Appendix 6-2 – Bat Survey Report

Briskalagh Renewable Energy Development, Co. Kilkenny

DOCUMENT DETAILS

Client:	**Briskalagh Ltd.**
Project Title:	**Briskalagh Renewable Energy Development, Co. Kilkenny**
Project Number:	**230502**
Document Title:	**Bat Survey Report**
Document File Name:	**Appendix 6-2 Bat Survey Report - F – 2024.10.03 - 230502**
Prepared By:	**MKO** **Tuam Road** **Galway** **Ireland** **H91 VW84**

Planning and Environmental Consultants

Rev	Status	Date	Author(s)	Approved By
01	Draft	10/05/2024	RC	AJ
02	Draft	17/06/2024	RC	
03	Draft	09/07/2024	RC	
04	Draft	31/07/2024	RC	
05	Draft	27/08/2024	RC	AJ
06	Draft	02/10/2024	RC	
07	Final	03/10/2024	RC	AJ/EMcC

Table of Contents

TABLE OF TABLES

TABLE OF PLATES

TABLE OF FIGURES

APPENDICES

Appendix 1 – Bat Habitat Suitability Appraisal

Appendix 2 – Site Risk Assessment

Appendix 3 – Overall Site Risk Assessment

1. INTRODUCTION

MKO was commissioned to complete a comprehensive assessment of the potential effects on bats, as part of an application for planning permission of a renewable energy development at Briskalagh and adjacent townlands, near Kilmanagh in Co. Kilkenny. This report provides details of the bat surveys undertaken, including survey design, methods and results, and the assessment of potential effects of the Proposed Project on bats. Where necessary, mitigation is prescribed to minimise any identified significant effects.

Bat surveys were predominantly undertaken throughout 2023, with surveys of the Proposed Grid Connection completed in March of 2024, and are consistent with the methodologies described in NatureScot 2021[1]. Bat surveys employed a combination of methods, including desktop study, habitat and landscape assessments, roost inspections, manual activity surveys and static detector surveys at ground level. Surveys in 2023 were based on an indicative turbine layout of 8 turbines. The final design includes 7 no. turbines.

The assessment and mitigation provided in this report has been designed in accordance with NatureScot 2021. Consideration was also given to the Northern Ireland Environment Agency (NIEA) Natural Environment Division (NED) Guidance [2], which was produced in August 2021 (amended March 2024).

As detailed in Section 1.1.1 in Chapter 1, for the purposes of this EIAR, the various project components are described and assessed using the following references: 'Proposed Project', 'Proposed Wind Farm', 'Proposed Grid Connection' and the 'Site'. Please see Section 1.1.1 of this EIAR for further details.

A detailed description of the Proposed Project is provided in Chapter 4 of this EIAR.

1.1 Background

Wind energy provides a clean, sustainable alternative to fossil fuels in generating electricity. However, wind energy development can impact wildlife, directly through mortality and indirectly through disturbance and habitat loss. Bat fatalities have been reported at wind energy facilities around the world, raising concern about the cumulative impacts of such developments on bat populations (Arnett *et al.* 2016). No large-scale studies have been undertaken in Ireland to date. However, a study from the UK estimated bat fatalities at between 0 – 5.25 bats per turbine per month (Mathews *et al.* 2016). While these results are not directly applicable to Ireland due to differences in bat species and behaviour, Ireland shares more similarities with bat assemblages of Great Britain, when compared to those of mainland Europe.

Investigative research in North America and mainland Europe have revealed the mechanisms for bat mortality at wind turbines. Fatalities arise from direct collision with moving turbine blades (Horn *et al.* 2008, Cryand *et al.* 2014) and barotrauma (Baer Wald *et al.* 2008), i.e. internal injuries caused by air pressure changes. The reason why bats fly in the vicinity of wind turbines has been attributed to several different behavioural and environmental factors, e.g. habitat associations, weather conditions and, species ecology.

Pre-construction bat surveys are undertaken to provide a baseline to gain an insight into bat activity in the absence of turbines and to predict and mitigate against any future risks identified. This report primarily focuses on surveys conducted within the Proposed Wind Farm site. The Proposed Grid Connection (including the underground cabling route) was assessed as part of the multidisciplinary survey effort detailed in Chapter 6. Further details of the bridge assessment along the Proposed Grid Connection

[1] *NatureScot published Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation. Version: August 2021 (NatureScot, 2021).*
[2] *Northern Ireland Environment Agency Natural Environment Division (NED) published Guidance on Bat Surveys, Assessment and Mitigation for Onshore Wind Turbine Developments in Northern Ireland (NIEA, 2021).*

underground cabling route are outlined below. Survey design and analyses of results at the Proposed Wind Farm site were undertaken with reference to the latest policy and legislation, scientific literature and industry guidelines. Any spatial, temporal or behavioural factors that may put bats at risk were fully considered.

1.2 Bat Survey and Assessment Guidance

Several guidelines for surveying bats at wind energy developments have been produced in Europe, the UK and Ireland.

At a European level, the Advisory Committee to the EUROBATS Agreement, to which Ireland is a signatory, have produced Guidelines for Consideration of Bats in Wind Farm Projects which outlines an approach for assessing the potential impacts of wind turbines on bats during planning, construction and operation phases (Rodrigues, 2015). However, these guidelines are based on continental scenarios and include more diverse species and behaviours than those typical of Ireland. As such, EUROBATS guidance may recommend a level of survey that may prove inappropriate in Irish scenarios. Nevertheless, the guidance is evidence-based and provides a useful European context, within which Member States are encouraged to produce specific national guidance, focusing on local circumstances.

Bat Conservation Ireland produced Wind Turbine/Wind Farm Development Bat Survey Guidelines (BCI, 2012a). This document provides advice to practitioners and decision makers in Ireland on necessary qualifications for surveyors, health and safety considerations, pre-construction and post-construction survey methodologies and information to be included in a report. In the absence of comprehensive Irish research, these guidelines provide generalised methodology rather than detailed technical advice.

The second edition of the UK Bat Conservation Trust Bat Survey Good Practice Guidelines (Hundt, 2012) includes a chapter (Chapter 10) on survey methodologies for assessing the potential impacts of wind turbines on bats. The document provides technical guidance for consultants carrying out impact assessments. However, the recommendations are not based on any research findings specific to the UK. A third edition to the guidelines, published in early 2016, removed the chapter on surveying wind turbine developments. Prior to the publication of the BCT guidelines, Natural England's *Bat and Onshore Wind Turbines: Interim Guidance* provided an interpretation of the EUROBATS recommendations, as applied to onshore wind energy facilities in the UK (Natural England, 2014). In addition, the Chartered Institute of Ecology and Environmental Management (CIEEM) publishes advice on best practice as well as updates on the current state of knowledge in *the Technical Guidance Series* and in the quarterly publication *In Practice*.

In August 2021, NatureScot (formerly Scottish Natural Heritage), published *Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation* (NatureScot, 2021). The 2021 version supersedes the 2019 version of the guidance. The purpose of the guidance is to help planners, developers and ecological consultants to consider the potential effects of onshore wind energy developments on bats. The emphasis is on direct impacts such as collision mortality, but there is reference throughout to the need for a full impact assessment requiring wider consideration of other (indirect) effects. The Guidance replaces previous guidance on the subject; notably that published by Natural England and Chapter 10 of the Bat Conservation Trust publication, *Bat Surveys: Good Practice Guidelines (2nd edition),* (Hundt, 2012) and tailors the generic EUROBATS guidance on assessing the impact of wind turbines on European bats (Rodrigues *et al.* (2014)). The document guides the user through the key elements of survey, impact assessment and mitigation.

The NIEA (NED) recently published *Guidance on Bat Surveys, Assessment and Mitigation for Onshore Wind Turbine Developments in Northern Ireland*. This new guidance follows and builds upon the recently updated NatureScot 2021 guidance. The latter guidance has set the industry standard since its publication in 2019. The NED guidance does not aim to replace the NatureScot guidance, but it does provide additional clarifications and recommendations regarding survey requirements and impact assessment in an Irish context.

The survey scope and assessment provided in this report are in accordance with NatureScot 2021 Guidance. This guidance has set the industry standard for best practice surveys at wind farms since its initial publication in 2019.

1.3 Irish Bats: Legislation, Policy and Status

Ireland has nine resident bat species, comprising more than half of Ireland's native terrestrial mammals (Montgomery *et al.,* 2014). All Irish bats are protected under European legislation, namely the Habitats Directive (92/43/EEC). All Irish species are listed under Annex IV of the Directive, requiring strict protection for individuals, their breeding sites and resting places. The lesser horseshoe bat (*Rhinolophus hipposideros*) is further listed under Annex II of the Directive, requiring the designation of conservation areas for the species. Under this Directive, Ireland is obliged to maintain the favourable conservation status of Annex-listed species. This Directive has been transposed into Irish law through the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477/2011, as amended).

In addition, Irish species are further protected by national legislation (Wildlife Acts 1976, as amended). Under this legislation, it is an offence to intentionally disturb, injure or kill a bat, or disturb its roost. Any work at a roost site must be carried out with the agreement of the National Parks and Wildlife Service (NPWS).

The NPWS monitors the conservation status of European protected habitats and species and reports their findings to the European Commission every 6 years in the form of an Article 17 Report. The most recent report for the Republic of Ireland was submitted in 2019. Table 1-1 summarises the current conservation status of Irish bat species and identified threats to Irish bat populations.

Table 1-1 Irish Bat Species Conservation Status and Threats (NPWS, 2019)

Bat Species	Conservation Status	Principal Threats
Common pipistrelle *Pipistrellus pipistrellus*	Favourable	**A05** Removal of small landscape features for agricultural land parcel consolidation (M) **A14** Livestock farming (without grazing) [impact of anti-helminthic dosing on dung fauna] (M) **B09** Clear--cutting, removal of all trees (M) **F01** Conversion from other land uses to housing, settlement or recreational areas (M) **F02** Construction or modification (e.g. of housing and settlements) in existing urban or recreational areas (M) **F24** Residential or recreational activities and structures generating noise, light, heat or other forms of pollution (M) **H08** Other human intrusions and disturbance not mentioned above (Dumping, accidental and deliberate disturbance of bat roosts (e.g. caving) (M) **L06** Interspecific relations (competition, predation, parasitism, pathogens) (M) **M08** Flooding (natural processes) **D01** Wind, wave and tidal power, including infrastructure (M)
Soprano pipistrelle *Pipistrellus pygmaeus*	Favourable	
Nathusius' pipistrelle *Pipistrellus nathusii*	Unknown	
Leisler's bat *Nyctalus leisleri*	Favourable	
Daubenton's bat *Myotis daubentoni*	Favourable	
Natterer's bat *Myotis nattereri*	Favourable	
Whiskered bat *Myotis mystacinus*	Favourable	
Brown long-eared bat *Plecotus auritus*	Favourable	
Lesser horseshoe bat *Rhinolophus hipposideros*	Inadequate	

1.4 Statement of Authority

MKO employs a dedicated bat unit within its Ecology team, dedicated to scoping, carrying out, and reporting on bat surveys, as well as producing impact assessments in relation to bats. MKO ecologists have relevant academic qualifications and are qualified in undertaking surveys to the levels required. MKO's Ecology team holds a bat derogation licence from NPWS. The licence is intended for professionals carrying out surveys with the potential to disturb roosting bats (i.e. roost inspections). Graduate and seasonal ecologist staff are covered under the licence under condition of being accompanied by more experienced colleagues.

Survey scoping was prepared by Aoife Joyce (BSc., MSc.). The daytime walkover survey and inspections were carried out by Ryan Connors (B.Sc., M.Sc.), Laura Gránicz (BSc., MSc.) and David Culleton (BSc., MSc.). Manual activity surveys were carried out by Ryan Connors, Laura Gránicz, Nora Szijarto (B.Sc., M.Sc.) and Deirdre McCarthy. Data manual ID were carried out by Ryan Connors. This report was prepared by Ryan Connors and was reviewed and approved by Aoife Joyce. Staff's roles, relevant ecological experience and training is presented in Table 1-2 below.

Table 1-2 Project team experience, qualifications and training.

Staff	Role	Training
Aoife Joyce (B.Sc., M.Sc.) 5 Years	Project Director	B.Sc. (Hons) Environmental Science, University of Galway, Ireland. M.Sc. (Hons) Agribioscience, University of Galway, Ireland. Advanced Bat Survey Techniques – Trapping, biometrics, handling (BCI), Bat Impacts and Mitigation (CIEEM), Bat Tree Roost Identification and Endoscope Training (BCI), Bats in Heritage Structures (BCI), Bats and Lighting (BCI), Kaleidoscope Pro Analysis (Wildlife Acoustics).
Laura Gránicz (B.Sc., MSc.) 2 years	Project Ecologist	B.Sc. Biology, University of Szeged, Hungary. M.Sc. Biology, University of Pécs, Hungary. Structure & Tree Inspection (Internal), Manual Transect Survey (Internal), Bat Habitat Appraisal (Internal), Emergence and Re-Entry Surveys (Internal), Advanced Bat Survey Techniques (BCI), Kaleidoscope Pro Analysis (Wildlife Acoustics).
Ryan Connors (B.Sc., M.Sc.) 1.5 years	Bat Ecologist	B.Sc. (Hons) Zoology, University College Galway, Ireland. M.Sc. (Hons) Conservation Behaviour, Atlantic Technological University, Galway, Ireland. Surveying Trees for Bats (BRTS), Structure & Tree Inspection (Internal), Manual Transect Survey (Internal), Bat Habitat Appraisal (Internal), Emergence and Re-Entry Surveys (Internal), Kaleidoscope Pro Analysis (Internal), Winter Tree Identification (Internal), Wintering Bird Surveying (Internal).
David Culleton (B.Sc., M.Sc.) 1.5 years	Bat Ecologist	B.Sc. (Hons) Zoology, University College Cork, Ireland. M.Sc. (Hons) Conservation Behaviour, Atlantic Technological University, Galway, Ireland. Bat Detector and Survey Training (BCI), Kaleidoscope Pro Analysis (Internal), Endoscope Training (Internal), Structure &

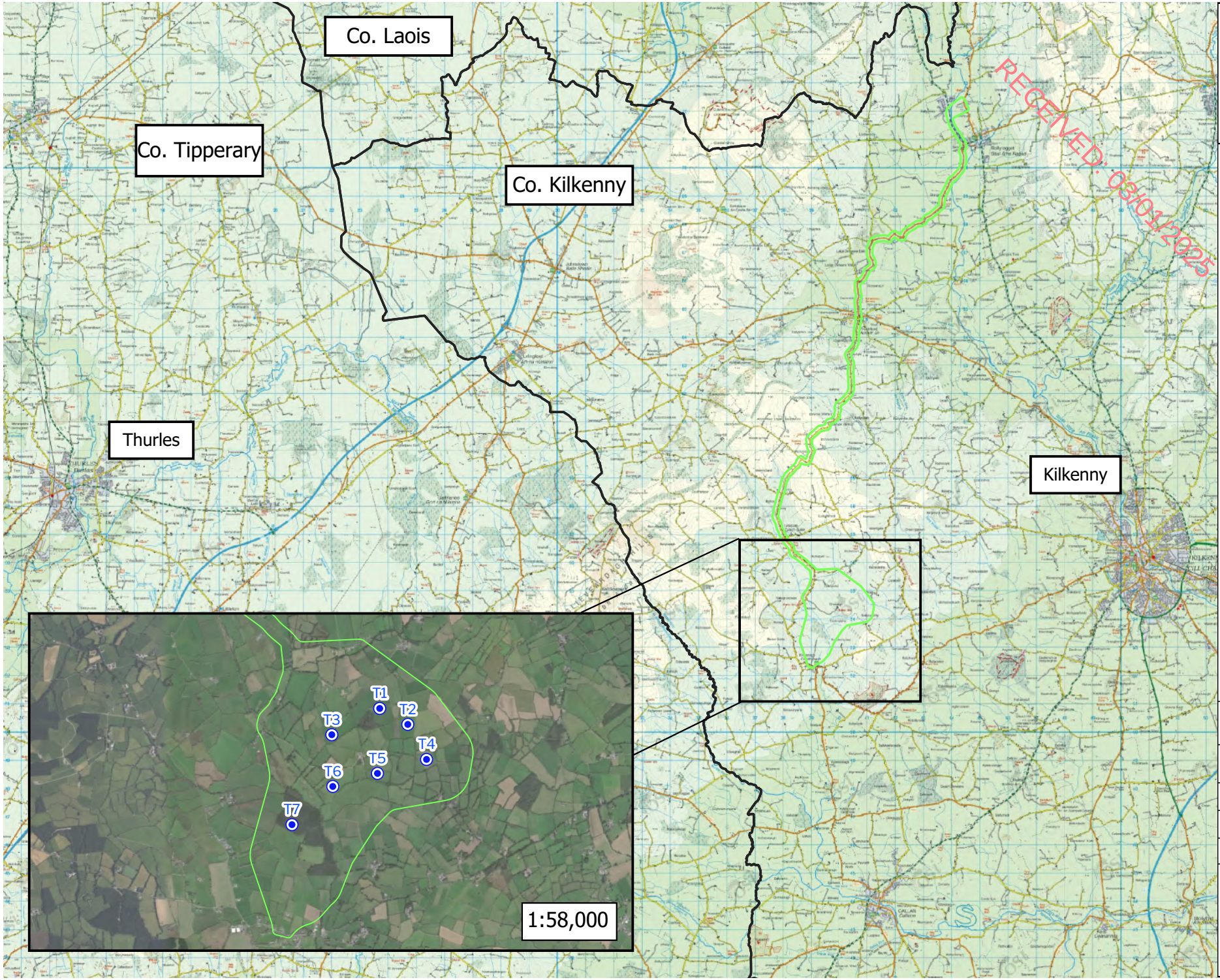
		Tree Inspection (Internal), Manual Transect Survey (Internal), Bat Habitat Appraisal (Internal), Emergence and Re-Entry Surveys (Internal).
Nora Szijarto (B.Sc., M.Sc.) 1.5 years	Bat Ecologist	B.Sc. Biology, University of Lausanne, Switzerland. M.Sc. Behaviour, Evolution and Conservation, University of Lausanne, Switzerland. Bat Detector and Survey Training (BCI), Kaleidoscope Pro Analysis (Wildlife acoustics), Endoscope Training (Internal), Structure & Tree Inspection (Internal), Manual Transect Survey (Internal), Bat Habitat Appraisal (Internal), Emergence and Re-Entry Surveys (Internal).
Deirdre McCarthy	Ecology Intern	Manual Transect Survey (Internal), Emergence and Re-Entry Surveys (Internal).

2. PROJECT DESCRIPTION

The Proposed Wind Farm is located within a rural, agricultural setting in northwest Kilkenny, approximately 9km west of Kilkenny City. The settlement of Kilmanagh is located approximately 1.2km south of the nearest proposed turbine, and the settlement of Tullaroan is located approximately 2.7km north of the nearest proposed turbine. The R695 regional road runs immediately south of the Proposed Wind Farm in an east-west orientation entering the settlement of Kilmanagh and then heading south from Kilmanagh towards Callan, passing within 1.3km of the nearest proposed turbine. Existing access is via farm entrances off the L5023 local road to the northwest, L5024 to the north, and L1009 to the south. The Proposed Wind Farm is traversed by a number of existing agricultural roads and tracks. The Site location context is shown in Figure 2-1. The full description of the Proposed Project is provided in Section 4.1 of Chapter 4 of this EIAR.

Landuse within the Proposed Wind Farm currently comprises a mix of pastoral agriculture and small-scale, private forestry. The surrounding landuse predominantly comprises pastoral agriculture and residential within Kilmanagh and Tullaroan.

It is proposed to connect the onsite 38 kV substation to the existing 110 kV Ballyragget substation in Moatpark, Co Kilkenny via 38 kV underground electrical cabling. The underground electrical cabling route is illustrated in Chapter 4, Figure 4-3. It is approximately 23km in length and located primarily within the public road corridor, with a short section (approximately 260m) located within a road within the Site and another short section (approximately 660m) passing through a number of agricultural fields and a private access track north of the Ballyragget substation. A full description of the Proposed Grid Connection is detailed in Section 4.1.2 of Chapter 4 of this EIAR.



Map Legend

- EIAR Site Boundary
- Proposed Turbine Locations

Drawing Title

Site Location

Project Title: Briskalagh Renewable Energy Development	
Drawn By: RC	Checked By: AJ
Project No.: 230502	Drawing No.: Figure 2-1
Scale: 1:175,000	Date: 2024-10-03

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

3. METHODS

3.1 Consultation

A scoping exercise was undertaken as part of the EIAR for the Proposed Project. A Scoping Document, providing details of the application site and the Proposed Project, was prepared by MKO and circulated to consultees in November 2023. As part of this exercise, prominent Irish conservation groups were contacted, and Bat Conservation Ireland (BCI), and the Department of Housing, Local Government and Heritage-Development Applications Unit (NPWS) were specifically invited to comment on the potential of the Proposed Project to affect bats.

Details of consultation responses specifically related to bats are provided in Section 4.1 below.

3.2 Desk Study

A desk study of published material was undertaken prior to conducting field surveys. The aim was to provide context to the Proposed Wind Farm site in order to assist bat survey planning and assessment. This included the identification of designated sites, species of interest or any other potential risk factors within the Proposed Wind Farm site and the surrounding region. The results of the desk study including sources of information utilised are provided below.

