technology Tralee, and a Certificate in Ecological Consultancy (Distinction) from Ecology Training UK (formerly Acorn Ecology). Sinéad has worked in ecological consultancy since 2018. She has designed and implemented numerous bat surveys for a wide range of diverse projects during her career. Sinéad is highly experienced in the analysis of bat call data, has written multiple baseline bat reports and undertaken impact analysis for bats for many wind farm projects.

2.3.6.2 Jess Colebrook

Jess has over 22 years' experience as a professional ecologist, providing ecological assistance to complex, multidisciplinary projects, including three years working for Countryside Council for Wales (now NRW). She has experience of many Environmental Assessments in the UK and abroad and is skilled in all aspects of ecological work including project management, consultation/negotiation, survey and assessment.

Services include preparation of Ecological Impact Assessments for input to the Environmental & Social Impact Assessment (ESIA) processes; planning, undertaking and supervision of ecological baseline surveys, Habitat and Biodiversity Management Plans; input to Construction Environmental Management Plans; ecological supervision of construction works, Habitat Regulations Appropriate Assessment work and conservation work.

She is also a licensed bat worker (England & Wales), and a registered consultant for Bats (RC124 under CL21) including under the HS2 mitigation licences for buildings (B39RC008, under CL39) and trees (B40RC008, under CL40).

2.3.6.3 Jonathon Dunn

Jonathon is an Associate Ecologist with SLR. Jonathon holds a BA (Hons) in Natural Sciences (Zoology) from the University of Cambridge, UK, an MSc in Ecology, Evolution and Conservation from Imperial College London, UK, and a PhD in Avian Ecology from Newcastle University, UK. He is a full member of the Chartered Institute of Ecology and Environmental Management (MCIEEM). Jonathon has over eight years' experience in the environmental sector. Jonathon has undertaken many different types of bat surveys for wind farm projects and has written several baseline bat reports for the same.

2.3.6.4 Kieran Moynihan

Kieran is a Project Ecologist with SLR and has worked in consultancy since 2022. He has a BSc (Hons) in Biological, Earth and Environmental Sciences (Ecology) from University College Cork. Kieran has experience of carrying out bat transects, roost surveys, emergence and re-entry surveys and deployment of static detectors.

2.3.6.5 Darragh Nagle

Darragh is a Project Ecologist with SLR and has worked in consultancy since 2022. Darragh has a BSc (Hons) in Ecology and Environmental Biology from University College Cork. He has experience of carrying out deployment of static detectors, bat roost surveys and bat transect surveys.

2.3.6.6 Aisling Kinsella

Aisling is a Senior Ecologist with SLR and has worked in ecological consultancy since 2020. Aisling holds a BSc (Hons) in Environmental Science with a major in Zoology from University College Cork and an MSc in Wildlife Management and Conservation from University College Dublin. Aisling has undertaken bat transect surveys, emergence surveys and deployed and collected ground-level static detectors for several wind farm and infrastructure projects.

2.3.6.7 Faolán Linnane

Faolán Linnane is a Senior Field Ecologist with SLR and has worked in consultancy since June 2021. Faolán holds a BSc in Environmental Science (Zoology) from University College Cork and an MSc in Marine Biology from University College Cork. Faolán has undertaken bat transect surveys, emergence surveys and deployed and collected ground-level static detectors for several wind farm and infrastructure projects.

2.3.6.8 Michael Bailey

Michael is an Associate Ecologist with SLR. Michael has worked in Irish consultancy since 2017 and prior to this worked in southern Africa for many years conducting ecology

components of ESIAs. He has a BSc (Hons) in Biology and Ecology from the University of Ulster, Jordanstown and a MSc in Quantitative Conservation Biology from the University of Witwatersrand, Johannesburg, South Africa. Michael is a member of the Chartered Institute of Ecology and Environmental Management. He has experience of a wide variety of surveys, including those for bats.

2.4 Assessment of Relative Bat Activity Levels

In accordance with NS guidance[2], the relative level of bat activity recorded during the static detector surveys should be analysed through the use of the secure online tool Ecobat[17], initially designed by the University of Exeter and now hosted and developed by the Mammal Society (Lintott et al. (2018))18. Ecobat compares data entered by the user with bat survey information collected from similar areas at the same time of year and (where possible) in comparable weather conditions. Ecobat generates a percentile rank for each night of activity and provides a numerical way of interpreting the relative levels of bat activity recorded at a site with other sites across the same regions or across Ireland as a whole.

Ecobat was not available for undertaking the required analysis as it was offline for essential maintenance at the time of writing this report (**Image 1**). National Parks and Wildlife Services (NPWS) was contacted to make them aware of this issue. Once Ecobat is back online, the outputs generated will be used to update this report, and the report will be reissued as an update.

Image 1 Ecobat Website

[17] http://www.mammal.org.uk/science-research/ecostat/

[18] Lintott, P. R., Davison, S., Breda, J., Kubasiewicz, L., Dowse, D., Daisley, J. & Mathews, F. (2018). Ecobat: An online resource to facilitate transparent, evidence-based interpretation of bat activity data. Ecology and Evolution 8(2): 935- 941.

2.5 Survey Limitations

2.5.1 Roost Assessment

Some of the structures identified as potential bat roosts were not accessible. This was because they were either within occupied dwellings or within third-party lands. The latter was true for most of the structures adjacent to the proposed grid connection route. Only one structure was targeted for emergence surveys. This was because either the potential roosts were not accessible (see above) or they were outside the development footprint, with no potential for direct or indirect impacts on roosting bats.

2.5.2 Activity Survey – Static Detector Survey (Ground-Level)

There were also some locations where it was impractical to place detectors at the exact proposed turbine location due to the indicative turbine locations being located within woodland habitats which will require keyhole felling prior to the installation of turbines. Consequently, where possible, detectors were located at nearby edges or firebreaks, which will be more representative of the baseline immediately prior to turbine operation once keyhole felling has occurred.

2.5.3 Automated Survey (Ground-Level): Weather

In all the deployment sessions, it was not possible to collect 10 *consecutive* nights of static bat data in suitable weather conditions. However, there were 11, 10 and 10 suitable nights for the spring, summer and autumn sessions, respectively.

In the spring deployment session, there was one night that exceeded the threshold for appropriate weather conditions (morning of 18th May 2022, where average nightly wind speed was 7m/s).

In the summer deployment session, there were four nights that exceeded the threshold for appropriate weather conditions. On the 18th, 19th, 23rd, and 25th July 2022 the average nightly wind speed was 6m/s, 7m/s, 10m/s, and 6m/s respectively.

In the autumn deployment session, there were three nights that exceeded the threshold for appropriate weather conditions. 30th September 2022, 6th and 8th October 2022 the average nightly wind speed was 6m/s, 10m/s, and 6m/s respectively.

However, all survey dates were retained for analysis, as bat calls were still recorded in sub-optimal weather conditions, suggesting that the conditions recorded did not significantly reduce bat activity. Furthermore, nights with suitable weather conditions sometimes had lower levels of bat activity than those with unsuitable weather conditions.

2.5.4 Conclusion

The survey limitations outlined above are not judged to have had a significant impact on the outcome of the baseline surveys.

3.0 Results

3.1 Desk Study

3.1.1 Habitat Assessment

3.1.1.1 Potential Roost Feature Assessment

Online satellite images, and the Environmental Sensitivity Mapper identified a number of buildings that could be used by roosting bats within 279.35m (200m plus blade length) of the optioned lands during the desk study. These were situated ca. 295m east of T8, ca. 787m south-west of T6, ca. 870m south of T2, ca. 479m east of T4, and ca. 252 south-west of T3.

3.1.1.2 Bat Landscapes

The mean bat landscapes suitability index across all bat species differs across the project site, with most of the northern half less suitable for bats than the southern half. For the northern section (T1, T3, T4, T5, T8), the score is 26.56 (out of a maximum score of 100). For the south-eastern section (T6, T7) the score is 31.67 (out of a maximum score of 100). For the south-western section (T2) the score is 39.22 (out of a maximum score of 100). A full breakdown is provided in **Table 7** with an explanation provided below.

The area within which T1, T3, T4, T5, T8 are located has a high bat landscapes suitability index for soprano pipistrelle, brown long-eared bat, common pipistrelle, and Leisler's bat. There is moderate suitability for whiskered bat, Daubenton's bat, and Natterer's bat. The bat landscapes suitability index is classified as low for lesser horseshoe bat, and Nathuisus' pipistrelle.

The area within which T6 and T7 are located has a high bat landscapes suitability index for soprano pipistrelle, brown long-eared bat, common pipistrelle, Leisler's bat, whiskered bat, and Natterer's bat. It has a moderate bat landscapes suitability index for Daubenton's bat. The bat landscapes suitability index is classified as low for lesser horseshoe bat, and Nathuisus' pipistrelle.

The area within which T2 is located has a high bat landscapes suitability index for soprano pipistrelle, brown long-eared bat, common pipistrelle, Leisler's bat, whiskered bat, Daubenton's bat and Natterer's bat. The bat landscapes suitability index is classified as low for lesser horseshoe bat, and Nathuisus' pipistrelle.

Table 7 Bat Landscape Suitability Index at Project Site

Location and Species	Landscape Suitability Index (out of maximum 100)
T1, T3, T4, T5, T8	
All Bats	26.56
Soprano pipistrelle	36
Brown long-eared bat	36
Common pipistrelle	39
Lesser horseshoe bat	1
Leisler's bat	36
Whiskered bat	29
Daubenton's bat	26
Nathusius' pipistrelle	1
Natterer's bat	35
T6, T7	
All Bats	31.67
Soprano pipistrelle	40
Brown long-eared bat	43
Common pipistrelle	44
Lesser horseshoe bat	2
Leisler's bat	42
Whiskered bat	37
Daubenton's bat	33
Nathusius' pipistrelle	1
Natterer's bat	43
T2	
All Bats	39.22
Soprano pipistrelle	46
Brown long-eared bat	51
Common pipistrelle	50
Lesser horseshoe bat	3
Leisler's bat	49
Whiskered bat	60
Daubenton's bat	38
Nathusius' pipistrelle	3

Location and Species	Landscape Suitability Index (out of maximum 100)
Natterer's bat	53

3.1.2 Bat / Roost Records

3.1.2.1 NBDC Data

NBDC has records for six bat species recorded within the 10 km grid squares (N00, N01, N10, N11) that overlaps the project site as shown in **Table 8**. The type of record (i.e. roost, flying, call) is not stated.

Table 8 Records of Bat Species within 10km of Project Site

Species	Most Recent Record	Grid Square(s)
Brown long-eared bat	26/08/2010	N00, N10
Common pipistrelle	06/08/2014	N00, N01, N10, N11
Daubenton's bat	26/08/2014	N00, N01, N10, N11
Leisler's bat	06/08/2014	N00, N01, N10
Nathusius' pipistrelle	21/07/2009	N00
Natterer's bat	26/08/2010	N00
Soprano pipistrelle	25/07/2012	N00, N01, N10, N11
Whiskered bat	18/06/2008	N00

3.1.2.2 Bat Conservation Ireland Data

Bat Conservation Ireland data (confidential **Appendix D** and **Appendix E**) show that 12 recorded bat roosts are located within 10km from the project site. The closest roost (ca. 900m west of the application boundary (proposed turning head works at the N52/N62 junction), and ca. 2.3km south of T2) is a mixed-species roost for whiskered bat, and brown long-eared bat. The remaining roosts are for soprano pipistrelle (two separate roosts), Leisler's bat (five separate roosts), Daubenton's bat (two separate roosts), whiskered bat (one separate roost), and common pipistrelle (one separate roost).

Only two roosts are likely to have ecological connectivity to the project site i.e., the core sustenance zones (CSZ)[19] as measured from the roost, overlap with the project site. Both of

[19] A CSZ as applied to bats, refers to the area surrounding a communal bat roost within which habitat availability and quality will have a significant influence on the resilience and conservation status of the colony using the roosts. If bat commuting and foraging habitats within the CSZ are affected by the project, then this could affect bats using the roost. Core_Sustenance_Zones_Explained_04.02.16.pdf (bats.org.uk) [Last accessed October 2023]

these are mixed species roosts. Only one of these overlaps with the main project site (i.e. whiskered bat, brown long-eared). Of these species, only brown long-eared bat roost is likely to have ecological connectivity as the project site is within the CSZ for the species (i.e. 2km). The other roost (common pipistrelle, soprano pipistrelle, Leisler's) overlaps with the application boundary but only the proposed turning head works at the N52/N62 junction, and not the main project site.

The BCI data showed there were no roosts adjacent to the grid connection.

Eight species were recorded by transects or as ad-hoc observations: Daubenton's bat, brown long-eared bat, common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle, Leisler's bat, Natterer's bat and whiskered bat.

3.1.3 National and International Designated Sites

Designated sites within 20 km of the Project Site are shown in **Table 9** and **Figure 03**.

There are seventeen pNHAs and two NHAs within 10 km of the Project Site. None of the NHAs are designated for bats; however, there are five pNHAs designated for bats.

There are no SACs within 10 km of the Project Site that are designated for bats.

Table 9 Designated Sites within 10km of Project Site

Site Name	Site Code	Distance from Project Site (km)	Designated for Bats?	Within the CSZ for species?
Nationally Designated Sites				
Birr (Domestic Dwelling No. 2, Occupied) pNHA	000568	2.97	Yes. A nursery roost for Leisler's bat.	No. While the pNHA is 2.97km from the application boundary at it's closest point, this relates to the proposed junction works. The pNHA is actually 4.29km from the main project site. As such, it is outside the CSZ for this species (i.e. 3km).

Site Name	Site Code	Distance from Project Site (km)	Designated for Bats?	Within the CSZ for species?
Birr (Domestic Dwelling No.1, Occupied) pNHA	000569	3.02	Yes. A nursery roost for Leisler's bat.	No. While the pNHA is 3.02km from the application boundary at it's closest point, this relates to the proposed junction works. The pNHA is actually 4.17km from the main project site. As such, it is outside the CSZ for this species (i.e. 3km).
Bracken's Dwelling, Near Whiteford pNHA	002058	3.86	Yes. A nursery roost for Leisler's bat.	No. This is outside the CSZ for this species (i.e. 3km).
Banagher (Domestic Dwelling, Occupied) pNHA	000567	5.84	Yes. Summer and possible winter roost of brown long-eared bat.	No. This is outside the CSZ for this species (i.e. 3km).
Cloghanbeg pNHA	002059	8.64	Yes. A nursery roost for Leisler's bat.	No. This is outside the CSZ for this species (i.e. 3km).

3.1.4 Location of Project Site Relative to Bat Range Edges

The location of the project site is at the range edge (the definition of range used here is the Extent of Occurrence[20]) for Nathusius' pipistrelle and whiskered bat. The 10km square (N01) that contains the project site is within the range of both species, but the next 10km square to the north (N01) is outside the range of Nathusius' pipistrelle. According to NS guidance[2], the potential for negative impact is likely to increase where there are high risk bat species on the edge of their range. This applies to Nathusius' pipistrelle (high risk) but not for whiskered bat

[20] The area contained within the shortest continuous imaginary boundary that can be drawn to encompass all the known, inferred, or project sites of present occurrence excluding cases of vagrancy.

acknowledged that there is much uncertainty surrounding its range and could be reflective of survey effort rather than true presence.

3.1.5 Other Wind Energy Developments or Projects

Table 10 outlines wind farms have been granted planning consent located within 10km of the project site:

Table 10 Other Wind Energy Developments

Name	Planning Reference	Planning Status	Number of turbines	Distance and Direction between nearest turbines (to nearest km)
Leabeg Wind Farm	10/130 and 14/95	Operational	2	11km (NE)
Derrinlough Wind Farm	PA19.306706	Under Construction	21	3km (N)
Cloghan Wind Farm	19/404	Operational	9	4km (N)
Meenwaun Wind Farm	15/44	Operational	4	2km (NE)
Carrig and Skehanagh Wind Farm	5123495 and 5123496	Operational	3 &5	13km (S/SW)
Carrig Renewables Wind Farm	23/60763	Proposed	7	10km (SW)

There are two operational wind farms and one under construction within 10km of the project site.

Apart from the consented wind farms named above, there are no other operational or consented projects located within 10km from the project site boundary that could give rise to cumulative effects on bat populations located within the project site.

3.2 Field Surveys

3.2.1 Habitat and Roost Assessment

3.2.1.1 Potential Roost Feature Survey

A map showing the locations of potential roost features is shown in Confidential **Appendix E** and a full description of each potential roost feature is provided in Confidential **Appendix D**. What follows is a summary of the potential roost feature survey.

Structures

Preliminary surveys identified eight structures with low suitability within the optioned lands for the proposed project. These were all classified as having low suitability. While they may be used opportunistically by a single bat during summer months, they lacked sufficient shelter and the appropriate conditions to support larger numbers or for winter roosts.

No evidence of roosting bats was observed in any of the structures surveyed. None of these buildings will be impacted by the proposed project.

Trees

The majority of the trees within the project site were assessed as having no roosting potential above 'low potential', consisting predominantly of conifers or broadleaved species lacking potential roosting features.

Preliminary surveys identified two trees of moderate suitability (one within the project site and one along the grid connection route). A mature, multi-stem willow *Salix* sp. was recorded ca. 369m south-east of T2. There was a minor rot hole that could provide a transitionary roost for one to two bats. However, it lacked sufficient shelter and the appropriate conditions to support larger numbers or for maternity and/or winter roosts. A mature ash tree with cankers in the trunk was recorded along the grid connection route. The majority of the hedgerows along the grid connection are quite low, having been regularly cut back. As a result, there is limited potential roosting features present along the route.

Sixteen trees were classified as having low suitability and the remainder were deemed to have negligible suitability due to the absence of potential roosting features.

3.2.1.2 Habitat Risk Assessment

The majority of the project site comprises improved agricultural grassland habitats, which are generally considered to be of lower value for foraging bats. However, there are also areas of mixed broadleaved woodland and conifer plantation, and the project site is well-connected to the surrounding landscape, with multiple linear features present such as hedgerows, treelines, forest edges, firebreaks and stream. Consequently, it is considered the habitats at the project site could be extensively used by foraging bats. Similarly, while there are only a small number of low-moderate quality potential roost features present at the project site, the prominent linear features present provide connectivity to the wider landscape, which may provide further opportunities for roosting bats.

The habitats at the project site are therefore considered to be of moderate risk for bats according to NS guidance[2] and reproduced below (the risk assessment category is provided for each point and the overall category is the mean of these categories):

- Small number of potential roost features of low-moderate quality present within the Project Site (low).
- Habitats could be used extensively by foraging bats (moderate);
- Project Site is well-connected to the wider landscape by a network of strong linear features such as rivers, blocks of woodland and mature hedgerows (high); and
- Project Site is located the edge of the ranges for Nathusius' pipistrelle and whiskered bat (high).

The Project is judged as being of medium size according to NS guidance[2] and reproduced below (the size assessment category is provided for each point and the overall category is the mean of these categories):

- Small scale development (8 turbines) (moderate);
- Three other consented wind developments are located within 5 km of Project Site (moderate); and
- Project comprises turbines >100 m in height (high).

Overall, the Project Site is judged to pose a medium risk to bats.

3.2.2 Activity Survey – Transect Surveys – All Species

Flight lines for transect surveys are shown in **Figure 4** to **Figure 9**. Call data recorded during the transects is also shown in **Figure 10** to **Figure 15**. Note that while there are differences in detectability between species, raw data have been presented for all species for each season. Between-species comparisons should not be made without adjustments to the raw data to account for these differences in detectability.

3.2.2.1 Spring 2022

Five species were recorded during the spring transect surveys:

- Common pipistrelle;
- Soprano Pipistrelle;
- Leisler's;
- Whiskered; and
- Daubenton's.

The number of bat passes recorded for each species for each transect is shown in **Table 11**.

Table 11 Spring 2022 Transect Bat Passes by Species

Species	Calls Per Transect			
	Northern		Southern	
	Calls	Percentage of Total Calls	Calls	Percentage of Total Calls
Common pipistrelle	6	21.43%	7	10.00%
Leisler's bat	17	60.71%	28	40.00%
Whiskered bat	0	0	8	11.43%
Daubenton's bat	0	0	1	1.43%
Soprano pipistrelle	5	17.86%	26	37.14%

Whiskered bat and Daubenton's bat were recorded in the southern transect only.

For the northern transect, the forest edge habitat ca. 250m south of the temporary met mast were areas that contained the most bat activity. A flight line of commuting common pipistrelle recorded travelling south-north between stop N and O. All other calls were heard not seen (HNS) during the survey.

For the southern transect, activity was recorded along most of the route, but the start and the centre of the track through the woodland yielded the most activity with Leisler's and soprano pipistrelle concentrated in these areas. Flight lines were recorded along the transect with foraging and commuting activity.

3.2.2.2 Summer 2022

Four species were recorded during the summer transect surveys:

- Common pipistrelle;
- Whiskered bat;
- Leisler's bat; and
- Soprano pipistrelle.

The number of bat passes recorded for each species for each transect is shown in **Table 12**.

Table 12 Summer 2022 Transect Bat Passes by Species

Species	Calls Per Transect			
	Northern		Southern	
	Calls	Percentage of Total Calls	Calls	Percentage of Total Calls
Common pipistrelle	28	33.73%	8	20.00%
Leisler's bat	19	22.89%	22	55.00%
Whiskered bat	3	3.61%	1	2.50%
Soprano pipistrelle	33	39.76%	9	22.50%

There were no differences in the species recorded between the two transects.

For the northern transect, the forest edge habitat ca. 250m south of the temporary met mast was again the area with the most activity. Three flight lines were recorded between stops B and D, comprising soprano pipistrelle and common pipistrelle foraging along the hedgerow and forestry edge. Leisler' bat was heard but not seen during the survey, most likely above the forestry. Whiskered bat was heard but not seen twice during the survey.

For the southern transect, activity was recorded all along the transect route. This is likely owing to the presence of linear habitats present along the majority of the transect route on both sides of the track. Density of activity appears to correlate with the amount of linear habitat present along the transect. Similar to the spring transect, the track through the woodland yielded the most activity.

3.2.2.3 Autumn 2022

Five species were recorded during the autumn transect surveys:

- Common pipistrelle;
- Soprano pipistrelle;
- Brown long-eared;
- Leisler's bat; and
- Whiskered bat.

The number of bat passes recorded for each species for each transect is shown in **Table 13**.

Table 13 Autumn 2022 Transect Bat Passes by Species

Species	Calls Per Transect			
	Northern		Southern	
	Calls	Percentage of Total Calls	Calls	Percentage of Total Calls
Common pipistrelle	73	42.94%	19	45.24%
Soprano pipistrelle	94	55.29%	17	40.48%
Brown long-eared	1	0.59%	0	0
Leisler's bat	1	0.59%	6	14.29%
Whiskered bat	1	0.59%	0	0

Brown long-eared bat and whiskered bat were only recorded along the northern transect. The other three species were recorded at both transects.

There was more activity recorded along the northern transect during the autumn transect compared to spring and summer. The majority of the calls comprised common pipistrelle and soprano pipistrelle. A single call each from brown long-eared, Leisler's, and whiskered bat was recorded. A lot of the activity appeared to be concentrated where drainage ditches in the cutover bog terminated perpendicular to the transect route. The majority of the activity comprised foraging activity.

Activity along the southern transect in autumn was significantly reduced along the woodland track. Instead, activity was greatest adjacent to the agricultural grassland. The majority of the calls comprised common pipistrelle and soprano pipistrelle. Six Leisler's calls were recorded. Three flightlines were recorded comprising foraging and commuting soprano pipistrelle. All other calls were heard not seen.

3.2.3 Activity Survey – Static Detector Survey (Ground-Level) – All Species

Eight species were recorded during the static bat detector surveys:

- Daubenton's bat;
- Whiskered bat;
- Natterer's bat;
- Leisler's bat;

- Nathusius' pipistrelle
- Common pipistrelle;
- Soprano pipistrelle; and
- Brown long-eared bat;

3.2.3.1 Temporal Distribution

A summary of the results per survey season is provided in **Table 14** and **Chart 1** - **Chart 4**, to illustrate any seasonal variation. Note that while there are differences in detectability between species, raw data have been presented for all species. Between-species comparisons should not be made without adjustments to the raw data to account for these differences in detectability.

Table 14 reports the maximum, mean and median bat passes per night at all locations, for all species combined, for each survey season. The table shows that:

- The highest maximum and median activity level per night was recorded in spring;
- The highest mean activity level per night was recorded in spring; and
- The lowest maximum, mean and median activity level per night was recorded in autumn.

Table 14 Summary of Results per Season Across All Sample Locations

Season	Maximum Bat Passes per Night	Mean Bat Passes per Night	Median Bat Passes per Night
Spring	3,203	1,553	1,614
Summer	1,596	892	804
Autumn	606	245	161

Notwithstanding differences in species detectability, **Chart 1** shows that the most frequently recorded species across all survey locations in spring was consistently common pipistrelle, with peak activity recorded on the 20th May 2022. The next most frequently recorded species were soprano pipistrelle and Leisler's bat. Eight species of bat were recorded in spring.