3.2.1 Bat Records

The National Bat Database of Ireland holds records of bat observations received and maintained by BCI. These records include results of national monitoring schemes, roost records as well as ad-hoc observations. The most recent search examined bat presence and roost records within a 10km radius of a central point within the Proposed Wind Farm site (Grid Ref: S 39679 54103) (BCI 2012, Hundt 2012, NatureScot, 2021). Available bat records were provided by Bat Conservation Ireland on 04/06/2024. Results from the National Biodiversity Data Centre were also reviewed for bat species present within the relevant 10km grid squares of the Proposed Wind Farm site.

3.2.2 Bat Species' Range

EU member states are obliged to monitor the conservation status of natural habitats and species listed in the Annexes of the Habitats Directive. Under Article 17, they are required to report to the European Commission every six years. In April 2019, Ireland submitted the third assessment of conservation status for Annex-listed habitats and species, including all species of bats (NPWS, 2019).

The 2019 Article 17 Reports were reviewed for information on bat species' range and distribution in relation to the location of the Proposed Wind Farm site. The aim was to identify any high-risk species at the edge of their range (NatureScot, 2021).

3.2.3 Designated Sites

The National Parks and Wildlife Service (NPWS) map viewer and website provides information on rare and protected species, sites designated for nature conservation and their conservation objectives. A search was undertaken of sites designated for the conservation of bats within a 10km radius of the centre point of the Proposed Wind Farm site (BCI 2012, Hundt, 2012, NatureScot, 2021). This included European designated sites, i.e. SACs, and nationally designated sites, i.e. NHAs and pNHAs.

3.2.4 Landscape Features

3.2.4.1 Ordnance Survey Mapping

Ordnance survey maps (OSI 1:5,000 and 1:50,000) and aerial photographs were reviewed to identify any habitats and features likely to be used by bats. Maps and images of the Proposed Wind Farm site and general landscape were examined for suitable foraging or commuting habitats including woodlands and forestry, hedgerows, treelines and watercourses. In addition, any potential roost sites, such as buildings and bridges, were noted for further investigation.

3.2.4.2 Geological Survey Ireland

The Geological Survey Ireland (GSI) online mapping tool and University of Bristol Speleological Society (UBSS) Cave Database for the Republic of Ireland were consulted for any indication of natural subterranean bat sites, such as caves, within 10 km of the Proposed Wind Farm site centre (BCI, 2012) (last searched on the 2nd October 2024). Furthermore, the archaeological database of national monuments was reviewed for any evidence of manmade underground structures, e.g. souterrains, that may be used by bats (last searched on the 2nd October 2024).

3.2.4.3 National Biodiversity Data Centre Bat Landscape Mapping

The National Biodiversity Data Centre (NBDC) map viewer presents "Bat Landscape" maps for individual species and for all species combined. Lundy *et al.* (2011) used Maximum Entropy Models to examine the relative importance of bat landscape and habitat associations in Ireland. The resulting map provides a 5-point scale, ranging from highest habitat suitability index (presented in red) to lowest suitability index (presented in green). However, squares highlighted as less favourable may still have local areas of abundance.

The location of the Proposed Wind Farm site was reviewed in relation to bat habitat suitability indices. The aim of this was to assess habitat suitability for all bat species within the Proposed Wind Farm site. It is worth noting that these results are based on a modelling exercise and not confirmed bat species records. Regardless, they may provide a useful indication of potential favourable bat associations within the Proposed Wind Farm site.

3.2.4.4 Additional Projects in the Wider Landscape

A search was conducted to identify permitted, operational and proposed wind energy developments within 10km of the proposed turbine locations. (NatureScot, 2021). This search adhered to methodologies outlined in Chapter 2, Section 3.8 The Wind Energy Ireland (WEI) interactive wind map (windenergyireland.com) was reviewed in conjunction with wind farm planning applications from Kilkenny and Tipperary County Council. Other infrastructure developments and proposals (e.g. large road projects and extractive industries) were also noted. Information on the location and scale of these developments was gathered to inform cumulative effects. More details on other infrastructure developments within the vicinity of the Proposed Project can be found in Chapter 2 of the main EIAR.

3.2.5 Multidisciplinary Surveys

Multidisciplinary walkover surveys were undertaken throughout 2023 and 2024. The Site was systematically and thoroughly walked in a ground-truthing exercise with the habitats on the Site assessed and classified. The habitats (including any culverts/bridges) were assessed for bat commuting, foraging and roosting suitability.

Multidisciplinary walkover surveys were undertaken on the following dates:

Table 3-1 Multidisciplinary Survey Effort

Multidisciplinary Survey	Dedicated Bat Survey
27th of July 2023	15th May 2023
28th of July 2023	6th June 2023
24th August 2023	18th July 2023
13th of September 2023	16th Aug 2023
21st of February 2024	27th Sept 2023
12th of March 2024	16th Oct 2023
21st of March 2024	21st of March 2024
22nd of March 2024	22nd of March 2024

3.3 Field Surveys

3.3.1 Bat Habitat Suitability Appraisal

Bat walkover surveys were carried out throughout 2023. During these surveys, habitats within the Proposed Wind Farm site were assessed for their suitability to support roosting, foraging and commuting bats. Connectivity with the wider landscape was also considered. Suitability was assessed according to Collins (2016) which provides a grading protocol for roosting habitats and for commuting and foraging areas. Suitability categories are divided into *High, Moderate, Low* and *Negligible*, and are described fully in **Appendix 1**.

3.3.2 Roost Surveys

Daytime Roost Inspections

A search for roosts was undertaken within 200m plus the rotor radius (i.e. 81.5m) of the proposed turbine locations. (NatureScot, 2021). The aim was to determine the presence of roosting bats and the need for further survey work or mitigation. The Proposed Wind Farm site was visited in May, June, July, September and October 2023. The watercourse crossings associated with the Proposed Grid Connection underground cabling route were assessed in March 2024. A walkover was carried out and structures were assessed for their potential to support roosting bats (see **Appendix 1** for criteria in assessing roosting habitats).

Three structures, and their associated outbuildings, were identified as potential roost features within the Proposed Wind Farm site (Grid Ref: S 39916 54409, S 39583 54179 and S 40862 53911). Additionally, one farm complex was identified just outside the Proposed Wind Farm site (Grid Ref: S 40960 53830). These were subject to a roost assessment which comprised a detailed inspection of the interiors and exteriors to look for evidence of bat use, including live and dead specimens, droppings, feeding remains, urine splashes, fur oil staining and noises. Locations of all Potential Roost Features (PRFs) are presented in Figure 3-1.

Watercourse, drain and culvert crossing infrastructure along the Proposed Grid Connection underground cabling route was also assessed for any suitability to host roosting bats. Surveys were carried out on the 21st and 22nd of March 2024 and comprised a detailed inspection of existing infrastructure to look for evidence of bat use. Locations of the watercourse, drain and culvert crossing infrastructure inspected are presented in Chapter 4 and Appendix 4-1.

Any potential tree roosts within the Proposed Wind Farm site were examined for the presence of rot holes, hazard beams, cracks and splits, partially detached bark, knot holes, gaps between overlapping branches and any other potential roost features (i.e. PRFs) identified by Andrews (2018).

Emergence Surveys

Emergence surveys at dusk were carried out which focused on the PRFs identified during the habitat appraisal within the Proposed Wind Farm site. During these surveys, surveyors were equipped with Bat Logger M bat detectors (Elekon AG, Lucerne, Switzerland). The emergence surveys commenced 15 minutes before sunset and concluded 90 minutes after sunset. Table 3-2 summarises survey effort in relation to emergence surveys. Where possible, species identification was made in the field and any other relevant information was also noted, e.g., numbers, behaviour, features used, etc. All bat echolocation was recorded for subsequent analysis to confirm species identifications.

Surveyors were located at PRFs identified during the daytime roost inspection surveys with a focus on potential access point and roosting features. The purpose was to identify any bat species, numbers, access points and roosting locations within the PRF structure. Surveys were carried out in favourable weather conditions.

Table 3-2 2023 Survey Effort - Emergence Surveys

Date	Surveyors	Sunrise/ Sunset	Type	Weather
31st May 2023	Laura Gránicz and Ryan Connors	21:40	Dusk Emergence	20-11°C, dry, calm, moon not visible, 0% cloud cover
27th July 2023	Laura Gránicz, Ryan Connors, Nora Szijarto and Deirdre McCarthy	21:30	Dusk Emergence	19-17°C, dry, calm, 50% moon visible, 55%-40% cloud cover
12th October 2023	Laura Gránicz and Ryan Connors	18:42	Dusk Emergence	17-15°C, dry, calm, moon not visible, 100% cloud cover

3.3.3 Manual Transects

Manual activity surveys comprised walked transects after dusk. A series of representative transect routes were selected throughout the Proposed Wind Farm site. The aim of these surveys was to identify bat species using the Proposed Wind Farm site and gather any information on bat behaviour and important features used by bats. Transect routes were prepared with reference to the Proposed Wind Farm site layout, desktop and walkover survey results as well as any health and safety considerations and access limitations. As such, transect routes generally followed existing roads and tracks. Transect routes undertaken in 2023 are presented in Figure 3-1.

Transects were walked by two surveyors, recording bats in real time. Transects commenced immediately after the dusk emergence surveys and were completed for up to 3 hours after sunset. Surveyors were equipped with active full spectrum bat detectors, the Batlogger M bat detector (Elekon AG, Lucerne, Switzerland), and all bat activity was recorded for subsequent analysis to confirm species identifications. Transects surveys were undertaken in spring, summer and autumn 2023. Table 3-3 summarises survey effort in relation to manual transects.

Table 3-3 Survey Effort - Manual Transects

Date	Surveyors	Sunrise/ Sunset	Survey Type	Time	Weather	Transect (km)
31st May 2023	Laura Gránicz & Ryan Connors	21:40	Dusk Emergence and Transect	23:10 – 00:40	12-10°C, dry, calm, moon not-visible, 0% cloud cover	4.6 km
27th July 2023	Laura Gránicz & Ryan Connors	21:30	Dusk Emergence and Transect	23:00 – 00:36	22-15°C, dry, calm, 50% moon visible, 40% cloud cover	6.3 km
12th October 2023	Laura Gránicz & Ryan Connors	18:42	Dusk Emergence and Transect	20:12 – 21:42	15°C, light rain, dry-light drizzle, calm, moon non-visible, 100% cloud cover	4.6 km

Map Legend

- EIAR Site Boundary
- Proposed Turbine Locations

Building Inspections

- High
- Moderate
- Low
- Negligible

- Spring Transect Route
- Summer Transect Route
- Autumn Transect Route

Drawing Title

Survey Effort 2023

Project Title	
Briskalagh Renewable Energy Development	
Drawn By: RC	Checked By: AJ
Project No.: 230502	Drawing No.: Figure 3-1
Scale: 1:18,000	Date: 2024-09-11

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

3.3.4 Ground-level Static Surveys

Where developments have less than 10 turbines, NatureScot requires 1 detector per turbine (up to 10 plus 1 detector for every 3 additional turbines). Given that 8 no. turbines were proposed at the time of the surveys, 8 detectors were deployed to ensure compliance with NatureScot guidance. The final design includes 7 no. turbines. Automated bat detectors were deployed for at least 10 nights in spring (April-May), 20 nights of summer (June-mid August) and 10 nights of autumn (mid-August-October) (NatureScot, 2021/NIEA, 2021). Detector locations were based on indicative turbine locations. Figure 3-2 presents static detector locations in relation to the final proposed layout. Static detector locations are described in Table 3-4.

Table 3-4 Ground-level Static Detector Locations 2023

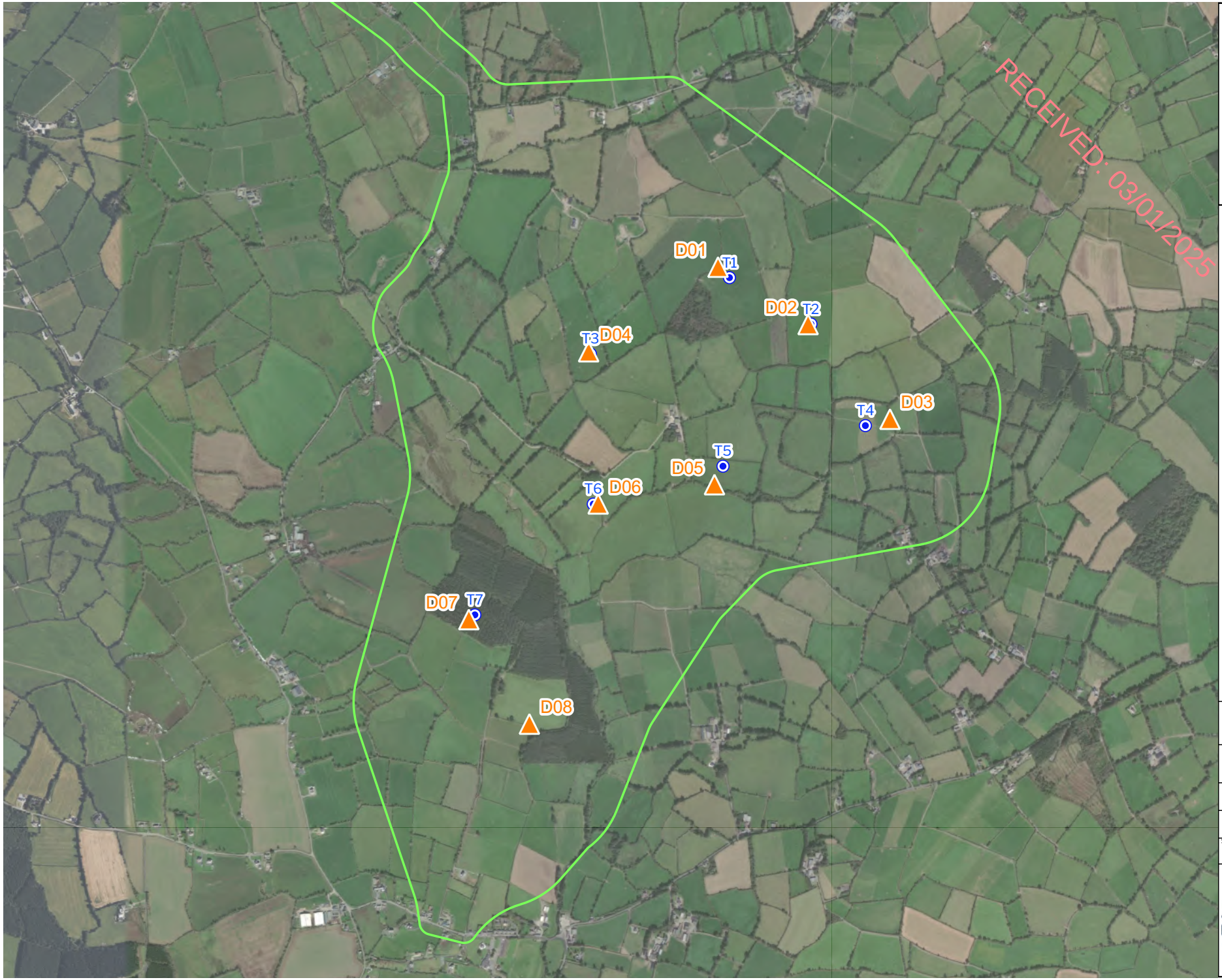
ID	Location (IG Ref)	Habitat	Linear Feature within 50m	Corresponding/ Nearest Turbine(s)
D01	S 40096 55016	Improved agricultural grassland (GA1)	WL1	T01
D02	S 40461 54783	Improved agricultural grassland (GA1)	N/A	T02
D03	S 40793 54400	Improved agricultural grassland (GA1)	Treelines (WL2)	T03
D04	S 39571 54674	Improved agricultural grassland (GA1)	N/A	T04
D05	S 40112 54177	Improved agricultural grassland (GA1)	Treelines (WL2)	T05
D06	S 39609 54056	Improved agricultural grassland (GA1)	Treelines (WL2)	T06
D07	S 39086 53585	Conifer plantation (WD4)	Treelines (WL2)	T07
D08	S 39332 53164	Improved agricultural grassland (GA1)	Hedgerow (WL1)	T07

Full spectrum bat detectors, Song Meter SM4BAT (Wildlife Acoustics, Maynard, MA, USA), were employed using settings recommended for bats, with minor adjustments in gain settings and band pass filters to reduce background noise when recording. Detectors were set to record from 30 minutes before sunset until 30 minutes after sunrise. The Song Meter automatically adjusts sunset and sunrise times using the Solar Calculation Method when provided with GPS coordinates.

Onsite weather monitoring was undertaken concurrently with static detector deployments. One Vantage Pro 2 (Davis Instruments, CA, UCS) was deployed each season and night-time hourly data was tracked remotely to ensure a sufficient number of nights (i.e. minimum 10-20 nights) with appropriate weather conditions were captured (i.e. dusk temperatures above 8˚C, wind speeds less than 5m/s and no or only very light rainfall). Table 3-5 summarises survey effort achieved in 2023 for each of the detector locations.

Table 3-5 2023 Survey Effort - Ground-level Static Surveys

Season	Survey Period	Total Survey Nights per Detector Location	Nights with Appropriate Weather
Spring 2023	18th May – 31st May 2023	13	13
Summer 2023	29th June – 27th July 2023	28	25
Autumn 2023	28th September – 12th October 2023	14	14
Total Survey Effort		**55**	**52**



Map Legend

- EIAR Site Boundary
- Proposed Turbine Locations
- Static Detector Locations

Drawing Title: Static Detector Locations 2023

Project Title: Briskalagh Renewable Energy Development

Drawn By	Checked By
RC	AJ
Project No.	**Drawing No.**
230502	Figure 3-2
Scale	**Date**
1:20,000	2024-09-11

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

3.4 Bat Call Analysis

All recordings from were later analysed using bat call analysis software Kaleidoscope Pro v.5.4.8 (Wildlife Acoustics, MA, USA). The aim of this was to identify, to a species or genus level, what bats were present at the Proposed Wind Farm site. Bat species were identified using established call parameters, to create site-specific custom classifiers and were manually verified.

Echolocation signal characteristics (including signal shape, peak frequency of maximum energy, signal slope, pulse duration, start frequency, end frequency, pulse bandwidth, inter-pulse interval and power spectra) were compared to published signal characteristics for local bat species (Russ, 1999). Myotis species (potentially Daubenton's bat (*M. daubentonii*), Whiskered bat (*M. mystacinus*), Natterer's bat (*M. nattereri*) were considered as a single group, due to the difficulty in distinguishing them based on echolocation parameters alone (Russ, 1999). The echolocation of soprano pipistrelle (*P. pygmaeus*) and common pipistrelle (*P. pipistrellus*) are distinguished by having distinct frequencies (peak frequency of maximum energy in search flight) of ~55 kHz and ~46 kHz respectively (Jones & van Parijs, 1993).

Plate 3-1 below shows a typical sonogram of echolocation pulses for common pipistrelle recorded with a SM4BAT bioacoustic static bat recording device. The recorded file is illustrated using Wildlife Acoustics Kaleidoscope software.

Individual bats of the same species cannot be distinguished by their echolocation alone. Thus, 'bat passes' was used as a measure of activity (Collins, 2016). A bat pass was defined as a recording of an individual species/species group's echolocation containing at least two echolocation pulses and of maximum 15s duration. All bat passes recorded in the course of this study follow these criteria, allowing comparison.