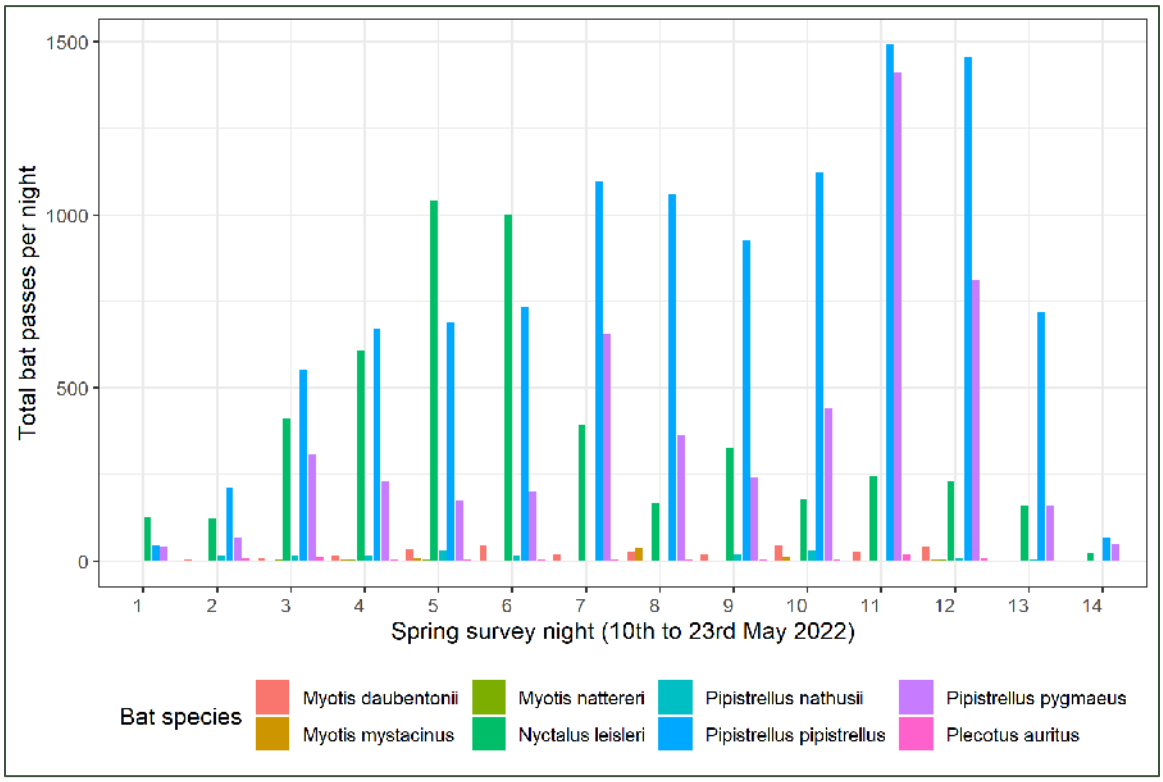

Chart 1 Total Bat Passes Per Night in Spring Across All Detector Locations

Notwithstanding differences in species detectability, **Chart 2** shows that the most frequently recorded species across all survey locations in summer was consistently soprano pipistrelle, with peak activity recorded on the 17th July 2022. The next most frequently recorded species were common pipistrelle and Leisler's bat. Eight species of bat were recorded in summer.

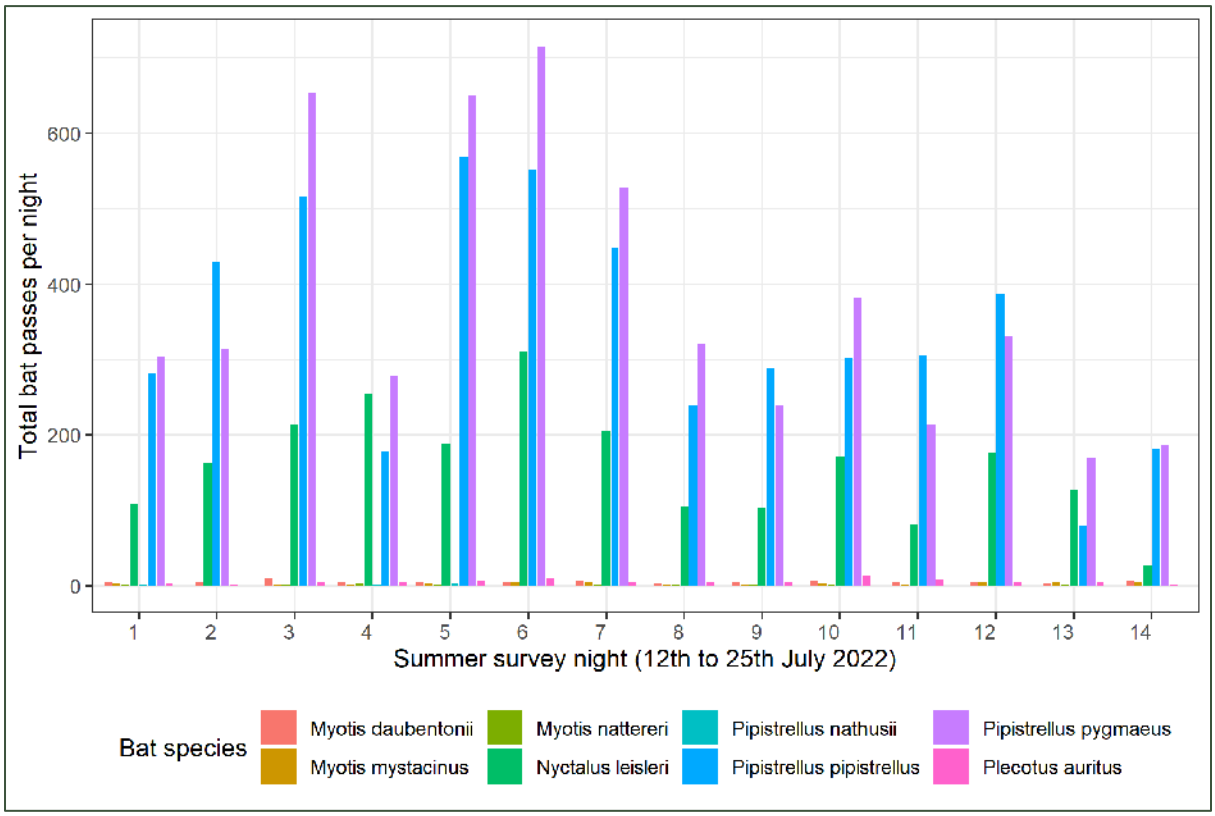

Chart 2 Total Bat Passes Per Night in Summer Across All Detector Locations

Notwithstanding differences in species detectability, **Chart 3** shows that the most frequently recorded species across all survey locations in autumn was consistently common pipistrelle, with peak activity recorded on the 5th October 2022. Eight species of bat were recorded in autumn.

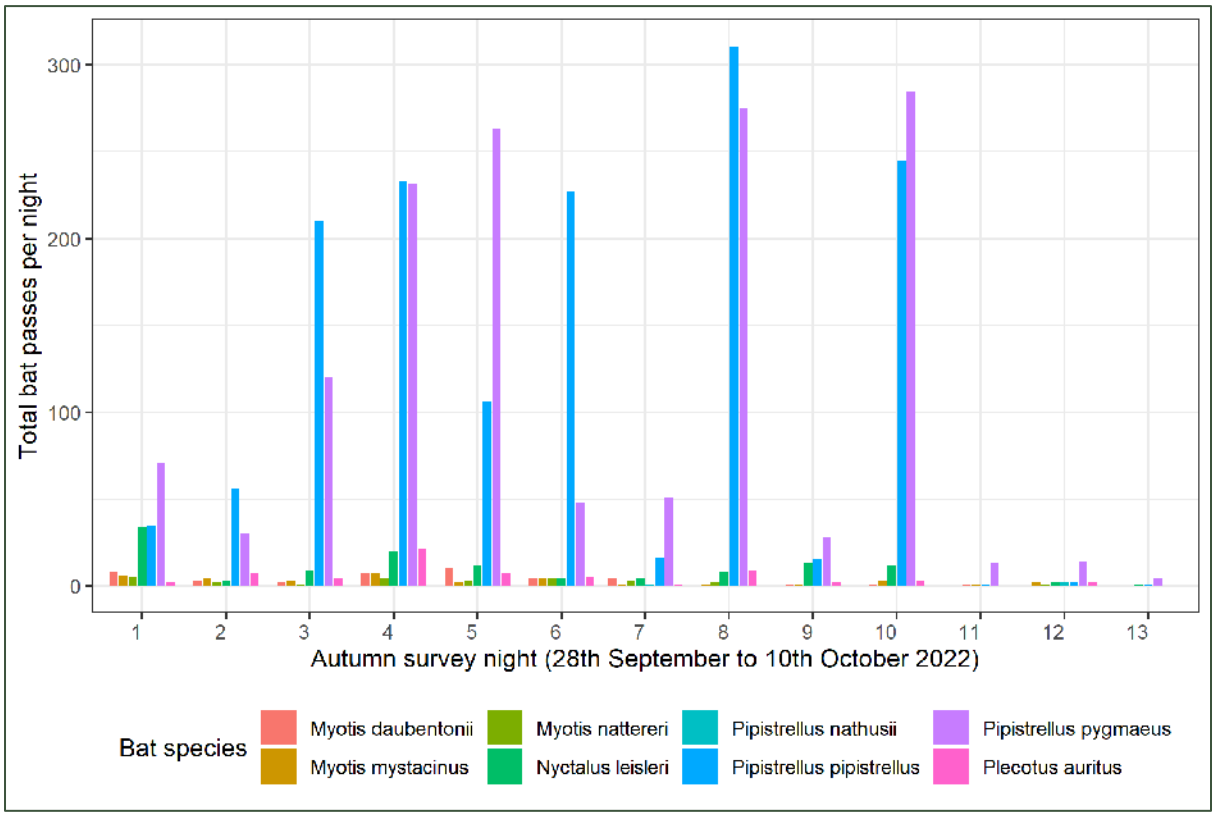

Chart 3 Total Bat Passes Per Night in Autumn Across All Detector Locations

3.2.3.2 Spatial Distribution

Table 15 reports the maximum, mean and median bat passes per night and total bat passes across all nights at each location, for all species combined, across all seasons combined. The total number of bat passes recorded at each location is also provided. The table shows that:

- The highest mean and median activity level per night was recorded at sample location T2;
- The lowest mean and median activity level per night was recorded at sample location T7;
- The greatest amount of activity in any one night (maximum bat passes per night) was recorded at sample location T2, while the lowest was sample location T8.

Table 15 Summary of Results per Sample Location Across All Seasons

Sample Location	Maximum Bat Passes per Night	Mean Bat Passes per Night	Median Bat Passes per Night
T1	1,153	127	216
T2	1,904	317	926
T4	1,079	156	418

Sample Location	Maximum Bat Passes per Night	Mean Bat Passes per Night	Median Bat Passes per Night
T5	1,302	157	413
T6	519	102	284
T7	245	27	53
T8	177	28	79

Chart 4 displays the mean number of bat passes per night for all locations split by bat species. Notwithstanding differences in species detectability, it shows that:

- For all locations, common pipistrelle was the most frequently recorded bat species across all seasons combined; and
- The only location where any other bat species was even half as common as common pipistrelle was at sample location T5, where soprano pipistrelle was the most frequently recorded bat species.

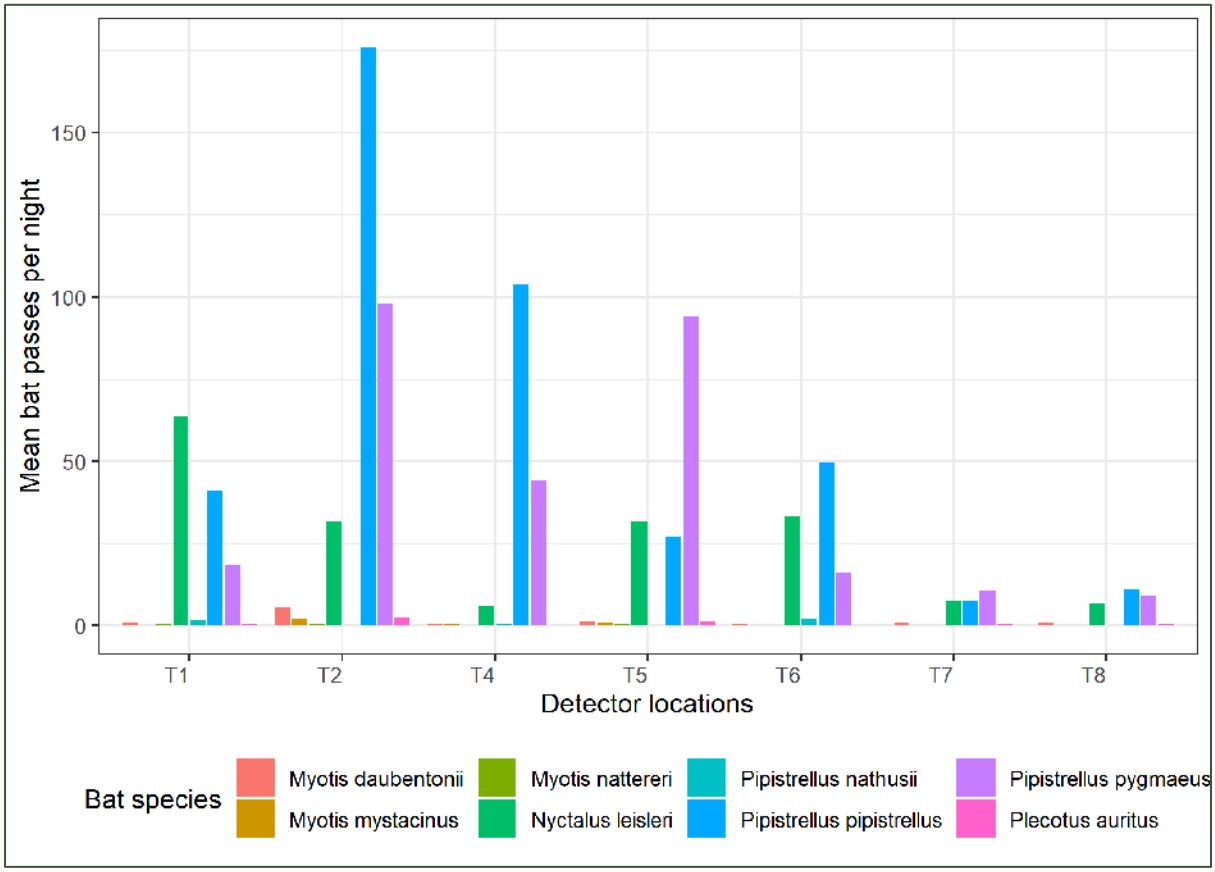

Chart 4 Bat passes at each detector location for each species recorded.

Table 16 provides the same data, but instead summarises the results for grassland, woodland edge/firebreak habitats. It illustrates that:

- The highest maximum, mean and median activity level per night was recorded at the woodland edge habitat; and
- The lowest maximum and mean activity level per night was recorded at woodland firebreak habitat, while the lowest median activity level was recorded at the grassland habitat.

Table 16 Summary of Results per Broad Habitat Type Across All Seasons

Habitats and Sample Locations	Maximum Bat Passes per Night	Mean Bat Passes per Night	Median Bat Passes per Night
Grassland (T1, T7, T8)	1,348	182	410
Woodland edge (T2, T5, T6)	2,892	575	2,004
Woodland firebreak (T4)	1,079	156	418

3.2.4 Activity Surveys – Static Bat Detector Survey – High Collision Risk Species

Species considered to be at a higher risk of collision in Ireland, as adapted from current NS guidance[2], include:

- Common pipistrelle;
- Soprano pipistrelle;
- Nathusius' pipistrelle; and
- Leisler's bat.

All four species were recorded at the project site.

Below each species recorded by the automated bat activity survey has been further analysed with reference to their spatial and temporal distributions.

3.2.4.1 Common Pipistrelle

Temporal Distribution

A summary of the common pipistrelle activity results per survey season is provided in **Table 17**, to illustrate any seasonal variation. **Table 17** reports the maximum, mean and median bat passes per night at all locations, for common pipistrelles, for each survey season. The table shows that:

- Common pipistrelle was recorded across all seasons.
- The highest mean and median activity level per night was recorded in spring;
- The lowest mean and median activity level per night was recorded in autumn; and

- The greatest amount of activity in any one night (maximum bat passes per night) was recorded in spring.

Table 17 Summary of Common Pipistrelle Activity Results Per Season Across All Sample Locations

Season	Maximum Bat Passes per Night	Mean Bat Passes per Night	Median Bat Passes per Night
Spring	1,493	775	727
Summer	569	340	304
Autumn	311	112	56

Spatial Distribution

A summary of the common pipistrelle activity results per sample location is provided in **Table 18** and **Chart 5**, to illustrate any spatial variation within the project site.

Table 18 reports the maximum, mean and median bat passes per night at each location, for common pipistrelles, across all seasons combined. The table shows that:

- Common pipistrelle were recorded across all locations.
- The highest mean and median activity level per night was recorded at locations T2 and T4 (woodland edge, woodland firebreak habitats);
- The lowest mean and median activity level per night was recorded at locations T7 and T8 (grassland); and
- The greatest amount of activity in any one night (maximum bat passes per night) was recorded at location T2 (woodland edge).

Table 18 Summary of Common Pipistrelle Results per Sample Location Across All Seasons

Sample Location	Maximum Bat Passes per Night	Mean Bat Passes per Night	Median Passes per Night
T1	498	41	60
T2	1,123	176	533
T4	913	104	230
T5	211	27	51
T6	378	50	134
T7	76	7	9
T8	79	11	27

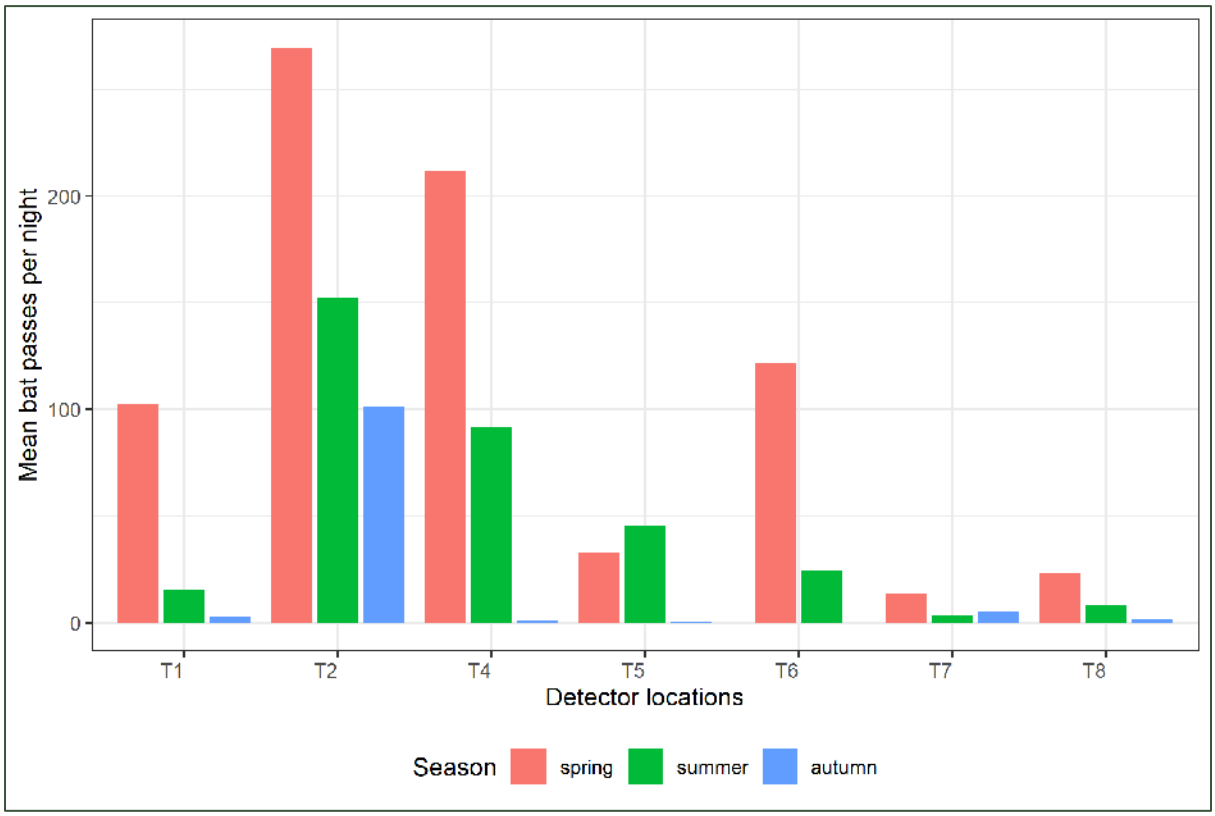

Chart 5 Average Common Pipistrelle Activity Per Sample Location and Season

It is evident from **Chart 5** that common pipistrelle was scarcely recorded at locations T7 and T8 (grassland habitat) across all seasons. Activity was highest at locations T2 and T4 (woodland edge and firebreak) in spring and summer, respectively. Despite there being high activity at this location in spring, common pipistrelle was not recorded at location T6 in autumn. However, common pipistrelle was recorded across all other locations and all seasons.

3.2.4.2 Soprano Pipistrelle

Temporal Distribution

A summary of the common pipistrelle activity results per survey season is provided in **Table 19** to illustrate any seasonal variation. **Table 19** reports the maximum, mean and median bat passes per night at all locations, for soprano pipistrelle, for each survey season. The table shows that:

- Soprano pipistrelle was recorded across all seasons;
- The highest mean and median activity level per night was recorded in summer;
- The lowest mean and median activity level per night was recorded in autumn; and

- The greatest amount of activity in any one night (maximum bat passes per night) was recorded in spring.

Table 19 Summary of Soprano Pipistrelle Activity Results Per Season Across All Sample Locations

Season	Maximum Bat Passes per Night	Mean Bat Passes per Night	Median Bat Passes per Night
Spring	1,412	369	238
Summer	716	378	318
Autumn	285	110	51

Spatial Distribution

A summary of the soprano pipistrelle activity results per sample location is provided in **Table 20** and **Chart 6**, to illustrate any spatial variation within the project site.

Table 20 reports the maximum, mean and median bat passes per night at each location, for soprano pipistrelles, across all seasons combined. The table shows that:

- Soprano pipistrelle were recorded across all locations;
- The highest mean and median activity level per night was recorded at locations T2 (woodland edge);
- The lowest mean and median activity level per night was recorded at location T7 and T8 (grassland); and
- The greatest amount of activity in any one night (maximum bat passes per night) was recorded at location T5 (woodland edge).

Table 20 Summary of Soprano Pipistrelle Results per Sample Location Across All Seasons

Sample Location	Maximum Bat Passes per Night	Mean Bat Passes per Night	Median Passes per Night
T1	163	18	34
T2	760	98	294
T4	216	44	110
T5	1,072	94	204
T6	112	16	44
T7	107	11	18
T8	124	9	17

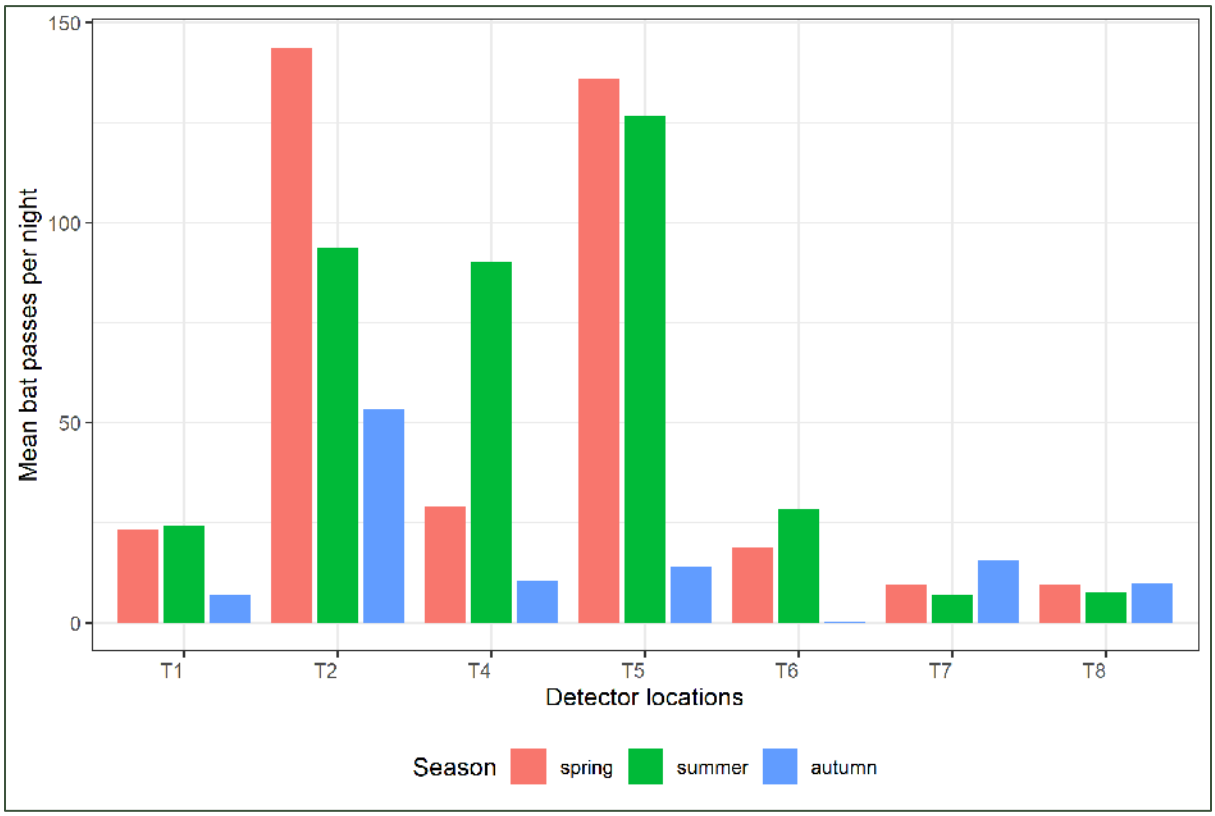

Chart 6 Average Soprano Pipistrelle Activity Per Sample Location and Season

It is evident from **Chart 6** that soprano pipistrelle was scarcely recorded at locations T1, T7 and T8 (grassland) across all seasons. Activity was highest at locations T2 and T5 (woodland edge) in spring and summer, respectively. Despite there being moderate activity at this location in spring and summer, soprano pipistrelle was recorded at very low levels at location T6 in autumn. However, common pipistrelle was recorded across all other locations and all seasons.

3.2.4.3 Nathusius' Pipistrelle

Temporal Distribution

A summary of the Nathusius' pipistrelle activity results per survey season is provided in **Table 21** to illustrate any seasonal variation. **Table 21** reports the maximum, mean and median bat passes per night at all locations, for soprano pipistrelle, for each survey season. The table shows that:

- Nathusius' pipistrelle was recorded across all seasons;
- The highest mean and median activity level per night was recorded in spring;
- The lowest mean and median activity level per night was recorded in summer; and
- The greatest amount of activity in any one night was recorded in spring.