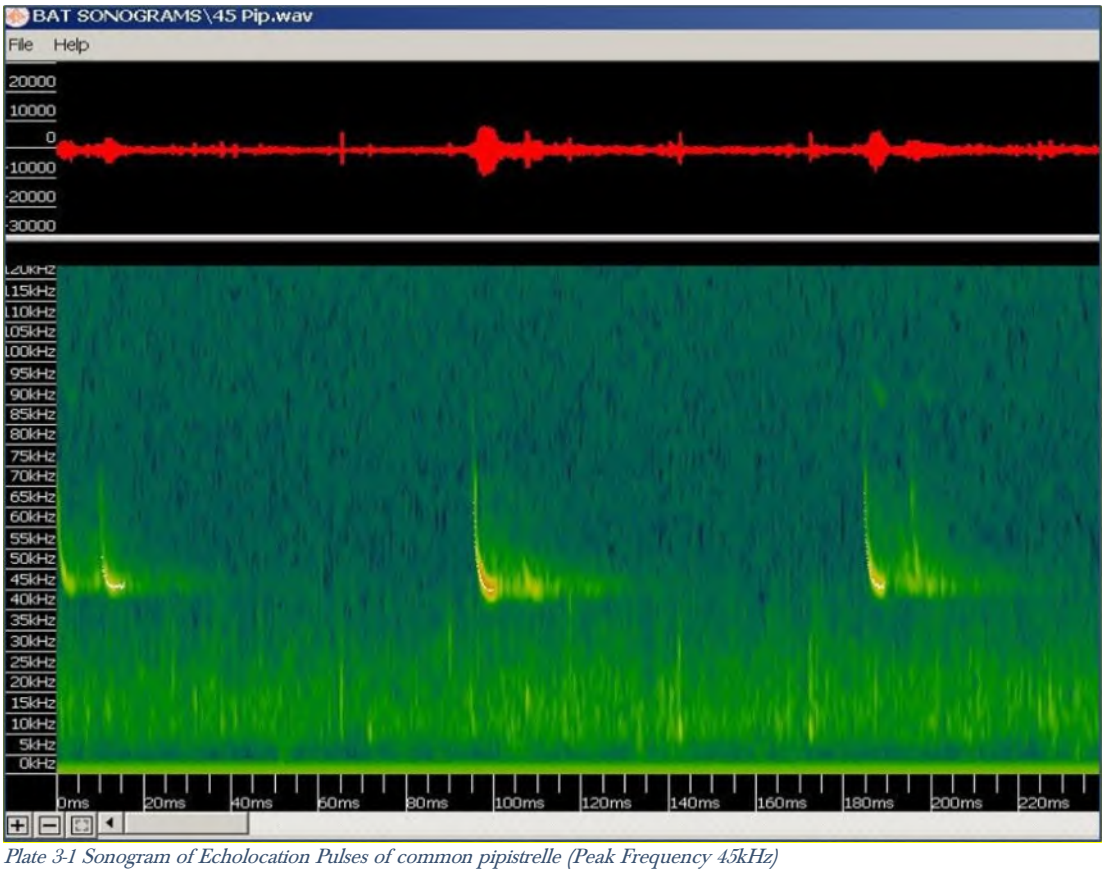


Plate 3-1 Sonogram of Echolocation Pulses of common pipistrelle (Peak Frequency 45kHz)

3.5 Assessment of Bat Activity Levels

The online database tool Ecobat (mammal.org.uk) is recommended by NatureScot 2021 to assess bat activity levels within a proposed wind-farm site. This web-based interface, launched in August 2016, allows users to upload activity data and to contrast results with a comparable reference range, allowing objective interpretation. Uploaded data then contributes to the overall dataset to provide increasingly robust outputs. Ecobat generates a percentile rank for each night of activity and provides a numerical way of interpreting levels of bat activity in order to provide objective and consistent assessments. Table 3-6 defines bat activity levels as they relate to Ecobat percentile values (NatureScot, 2021).

Table 3-6 Ecobat Percentile Score and Categorised Level of Activity (NatureScot, 2021)

Ecobat Percentile	Bat Activity Level
81 to 100	High
61 to 80	Moderate to High
41 to 60	Moderate
21 to 40	Low to Moderate
0 to 20	Low

Ecobat was unavailable for a cross-site analysis of 2023 data as the platform has been undergoing maintenance since late 2022 with no proposed timeline of a relaunch. Therefore, data were assessed on a site-specific basis.

Following preliminary analysis and manual verification using Kaleidoscope Pro, statistical analysis and visualisation was performed using RStudio (version 2023.12.1+402.) and R (version 4.3.3). RStudio, an integrated development environment for the R programming language, was employed for data cleaning, exploration, and data visualisation. The 'ggplot2' R package was particularly instrumental in creating the data visualisations shown in the results section. Data was standardised into bat pass rates, calculated as bat passes per hour (total bat passes / night length) to account for seasonal changes in night length (Matthews *et al.* 2016). Activity is often variable between survey nights. Therefore, the median Nightly Pass Rate was used as the most appropriate measure of bat activity (Lintott & Mathews, 2018). During all calculations, data was rounded to at least three decimal places. When visualising the bat pass rates per season, survey effort was defined as detector hours (sum of recorded hours across all detectors). This was defined to circumvent any issues arising from differences in survey effort between detectors in a season.

The methodology used to assess activity levels across the Proposed Wind Farm site was adapted from Mathews *et al.* (2016), where activity ranges of pipistrelle species were defined using an average of maximum nightly pass rates (in total passes during the survey period) across the Proposed Wind Farm site, divided into tertiles. Widespread pipistrelle species' activity ranges were determined using an average of maximum nightly pass rates (total passes during the survey period) across the Proposed Wind Farm site, divided into quartiles. The same process was applied to Leisler's bats. For all other species groups maximum nightly pass rate (bpph) recorded across the Proposed Wind Farm site divided into quartiles was used. Activity levels were assessed separately for widespread pipistrelle species (*Pipistrellus pipistrellus, Pipistrellus pygmaeus*), noctules (*Nyctalus leisleri*), Myotis spp. and rare or hard to record species brown long-eared bat (*Plecotus auritus*) and Nathusius pipistrelle (*Pipistrellus nathusii*). Median and maximum nightly activity (bpph) at each detector location were then categorized as Low, Medium, or High for each recorded season. Any figure below 25% of the maximum/average maximum nightly pass rate was considered Low activity, while figures above 75% were classified as High. Values falling between these two quartiles were defined as Medium. To prevent skewing the activity threshold towards high levels, any evident outliers recorded across the detectors were excluded. Table 3-7 presents activity ranges per species group identified.

Table 3-7 Site-specific Activity Level Categories based on Maximum Bat Passes per Hour (bpph)

Assessment Level	Activity Threshold as Bat Passes per Hour (bpph) for Bat Species				
	Myotis spp.	*Nyctalus spp.*	*Nathusius pipistrelle*	*Pipistrellus spp.*	*Brown long-eared bat*
Low	< 4.50	< 2.38	< 0.36	< 5.18	< 1.12
Medium	4.50 – 13.51	2.38 – 7.13	0.36 - 1.07	5.18 – 15.54	1.12 – 3.35
High	> 13.51	> 7.13	> 1.07	> 15.54	> 3.35

Based on experience gained surveying a large number of development sites, the calculated activity thresholds were considerably high for all species surveyed. Thresholds were therefore adapted to more representative activity levels for agricultural/wet grassland and woodland habitats based on MKO's experience with similar habitats, as presented in Table 3-8.

Table 3-8 Adapted Activity Level Categories

Assessment Level	Activity Threshold as Bat Passes per Hour (bpph) for Bat Species				
	Myotis spp.	*Nyctalus* spp.	*Nathusius pipistrelle*	*Pipistrellus* spp.	Brown long-eared bat
Low	< 1.14	< 0.91	< 0.17	< 3.81	< 0.34
Medium	1.14 – 3.42	0.91 – 2.73	0.17 – 0.51	3.81 – 11.44	0.34 – 1.03
High	> 3.42	> 2.73	> 0.51	> 11.44	> 1.03

3.6 Assessment of Collision Risk

3.6.1 Population Risk

NatureScot (2021) provides a generic assessment of bat collision risk for UK species, based on species behaviour and flight characteristics. In the guidelines, this measure of collision risk is used, in combination with relative abundance, to indicate the potential vulnerability of British bat populations. No such assessment is provided for Irish bat populations.

In Plate 3-2, an adapted assessment of vulnerability of Irish bat populations to collision with wind turbine blades is provided. This adaptation of the NatureScot Guidance Table 2 was based on collision risk and species abundance of Irish bat populations. Species' collision risk follows those described in NatureScot (2021). Relative abundance for Irish species was determined in accordance with Wray *et al.* (2010) using population data available in the 2019 Article 17 reports (NPWS, 2019). Feeding and commuting behaviours, and habitat preferences for bat species in Ireland were also considered.

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

Low Population Vulnerability	Medium Population Vulnerability	High Population Vulnerability

Plate 3-2 Population Vulnerability of Irish Bat Species (Adapted from NatureScot, 2021)

3.6.2 Site Risk

The likely impact of a proposed development on bats is related to site-based risk factors, including habitat and development features. The cross-tablature result of habitat risk and project size determines the site risk (i.e. Low, Medium or High) (Plate 3-3) i.e. Table 3a (NatureScot, 2021). Table 5-1 in the results section describes the criteria and site-specific characteristics used to determine an indicative risk level for the Proposed Wind Farm site. All site assessment levels, as per NatureScot (2021) are presented in **Appendix 2**.

		Project Size		
		Small	Medium	Large
Habitat Risk	Low	1	2	3
	Moderate	2	3	4
	High	3	4	5

Low/Lowest Site Risk (1-2)	Medium Site Risk (3)	High/Highest Site Risk (4-5)

Plate 3-3 Site-risk Level Assessment Matrix (Table 3a, NatureScot, 2021)

3.6.3 Overall Risk Assessment

An overall assessment of risk was made by combining the site risk level (i.e. Medium) and the population risk (i.e. Ecobat bat activity outputs), as shown in the overall risk assessment matrix table (Plate 3-4) i.e. Table 3b (NatureScot, 2021). The assessment was carried out for both median and maximum activity categories in order to provide insight into typical bat activity (i.e. median values) and activity peaks (i.e. maximum values) (**Appendix 3**).

	Ecobat Activity Category					
Site Risk Level	Nil (0)	Low (1)	Low-Moderate (2)	Moderate (3)	Moderate-High (4)	High (5)
Lowest (1)	0	1	2	3	4	5
Low (2)	0	2	4	6	8	10
Medium (3)	0	3	6	9	12	15
High (4)	0	4	8	12	16	18
Highest (5)	0	5	10	15	20	25

Low Overall Risk (0-4)	Medium Overall Risk (5-12)	High Overall Risk (15-25)

Plate 3-4 Overall Risk Assessment Matrix (Table 3b, NatureScot, 2021)

This exercise was carried out for each high collision risk species. Overall risk assessments were also considered in the context of any potential impacts at the population level, particularly for species identified as having high population vulnerability (Plate 3-2 above).

3.7 Limitations

A comprehensive suite of bat surveys has been undertaken at the Proposed Wind Farm site in 2023 and at the Proposed Grid Connection in 2024. The surveys undertaken at the Proposed Wind Farm site, in accordance with NatureScot Guidance, provide the information necessary to allow a complete, comprehensive and robust assessment of the potential impacts of the Proposed Wind Farm site on bats receptors.

The information provided in this report accurately and comprehensively describes the baseline environment; provides an accurate prediction of the likely effects of the Proposed Project; prescribes mitigation as necessary; and describes the predicted residual impacts. The specialist studies, analysis and reporting have been undertaken in accordance with the appropriate guidelines.

No limitations in the scope, scale or context of the assessment have been identified. Overall, a comprehensive assessment has been achieved.

4. SURVEY RESULTS

4.1 Consultation

4.1.1 Bat Conservation Ireland

Bat Conservation Ireland were invited to comment on the potential of the Proposed Project to affect bats. As of 2nd October 2024, no response has been received.

4.1.2 Development Applications Unit - NPWS

The Development Applications Unit were also invited to provide any feedback, comments or suggestions they might have relating to the Proposed Project. A response was received from the Department of Housing, Local Government and Heritage on the 15th of January 2024, in which they stated that they were not in a position to make specific recommendations on this particular development at this time.

4.2 Desk Study

4.2.1 Bat Records

Bat Conservation Ireland

A data request was sent to Bat Conservation Ireland for records of bat activity and roosts within a 10km radius of an approximate central point in the Proposed Wind Farm site (Grid Ref: S 39679 54103); last search 13/06/2024). Available bat records were provided by BCI on 4th June 2024. The search included roosts, transects and ad-hoc observations. A number of ad-hoc observations (n=31) have been recorded. At least seven of Ireland's nine resident bat species were recorded within 10km of the Proposed Wind Farm site. The results of the database search are provided in Table 4-1.

Table 4-1 National Bat Database of Ireland Records within 10km of the Proposed Wind Farm site centre

Survey Type	Species	Grid reference	Date	Location
Roost	Pipistrellus pygmaeus	S4352	N/A	Ballycallan, County Kilkenny
	Myotis daubentonii, Plecotus auritus, Myotis natterreri	S4894563620	N/A	Ballyrafton Wood, Jenkinstown, Co. Kilkenny
Transect	Myotis daubentonii, Unidentified bat	S3410347108	N/A	Along railway track, River Suir
	Myotis daubentonii, Unidentified bat	S4789062850	N/A	Dinin Bridge Transect
	Pipistrellus pipistrellus (45kHz), Pipistrellus spp. (45kHz/55kHz), Nyctalus leisleri, Pipistrellus pygmaeus, Unidentified bat	S3936549954	N/A	S12 (1) 2004-
	Pipistrellus pygmaeus, Pipistrellus spp. (45kHz/55kHz), Pipistrellus pipistrellus (45kHz), Unidentified bat, Myotis spp., Nyctalus leisleri	S3521649021	N/A	S12 (2) 2004-

	Pipistrellus pipistrellus (45kHz), Pipistrellus pygmaeus, Pipistrellus spp. (45kHz/55kHz), Nyctalus leisleri, Unidentified bat	S308644852 0	N/A	S12 (3) 2004-
	Pipistrellus pipistrellus (45kHz), Pipistrellus spp. (45kHz/55kHz), Nyctalus leisleri, Pipistrellus pygmaeus, Myotis spp.	S354628	N/A	S15 (2) 2005-
	Pipistrellus spp. (45kHz/55kHz), Nyctalus leisleri, Plecotus auritus, Pipistrellus nathusii, Pipistrellus pygmaeus, Pipistrellus pipistrellus (45kHz)	S354600	N/A	S15 (3) 2005-
	Unidentified bat, Pipistrellus pygmaeus, Pipistrellus spp. (45kHz/55kHz), Nyctalus leisleri, Pipistrellus pipistrellus (45kHz)	S345582	N/A	S15 (4) 2005-
	Myotis spp., Pipistrellus spp. (45kHz/55kHz), Nyctalus leisleri, Pipistrellus pygmaeus, Pipistrellus pipistrellus (45kHz)	S350552	N/A	S15 (5) 2005-
	Pipistrellus pygmaeus, Pipistrellus pipistrellus (45kHz), Unidentified bat, Nyctalus leisleri, Pipistrellus spp. (45kHz/55kHz)	S306532	N/A	S15 (6) 2005-
	Myotis daubentonii, Unidentified bat	S465626	N/A	Three Castles Bridge, Spot 1-10
	Pipistrellus pygmaeus, Unidentified bat, Myotis daubentonii	S458216270 9	N/A	Threecastles Bridge Transect
Ad-Hoc	Pipistrellus pipistrellus (45kHz), Pipistrellus pygmaeus	S490570	06/2009	Consultancy Survey
	Pipistrellus pipistrellus (45kHz), Pipistrellus pygmaeus, Nyctalus leisleri	S454513	29/05/2009	BATLAS 2010
	Pipistrellus pipistrellus (45kHz), Pipistrellus pygmaeus, Myotis spp.	S460573	29/05/2009	BATLAS 2010
	Pipistrellus pipistrellus (45kHz), Pipistrellus pygmaeus, Myotis daubentonii	S495594	29/05/2009	BATLAS 2010
	Unidentified bat, Pipistrellus pygmaeus, Nyctalus leisleri	S377568	08/08/2009	BATLAS 2010
	Unidentified bat, Pipistrellus pipistrellus (45kHz), Pipistrellus spp. (45kHz/55kHz), Myotis daubentonii	S334544	08/08/2009	BATLAS 2010
	Pipistrellus pygmaeus, Plecotus auritus	S327621	08/08/2009	BATLAS 2010
	Pipistrellus pipistrellus (45kHz), Nyctalus leisleri, Myotis spp.	S397477	31/05/2009	BATLAS 2010
	Pipistrellus pipistrellus (45kHz)	S429574490 9	17/07/2017	BATLAS 2020

	Pipistrellus pipistrellus (45kHz), Myotis daubentonii	S3912346706	09/06/2018	BATLAS 2020
	Pipistrellus pygmaeus	S4782146921	14/07/2017	BATLAS 2020
	Pipistrellus pipistrellus (45kHz), Pipistrellus pygmaeus, Nyctalus leisleri, Myotis natterreri, Myotis spp.	S3968047726	09/06/2018	BATLAS 2020
	Pipistrellus pygmaeus	S4762747823	13/07/2017	BATLAS 2020
	Pipistrellus pygmaeus, Nyctalus leisleri	S3108248410	10/06/2018	BATLAS 2020
	Pipistrellus pipistrellus (45kHz), Plecotus auritus	S4279052059	22/09/2018	BATLAS 2020
	Pipistrellus pygmaeus, Plecotus auritus, Myotis natterreri	S3937652316	21/09/2018	BATLAS 2020
	Pipistrellus pipistrellus (45kHz), Pipistrellus pygmaeus	S4652452853	22/09/2018	BATLAS 2020
	Pipistrellus pipistrellus (45kHz), Pipistrellus pygmaeus	S4649652888	22/09/2018	BATLAS 2020
	Pipistrellus pipistrellus (45kHz), Plecotus auritus	S4268053792	22/09/2018	BATLAS 2020
	Pipistrellus pipistrellus (45kHz), Pipistrellus pygmaeus	S3341854448	21/09/2018	BATLAS 2020
	Pipistrellus pipistrellus (45kHz),Pipistrellus pygmaeus	S4190356312	22/09/2018	BATLAS 2020
	Pipistrellus pipistrellus (45kHz),Pipistrellus pygmaeus	S4189956353	22/09/2018	BATLAS 2020
	Pipistrellus pipistrellus (45kHz),Pipistrellus pygmaeus,Nyctalus leisleri,Pipistrellus nathusii	S3771556881	21/09/2018	BATLAS 2020
	Pipistrellus pipistrellus (45kHz),Pipistrellus pygmaeus,Plecotus auritus,Myotis natterreri	S4568957267	22/09/2018	BATLAS 2020
	Nyctalus leisleri	S3433458436	21/09/2018	BATLAS 2020
	Pipistrellus pipistrellus (45kHz)	S3439761996	11/08/2018	BATLAS 2020
	Pipistrellus pipistrellus (45kHz),Pipistrellus pygmaeus,Nyctalus leisleri,Myotis daubentonii,Myotis natterreri	S4577362680	10/08/2018	BATLAS 2020
	Pipistrellus pipistrellus (45kHz),Plecotus auritus,Myotis natterreri	S3689363217	11/08/2018	BATLAS 2020
	Pipistrellus pipistrellus (45kHz),Pipistrellus pygmaeus,Nyctalus leisleri,Myotis daubentonii	S4900056000	01/06/2007	Consultancy Survey
	Pipistrellus pipistrellus (45kHz),Pipistrellus pygmaeus,Plecotus auritus,Nyctalus leisleri	S4330063350	29/05/2007	Consultancy Survey

	Myotis daubentonii	S494644	22/06/2019	National Biodiversity Data Centre Bat Records

National Bat Database of Ireland

The National Bat Database of Ireland was searched for records of bat activity and roosts within a 10km radius of the Proposed Wind Farm site centre (last search 13/06/2024). Hectad S35 and S45 lies within 10km of the Proposed Wind Farm site. Four of Ireland's nine resident bat species were recorded within 10km of the Proposed Wind Farm site works. The results of the database search are provided in Table 4-2.

Table 4-2 NBDC Bat Records within 10km of Proposed Project

Hectad	Species	Database	Designation
S35, S45	Common pipistrelle (*Pipistrellus pipistrellus*)	National Bat Database of Ireland	HD Annex IV, WA
S35, S45	Soprano pipistrelle (*Pipistrellus pygmaeus*)	National Bat Database of Ireland	HD Annex IV, WA
S35, S45	Daubenton's bat (*Myotis daubentonii*)	National Bat Database of Ireland	HD Annex IV, WA
S35, S45	Leisler's bat (*Nyctalus leisleri*)	National Bat Database of Ireland	HD Annex IV, WA

4.2.2 Bat Species Range

The potential for negative impacts is likely to increase where there are high risk species at the edge of their range (NatureScot, 2021). Therefore, range maps presented in the 2019 Article 17 Reports (NWPS, 2019) were reviewed in relation to the location of the Proposed Wind Farm site.

The Proposed Wind Farm site is located outside the current known range for lesser horseshoe bat, Natterer's bat and Whiskered bat and is within the range of all other species.

4.2.3 Designated Sites

Within Ireland, the lesser horseshoe bat is the only bat species requiring the designation of Special Areas of Conservation (SACs). The Proposed Wind Farm site is located outside the current known range of this species (NPWS, 2019) and is approximately 96 km away from the nearest designated SAC for the lesser horseshoe bat (Curraghchase Woods SAC).

Natural Heritage Areas (NHAs) and proposed Natural Heritage Areas (pNHAs) may be designated for any bat species. A search of NHAs and pNHAs within a 10km radius of the Proposed Wind Farm site centre found no sites designated for the conservation of bats.

4.2.4 Landscape Features and Habitat Suitability

A review of mapping and photographs provided insight into the habitats and landscape features present at the Proposed Wind Farm site. In summary, the primary land use within the Proposed Wind Farm site is improved agricultural grassland and conifer forestry.

A review of the GSI online mapper did not indicate the possible presence of any subterranean sites within the Proposed Wind Farm site and a search of the National Monuments Database did not reveal the presence of any manmade subterranean sites within the Proposed Wind Farm site.

A search of the UBSS Cave Database for the Republic of Ireland found no caves within the Proposed Wind Farm site and three within 10km of the Proposed Wind Farm site centre (Table 4-3).

A review of the NBDC bat landscape map provided a habitat suitability index of 24.78 (Yellow) to 31.56 (Orange). This indicates that the Proposed Wind Farm site has Low to Moderate habitat suitability for bat species.