Table 21 Summary of Nathusius' Pipistrelle Activity Results Per Season Across All Sample Locations

Season	Maximum Bat Passes per Night	Mean Bat Passes per Night	Median Bat Passes per Night
Spring	31	12	16
Summer	3	<1	1
Autumn	2	<1	2

Spatial Distribution

A summary of the Nathusius' pipistrelle activity results per sample location is provided in **Table 22** and **Chart 7**, to illustrate any spatial variation within project site.

Table 22 reports the maximum, mean and median bat passes per night at each location, for Nathusius' pipistrelle, across all seasons combined. The table shows that:

- Nathusius' pipistrelle were recorded across all locations except T7;
- The highest mean and median activity level per night was recorded at locations T6 (woodland edge);
- The lowest mean and median activity level per night was recorded at locations T2, T4, and T8 (woodland edge/firebreak, grassland); and
- The greatest amount of activity in any one night (maximum bat passes per night) was recorded at location T1 (grassland).

Table 22 Summary of Soprano Pipistrelle Results per Sample Location Across All Seasons

Sample Location	Maximum Bat Passes per Night	Mean Bat Passes per Night	Median Passes per Night
T1	23	2	3
T2	1	<1	1
T4	13	<1	1
T5	4	<1	3
T6	16	2	5
T7	0	0	0
T8	1	<1	1

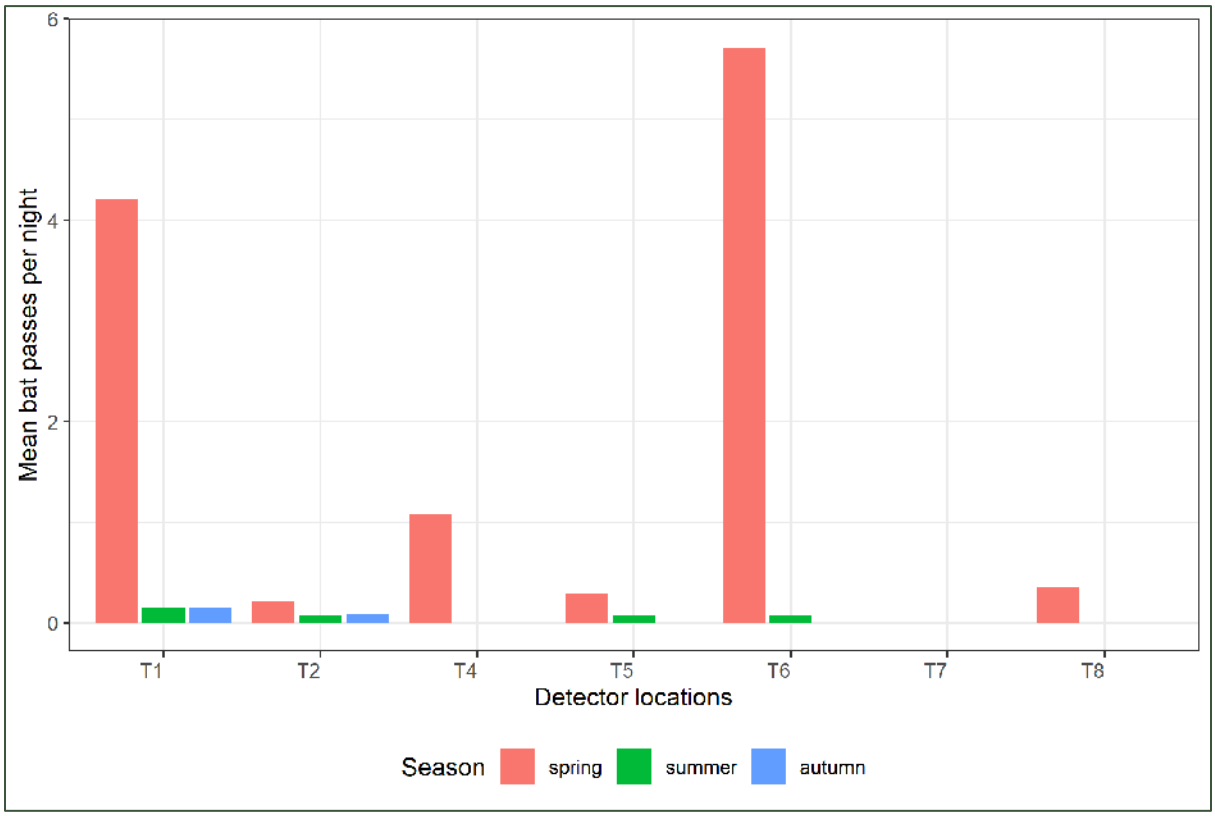

Chart 7 Average Nathusius' Pipistrelle Activity Per Sample Location and Season

It is evident from **Chart 7** that soprano pipistrelle was not recorded at location T7 (grassland) and was scarcely recorded at locations T5 (woodland edge) and T8 (grassland) across all seasons. Activity was highest at locations T1 (grassland) and T6 (woodland edge) in spring, although was still very low overall. Nathusius' pipistrelle was not recorded in summer or autumn at location T4 (woodland firebreak). There was also no activity recorded at locations T5, T6, and T8 in autumn. Despite there being some activity at this location in spring, Nathusius' pipistrelle was recorded at very low levels at location T6 in summer.

3.2.4.1 Leisler's Bat

Temporal Distribution

A summary of the Leisler's bat activity results per survey season is provided in **Table 23** to illustrate any seasonal variation. **Table 23** reports the maximum, mean and median bat passes per night at all locations, for soprano pipistrelle, for each survey season. The table shows that:

- Leisler's bat was recorded across all seasons.
- The highest mean and median activity level per night was recorded in spring;
- The lowest mean and median activity level per night was recorded in autumn; and
- The greatest amount of activity (maximum bat passes per night) in any one night was recorded in spring.

Table 23 Summary of Leisler's bat Activity Results Per Season Across All Sample Locations

Season	Maximum Bat Passes per Night	Mean Bat Passes per Night	Median Bat Passes per Night
Spring	1,043	360	237
Summer	310	160	167
Autumn	34	9	9

Spatial Distribution

A summary of the Leisler's bat activity results per sample location is provided in **Table 24** and **Chart 8**, to illustrate any spatial variation within project site.

Table 24 reports the maximum, mean and median bat passes per night at each location, for Leisler's bat, across all seasons combined. The table shows that:

- Leisler's bat were recorded across all locations;
- The highest mean and median activity level per night was recorded at locations T1 (grassland);
- The lowest mean and median activity level per night was recorded at location T7 and T8 (grassland); and
- The greatest amount of activity in any one night (maximum bat passes per night) was recorded at location T5 (woodland edge).

Table 24 Summary of Leisler's bat Results per Sample Location Across All Seasons

Sample Location	Maximum Bat Passes per Night	Mean Bat Passes per Night	Median Passes per Night
T1	724	64	100
T2	183	32	100

Sample Location	Maximum Bat Passes per Night	Mean Bat Passes per Night	Median Passes per Night
T4	53	6	12
T5	285	32	81
T6	255	33	72
T7	47	7	19
T8	42	7	19

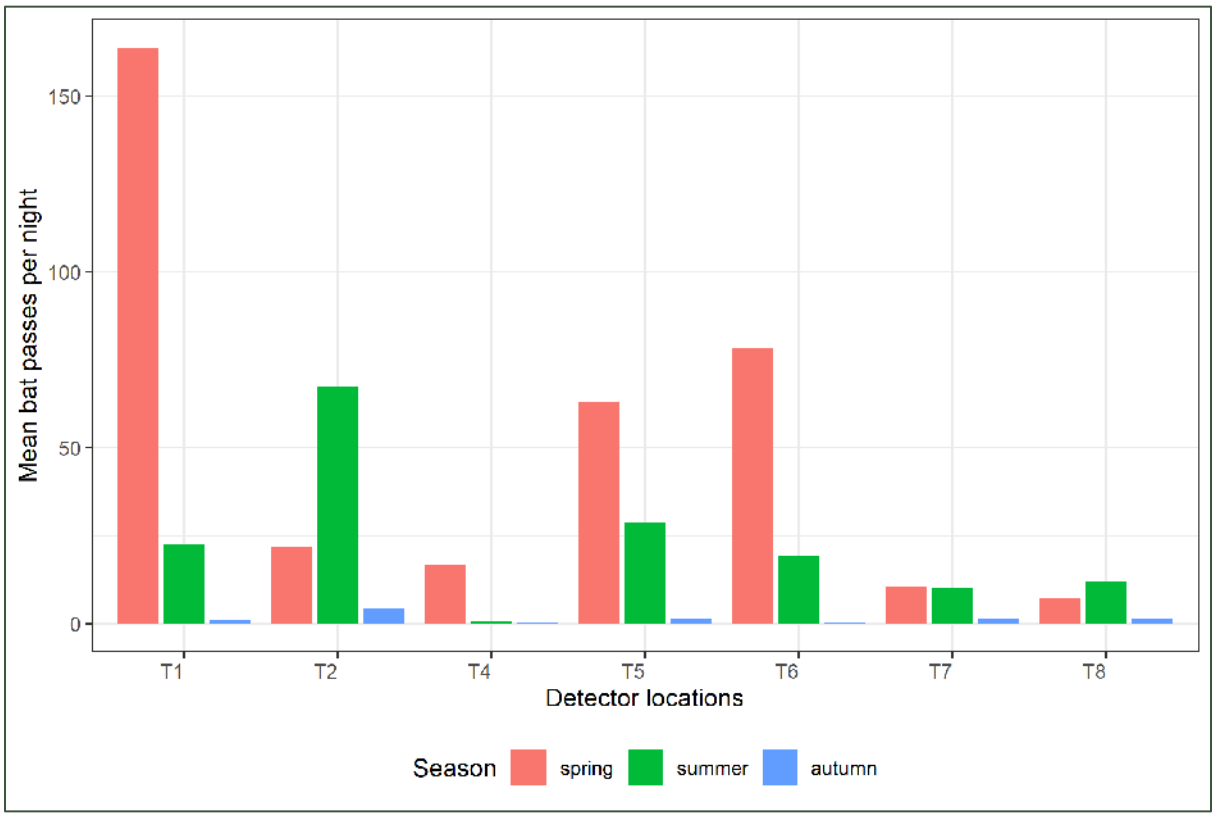

Chart 8 Average Leisler's Bat Activity Per Sample Location and Season

It is evident from **Chart 8** that Leisler's bat was scarcely recorded at locations T4, T7 and T8 (woodland firebreak, grassland) across all seasons.

Activity was highest at locations T1 and T6 (grassland and woodland edge) in spring, and at T2 (woodland edge) in summer. Activity across all locations was low in autumn.

3.2.5 Activity Surveys – Static Bat Detector Survey – Lower Collision Risk Species

A summary of brown long-eared, Daubenton's bat, Natterer's bat and whiskered bat activity results per sample location is provided in **Chart 9**, to illustrate any spatial variation within project site. In general, the mean number of bat calls per night across all seasons and turbine locations is very low (typically <5 calls per night) for all four species.

While in general, all four species were recorded at all turbine locations, they were not recorded in all seasons. In spring, whiskered bat was not recorded at T6. Brown long-eared bat was not recorded at T7 in spring. In summer, Daubenton's, whiskered, and Natterer's were not recorded at T4. Whiskered bat was not recorded at T8, and Natterer's was not recorded at T6 in summer. In autumn, Daubenton's bat was not recorded at T8. Whiskered bat and Natterer's bat were not recorded at T1, T6.

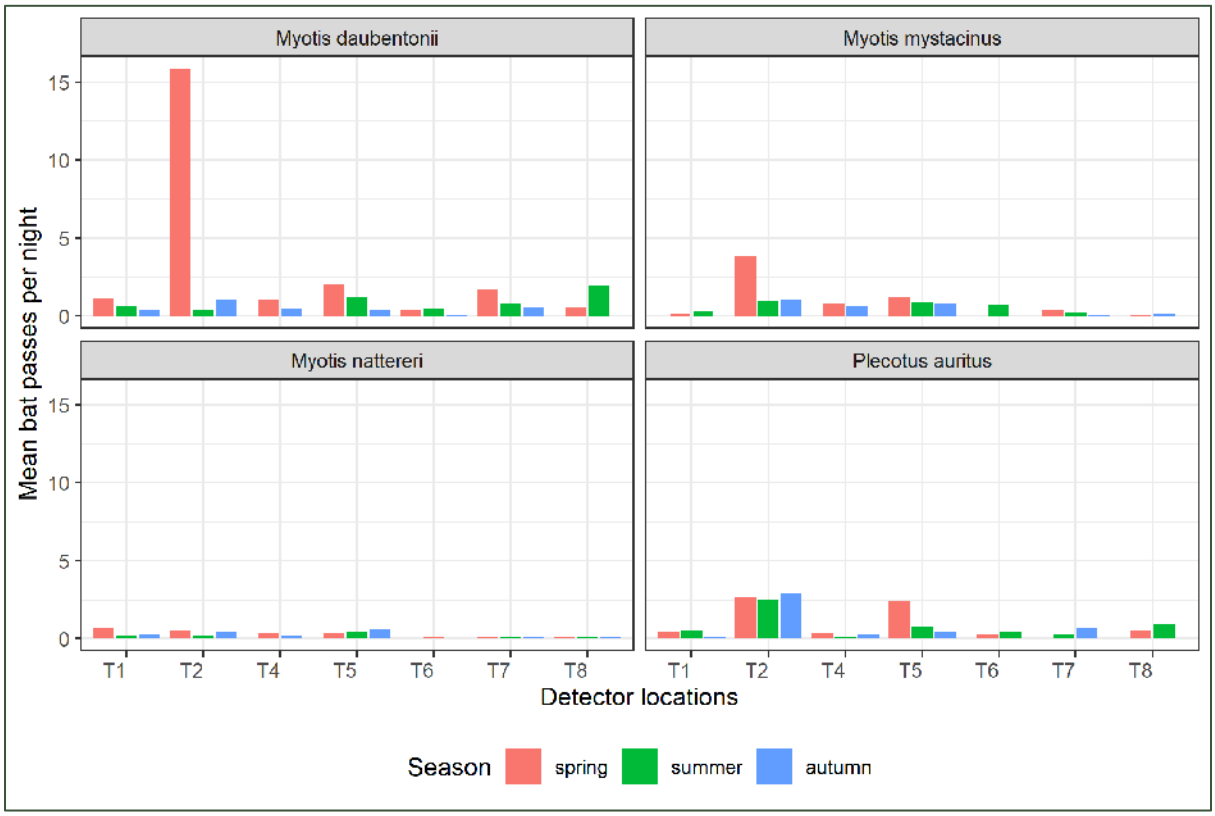

Chart 9 Mean Brown Long-Eared Bat, Daubenton's Bat, Natterer's Bat and Whiskered Bat Activity Per Sample Location and Season

3.2.6 Activity Surveys – Static Detector Survey (At-Height)

A summary of bat passes per survey round is provided in **Table 25**. The table shows that aa total of six species were recorded during the static detector (at-height) surveys:

- Daubenton's bat;
- Brown long-eared bat;
- Leisler's bat;
- Soprano pipistrelle;
- Common pipistrelle; and
- Nathuisus' pipistrelle.

Table 25 Summary of At-Height Bat Activity (Total Bat Passes) Results Per Round

Survey Round	Daubenton's bat	Brown long-eared bat	Leisler's bat	Soprano pipistrelle	Common pipistrelle	Nathuisus' pipistrelle	All Species Combined
Round 1	0	2	179	1	9	0	191
Round 2	0	12	760	102	110	1	985
Round 3	2	1	9	2	0	0	14
Total Calls per Species	2	15	948	105	119	1	1190

3.2.6.1 Temporal Variation

A summary of results per survey round in the summer season in provided in **Table 26,** and Chart 10 to **Chart 12** to illustrate any seasonal variation.

Table 26 reports the maximum, mean and median bat passes per night at all locations, for all species combined, for each survey season. The table shows that:

- The highest per night maximum activity level was recorded during the second recording period (round 2); and
- The per night mean and median activity levels were highest during the second recording period (round 2), and lowest during the third recording period (round 3).

Table 26: Summary of Results per Season Across All Sample Locations

Survey Round	Maximum Bat Passes per Night	Mean Bat Passes per Night	Median Bat Passes per Night
Round 1	22	9	6

Survey Round	Maximum Bat Passes per Night	Mean Bat Passes per Night	Median Bat Passes per Night
Round 2	58	15	12
Round 3	3	2	2

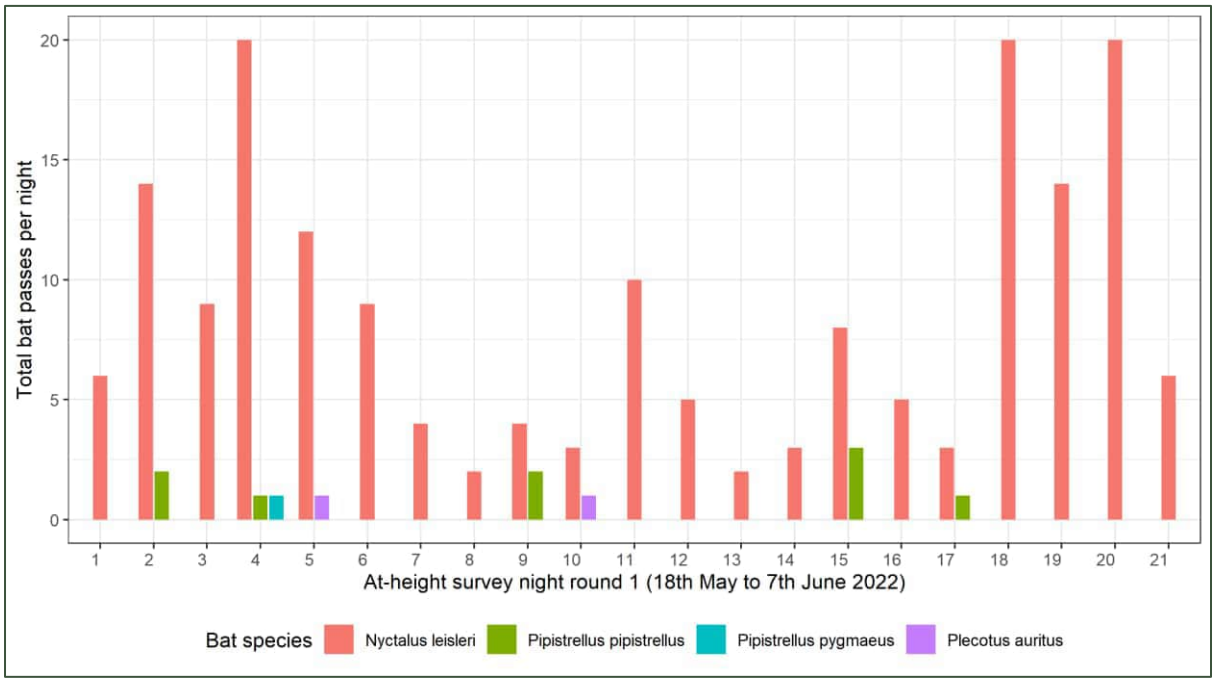

Chart 10 At-height survey night - Round 1

Chart 10 indicates Leisler's bat was by far the most frequently recorded species across round 1, with the most activity captured on 4th May, and 4th and 6th June 2022. The other three species were recorded less frequently and in significantly lower numbers. Only Leisler's bat was recorded across all survey nights in round 1.

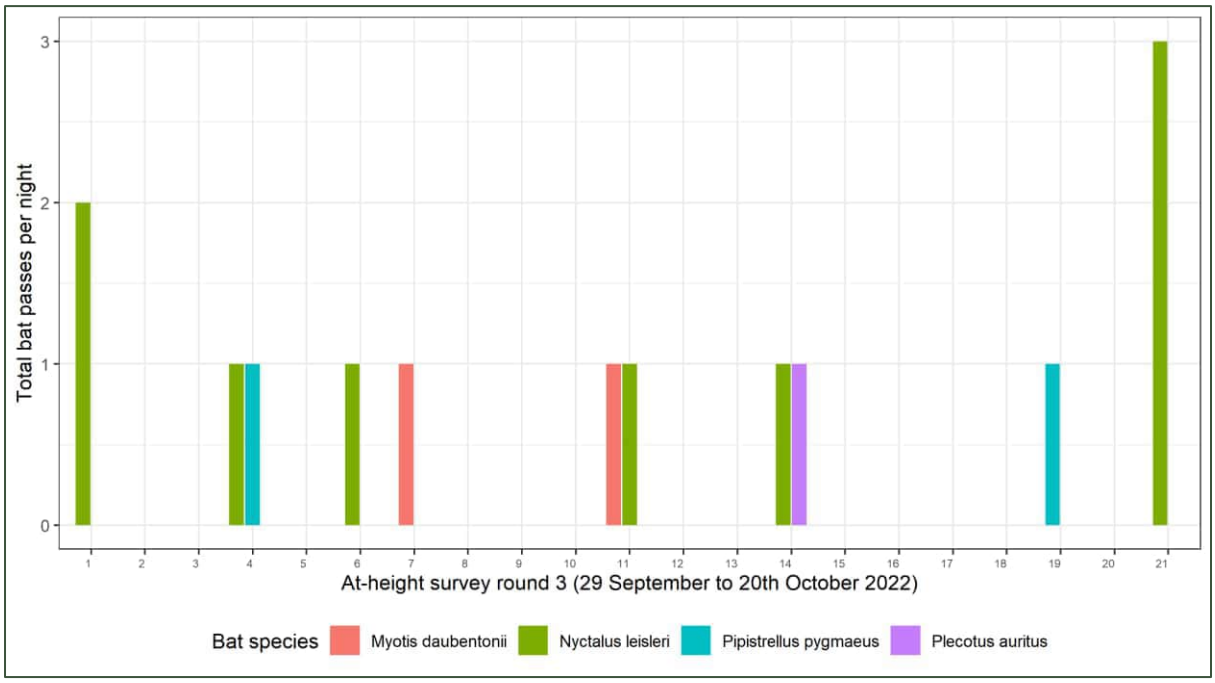

Chart 11 At-height survey night - Round 2

Chart 11 indicates that Leisler's bat was the most frequently recorded species in Round 2. However, it was only recorded on six out of the 21 total survey nights. The most activity was recorded on 20th October 2022. No bat calls were recorded on thirteen out of the twenty-one survey nights in Round 2. Daubenton's bat was only recorded on 5th and 9th October 2022. Soprano pipistrelle 2nd and 17th October 2022. Brown long-eared bat was only recorded on 12th October 2022.

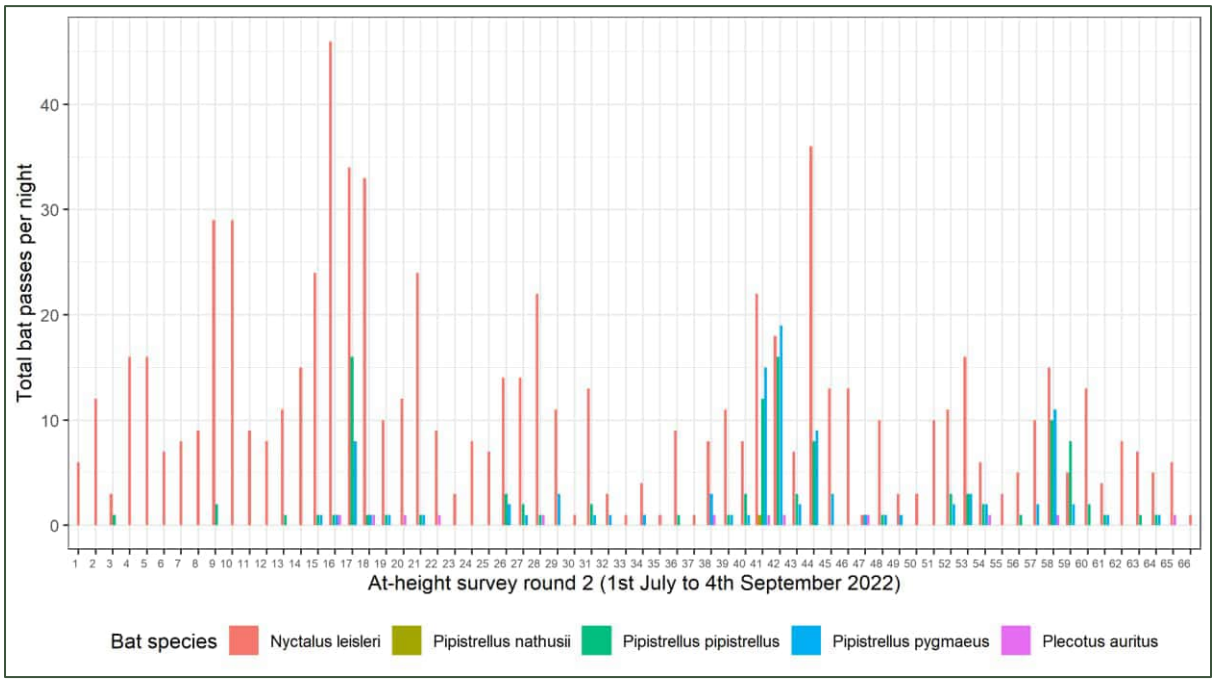

Chart 12 At-height survey night - Round 3

Chart 12 indicates that Leisler's bat was the most frequently recorded species in Round 2 and was recorded on each of the 66 survey nights in Round 3. The most activity was recorded on 16th July 2022. Other species were recorded less frequently, with mean number of calls <20.

4.0 Discussion and Conclusions

4.1 Designated Sites for Bats

There are five pNHAs within 10km of the Site, which are of interest for their populations of Leisler's bat and brown long-eared bat. The distance between these pNHAs and the project site is outside the CSZ for these species. Therefore, the populations for which these pNHAs are designated are not considered to use the Site.

4.2 Habitat and Roost Assessment

The Project Site contains multiple linear features (hedgerows, treelines, woodland edges and stream) considered to be of value to foraging/commuting bats and providing connectivity to the wider landscape.

There are also multiple habitats present that afford good foraging opportunities for bats, including mixed broadleaved woodland.