Table 4-3 Caves and subterranean sites within 10km of the Proposed Wind Farm site centre

Caves	Distance from Site	Description
Within 10km of the Proposed Wind Farm site		
Holedensrath Cave	6.9 km	Seven muddy rifts totalling 71 metres
Ballintaggart Quarry Cave	7.2 km	100 metres of streamway to sumps
Kilbrickan Cave	9.7 km	Sink and chamber

4.2.5 Additional Projects in the Wider Landscape

Table 4-4 provides an overview of wind farm developments within 5 and 10 km of the proposed turbine locations.

Table 4-4 Wind farm developments within 10km of the proposed turbine locations

Wind Farm	Status	No. of Turbines	Turbine Height
Less than 5km			
Foyle Wind Farm*	Existing	5	Tip Height 121m
Kyleballyoughter Wind Farm	Permitted	2	Tip Height 121m
5 to 10km			
Ballybay Wind Farm	Existing	13	Tip Height 110m
Farranrory Wind Farm	Permitted	9	Tip Height 150m
An Cnoc Wind Farm	Existing	5	Tip height 99.5m

**4 existing turbines with an additional permitted turbine.*

In addition to wind energy developments, four other EIA planning applications were noted within 10km of the proposed turbine locations. These include the following:

- EIA Portal Ref: 2023037 - Planning permission of 27yrs sought for continued use and extension of existing dimension stone quarry & provision of new maintenance workshop (160sq.m.) within application area of 15.8ha. and restoration to ecological/agricultural afteruse.
- EIA Portal Ref: 2021233 - The installation of 2250 metres of 38KV underground grid connection comprising cable ducting and associated electrical cabling and all other ancillary works including joint bays, culverts, maker posts and all associated development.
- EIA Portal Ref: 2021145 - The installation of 31.489 km of 38 KV cable ducting and associated electrical cabling and all other ancillary works including joint bays, culverts, maker posts and all associated development.

- EIA Portal Ref: 2019200 – A 10-year permission for a mixed-use permission consisting of 266 no. residential units, 2 no. office blocks, nursing home, 2 no. retail/commercial units with offices overhead, creche and delivery of 3.96 hectares of open parkland.

4.3 Field Surveys

4.3.1 Bat Habitat Suitability Appraisal

4.3.1.1 Proposed Wind Farm Infrastructure

A total of fifteen habitats were recorded within and surrounding the Proposed Wind Farm infrastructure footprint, including:

- *Conifer Plantation (WD4)*
- *Mixed broadleaved/conifer woodland (WD2)*
- *Broad-leaved woodland (WD1)*
- *Semi-Native Woodland (WN6)*
- *Spoil and Bare Ground (ED2)*
- *Recolonising Bare Ground (ED3)*
- *Eroding/Upland rivers (FW1)*
- *Drainage Ditches (FW4)*
- *Improved Agricultural Grassland (GA1)*
- *Wet Grassland (GS4)*
- *Buildings and Artificial Surfaces (BL3)*
- *Dry Meadows and Grassy Verges (GS2)*
- *Scrub (WS1)*
- *Hedgerow (WL1)*
- *Treeline (WL2)*

Further details on habitats within the Proposed Wind Farm can be found in Chapter 6 of the main EIAR. Habitats within the Proposed Wind Farm are dominated by large areas of improved agricultural grassland, with smaller areas of wet grassland, treeline/hedgerow and forestry/woodland habitats.

Results from the desktop review and walkover surveys were used to assess habitats for their suitability to support foraging and commuting bats, and roosting bats, according to Collins (2016). Suitability categories, divided into *High, Moderate, Low* and *Negligible*, are described fully in **Appendix 1.**

With regard to foraging and commuting bats, exposed areas of grassland and farmland (tilled and arable) habitats outlined above, as well as spoil and bare ground and recolonising bare ground, were considered *Low* suitability, i.e. habitat that could be used by small numbers of commuting bats such as gappy hedgerow or unvegetated stream but isolated (Collins, 2016). Areas of scrub, conifer plantation and drainage ditches provide connectivity via linear features to the surrounding landscape. As such, they were assessed as having *Moderate* suitability i.e. habitat that is connected to the wider landscape that could be used by bats for foraging such as trees, scrub, grassland or water (Collins, 2016). Due to their varying levels of maturity and connectivity, treelines and hedgerows were assessed as having *Moderate* to *High* suitability. While mature mixed broadleaf woodland and depositing lowland rivers were assessed as having *High* suitability, i.e. continuous, high-quality habitat that is well connected to the wider landscape that is likely to be used regularly by commuting bats such as river valleys, streams, hedgerows, lines of trees and woodland edge. (Collins, 2016).

Trees present on the Proposed Wind Farm site comprise a mixture of mature and immature conifer and broadleaved species. With regards to roosting bats, a number of mature broadleaf trees were identified within the bat felling buffers which present *Negligible* to *Moderate* roosting potential. In relation to bat felling buffers, a minimum 50m buffer between turbine blade tip and nearest woodland (or other key habitat features) used by bats (e.g., hedgerows, treelines etc.) is recommended at all wind turbines (NatureScot, 2021). Further detail on bat felling buffers is outlined in in Section 6.1.3 below.

The trees assessed varied in characteristics with some containing extensive ivy cover as well as branch damage and wounds providing potential roosting features suitable for opportunistic and/or regular roosting. Habitat suitability assessment for trees with potential for roosting bats are outlined in further detail in Section 4.3.2 below. Additionally, four structures and their associated outbuildings (*buildings and artificial surfaces*) are also further assessed for roosting potential in Section 4.3.2 below. All other habitats present were assigned a *Negligible* value for roosting bats.

4.3.1.2 Proposed Grid Connection

The Proposed Grid Connection underground cabling route has an approximate length of 23km. It will leave the on-site substation and travel north-west for 250m following an existing farm track. The Proposed Grid Connection underground cabling route will then join the public road classified as Buildings and artificial surfaces (BL3). The cable will pass beneath the River Nore via HDD. Improved agricultural grassland (GA1) habitat was also recorded along the Proposed Grid Connection underground cabling route.

The verges across much of the Proposed Grid Connection underground cabling route contained species typical of dry grassy verges (GS4) which were not mapped due to their small size and mosaic-like occurrence throughout and along the route.

Several drainage ditches (FW4) with and without water present were recorded along the Proposed Grid Connection underground cabling route during the surveys undertaken. Several watercourses are culverted, box culverted, or bridges created to allow watercourses to pass beneath the roads along the Proposed Grid Connection underground cabling route.

Habitats along the Proposed Grid Connection footprint include:

- *Buildings and artificial surfaces (BL3)*
- *Improved agricultural grassland (GA1)*
- *Dry meadows and grassy verges (GS4)*
- *Depositing/lowland river (FW1)*
- *Eroding river (FW2)*
- *Drainage ditches (FW4)*
- *Hedgerows (WL1)*
- *Treelines (WL2)*

Further details of habitats along the Proposed Grid Connection footprint are outlined in Chapter 6, Section 6.6.1.2.

The habitat at the proposed 38kV on-site substation and adjacent temporary construction compound consists primarily of improved agricultural grassland (GA1). Mature ivy-covered ash trees dominate the treeline habitat (WL2), located adjacent to the proposed on-site substation compound, while the understory is managed and comprises hawthorn, blackthorn, gorse and grey willow. The treeline was assessed as having *Moderate* suitability to support commuting bats. A drainage ditch (FW4) was also recorded at the treeline north of the proposed on-site substation. Two of the trees present within this treeline contain PRF's and were assessed as having *Moderate* suitability to support roosting bats while an additional two were assessed as *Low* due to the presence of dense ivy cover. These trees will be retained and avoided as part of the Proposed Project.

With regard to commuting and foraging bats, features along the Proposed Grid Connection underground cabling route such as stone walls, grassland habitats, drainage ditches, hedgerows and treelines were assessed as having *Low* to *Moderate* suitability i.e. Habitat that is connected to the wider landscape that could be used by bats for foraging such as trees, scrub, grassland or water (Collins, 2016).

With regard to roosting bats, habitat features along the Proposed Grid Connection underground cabling route, including grassland habitats, hedgerows and drainage ditches were assessed as having *Negligible* suitability i.e. Negligible habitat features likely to be used by roosting bats/trees of sufficient size and age to contain PRFs but with none seen from the ground or features seen with only very limited roosting potential (Collins, 2016). Mature trees containing PRFs, and stone walls were classified as having *Low* to *Moderate* suitability i.e. 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.

Twelve existing watercourse crossing structures were recorded along the Proposed Grid Connection underground cabling route to the Ballyragget substation, excluding the crossing at the River Nore (WC1) where there is no structure present that could be used by roosting bats. A total of 9no. bridge crossings, 2no. culverts and 1no. concrete pipe will be traversed for the underground cabling route. Four crossings will require horizontal directional drilling including beneath the River Nore and all other works will be confined to the road structure.

The structures at the existing 12 no. watercourse crossings were inspected for signs of bat roosts and were assessed for bat roost potential on the 21st and 22nd of March 2024. No evidence of bat roosts was found at any of the structures. The findings are summarized in Table 4-5 below. The locations of the watercourse crossings are shown in Chapter 4, Appendix 4-1.

In addition to the features listed in Table 4-5 below, several potential roost features in trees were identified along the underground cabling route. However, no trees are designated for removal as part of the Proposed Grid Connection underground cabling works. Further details on the Proposed Grid Connection can be found in Chapter 4, Section 4.3.2.

Table 4-5 Bat Roost Suitability of Bridges/ culverts along the Proposed Grid Connection underground cabling route

Crossing ID	Grid Ref	Culvert type	Photo	Bat Roost Potential	Crossing Type Description
WC2	S 43633 68643	Stone Bridge		No evidence of bats found during inspection. No substantial cracks or crevices in blockwork, solid concrete on the undersurface of the bridge. *Negligible* bat roost potential.	Horizontal Directional Drilling
WC3	S 42177 67547	Stone Culvert		No evidence of bats found. Solid concrete undersurface with no cracks or crevices present. *Negligible* bat roost potential.	Flatbed Formation over Bridges/Culverts

Crossing ID	Grid Ref	Culvert type	Photo	Bat Roost Potential	Crossing Type Description
WC4	S 40678 65365	Stone Arch Bridge		No evidence of bats found. Small crevices present in stonework offering opportunistic roosting potential. Solid concrete undersurface. *Low* bat roost potential.	Flatbed Formation over Bridges/Culverts
WC5	S 40695 64845	Stone Arch Bridge		No evidence of bats found. Small gaps and dense ivy cover present on parts of the bridge. Undersurface is solid concrete construction. *Low* bat roost potential.	Flatbed Formation over Bridges/Culverts
WC6	S 40673 64486	Stone Arch Bridge		No evidence of bats found. Small but deep cracks on and underneath bridge arch that could be used opportunistically by roosting bats. *Low* bat roost potential.	Flatbed Formation over Bridges/Culverts

Crossing ID	Grid Ref	Culvert type	Photo	Bat Roost Potential	Crossing Type Description
WC7	S 40440 63066	Stone Arch Bridge		Very dense ivy cover. Access restricted due to health and safety in the form of a steep drop surrounding watercourse crossing. No obvious PRF visible but assessed as *Low* precautionarily due to uncertainty surrounding ivy cover.	Flatbed Formation over Bridges/Culverts
WC8	S 40421 62669	Stone Culvert		No evidence of bats found. Solid concrete culvert. No PRFs identified. *Negligible* bat roost potential.	Flatbed Formation over Bridges/Culverts
WC9	S 39949 61499	Stone Arch Bridge		No evidence of bats found. Dense ivy cover on one side of bridge. Some deep cracks and crevices on other side and on the undersurface of the bridge that could be used by bats for opportunistic roosting. *Low* bat roost potential.	Flatbed Formation over Bridges/Culverts

Crossing ID	Grid Ref	Culvert type	Photo	Bat Roost Potential	Crossing Type Description
WC10	S 38941 60236	Concrete Pipe		Piped culvert under road surface. *Negligible* bat roost potential.	Horizontal Directional Drilling
WC11	S 38041 58850	Stone Arch Bridge		No evidence of bats found. Minimal cracks with some ivy cover present that could be used by individual bats oppertunistically. Solid concrete undersurface. *Low* bat roost potential.	Crossing Using Standard Trefoil Formation
WC12	S 37810 57994	Stone Arch Bridge		No evidence of bats found. Cracks and crevices present above and below bridge that could be used by a small number of bats. Ivy cover also present. *Low* bat roost potential.	Flatbed Formation over Bridges/Culverts

Crossing ID	Grid Ref	Culvert type	Photo	Bat Roost Potential	Crossing Type Description
WC13	S 39108 55420	Stone Arch Bridge		No evidence of bats found. Crevices present above and below bridge that could be used opportunistically with some ivy cover also present. *Low* bat roost potential.	Horizontal Directional Drilling

4.3.1.3 Turbine Delivery Accommodation Works

As described in Chapter 4, Section 4.5.2 of this EIAR, no significant turbine delivery route accommodation works are required to facilitate the delivery of components to the Site. Therefore, no significant effects on bats associated with the turbine delivery route are anticipated.

4.3.2 Roost Surveys

4.3.2.1 Daytime Roost Inspections

Following the search for roosts in 2023, four structures and their associated outbuildings containing potential suitable bat roost features were identified within the Proposed Wind Farm site.

The grading protocol described by Collins (2016) was used: structures with *High* roosting potential present one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions and surrounding habitat; structures with *Moderate* roosting potential could be used by bats due to their size, shelter, protection, conditions and surrounding habitat, but are unlikely to support a roost of high conservation status; structures with *Low* potential present one or more potential roost sites that could be used by an individual bat opportunistically.

The structures were subject to interior (where accessible) and exterior inspections to search for evidence of bats. Details of the inspection surveys are presented below. All identified structures will be retained and avoided as part of the Proposed Project.

4.3.2.1.1 *Farm Complex 1*

A farm consisting of several corrugated iron hay sheds (Plate 4-1 & 4-2), and two stone sheds were identified on agricultural lands in the centre of the Proposed Wind Farm site (Grid Ref: S 39927 54413). The farm is approximately 275 m from the nearest proposed turbine (T05). The corrugated iron hay sheds (Grid Ref: S 39927 54393, S 39939 54325, S 39940 54320, S 39915 54376, S 39887 54397 and S 39905 54420) were open-facing and exposed to the elements. No evidence of bats was found in these sheds, and they were assessed as having *Negligible* potential to house roosting bats (Plates 4-1 & 4-2) i.e. Negligible habitat features on site likely to be used by roosting bats (Collins, 2016).

The two stone sheds were of stone block construction with corrugated iron roof structures. The eastern single-story shed (Grid Ref: S 39940 54421) consisted of two internal rooms with two open facing segments to the north of the structure and had no felt underlining (Plate 4-3). Both rooms had an open doorway with small windows at the front and rear allowing potential access for bats. Within the northern room, there were seed sacks draped from the rafters that could provide roosting potential for a number of bats (Plate 4-4). During the summer inspection 2no. brown long-eared bats were observed roosting within the seed sacks. Butterfly and moth wings in addition to bat droppings were found dispersed around the building. Small accumulations of droppings were discovered beneath the seed sacks (Plate 4-5) The building was assessed as having *Moderate* roosting potential i.e. A structure 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 (Collins, 2016).

The second stone building (Grid Ref: S 39920 54421) was also made up of two separate rooms with open doorways (Plates 4-6 & 4-7). The northern room included an attic space in which an unidentified bat carcass, accumulations of bat droppings and several butterfly wings were found (Plate 4-8). The southern room, with felt underlining in the roof, exhibited sparsely scattered bat droppings around the area. This structure was also assessed as having *Moderate* potential to house roosting bats.

Plate 4-1 Negligible corrugated iron shed to the south.

Plate 4-2 Another Negligible corrugated iron shed to the north.

Plate 4-3 Eastern stone shed offering Moderate roosting suitability.

Plate 4-4 Seed sacks in eastern shed where bats were found roosting.

Plate 4-5 Small accumulations of droppings and insect wings beneath seed sacks.

Plate 4-6 West aspect of western stone shed assessed as having Moderate suitability.

Plate 4-7 East aspect of western shed.

Plate 4-8 Bat carcass found in attic space of western shed.

4.3.2.1.2 Derelict buildings

Located approximately 425 meters to the south-west of Farm Complex 1 are two derelict stone block structures, positioned 125 meters north of the nearest proposed turbine (T06). Both structures exhibit compromised slate roofs, with cracks in their blockwork, offering potential access and roosting opportunities for bats. Additionally, dense ivy covers portions of both buildings.

The larger building to the east (Grid Ref: S 39588 54176), serves primarily as a hay storage facility (Plates 4-9 & 4-10). Scaffolding is evident both internally and externally, seemingly erected for the installation of a corrugated iron sheet integrated into the damaged roof structure. Although no underlining is present beneath the remaining slates, the observed damage to rafters and joists creates potential roosting opportunities for bats (Plate 4-11). Despite no evidence of bats found during the 2023 inspections, this structure was assessed as having *Moderate* suitability for roosting bats.

The western building (Grid Ref: S 39562 54194), consists of a main building with an adjoining lean-to extension featuring a corrugated iron roof (Plates 4-12 & 4-13). Similar to the larger building, the damaged roof structure and blockwork offer potential access and roosting opportunities for bats (Plate 4-14). Although no evidence of bats was discovered within this structure, it was also evaluated as having *Moderate* suitability for roosting bats.

Plate 4-9 Eastern stone shed with damaged roof offering Moderate suitability.

Plate 4-10 Dense ivy cover at the rear of the building.

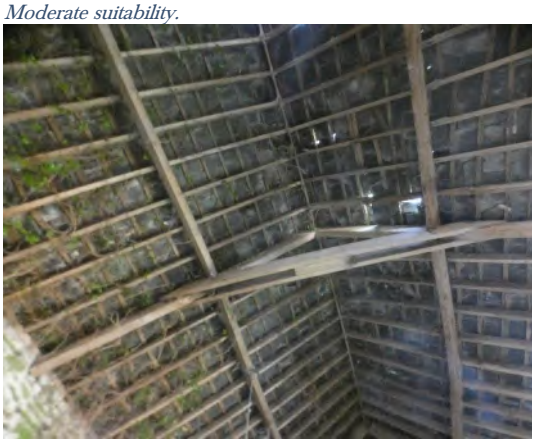


Plate 4-11 Internal roof structure.

Plate 4-12 Western stone shed with damaged roof offering Moderate suitability.

Plate 4-13 Dense ivy cover at rear.

Plate 4-14 Internal stonework of western shed.

4.3.2.1.3 Farm Complex 2

A second farm complex is situated in the south-east of the Proposed Wind Farm site (Grid Ref: S 40863 53902). It is located approximately 500m south of the nearest proposed turbine (T4). It consists of an inhabited dwelling to the south connected to a small storage building (Grid Ref: S 40863 53889), a hay storage shed to the west (Grid Ref: S 40839 53904), several sheds used for dairy farming and hay storage to the north (Grid Ref: S 40842 53927, S 40863 53937, S 40824 53937) and a derelict structure to the east (Grid Ref: S 40864 53911).

The inhabited dwelling is modern and well-sealed with no obvious access points for bats (Plate 4-15). An internal inspection of the dwelling was not deemed necessary. The connected shed is open-faced with an open window frame. However, it is cluttered with limited space for bats to fly within. Both structures were assessed as having *Low* roosting suitability i.e. 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 (Collins, 2016).

The open-fronted hay storage shed to the west consists of two adjoining rooms (Plate 4-16 & 4-17), one stocked with hay bales, while the other is spacious with some miscellaneous items spread around the room. The shed has a Perspex roof with a felt underlining with several tears offering potential roosting opportunity for bats. No evidence of bats was found in this building, but the lack of flat surfaces and the hay covered floor could be obscuring any accumulations of droppings. This structure was assessed as having *Moderate* suitability for roosting bats due to the presence of the felt underlining.

The hay storage and dairy sheds to the north are constructed with galvanised metal with corrugated iron roof structures (Plate 4-18). These lacked the necessary protection and appropriate conditions that could be used by bats and were universally assessed as having *Negligible* suitability for roosting bats.

The derelict building is of stone block construction with an open doorway and window frame providing access for bats (4-19). There is also damage to the slate roof that also provides potential access for bats (Plate 4-20). No evidence of roosting bats was found within the structure. However, the structure was assessed as having *Moderate* suitability for roosting bats.

Plate 4-15 Shed connected to inhabited dwelling. Both assessed as having Low suitability.

Plate 4-16 Open-fronted hay shed assessed as having Moderate suitability.

Plate 4-17 Felt underlining in open-fronted shed.

Plate 4-18 Galvanised metal hay storage shed assessed as having negligible roosting suitability.

Plate 4-19 Derelict building with open doorway and window frame assessed as having Moderate suitability.

Plate 4-20 South aspect of derelict building showing damage to slate roof.

4.3.2.1.4 Farm Complex 3

A third farm is present adjacent to Farm Complex 2. This farm is not contained within the Proposed Wind Farm site and is situated approximately 600m from the nearest proposed turbine location (T4). It is comprised of eight structures that include an inhabited dwelling to the north (Grid Ref: S 40932 53842) a stone shed to the south (Grid Ref: S 40958 53830) and six sheds constructed either entirely of galvanized metal or with a stone block construction and a galvanized metal roof to the east (Grid Ref: S 40969 53866, S 41006 53868, S 40991 53852, S 41018 53837, S 40977 53838, S 40945 53818).

The inhabited dwelling is modern and displayed no obvious access points for bats (Plate 4-21). An internal inspection of the dwelling was not deemed necessary. The structure was precautionarily assessed as having *Low* suitability to support roosting bats.

The stone shed (Plate 4-22) is of stone block construction with a pebble dash finish. The slated roof exhibits small sections of damage around the ridge tiles and above the guttering, providing permanent access for bats. An open door was noted during inspection, and the presence of felt underlining further offers a potential roosting site for bats (Plate 4-23). The damage to the roof is further detailed in Plate 4-24 where daylight is visible from within the structure. The structure was assessed as having *Moderate* suitability to support roosting bats.

All galvanized metal sheds on the farm are open-faced and exposed to the elements (Plates 4-25 – 4-27) with no identified potential roosting features. The stone block sheds (Plates 4-28 & 4-29) also lacked features such as cracks in the blockwork that could support roosting bats. Consequently, all these structures were assessed as having *Negligible* roosting suitability.

Plate 4-21 Inhabited dwelling assessed as having Low suitability.

Plate 4-22 Stone shed with open door assessed as having Moderate suitability.

Plate 4-23 Interior of stone shed.

Plate 4-24 Felt underlining and damaged roof offering access and roosting potential for bats.

Plate 4-25 Galvanised metal sheds assessed as Negligible.

Plate 4-26 Exposed galvanised metal shed.

Plate 4-27 Another galvanised metal shed.

Plate 4-28 Stone block shed with corrugated iron roof structure. Assessed as having negligible suitability.

Plate 4-29 Another Negligible stone block shed with a corrugated iron roof structure.

4.3.2.1.5 Ground-Level Tree Assessments

Mature broadleaf tree species forming field boundaries consisted primarily of ash, sycamore, willow, oak, beech and birch. The majority of trees within the Proposed Wind Farm site will be retained as part of the Proposed Project; however, there will be some requirement to remove trees to facilitate the required bat buffers (outlined in Section 6.1.3). A summary of trees/tree groups of note within an 87m radius (requiring removal) of the proposed turbine locations. Their general location, PRFs and respective suitability for bat roosting, are outlined in Table 4-6 below. Further details are included in the Figure 4-1.

Of these trees, a small number contained *Moderate* roosting potential, i.e. a 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 (Collins, 2016).

The majority of trees assessed were classified as having *Low* roosting potential i.e. a tree of sufficient size and age to contain potential roost features but with none seen from the ground or with features seen with only very limited roosting potential (Collins, 2016).

Conifer plantation to the southwest of the Proposed Wind Farm site do not provide potential roosting habitat of significance for bats and as such were assessed as having *Negligible* roosting potential i.e. negligible habitat features to be used by roosting bats, due to their size and lack of suitable PRFs.

The trees assessed along the Proposed Grid Connection underground cabling route varied in their suitability to support roosting bats, with the majority being assessed as *Negligible*, and a small number as having *Low* to *Moderate* suitability. None of the trees assessed are designated for removal to facilitate the Proposed Grid Connection.

A hedgerow, primarily consisting of hawthorn with brambles and individual ash trees, is located adjacent the site of the proposed met mast. The ash trees were evaluated as having *Negligible* potential for supporting roosting bats, and none are designated for removal to accommodate the installation of the mast.

Overall, the Proposed Wind Farm site contains a number of mature trees, hedgerows and treelines. All trees assessed are outlined in Table 4-6, Figure 4-1 and shown in Plates 4-30 to 4-45. Some of these features will require removal to facilitate the bat felling buffer (see Section 6.1.3). Several trees proposed for removal provide potential suitable habitat for roosting bats. However, no evidence of roosting bats was identified during the ground level assessment.

Table 4-6 Summary of Trees/Tree Groups Inspected within the Proposed Wind Farm site

Nearest Turbine	Inspection Date	PRFs	Trees/Hedgerows to be removed/retained. North, South, East or West of Turbine	Bat Suitability
T01	31st May 2023	*Broken limbs, hollows and dense ivy cover.*	*Portion of treeline to west to be removed.*	• *Low*
T02	31st May 2023	*Dense ivy cover*	• *Just outside felling buffer* • *Treeline to the west being retained.*	• *Low*
T03	31st May 2023	*Canker, hollows, ivy cover*	Sections of treeline to east and south to be removed.	• East treeline *Low – Moderate* • South treeline *Low*
T04	31st May 2023	Ivy cover	All treelines outside bat buffer.	• North - *Negligible* • East – *Negligible,* one *Low* • South – *Negligible* • West - *Negligible*

T05	31st May 2023	N/A	Hedgerows to north and portion of hedgerow to south to be removed.	• *Negligible*
T06	31st May 2023	Broken limb, dead limbs, ivy cover	Treelines to west and east to be removed.	• 9 trees with *Low* suitability to south of turbine with *Moderate*
T07	31st May 2023	*N/A*	3.57 ha of Conifer plantation to be felled.	• *Negligible*
Proposed Grid Connection	21st/22nd March 2024	*Ivy cover, cracks, wounds*	No vegetation removal proposed.	• *Negligible* - *Moderate*
Met Mast	31st May 2023	N/A	No vegetation removal proposed.	• *Negligible*

Plate 4-30 T01 – Ash tree with broken limb - Low

Plate 4-31 T01 Gap in divergence of trunk - Low

Plate 4-32 T01 Cavity in Ash tree - Low

Plate 4-33 T01 Ash tree with broken limb - Low

Plate 4-34 T02 Sycamore with heavy ivy cover - Low

Plate 4-35 Mature Oak tree with heavy ivy cover - Low

Plate 4-36 Oak tree with broken limb and large wound – Moderate

Plate 4-37 T03 Mature Oak with dense ivy cover - Low

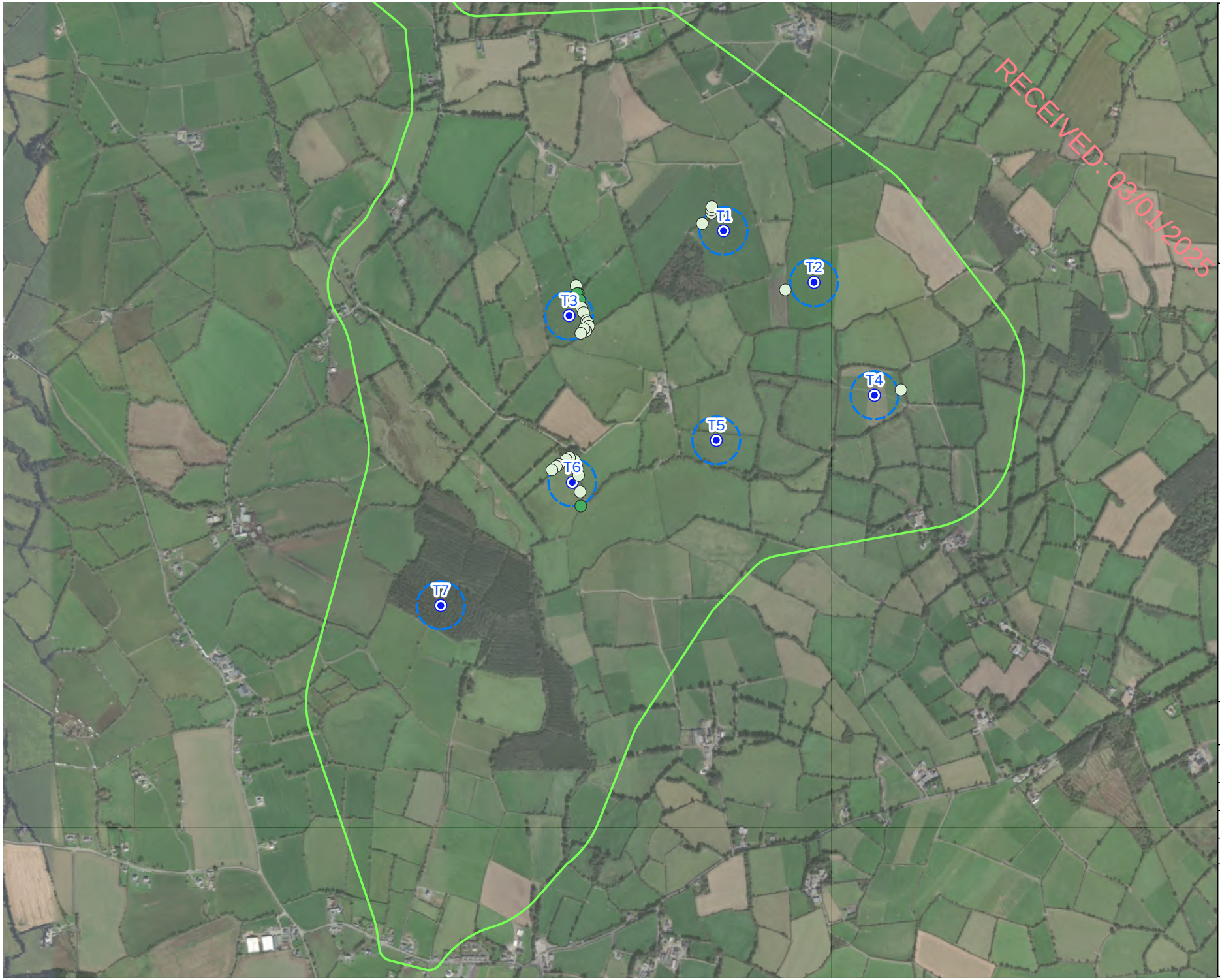
Plate 4-38 T03 Ash with cankers and broken limbs - Moderate

Plate 4-39 T04 Mature Willow – Outside buffer

Plate 4-40 T06 Beech with fluting and dense ivy cover - Moderate

Plate 4-41 T06 Ash with dead limbs and dense ivy cover - Low

Plate 4-42 T06 Ash tree with broken limb and dense ivy cover - Low



Map Legend

- EIAR Site Boundary
- Proposed Turbine Locations
- Bat Buffer

Ground Level Tree Assessment

- Low
- Moderate

Drawing Title
Ground-Level Tree Assessment

Project Title
Briskalagh Renewable Energy Development

Drawn By	Checked By
RC	AJ
Project No.	Drawing No.
230502	Figure 4-1
Scale	Date
1:18,000	2024-09-11

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

4.3.2.2 Emergence Surveys

Emergence surveys were carried out in spring, summer and autumn of 2023. The spring dusk emergence survey was conducted by two surveyors on the 31st May at Farm Complex 1 with particular focus on the shed containing hanging seed sacks. This specific structure was confirmed as a roost, prompting a subsequent survey in summer on July 27th by two surveyors. Bats were again observed emerging from the roost during this follow-up survey. Concurrently, on the same date, another team of surveyors examined derelict buildings located approximately 400 meters southwest of Farm Complex 1. While no bats were observed emerging from these structures, a number of bats were seen foraging around the treeline and other structures.

An emergence survey was also conducted on 12th October during the autumn period at Farm Complex 2 in which two pipistrelles were observed emerging from the open-fronted hay shed, with two other species recorded foraging around the farm. Table 4-7 summarises the findings of the bat activity surveys carried out on the structures.

Table 4-7 Emergence Survey Results 2023

Structure	PRF Suitability	IG Ref	Survey Type	Date Surveyed	Survey Results
Farm Complex 1 - Shed with seed sacks	*Moderate*	S 39935 54423	Dusk Emergence Spring 2023	31st May 2023	2no. soprano pipistrelle and 3no. brown long-eared bats observed emerging.
Farm Complex 1 - Shed with seed sacks	*Moderate*	S 39935 54423	Dusk Emergence Summer 2023	27th July 2023	5no. soprano pipistrelle emerged with 5no. other specimens observed emerging that weren't recorded on bat logger (likely brown long-eared).
Derelict buildings	*Low*	S 39588 54182	Dusk Emergence Summer 2023	27th July 2023	No bats emerging. 4-5no. bats observed foraging around treeline and derelict structures (2no. soprano pipistrelles, 2no. common pipistrelles and 1no. Leisler's bat).
Farm Complex 2	*Negligible, Low and Moderate*	S 40838 53906	Dusk Emergence Autumn 2023	12th October 2023	One soprano and one common pipistrelle observed emerging from hay shed (S 40838 53906). 1-2no. common and sopranos pipistrelles, 2no. *Myotis spp.* and 1no. brown long-eared bat commuting and foraging.

4.3.3 Manual Transects

Manual transects were undertaken in spring, summer and autumn 2023. Bat activity was recorded in all seasons. A total of 2,049 bat passes were recorded, including emergence survey activity. In general, soprano pipistrelle (n=940) was recorded most frequently, followed by common pipistrelle (n=885). Leisler's bat (n=159), *Myotis spp.* (n=53) and brown long-eared bat (n=12) were less frequent (Plate 4-43).

Species composition and activity levels varied between surveys. Transect survey results were calculated as bat passes per km surveyed (to account for differences in survey effort). Plate 4-44 presents the results for individual species per survey period. Figures 4-2 – 4-4 present the spatial distribution of bat activity across surveys. Bat activity was concentrated along treelines, hedgerows, and linear (road/track) habitats.

Soprano pipistrelle occurred more frequently in spring and autumn of 2023, while common pipistrelle occurred most often in summer. Leisler's bat was more prominently present in the spring, particularly within the conifer plantation at T07.

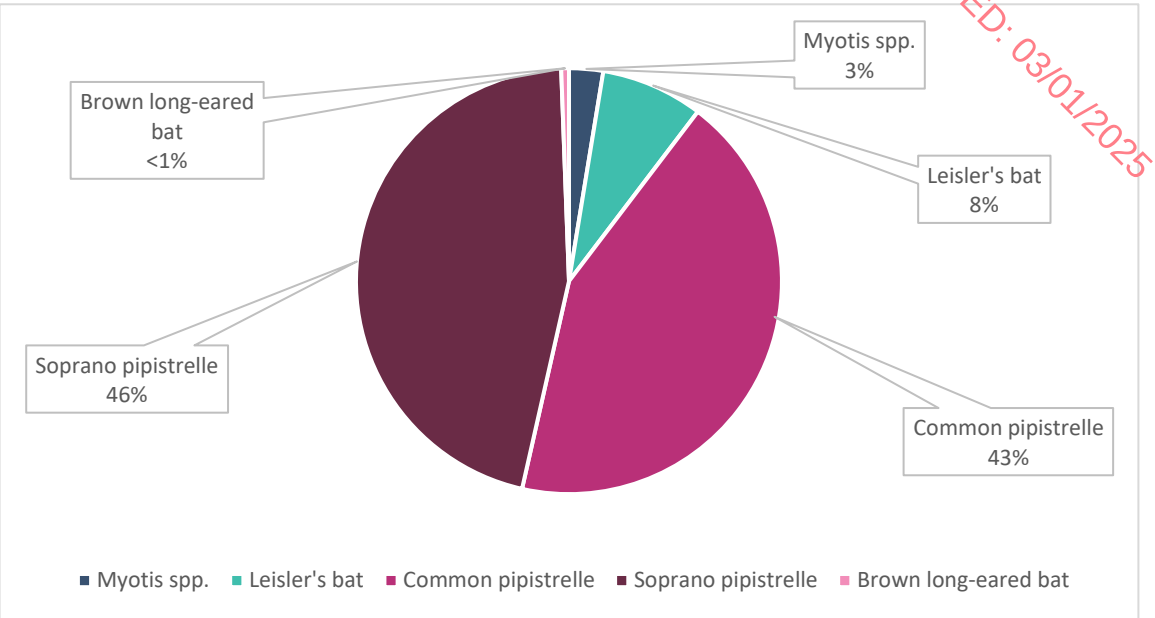


Plate 4-43 2023 Manual Activity Surveys (Total Species Composition)

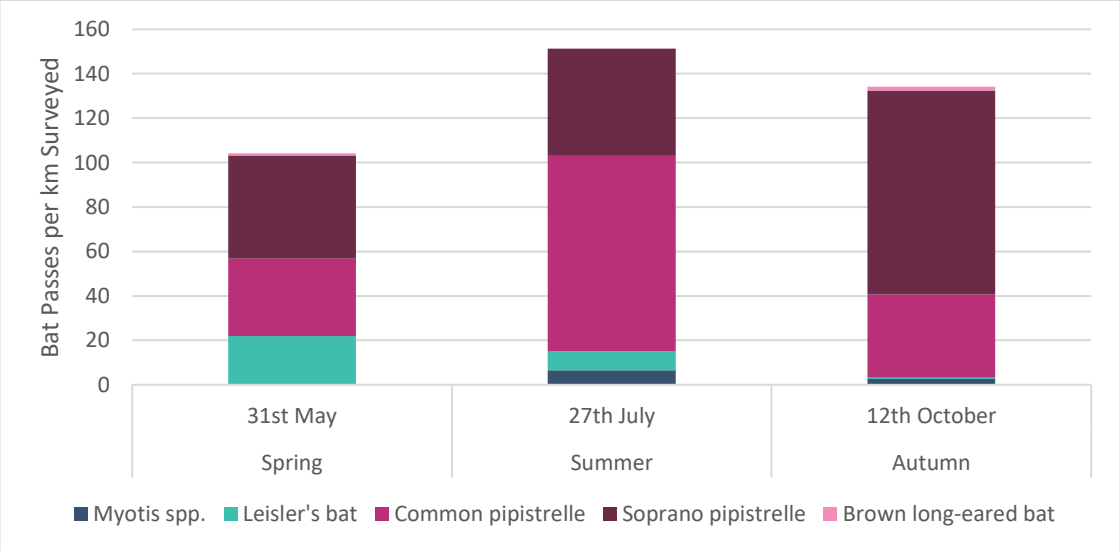
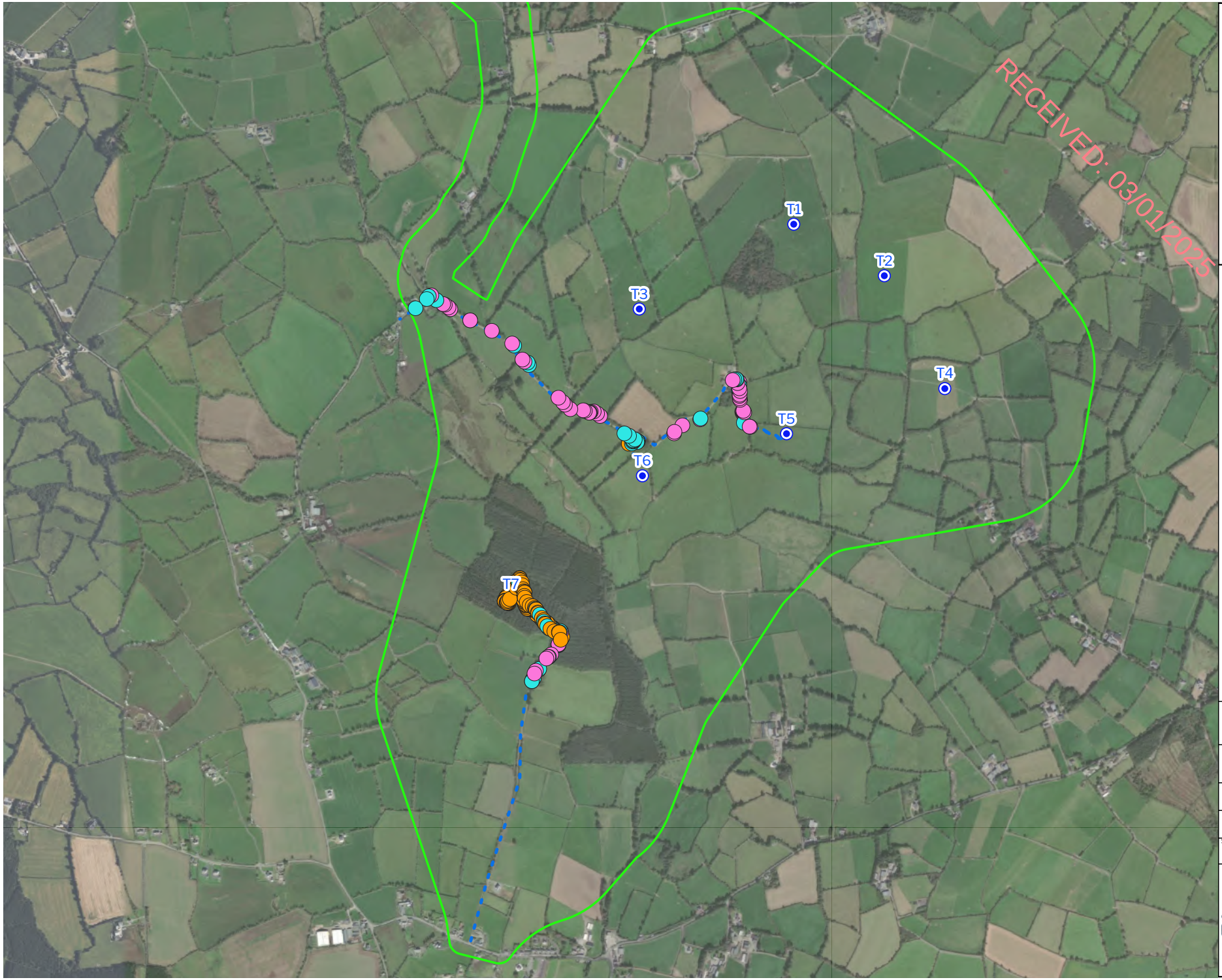