A desktop study identified two previously known bat roosts with ecological connectivity to the Project Site (i.e. the roost is within the CSZ for the bat species recorded there). However, only one of these has potential ecological connectivity with the proposed project site (within the CSZ for brown long-eared bat) as the other only overlaps with the proposed turning head at the N52/N62 junction.

Field surveys also identified eight structures with low suitability for roosting bats, and no evidence of bats was recorded at any of these.

Two trees were assessed as having moderate roosting suitability within the optioned lands and grid connection route.

There are no previously recorded roosts within the proposed project site or along the grid connection route, and field surveys did not identify any likely roosts immediately adjacent to the same.

Overall, the project itself was judged to be of 'medium size', which combined with 'high risk' habitats within project site, means the Project itself is of 'medium risk' to bat species.

4.3 Overview of Bat Activity

Eight bat species were recorded during the ground-level automated activity surveys conducted in 2022: brown long-eared bat, common pipistrelle, Daubenton's bat, Leisler's bat, Nathusius' pipistrelle, Natterer's bat, soprano pipistrelle and whiskered bat.

Five species were recorded during transect surveys in 2022; common pipistrelle, soprano pipistrelle, Leisler's bat, Daubenton's bat, whiskered bat, and brown long-eared bat. Flight lines from the 2022 surveys showed that bats used the hedgerows and woodland edges for commuting and were recorded foraging along the same.

4.4 Temporal Distribution of Bat Activity

Bat activity at ground-level was highest in spring (a mean of 1,553 bat passes per night) and lowest in autumn (a mean of 245 bat passes per night). The difference in activity between the highest and lowest season was 1,308 bat passes per night on average.

Bat activity at-height was highest in round 2 survey period (a mean of 15 bat passes per night) and lowest in round 3 (a mean of 2 bat passes per night). The difference in activity between the highest and lowest season was 13 bat passes per night on average.

4.5 Spatial Distribution of Bat Activity

Bats were recorded at all detector locations, but generally locations T2 (woodland edge habitat) had the greatest number of bat passes per night, across all seasons. Locations T7 and T8 (grassland habitats) had the lowest number of bat passes per night across all seasons.

Bat activity was typically higher at woodland edge habitats (locations T2, T5, T6), where a mean of 575 bat passes per night was recorded. Grassland and woodland firebreak habitats (locations T1, T7, T8, and T4, respectively) had lower levels of activity, where a mean of 182 and 156 bat passes per night was recorded, respectively.

4.6 'High Collision Risk' Bat Species

4.6.1 Activity Survey – Static Detector (Ground-Level)

All four Irish 'high collision risk' species were recorded during surveys: common pipistrelle, Leisler's bat, Nathusius' pipistrelle and soprano pipistrelle.

Common pipistrelle was the most frequently recorded species, with a peak activity (largest number of mean calls per night) recorded at location T2 in the spring season, and a mean of 775 calls per night.

Soprano pipistrelle was the next most frequently recorded species, with a peak activity (largest number of mean calls per night) recorded at location T2 and T5 in the summer season and a mean of 378 calls per night.

Leisler's bat was the third most frequently recorded species, with a peak activity (largest number of mean calls per night) recorded at location T1 in the spring season and a mean of 1043 calls per night.

Nathusius' pipistrelle was the most infrequently recorded 'high collision risk' species, with a peak activity (largest number of mean calls per night) recorded at location 2 in the spring season, although the number of calls was extremely low (mean of 2 calls per night).

4.6.2 Activity Survey – Static Detector (At-Height)

All four Irish 'high collision risk' species were recorded during the at-height surveys: common pipistrelle, Leisler's bat, Nathusius' pipistrelle and soprano pipistrelle.

Leisler's bat was the most frequently recorded species, with a peak activity (largest number of mean calls per night) recorded during round 2 survey and a total of 760 calls per night. In total, 948 calls were recorded during the survey rounds (n=3).

Common pipistrelle was the next most frequently recorded species, with a peak activity (largest number of mean calls per night) during round 2 survey and a total of 110 calls per night. In total, 119 calls were recorded during the survey rounds (n=3).

Soprano pipistrelle was the third most frequently recorded species, with a peak activity (largest number of mean calls per night) during round 2 survey and a total of 102 calls per night. In total, 105 calls were recorded during the survey rounds (n=3).

Nathuisus' pipistrelle was the most infrequently recorded 'high collision risk' species, although the activity level was extremely low with a peak activity (largest number of mean calls per night) during round 2 survey and a total of 1 call per night. In total, one call were recorded during the survey rounds (n=3).

4.6.3 Bat Activity Relative to Other Sites

No assessment of bat activity relative to other sites was possible (see Section 2.4).

4.7 Other Bat Species

While brown long-eared bat, Daubenton's bat, Natterer's bat and whiskered bat were also recorded, these species are at low risk of collision with turbines due to their flight and foraging behaviour. They were all recorded at much lower frequencies than soprano pipistrelle, Leisler's bat or common pipistrelle by both static detector and transect surveys and therefore, project site does not represent important foraging or roosting habitats for them, making them unlikely to be negatively affected by any loss of habitat through wind farm construction or decommissioning.

5.0 References

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Appendix A Figures

Baseline Bat Report

Cush Wind Farm

Cush Wind Limited

SLR Project No.: 501.00581.00006

9 November 2023

N

T1
T2
T4
T5
T6
T7
T8

0 0.25 0.5 1 1.5 2
Kilometers

LEGEND

- Site Boundary
- Grid Connection Route
- Potential Roost Search Area
- Activity Survey - Transect Routes
- Ground-Level Static Detectors
- At-Height Static Detector

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BASELINE BAT SURVEY REPORT

SURVEY AREAS

FIGURE 1

Scale 1:20,000 @ A3

Date NOVEMBER 2023

501.00581.00006 Cush WF Bat Surveys - Survey Areas

Banagher (Domestic Dwelling, Occupied)

Cloghanbeg

Birr (Domestic Dwelling No.1, Occupied)

Birr (Domestic Dwelling No. 2, Occupied)

Bracken's Dwelling, Near Whiteford

N

0 1 2 4 6 8

Kilometers

© OpenStreetMap (and) contributors, CC-BY-SA

501.00581.00006 pNHAs

LEGEND

- Site Boundary
- Grid Connection Route
- Proposed Natural Heritage Areas (pNHAs)

pNHA - Core Sustenance Zones for Qualifying Interests

- Banagher (Domestic Dwelling, Occupied) pNHA - 3km
- Birr (Domestic Dwelling No. 2, Occupied) pNHA - 3km
- Birr (Domestic Dwelling No.1, Occupied) pNHA - 3km
- Bracken's Dwelling, Near Whiteford pNHA - 3km
- Cloghanbeg pNHA - 3km

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BASELINE BAT SURVEY REPORT

pNHAs Designated for Bats

FIGURE 3

Scale 1:80,000 @ A3

Date NOVEMBER 2023

LEGEND

- Site Boundary
- Grid Connection Route
- Turbine Locations
- Stop Points
- Transect - north

Flightline

- Soprano pipistrelle

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BASELINE BAT SURVEY REPORT

TRANSECT SURVEY - SPRING (NORTH)

FIGURE 4

Scale: 1:2,937 @ A3

Date: NOVEMBER 2023

501.00581.00006 Cush WF Bat Surveys - Transect Surveys

LEGEND

- Site Boundary
- Grid Connection Route
- Turbine Locations
- Stop Points
- Transect - north

Flightline

- Soprano pipistrelle

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BASELINE BAT SURVEY REPORT

TRANSECT SURVEY - AUTUMN (NORTH)

FIGURE 6

Scale 1:2,937 @ A3

Date NOVEMBER 2023

501.00581.00006 Cush WF Bat Surveys - Transect Surveys

LEGEND

- Site Boundary
- Grid Connection Route
- Turbine Locations
- Stop Points
- Transect - north

Flightline

- Common Pipistrelle
- Soprano Pipistrelle

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BASELINE BAT SURVEY REPORT

TRANSECT SURVEY - SUMMER (NORTH)

FIGURE 5

Scale: 1:2,937 @ A3

Date: NOVEMBER 2023

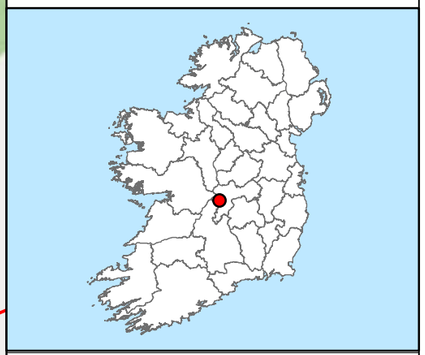
501.00581.00006 Cush WF Bat Surveys - Transect Surveys

LEGEND

- Stop Points
- Transect (south)
- Site Boundary
- Grid Connection Route
- Turbine Locations

Flightlines

- Common pipistrelle
- Leisler's
- Soprano pipistrelle



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BASELINE BAT SURVEY REPORT

TRANSECT SURVEY - SPRING (SOUTH)

FIGURE 7

Scale: 1:3,700 @ A3

Date: NOVEMBER 2023

501.00581.00006 Cush WF Bat Surveys - Transect Surveys

LEGEND

- Site Boundary
- Grid Connection Route
- Transect (south)
- Stop Points
- Turbine Locations

Flightline

- Soprano pipistrelle

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BASELINE BAT SURVEY REPORT

TRANSECT SURVEY - SUMMER (SOUTH)

FIGURE 8

Scale: 1:3,700 @ A3

Date: NOVEMBER 2023

501.00581.00006 Cush WF Bat Surveys - Transect Surveys

LEGEND

- Site Boundary
- Grid Connection Route
- Transect (south)
- Stop Points
- Turbine Locations

Flightlines

- Soprano pipistrelle

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BASELINE BAT SURVEY REPORT

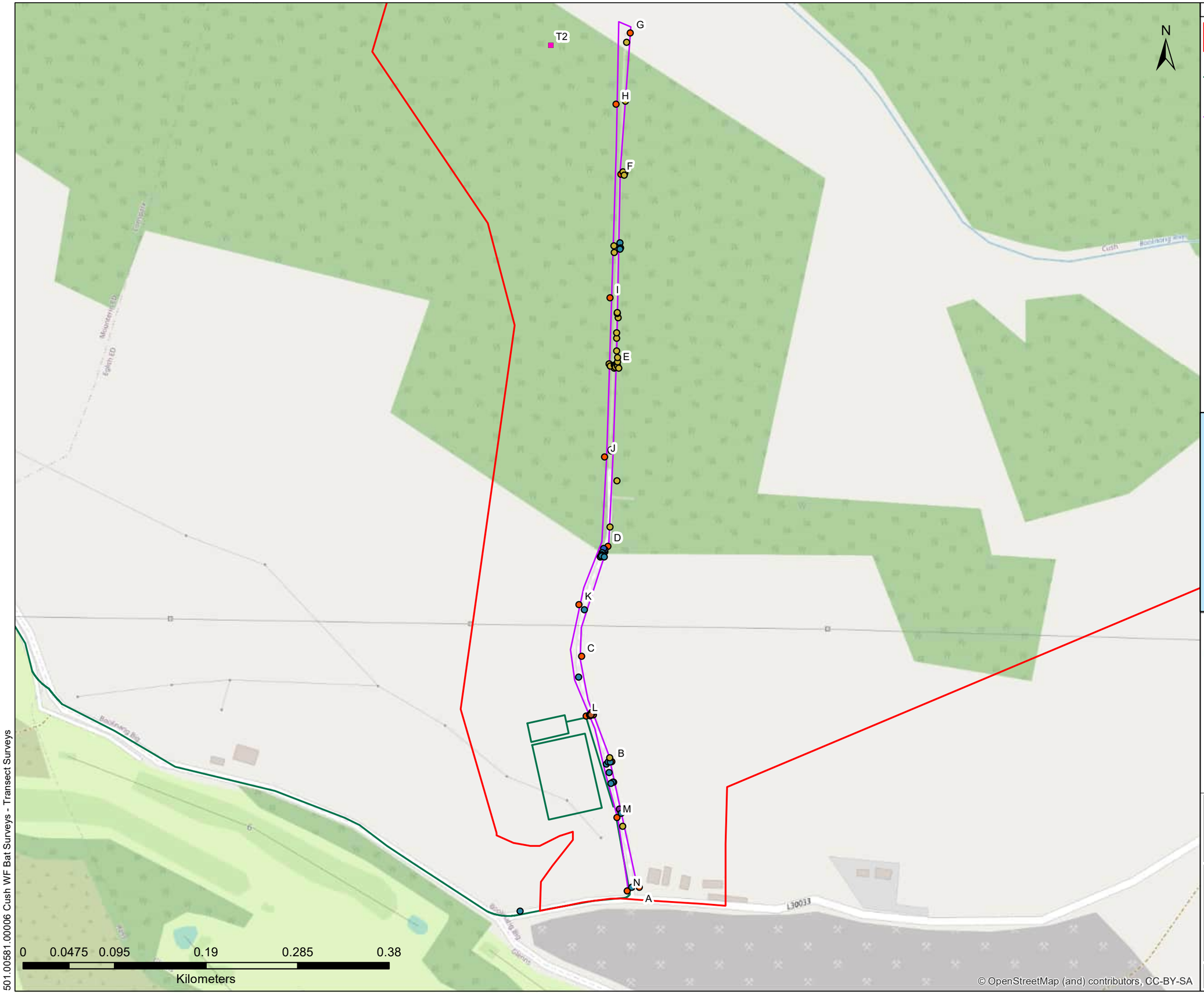
TRANSECT SURVEY - AUTUMN (SOUTH)