Plate 4-44 2023 Transect Results – Species Composition Per Survey Period



Map Legend

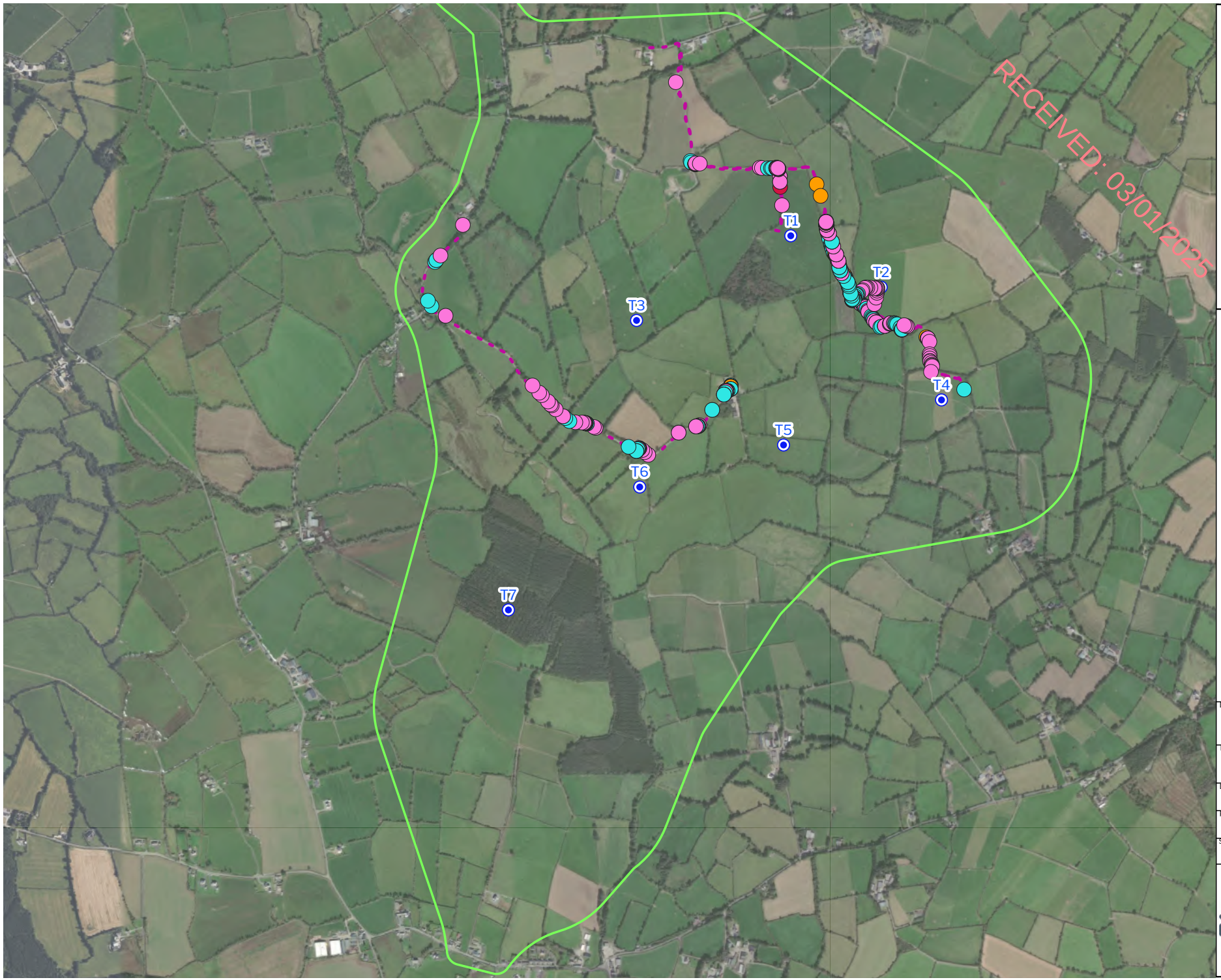
- EIAR Site Boundary
- Proposed Turbine Locations
- Spring Transect Route 31st May 2023

Spring Transect Results

- Leisler's bat
- Common pipistrelle
- Soprano pipistrelle

Drawing Title	Spring Manual Transect Results 2023
Project Title	Briskalagh Renewable Energy Development
Drawn By: RC	Checked By: AJ
Project No.: 230502	Drawing No.: Figure 4-2
Scale: 1:18,000	Date: 2024-09-11

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie



Map Legend

- EIAR Site Boundary
- Proposed Turbine Locations
- Summer Transect Route 27th July 2023

Summer Transect Results

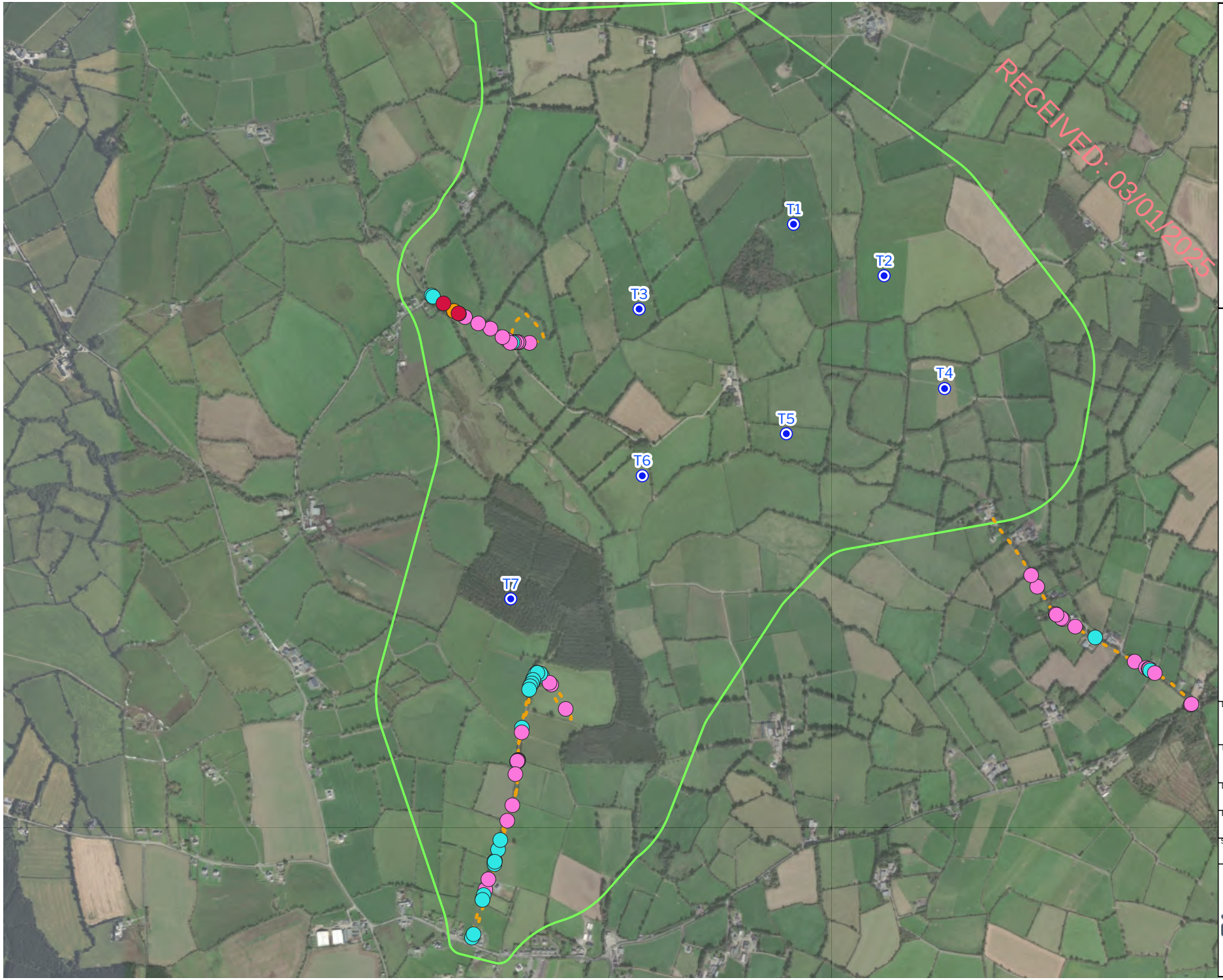
- Myotis spp.
- Leisler's bat
- Common pipistrelle
- Soprano pipistrelle

Drawing Title
Summer Manual Transect Results 2023

Project Title
Briskalagh Renewable Energy Development

Drawn By	Checked By
RC	AJ
Project No.	Drawing No.
230502	Figure 4-3
Scale	Date
1:18,000	2024-09-11

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie



Map Legend

- EIAR Site Boundary
- Proposed Turbine Locations
- Autumn Transect Route 12th October 2023

Autumn Transect Results

- Myotis spp.
- Leisler's bat
- Common pipistrelle
- Soprano pipistrelle

Drawing Title
Autumn Manual Transect Results 2023

Project Title
Briskalagh Renewable Energy Development

Drawn By	Checked By
RC	AJ
Project No.	Drawing No.
230502	Figure 4-4
Scale	Date
1:18,000	2024-09-11

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

4.3.4 Ground-level Static Surveys

In total, 64,224 bat passes were recorded across all deployments. In general, common pipistrelle (n=23,217) occurred most frequently, followed by soprano pipistrelle (n=21,410) and Leisler's bat (n=14,362). Instances of *Myotis spp.* (n=4,484), Brown long-eared bat (n=673) and Nathusius' pipistrelle (n=78) were recorded less frequently during the 2023 survey period. Plate 4-45 presents relative species composition across all ground-level static detector surveys.

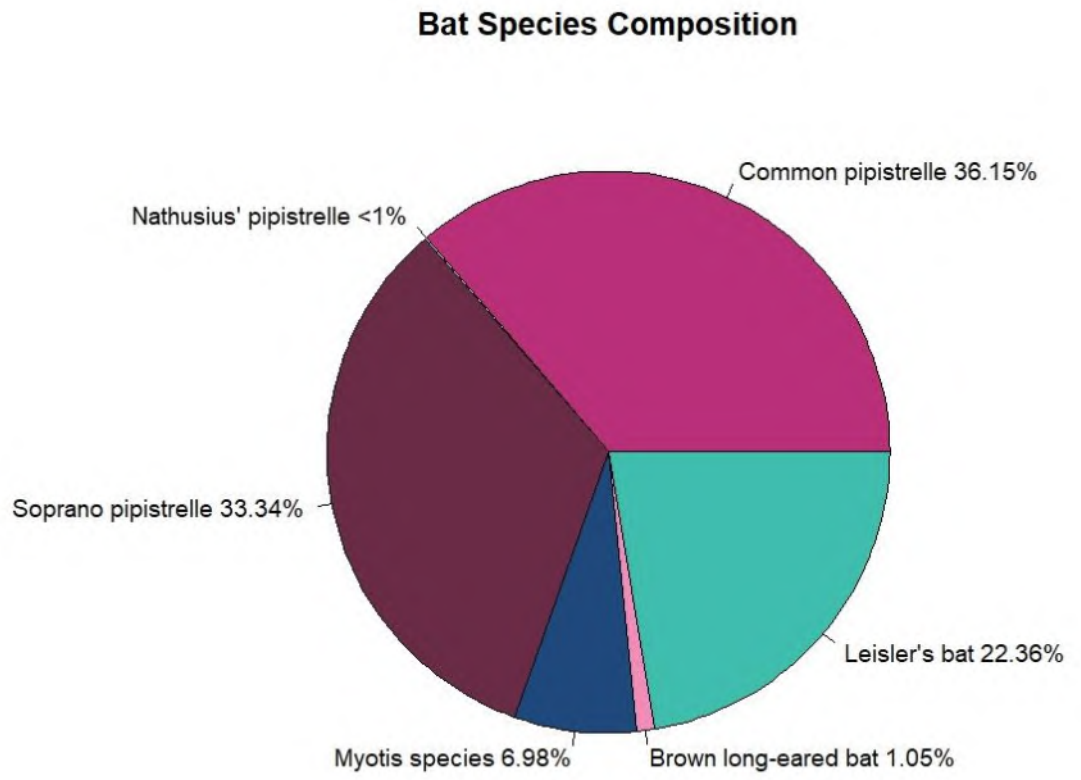


Plate 4-45 2023 Static Detector Surveys: Species Composition Across All Deployments (Total Bat Passes)

Bat activity was calculated as total bat passes per hour (bpph) per season to account for any bias in survey effort, resulting from varying night lengths between seasons. Plates 4-46 and Table 4-8 presents these results for each species per season. Spring activity was dominated by Leisler's bat and common pipistrelle. During the summer and autumn, activity was more evenly distributed between common and soprano pipistrelle, with significant representation from Leisler's bat and Myotis spp. Instances of brown long-eared bat and Nathusius' pipistrelle were relatively rare throughout the survey periods.

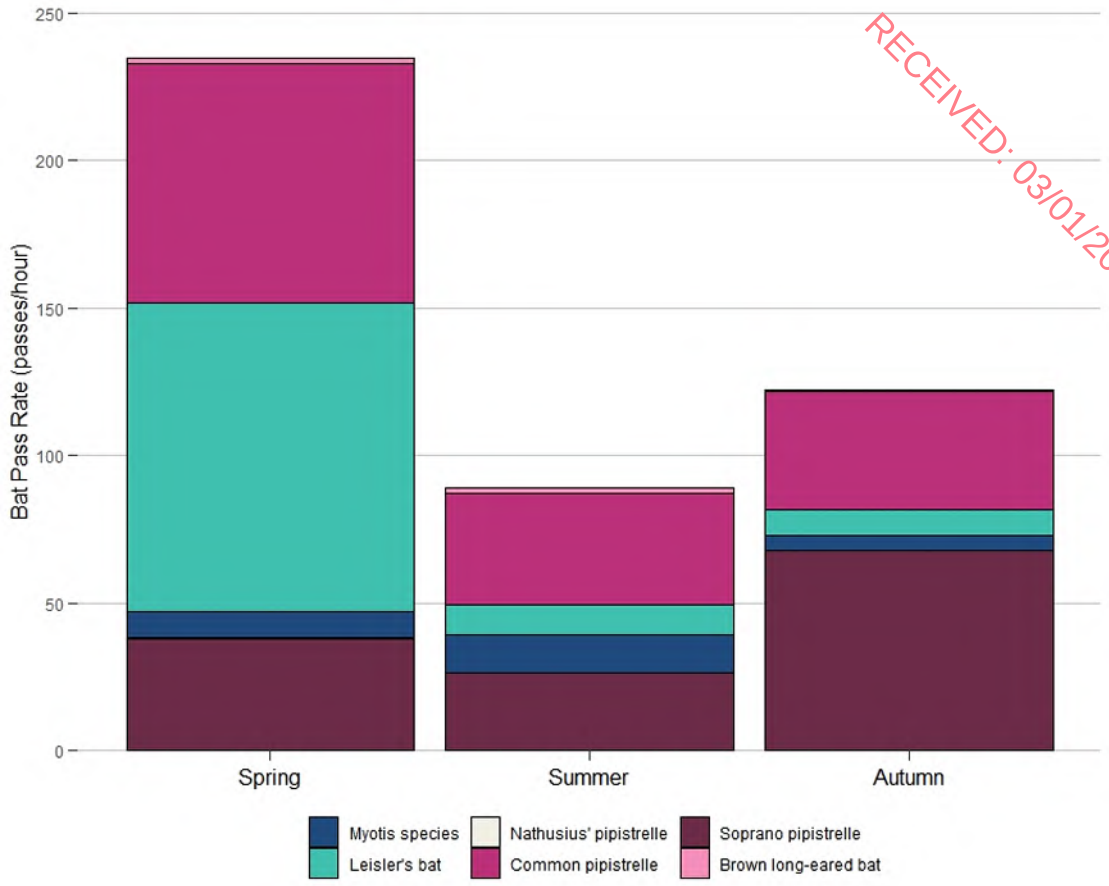


Plate 4-46 2023 Static Detector Surveys: Species Composition Across All Deployments (Total Bat Passes Per Hour, All Nights)

Table 4-8 Static Detector Surveys: Species Composition Across All Deployments (Total Bat Passes Per Hour, All Nights)

	Spring	Summer	Autumn
Total Survey Hours	**101.5**	**212.1**	**176.6**
Myotis spp.	8.66	13.05	4.74
Leisler's bat	104.78	10.08	8.99
Nathusius' pipistrelle	0.47	0.11	0.03
Common pipistrelle	81.01	37.53	39.83
Soprano pipistrelle	37.94	26.22	67.94
Brown long-eared bat	1.77	1.83	0.59

The Median Bat Pass Rate, Per Detector, Per Survey period is shown in Plates 4-47 and 4-48 (varied axis scale). Bat activity varied across seasons and detector locations. Activity at D07 in spring was significantly higher than all other detector locations and largely dominated by Leisler's bat activity. This detector was located within dense conifer plantation. Activity in summer was substantially reduced, and species composition shifted to being common pipistrelle, soprano pipistrelle and *Myotis spp.* dominant, particularly at D05, D06 and D07. In autumn, D03 and D05 had the highest activity compared with other detector locations, with soprano and common pipistrelle dominating, respectively. The remaining detectors exhibited very low activity across the season.

The Median Nightly Pass Rate (i.e. total bat passes per hour, per night) was used to determine typical bat activity at the Proposed Wind Farm site (Plate 4-49). Activity was often variable between survey nights. Plates 4-50 to 4-52 (varied axis scales) illustrates the Median Nightly Pass Rate per species, per deployment. Therefore, the Median Nightly Pass Rate was used as the most appropriate measure of bat activity (Lintott & Mathews, 2018). Zero data, when a species was not detected on a night, was also included.

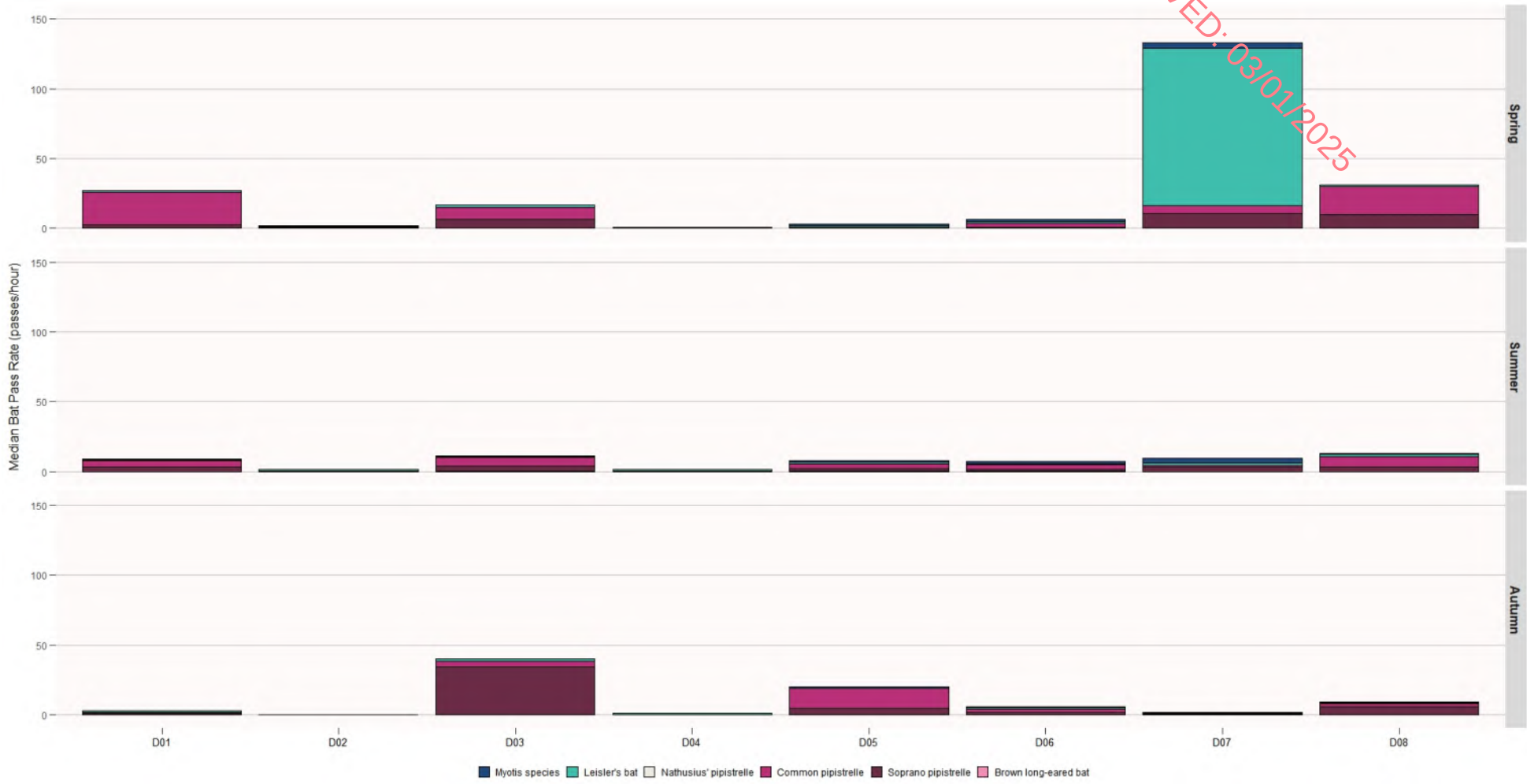


Plate 4-47 Static Detector Surveys: Median Bat Pass Rate (bpph) Including Absences, Per Location Per Survey Period.

Plate 4-48 Static Detector Surveys: Median Bat Pass Rate (bpph) Including Absences, Per Location Per Survey Period (Varied Axis Scale.

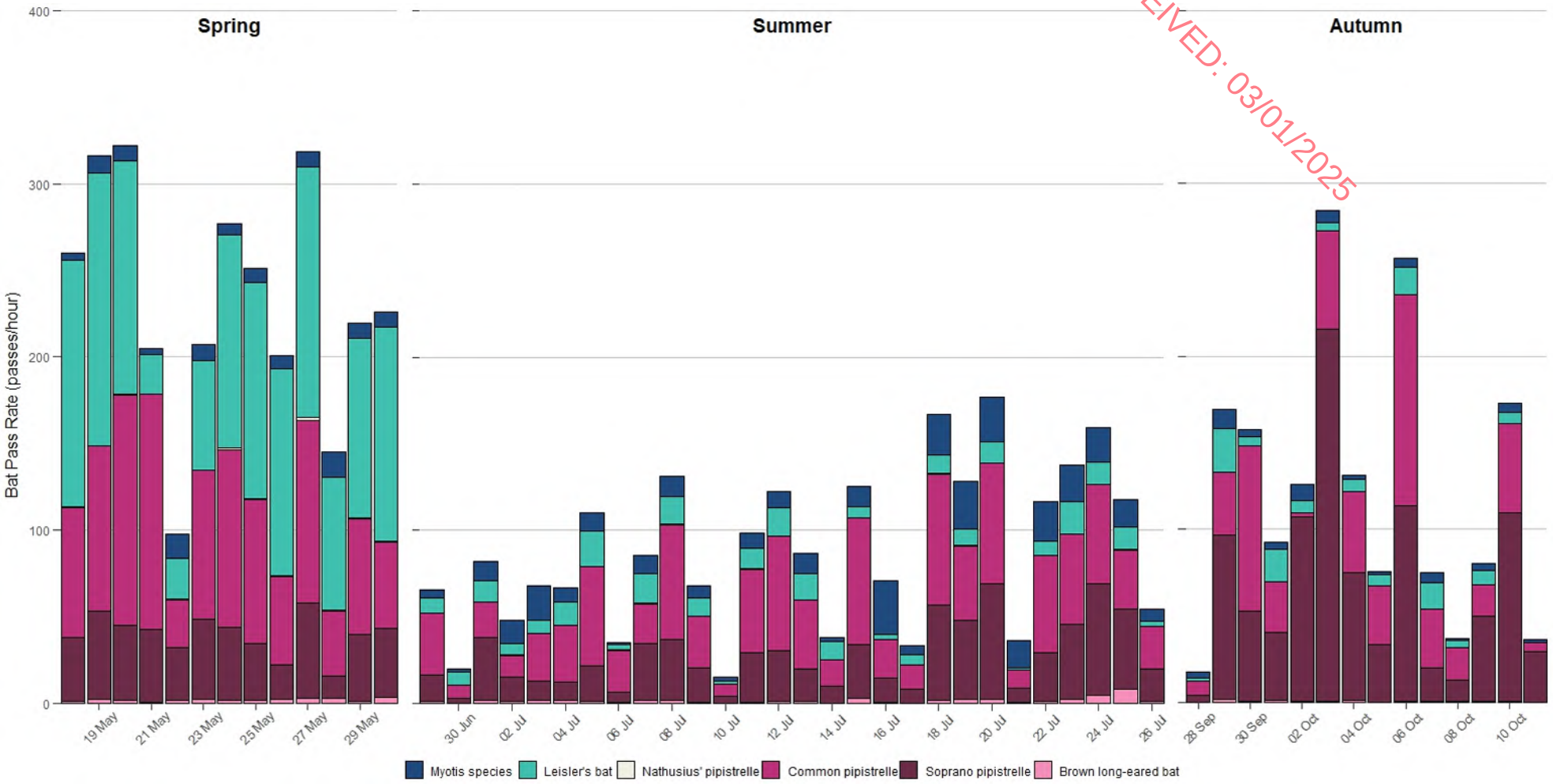


Plate 4-49 Static Detector Surveys: Median Bat Pass Rate (bpph) Including Absences, Per Season Per Night

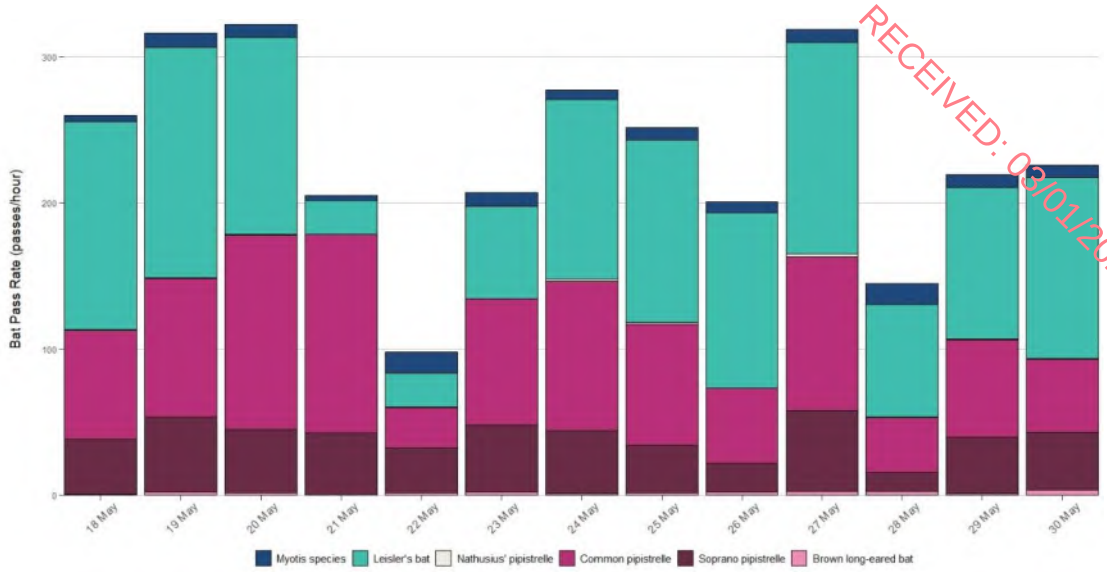


Plate 4-50 Static Detector Surveys: Spring Median Bat Pass Rate (bpph) Including Absences, Per Night

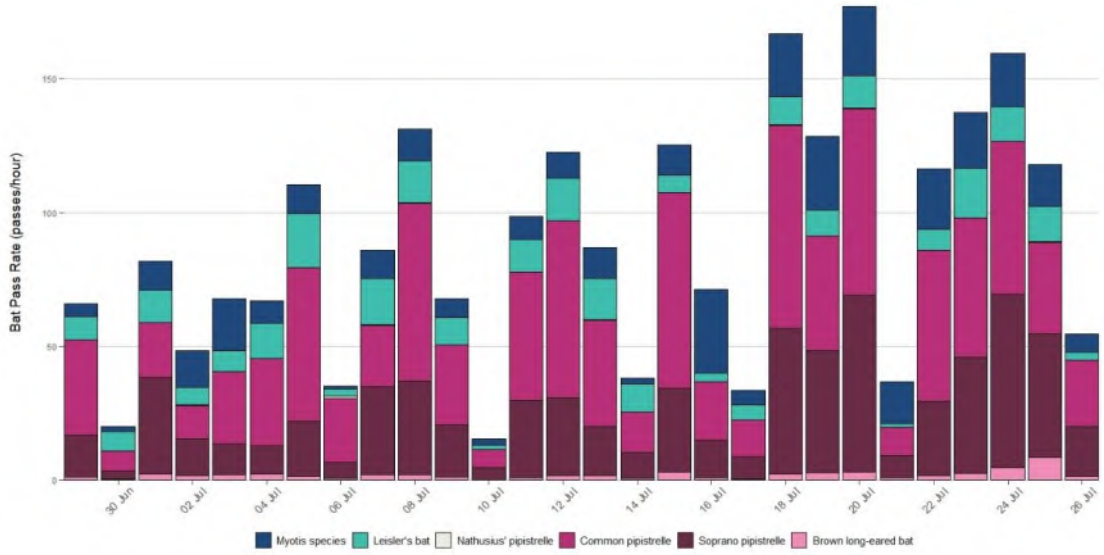


Plate 4-51 Static Detector Surveys: Summer Median Bat Pass Rate (bpph) Including Absences, Per Night

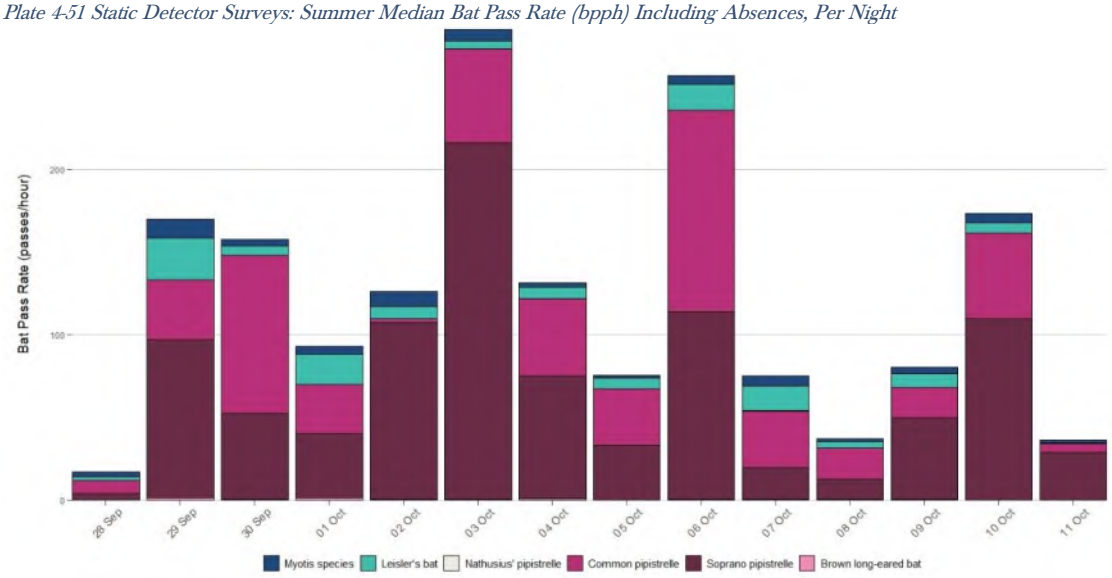


Plate 4-52 Static Detector Surveys: Autumn Median Bat Pass Rate (bpph) Including Absences, Per Night

4.4 Assessment of Bat Activity Levels 2023

4.4.1 Adapted Site-specific Ranges

Low, Medium and High activity levels were assigned to median and maximum pass rates (bpph) identified during spring, summer and autumn at the detectors deployed across the Proposed Wind Farm site, as adapted from Mathews *et al.* (2016). Table 4-9 shows the results of the site-level assessment as calculated on a site-specific activity level. Where no maximum activity at a detector is reported, no data was recorded for that species throughout the deployment.

Leisler's bat typically exhibited *Low* to *Moderate* Median Activity Levels in spring and summer, with generally *Low* Activity observed in autumn. However, a significant outlier was detected at D07 during the spring, recording a *High* Median Activity of 112.5 bpph and a Maximum Activity of 144.5 bpph. This detector, situated within dense conifer plantation (WD4), experienced a substantial drop-off in both Median and Maximum Activity during the summer and autumn periods.

For common pipistrelle, Median Bat Activity was generally *Low* to *Moderate* across all seasons. Three detectors, D01 and D08 in spring, and D05 in autumn, recorded *High* Median Activity, accompanied by significantly higher Maximum Activity compared to the rest of the Proposed Wind Farm site during those periods. Similar to Leisler's bat, common pipistrelle exhibited increased activity during the spring season.

Soprano pipistrelle generally displayed *Low* Median Bat Activity, with occasional instances of *Moderate* Activity. D03 in autumn was the sole detector recording *High* Median Activity, with a rate of 34.1 bpph and a Maximum of 195.8 bpph. This reading was notably higher than all other locations, including the same location in spring and summer.

Myotis spp. recorded relatively *Low* activity compared to other species across the Proposed Wind Farm site. Median Activity was generally *Low* to *Moderate* in all three seasons, with the exception of D07, which recorded *High* Median Activity in summer and autumn. *High* Maximum Activity was also observed at D07 during these periods, with Maximum Activity peaking at D01 in summer.

Brown long-eared bat exhibited *Low* Median Activity at all detectors in all periods across the Proposed Wind Farm site. Maximum Bat Activity for the species peaked at D02 in autumn with a rate of 4.5 bpph.

Nathusius' pipistrelle also recorded *Low* Median Activity at all locations in all seasons throughout 2023, with a Median Activity of 0.00 bpph for all locations. D05 recorded *High* Maximum Activity in spring and summer, with activity peaking in spring at a rate of 1.43 bpph.

Table 4-9 Median Nightly Bat Activity (bpph) per Species, per Season, per Detector Location 2023 Low, Moderate, High

2023 Season	Detector	*Myotis spp.*		Leisler's bat		Nathusius' pipistrelle		Common pipistrelle		Soprano pipistrelle		Brown long-eared bat	
		Median Bat Activity	Max Bat Activity	Median Bat Activity	Max Bat Activity	Median Bat Activity	Max Bat Activity	Median Bat Activity	Max Bat Activity	Median Bat Activity	Max Bat Activity	Median Bat Activity	Max Bat Activity
Spring	D01	0.26	1.03	0.65	1.76			23.59	97.28	2.47	7.47	0.13	2.38
	D02	0.26	0.63	0.87	2.49			0.37	1.13	0.00	0.39	0.13	0.39
	D03	0.38	1.43	1.56	4.13	0.00	0.53	8.42	35.28	6.41	26.33	0.25	0.53
	D04	0.00	0.13	0.40	1.79	0.00	0.13	0.25	0.88	0.13	0.26	0.13	0.62
	D05	1.29	2.79	1.03	2.35	0.00	1.43	0.38	1.69	0.00	0.50	0.39	1.30
	D06	1.52	2.33	1.56	2.88	0.00	0.26	2.84	5.08	0.51	1.38	0.13	0.51
	D07	4.28	9.95	112.55	144.55	0.00	0.13	5.89	34.53	10.40	39.44	0.00	0.25
	D08	0.13	0.53	1.30	4.08	0.00	0.12	20.11	71.89	9.56	37.79	0.25	0.51
Summer	D01	0.40	18.01	1.06	3.42	0.00	0.13	4.34	35.64	3.17	40.87	0.00	0.62
	D02	0.00	0.74	0.97	4.51	0.00	0.13	0.26	1.50	0.13	1.03	0.00	4.47
	D03	0.14	1.85	0.90	2.64	0.00	0.14	6.00	20.32	3.86	26.22	0.13	2.23
	D04	0.14	1.03	0.93	3.39	0.00	0.14	0.27	1.26	0.19	0.77	0.13	0.55
	D05	1.62	2.61	1.06	4.01	0.00	0.68	3.36	20.66	1.71	7.64	0.27	1.36
	D06	1.78	4.33	0.69	3.29	0.00	0.27	3.14	47.62	1.63	5.86	0.14	1.37
	D07	3.43	15.06	1.53	4.98			1.03	4.81	3.36	7.23	0.00	0.54
	D08	0.46	4.57	1.75	6.25			7.34	29.68	3.25	7.41	0.00	1.84
Autumn	D01	0.08	0.25	1.13	5.51			0.78	11.27	0.83	3.35	0.00	0.32
	D02	0.00	0.16	0.08	1.11	0.00	0.08	0.00	0.25	0.00	0.16	0.00	0.08
	D03	0.08	2.70	1.66	5.58	0.00	0.08	4.34	13.86	34.13	195.83	0.00	0.25
	D04	0.04	0.31	0.67	2.35			0.08	0.33	0.08	0.46	0.00	0.41
	D05	0.76	3.12	0.40	2.70	0.00	0.16	14.28	84.47	4.23	10.07	0.16	0.32
	D06	0.85	4.54	0.80	2.12	0.00	0.08	2.48	20.56	1.61	6.53	0.12	0.41
	D07	0.67	6.29	0.47	7.52			0.24	1.55	0.47	2.53	0.00	0.08
	D08	0.56	1.32	0.64	4.85			2.08	9.40	5.68	14.06	0.08	0.33

4.5 Importance of Bat Population Recorded at the Proposed Wind Farm site

Ecological evaluation within this section follows a methodology that is set out in Chapter three of the '*Guidelines for Assessment of Ecological Impacts of National Roads Schemes'* (NRA, 2009).

All bat species in Ireland are protected under the Bonn Convention (1992), Bern Convention (1982) and the EU Habitats Directive (92/43/EEC). Additionally, in Ireland bat species are afforded further protection under the Birds and Natural Habitats Regulations (2011) and the Wildlife Acts 1976, as amended. Bats as an Ecological Receptor have been assigned ***Local Importance (Higher value)*** on the basis that the habitats within the Proposed Wind Farm site are utilized by a regularly occurring bat population of Local Importance.

During the 2023 surveys, three roosts containing soprano pipistrelles, *Myotis spp.* and brown long-eared bats were identified. However, these roosts were characterized by limited emergences, with only single-digit counts observed. No roosting site of National Importance (i.e. site greater than 100 individuals) was recorded within the Proposed Wind Farm site during the 2023 surveys.

5. RISK AND IMPACT ASSESSMENT

This risk and impact assessment has been undertaken in accordance with NatureScot Guidance. As per the NatureScot Guidance, wind farms present four potential risks to bats:

- Collision mortality, barotrauma and other injuries
- Loss or damage to commuting and foraging habitat
- Loss of, or damage to, roosts
- Displacement of individuals or populations

For each of these four risks, the detailed knowledge of bat distribution and activity within the Proposed Wind Farm site has been utilized to predict the potential effects of the Proposed Project on bats.

5.1 Collision Mortality

5.1.1 Assessment of Site-Risk

The likely impact of a proposed development on bats is related to site-based risk factors, including habitat and development features. The site risk assessment, as per Table 3a of the NatureScot guidance, is provided in Table 5-1 below.

Table 5-1 Site-risk Level Determination for the Proposed Project (Adapted from NatureScot, 2021)

Criteria	Site-specific Evaluation	Site Assessment
Habitat Risk	Three low-value roosts (≤10 specimens) containing soprano pipistrelles, *Myotis spp.* and brown long-eared bats were identified within the Proposed Wind Farm site. One other PRF complex was surveyed, and no evidence of the presence of roosting bats was identified. A number of trees with *Low-Moderate* potential as roost sites on or near the Proposed Wind Farm site turbine locations. The habitats within the Proposed Wind Farm site provide suitable commuting and foraging habitat for bats and is connected to the wider landscape by linear features such as tree lines, hedgerows and streams. Despite the presence of these linear features, it does not provide an extensive and diverse habitat mosaic of high quality or meet any of the criteria of a High risk site as set out in Table 3a of NatureScot, 2021.	Medium
Project Size	Following the criteria set out in NatureScot, 2021 the project is of Small scale as it consists of <10 turbines (7 no. turbines). However, since these turbines exceed 100m in height, the project falls into the Medium project size category. The project is not a strategic infrastructural development and is well below the number of turbines that would constitute a Large development (NatureScot, 2021). The project has therefore been assessed as being of Medium size. There is one wind energy developments within 5km and three others within 10km.	Medium
Site Risk Assessment (from criteria in Plate 3-3)		**Medium Site Risk (3)**

The Proposed Wind Farm site is located in an area of predominantly Improved Agricultural Grassland with broadleaf treelines and hedgerows forming field boundaries throughout the Proposed Wind Farm site. As per Table 3a of the NatureScot Guidance (2021), the Proposed Wind Farm site has a *Moderate*

habitat risk and *Medium* project size (Small scale development including 7 turbines but comprised of turbines >100m in height). The cross tabulation of a ***Medium*** project on a ***Moderate*** risk site results in an overall risk score of ***Medium*** (NatureScot Table 3a).

5.1.2 Assessment of Collision Risk

The following high-risk species were recorded during the dedicated surveys:

- Leisler's bat,
- Common pipistrelle
- Soprano pipistrelle
- Nathusius' pipistrelle

The Overall Risk Assessment for high collision risk species is provided in the sections below. Overall Risk was determined, in accordance with Table 3b of NatureScot 2021 guidance (**Appendix 3**), by a cross-tablature of the site risk level (i.e. Medium). The assessment was carried out for both median and maximum activity categories in order to provide insight into typical bat activity (i.e. median values) and activity peaks (i.e. maximum values). NatureScot recommends that the most appropriate activity level (i.e. median or maximum) be utilised to determine the overall risk assessment for a species.