FIGURE 9

Scale: 1:3,700 @ A3

Date: NOVEMBER 2023

501.00581.00006 Cush WF Bat Surveys - Transect Surveys



LEGEND

- Site Boundary
- Grid Connection Route
- Transect (south)
- Stop Points
- Turbine Locations

Species

- Daubenton
- Whiskered
- Leisler's
- Common pipistrelle

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BASELINE BAT SURVEY REPORT

TRANSECT (SOUTH) - CALLS (SPRING)

FIGURE 10

Scale: 1:3,700 @ A3

Date: NOVEMBER 2023

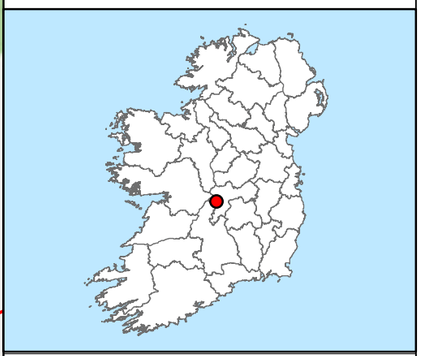
501.00581.00006 Cush WF Bat Surveys - Transect Surveys

LEGEND

- Site Boundary
- Grid Connection Route
- Stop Points
- Transect (south)
- Turbine Locations

Species

- Whiskered
- Leisler's
- Common pipistrelle
- Soprano pipistrelle



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BASELINE BAT SURVEY REPORT

TRANSECT (SOUTH) - CALLS (SUMMER)

FIGURE 11

Scale: 1:3,700 @ A3

Date: NOVEMBER 2023

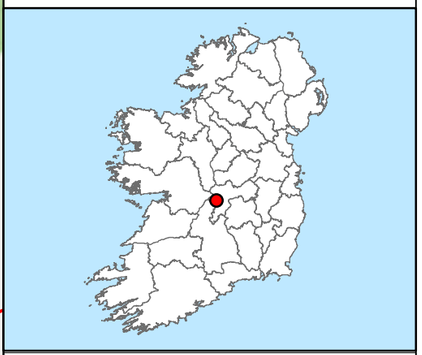
501.00581.00006 Cush WF Bat Surveys - Transect Surveys

LEGEND

- Site Boundary
- Grid Connection Route
- Stop Points
- Transect (south)
- Turbine Locations

Species

- Leisler's
- Common pipistrelle
- Soprano pipistrelle



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BASELINE BAT SURVEY REPORT

TRANSECT (SOUTH) - CALLS (AUTUMN)

FIGURE 11

Scale: 1:3,700 @ A3

Date: NOVEMBER 2023

501.00581.00006 Cush WF Bat Surveys - Transect Surveys

LEGEND

- Site Boundary
- Grid Connection Route
- Transect - north
- Stop Points
- Turbine Locations

Species

- Leisler's
- Common pipistrelle
- Soprano pipistrelle

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BASELINE BAT SURVEY REPORT

TRANSECT (NORTH) - CALLS (SPRING)

FIGURE 12

Scale: 1:2,937 @ A3

Date: NOVEMBER 2023

501.00581.00006 Cush WF Bat Surveys - Transect Surveys

LEGEND

- Site Boundary
- Grid Connection Route
- Transect - north
- Stop Points
- Turbine Locations

Species

- Whiskered
- Leisler's
- Common pipistrelle
- Soprano pipistrelle

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BASELINE BAT SURVEY REPORT

TRANSECT (NORTH) - CALLS (SUMMER)

FIGURE 14

Scale 1:2,937 @ A3

Date NOVEMBER 2023

501.00581.00006 Cush WF Bat Surveys - Transect Surveys

LEGEND

- Site Boundary
- Grid Connection Route
- Transect - north
- Stop Points
- Turbine Locations

Species

- Whiskered
- Leisler's
- Common pipistrelle
- Soprano pipistrelle

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BASELINE BAT SURVEY REPORT

TRANSECT (NORTH) - CALLS (AUTUMN)

FIGURE 15

Scale: 1:2,937 @ A3

Date: NOVEMBER 2023

501.00581.00006 Cush WF Bat Surveys - Transect Surveys

Appendix B Criteria for Assessing Habitat Risk for Bats

Baseline Bat Report

Cush Wind Farm

Cush Wind Limited

SLR Project No.: 501.00581.00006

9 November 2023

B.1 Criteria for Assessing Habitat Risk for Bats

Table B 1 was taken from the latest NatureScot guidance[2].

Table B 1: Bat Habitat Risk

Habitat Risk	Description
Low	• Small number of potential roost features, of low quality • Low quality foraging habitat that could be used by small numbers of foraging bats • Isolated site not connected to the wider landscape by prominent linear features
Moderate	• Buildings, trees or other structures with moderate-high potential as roosts sites on or near the site • Habitats could be used extensively by foraging bats • Site is connected to the wider landscape by linear features such as scrub, tree lines and streams
High	• Numerous suitable buildings, trees (particularly mature ancient woodland) or other structures with moderate-high potential as roost sites on or near the site, and/or confirmed roosts present close to or on the site • Extensive and diverse habitat mosaic of high quality for foraging bats • Site is connected to the wider landscape by a network of strong linear features such as rivers, blocks of woodland and mature hedgerows • At/near edge of range and/or on an important flyway • Close to key roost and/or swarming site

Appendix C Collision Risk, Relative Abundance and Overall Population Vulnerability of Bat Species in Ireland

Baseline Bat Report

Cush Wind Farm

Cush Wind Limited

SLR Project No.: 501.00581.00006

9 November 2023

C.1 Population Vulnerability of Irish Bat Species

Table C 1 below is adapted from NS guidance[2] using data from the latest Irish red list[21]. Red indicates high population vulnerability, orange medium and yellow low population vulnerability.

Table C 1: Collision Risk x Relative Abundance

Relative abundance	Ireland	Collision Risk		
		Low	Medium	High
	Common species			Common pipistrelle Soprano pipistrelle
	Rarer species	Brown long eared bat Daubenton's bat Lesser horseshoe		Leisler's bat
	Rarest species	Natterer's bat Whiskered bat		Nathusius' pipistrelle

[21] Marnell, F., Looney, D. & Lawton, C. (2019) Ireland Red List No. 12: Terrestrial Mammals. National Parks and Wildlife Service, Department of the Culture, Heritage and the Gaeltacht, Dublin, Ireland.

Appendix D Confidential Appendix: Confidential Roost Data

Baseline Bat Report

Cush Wind Farm

Cush Wind Limited

SLR Project No.: 501.00581.00006

9 November 2023

Table D 1 Potential Roosting Features - Structures

Map Ref.	Type	Suitability	Description	Photo	Coordinates (ITM)	
					X	X
[redacted]						

Map Ref.	Type	Suitability	Description	Photo	Coordinates (ITM)	
					X	X
[redacted]						

Map Ref.	Type	Suitability	Description	Photo	Coordinates (ITM)	
					X	X
[redacted]						

Map Ref.	Type	Suitability	Description	Photo	Coordinates (ITM)	
					X	X
[redacted]						

Table D 2 Potential Roosting Features - Trees

Map Ref.	Suitability	Description	Photo	Coordinates (ITM)	
				X	X
[redacted]					

Map Ref.	Suitability	Description	Photo	Coordinates (ITM)	
				X	X
[redacted]					

Map Ref.	Suitability	Description	Photo	Coordinates (ITM)	
				X	X
[redacted]					

Map Ref.	Suitability	Description	Photo	Coordinates (ITM)	
				X	X
[redacted]					

LEGEND

- Site Boundary
- Grid Connection Route
- Potential Roost Search Area
- Turbine Locations

Tree

- Low
- Moderate

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BASELINE BAT SURVEY REPORT

POTENTIAL ROOST SURVEY - TREES

FIGURE 3

Scale: 1:21,000 @ A3

Date: NOVEMBER 2023

501.00581.00006 Cush WF Bat Surveys - PRF Surveys - Trees

Appendix E Confidential Appendix: Bat Conservation Ireland Data

Baseline Bat Report

Cush Wind Farm

Cush Wind Limited

SLR Project No.: 501.00581.00006

9 November 2023

Table E 1: Bat Conservation Ireland Data

Record No.	Distance from Site (km)	Species
[redacted]		

Record No.	Distance from Site (km)	Species
[redacted]		

Record No.	Distance from Site (km)	Species
[redacted]		

LEGEND

- Site Boundary
- Grid Connection Route
- Turbine Locations
- Bat Conservation Ireland - Roost Data
- Leisler roosts - 3km CSZ
- Whiskered roosts - 1km CSZ
- Daubenton's roosts - 2km CSZ
- Mixed Roosts - 3km CSZ (largest for species roosting there)
- Soprano roosts - 3km CSZ

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CUSH WIND FARM

BASELINE BAT SURVEY REPORT

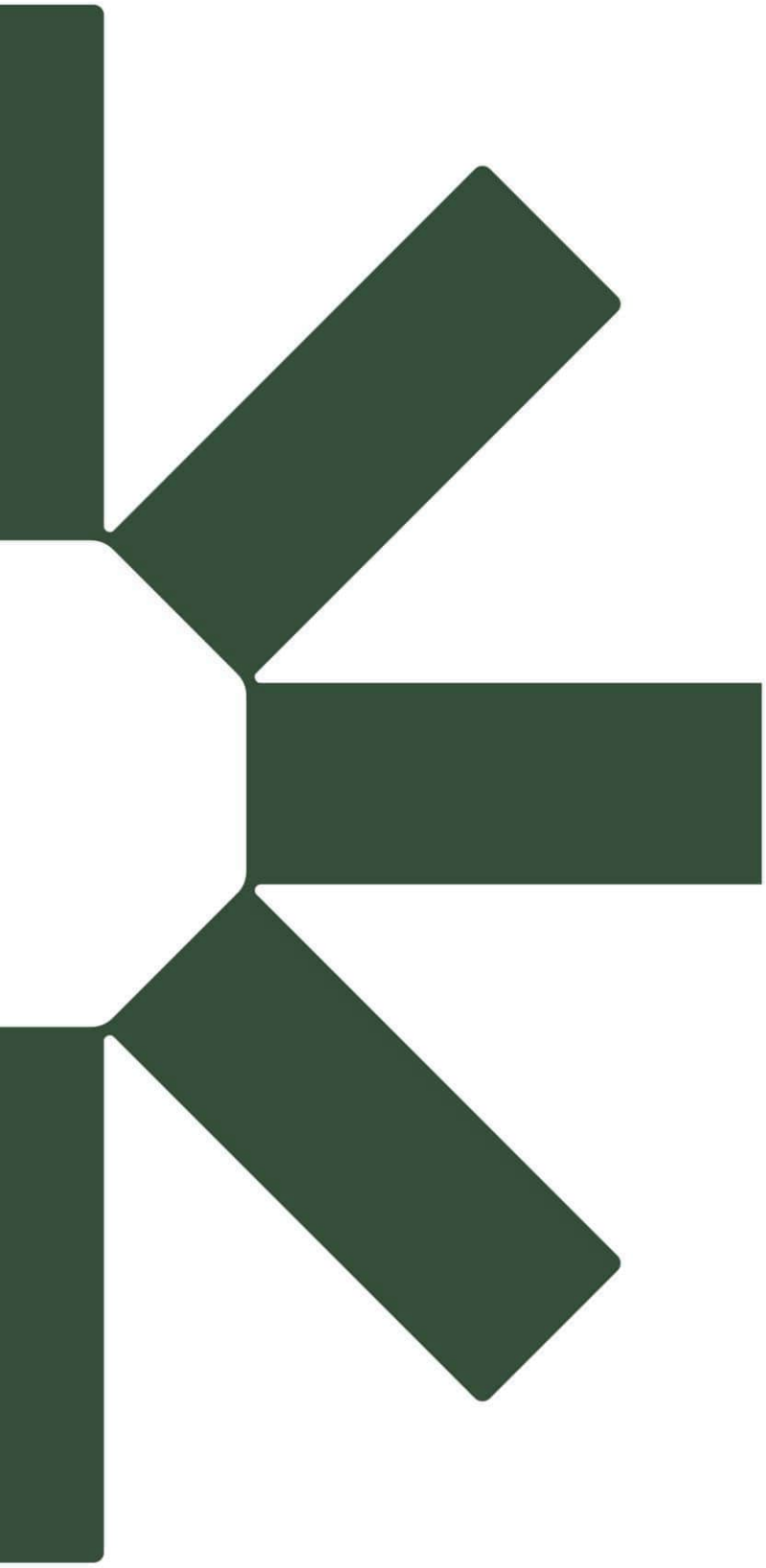
BAT CONSERVATION DATA - ROOSTS

FIGURE 16

Scale: 1:70,867 @ A3

Date: NOVEMBER 2023

501.00581.00006 Cush WF Bat Surveys - BCI Data



Making Sustainability Happen