As per NatureScot guidance there is no requirement to complete an Overall Risk Assessment for low-risk species. During the extensive suite of surveys undertaken the following low risk species were recorded:

- *Myotis spp.*
- Brown long-eared bat

Overall activity levels for brown long-eared bat were low. While there were peaks in median activity levels for *Myotis spp.* at D07 for summer and autumn, the overall activity levels for the species were low; therefore, no significant collision related effects are anticipated. Loss of habitat is assessed further in Section 5.2 and 5.3. below. Activity levels for these species will continue to be assessed during operational monitoring following the implementation of best practice mitigations provided. Further mitigation will be implemented after Year 1 if deemed necessary.

5.1.2.1 Leisler's bat

The Proposed Wind Farm site is within the current range of the Leisler's bat (NPWS, 2019). Leisler's bats are classed as a rarer species of a high population vulnerability which have a high collision risk (Plate 3-2). Leisler's bats were recorded during all activity surveys across the Proposed Wind Farm site. When assessed in the context of the identified site risk and in line with Table 3b (NatureScot, 2021), overall activity risk for Leisler's bat was found to be ***Medium*** in spring and summer, and ***Low*** in autumn at typical activity levels. ***High*** peak activity levels were recorded across all seasons in 2023 (See Table 5-2 below).

Based on site visit and survey data, including walked transects, it is determined that the Typical Activity (i.e. Median) is reflective of the nature of the Proposed Wind Farm site, which is primarily agricultural grassland, treelines/hedgerows and small areas of conifer plantations with moderate levels of bat activity recorded during the walked transects undertaken at the Proposed Wind Farm site.

Thus, the overall collision risk level for the local population of Leisler's bat is generally assessed as ***Medium*** across all seasons and detectors with the sole exception of D07, which was assessed as having a ***High*** collision risk level in spring.

Table 5-2 Leisler's bat - Overall Risk Assessment

Survey Period	Site Risk	Typical Activity (Median)	Typical Risk Assessment (as per Table 3b NatureScot 2021)	Activity Peaks (Maximum)	Peak Risk Assessment (as per Table 3b NatureScot 2021)
Spring 2023	Medium (3)	Medium (3)*	Typical Risk is Medium (9)	High (5)	Peak Risk is High (15)
Summer 2023		Medium (3)	Typical Risk is Medium (9)	High (5)	Peak Risk is High (15)
Autumn 2023		Medium (3)	Typical Risk is Low (3)	High (5)	Peak Risk is High (15)

**The spring median value for D07 was excluded from the overall assessment of Typical Activity as it considerably skews the data, providing an inaccurate representation of the typical activity observed across the Proposed Wind Farm site.*

5.1.2.2 Soprano pipistrelle

The Proposed Wind Farm site is within range for soprano pipistrelle bat (NPWS, 2019). Soprano pipistrelle are classed as a common species of a medium population vulnerability which have a high potential collision risk (Plate 3-2). Soprano pipistrelle was recorded during activity surveys across the Proposed Wind Farm site. When assessed in the context of the identified site risk and in line with Table 3b (NatureScot 2021) overall activity risk for soprano pipistrelle was found to be ***Low*** at typical activity levels for spring and summer, and ***Medium*** for autumn. Peak activity levels were ***High*** across all seasons (See Table 5-3 below).

Based on site visit and survey data, including walked transects, it is determined that the Typical Activity (i.e. Median) is reflective of the nature of the Proposed Wind Farm site, which is primarily agricultural grassland, treelines/hedgerows and small areas of conifer plantations with moderate levels of bat activity recorded during the walked transects undertaken at the Proposed Wind Farm site.

Thus, there is ***Low - Medium*** collision risk level assigned to the local population of soprano pipistrelle in all seasons.

Table 5-3 Soprano pipistrelle - Overall Risk Assessment

Survey Period	Site Risk	Typical Activity (Median)	Typical Risk Assessment (as per Table 3b NatureScot 2021)	Activity Peaks (Maximum)	Peak Risk Assessment (as per Table 3b NatureScot 2021)
Spring 2023	Medium (3)	Low (1)	Typical Risk is Low (3)	High (5)	Peak Risk is High (15)
Summer 2023		Low (1)	Typical Risk is Low (3)	High (5)	Peak Risk is High (15)
Autumn 2023		Medium (3)	Typical Risk is Medium (9)	High (5)	Peak Risk is High (15)

5.1.2.3 Common pipistrelle

The Proposed Wind Farm site is within the current range of the common pipistrelle bat (NPWS, 2019). Common pipistrelle are classed as a common species of a medium population vulnerability which have a high collision risk (Plate 3-2). Common pipistrelle were recorded during all activity surveys across the Proposed Wind Farm site. When assessed in the context of the identified site risk and in line with Table 3b (NatureScot 2021); overall activity risk for common pipistrelle at Typical Activity levels was found to be ***Low*** in spring and summer, and ***Medium*** in autumn. Peak risk levels for common pipistrelle was found to be ***High*** in all seasons. (See Table 5-4 below).

Based on site visit and survey data, including walked transects, it is determined that the Typical Activity (i.e. Median) is reflective of the nature of the Proposed Wind Farm site, which is primarily agricultural grassland, treelines/hedgerows and small areas of conifer plantations with moderate levels of bat activity recorded during the walked transects undertaken.

Thus, there is a ***Low – Medium*** collision risk level assigned to the local population of common pipistrelle in all seasons.

Table 5-4 Common pipistrelle - Overall Risk Assessment

Survey Period	Site Risk	Typical Activity (Median)	Typical Risk Assessment (as per Table 3b NatureScot 21	Activity Peaks (Maximum)	Peak Risk Assessment (as per Table 3b NatureScot 2021)
Spring 2023	Medium (3)	Low (1)	Typical Risk is Low (3)	High (5)	High (15)
Summer 2023		Low (1)	Typical Risk is Low (3)	High (5)	High (15)
Autumn 2023		Medium (3)	Typical Risk is Medium (9)	High (5)	High (15)

5.1.2.1 Nathusius' pipistrelle

The Proposed Wind Farm site is within the current range of the Nathusius' pipistrelle bat (NPWS, 2019). Nathusius' pipistrelle bats are classed as a rarer species of a high population risk which have a high collision risk (Plate 3-4). Nathusius' pipistrelle bats were recorded during activity surveys across most of the Proposed Wind Farm site. When assessed in the context of the identified site risk and in line with Table 3b (NatureScot, 2021) overall activity risk for Nathusius' pipistrelle bats was found to be ***Low*** at both typical and peak activity levels across all seasons (See Table 5-5 below).

Based on site visit and survey data, including walked transects, it is determined that the Typical Activity (i.e. Median) is reflective of the nature of the Proposed Wind Farm site, which is primarily agricultural grassland, treelines/hedgerows and small areas of conifer plantations, with no activity recorded during the walked transects undertaken.

Thus, there is ***Low*** collision risk level assigned to the local population of Nathusius' pipistrelle.

Table 5-5 Nathusius' pipistrelle - Overall Risk Assessment

Survey Period	Site Risk	Typical Activity (Median)	Typical Risk Assessment (as per Table 3b NatureScot 2021)	Activity Peaks (Maximum)	Peak Risk Assessment (as per Table 3b NatureScot 2021)
Spring	Medium (3)	Nil (0)	Typical Risk is Low (0)	Low (1)	Peak Risk is Low 3)
Summer		Nil (0)	Typical Risk is Low (0)	Low (1)	Peak Risk is Low (3)
Autumn		Nil (0)	Typical Risk is Low (0)	Low (1)	Peak Risk is Low (3)

5.1.3 Collision Risk Summary

Site-level collision risk for high collision risk bat species was typically ***Low*** to ***Medium***. Overall bat activity levels were typical of the nature of the Proposed Wind Farm site, which is predominantly agricultural grassland, treelines, hedgerows, and small segments of conifer plantation with moderate levels of bat activity recorded during the static detector surveys and the walked transects undertaken.

However, following per detector R-analysis, Detectors D01, D03, D05 and D07 recorded ***High*** Median Activity levels in either spring or autumn (Table 5-6). During manual transect surveys, the majority of Leisler's bat activity was focused around D07, while soprano and common pipistrelle activity was distributed more evenly across the Proposed Wind Farm site.

While ***High*** median activity was recorded at four locations, it is noted that habitats at these locations will change during the construction phase of the Proposed Project with the required implementation of the bat felling buffers (Section 6.1.3). A monitoring and mitigation strategy has been devised for the Proposed Project, in line with the case study example provided in Appendix 5 of the NatureScot 2021 Guidance and based on the site-specific data. After year 1 monitoring, if a curtailment requirement is identified, a curtailment programme, in line with relevant guidelines, will be devised around key activity periods and weather parameters, as well as a potential increase in buffers if deemed necessary.

Table 5-6 Detector Location Recording High Median Activity in 2023 for High-risk Bat Species

Detector ID	Turbine	Species	High Median Activity Survey Period
D01	T01	Common pipistrelle	Spring 2023
D03	T03	Soprano pipistrelle	Autumn 2023
D05	T05	Common pipistrelle	Autumn 2023
D07	T07	Leisler's bat	Spring 2023

5.2 Loss or Damage to Commuting and Foraging Habitat

In the absence of appropriate design, the loss or degradation of commuting/foraging habitat has potential to reduce feeding opportunities and/or displace bat populations. The Proposed Wind Farm site is predominantly located on improved agricultural grassland with mature (managed and unmanaged) hedgerows and treelines delineating the vast majority of field boundaries. Smaller areas of conifer plantation are also present.

Approximately 3.57 ha of conifer forestry and 0.73 ha of mixed broadleaved/conifer woodland will be felled to accommodate Turbine 7 and its associated infrastructure. Chapter 4, Figure 4-14 shows the extent of the commercial forestry to be permanently felled as part of the Proposed Wind Farm site. The felling of trees is required to achieve the required buffer distance for the protection of bats, from the turbines to the canopy of the nearest habitat feature, as recommended by the Natural England (2014) and NatureScot (2021). Further details on buffer calculations can be found in section 6.1.3 of this report. It should be noted that conifer forestry on the Proposed Wind Farm site was originally planted as a commercial crop and will be felled in the future should the proposed renewable energy development proceed or not. The felling of commercial forestry will have a positive effect by opening up large areas of formerly closed canopy commercial forestry i.e. there will be more linear forestry edge habitat created. This will have a positive impact on bats as it will provide more commuting and foraging opportunities. Overall, the proposed works will retain areas of linear forestry edge habitats.

The majority of turbines will be located in agricultural grassland resulting in minimal loss of linear habitat features. Approximately 1,388m of linear vegetation removal will be required within and around the Proposed Wind Farm site infrastructure footprint to allow for the construction of the turbine bases, access roads, and the other ancillary infrastructure. This also includes vegetation removal in accordance with the proposed bat buffers detailed in Section 6.1.3. Further details on vegetation removal required within and around development footprint is detailed in Chapter 4, Section 4.3.1.6 of this EIAR. As such, it is proposed to incorporate additional and enhancement native hedgerow planting (approx. 3,640m) within the Site to offset the anticipated loss of hedgerow to the footprint of the Proposed Project. Further details on tree removal required within and around development footprint is detailed in Chapter 6 of this EIAR. Existing hedgerow habitat throughout the Site will be enhanced through additional native hedgerow species. It is proposed to plant some native tree species within the hedgerow habitat to further increase the biodiversity value within the Site. The enhancement design will ensure habitat connectivity is maintained and improved around the Site. No permanent loss of, or damage to, commuting or foraging habitats is anticipated as a result of the Proposed Wind Farm site or associated infrastructure. The proposed replanting area is shown and discussed in Appendix 6-4, Biodiversity Management and Enhancement Plan (BMEP). Following the implementation of the replanting plan as outlined in the BMEP, no significant effects in relation to habitat fragmentation or loss of foraging habitat for bats is anticipated.

The habitat within the location of the proposed 38kV substation and adjacent temporary construction compound consists entirely of Improved agricultural grassland (GA1) with no linear vegetation removal proposed. Therefore, no loss of significant commuting/foraging habitat are anticipated.

As described in Chapter 4, Section 4.5.2 of this EIAR, no significant turbine delivery route accommodation works are required to facilitate the delivery of components to the Site. Therefore, no significant effects on commuting and foraging bats associated with the turbine delivery route are anticipated.

Given the extensive area of habitat that will remain undisturbed throughout the Proposed Wind Farm site and the avoidance of the most significant areas of faunal habitat (i.e. natural woodlands and mature treelines), no significant effects with regard to loss of commuting and foraging habitat are anticipated.

5.3 Loss of, or Damage to, Roosts

The Proposed Wind Farm site is predominantly located within agricultural grassland surrounded by treelines and hedgerows, with smaller areas of conifer plantation. The trees contained within the commercial conifer forestry do not provide the optimal roosting habitat for bats.

Four structures, and their associated outbuildings, were identified within the Proposed Wind Farm site and were subjected to inspections and dusk activity surveys. Three roosts were identified within two of the farm complexes, each with fewer than 10 observations of emerging bats. These structures and the surrounding linear habitat features will be retained and avoided as part of the Proposed Project.

There will be some requirement to remove trees to facilitate the proposed bat felling buffers, as detailed in section 6.1.3 below. Trees within the bat buffers varied in suitability from *Negligible* to *Moderate* for roosting bats. A small number of trees identified during the roost surveys as having potential to host roosting bats were located within the bat buffers detailed in Section 4.3.2. Although no evidence of bat use was found during daytime inspections, there is a potential for indirect effects on bats, such as the loss of roosting habitats, and direct effects, including temporary disturbance, harm, or death due to the proposed tree felling. On a precautionary basis, as the trees provide some potential roosting habitat, the proposed linear vegetation removal has been designed to retain suitable treelines where possible and post-construction monitoring will be carried out. A confirmatory pre-construction tree survey will be conducted on trees identified as having roosting potential prior to removal to ensure no bats are present. Mitigation will be provided through the provision of alternative roosting features, as detailed in Section 6.1.4 to ensure no potential significant effects on bats can arise as a result of the Proposed Project.

The habitat within the proposed substation and temporary construction compound is comprised of *Improved agricultural grassland (GA1),* with no linear vegetation proposed for removal. Additionally, the underground cabling will be following existing roads and agricultural grassland and does not require the removal of any linear vegetation to facilitate its construction. Therefore, no loss of roosting habitat is anticipated.

Twelve watercourse crossings are present along the Proposed Grid Connection underground cabling route, excluding the crossing at the River Nore. The structures located at these watercourse crossings present *Negligible* to *Low* suitability for roosting bats. No evidence of bat roosts was found at any of these structures during the surveys. Based on the proposed construction methodologies for the provision of the Proposed Grid Connection underground cabling outlined in Section 4.3.1.2 above, no loss of roosting habitat associated with these works is anticipated.

The turbine delivery route traverses habitats including hedgerows (WL1), treelines (WL2), stone walls (BL1), grassy verges (GS2) and eroding/upland watercourses (FW1). No significant accommodation works associated with the TDR are proposed and as such, no loss of roosting habitat is anticipated.

No potential for significant effect with regard to the loss of, or damage to roosting habitat as a result of the Proposed Wind Farm site, Proposed Grid Connection or the turbine delivery route is anticipated.

5.4 Displacement of Individuals or Populations

The Proposed Project is predominantly located within agricultural grassland with treelines/hedgerows delineating field boundaries with smaller areas of conifer plantation also present. A number of treelines within the turbine buffers to be removed provide potential roosting and foraging/commuting habitat. Mitigation measures are detailed in Section 6.1 below. There will be no net loss of linear landscape features for commuting and foraging bats and there will be no loss of any roosting site of ecological significance. The habitats on the Proposed Wind Farm site will remain suitable for bats and no significant displacement of individuals or populations is anticipated.

6. BEST PRACTICE AND MITIGATION MEASURES

This section describes the best practice and site-specific mitigation measures that are in place to avoid and reduce the potential for significant effects on local bat populations.

6.1 Standard Best Practice Measures

6.1.1 Noise Restrictions

During the construction phase, plant machinery will be turned off when not in use and all plant and equipment for use will comply with the Construction Plant and Equipment Permissible Noise Levels Regulations (S.I. No. 632 of 2001).

6.1.2 Lighting Restrictions

Where lighting is required, directional lighting will be used to prevent overspill on to woodland/forestry edges. Exterior lighting, during construction and post construction, shall be designed to minimize light spillage, thus reducing the effect on areas outside the Proposed Wind Farm, and consequently on bats i.e. Lighting will be directed away from mature trees/treelines around the periphery of the site boundary to minimize disturbance to bats. Directional accessories can be used to direct light away from these features, e.g. through the use of light shields (Stone, 2013). The luminaries will be of the type that prevent upward spillage of light and minimize horizontal spillage away from the intended lands.

The proposed lighting around the Proposed Wind Farm shall be designed with consideration of the Institute of Lighting Professionals Guidance Note 08/23 Bats and Artificial Lighting at Night (ILP, 2023).

In addition, the applicant commits to the use of lights during construction, operation and decommissioning (such that they are necessary) having consideration of the following guidance that is provided in the Dark Sky Ireland Lighting Recommendations:

- Every light needs to be justifiable,
- Limit the use of light to when it is needed,
- Direct the light to where it is needed,
- Reduce the light intensity to the minimum needed,
- Use light spectra adapted to the environment,
- When using white light, use sources with a “warm” colour temperature (less than 3000K).

With regard to the potential for lighting to increase collision risk, it is noted that there will be limited illumination of the turbines in the form of aviation lighting. Post construction monitoring will be carried out (as outlined below) to assess any potential changes in bat activity patterns and collision risk. Significant effects as a result of lighting are not anticipated; however, if in the course of this monitoring, any potential for significant effects on bats is identified, the site-specific mitigation measures will be reviewed and any changes necessary will be implemented to avoid any such impacts.

6.1.3 Bat Felling Buffers

In accordance with NatureScot and NIEA Guidance, a minimum 50m buffer to all habitat features used by bats (e.g., hedgerows, tree lines etc.) should be applied to the siting of all wind turbines (See example provided in Plate 6-1 below). However, Eurobats No. 6 guidance and NIEA recommends increased buffers of 100m and 200m around woodland/forestry areas, however, there is no scientific evidence to support these increased buffer distances in Ireland or the UK.

NatureScot recommends that a distance of 50m between turbine blade tip and nearest woodland (or other key habitat features) is adequate mitigation. This 50m buffer will be implemented from the outset and monitored as per the post-construction monitoring. The success of the buffer mitigation will be assessed as part of post construction monitoring (outlined in Section 6.2 below) and updated where necessary.

The formula below is presented to provide appropriate mitigation in relation to bats, and the relevant input required from turbine parameters, is the combination of the blade length and hub height. The turbine model to be installed on the Proposed Wind Farm will have an overall ground-to-blade tip height of 185m, rotor diameter of 163m, and hub height of 103.5m.

There will be a requirement to fell an area of conifer forestry (at T7) and to remove some linear vegetation i.e. treelines/hedgerows, to facilitate the required bat buffers at the Proposed Wind Farm. This is outlined in further detail in Section 6.1.4 below. These vegetation-free areas will be maintained during the operational life of the Proposed Project.

It is necessary to calculate the distance between the edge of the habitat feature and the centre of the tower (b). Using the formula:

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

Where, bl =Blade length, hh = hub height, fh = feature height all in metres. E.g. (below) b = 69.3m (Plate 6-1). Based on the turbine parameters provided, the formula calculates a bat felling buffer of 87m.

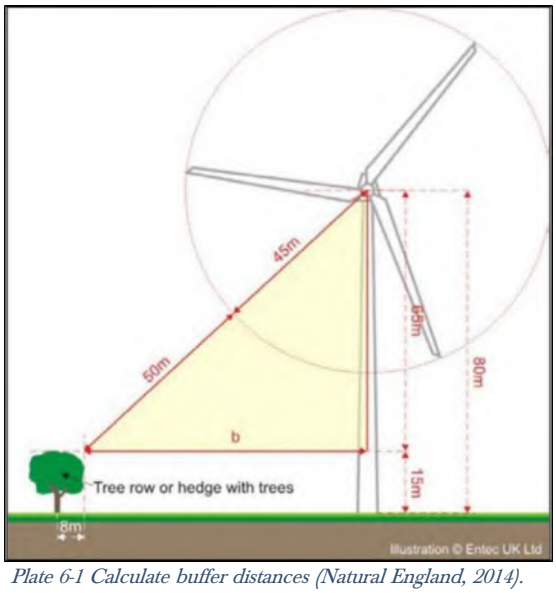


Plate 6-1 Calculate buffer distances (Natural England, 2014).

6.1.4 Confirmatory Pre-construction Tree Survey

A number of mature trees presenting potential roosting features were identified within the bat felling buffers. Areas subject to removal are shown in Figure 6-1. Although no evidence of bats was found at these locations, bats comprise mobile species that can move regularly between tree roosts. As such, the trees with potential roosting features have been considered as a "roost resource" and compensation will be provided to cover for the loss of the resource. The following procedures are proposed prior to felling trees with PRFs:

- A pre-commencement survey will be carried out by a suitably qualified ecologist on trees with PRFs proposed for felling.
- If a bat roost is identified within any of the trees to be removed/pruned, a bat derogation licence will be obtained from the NPWS, prior to removal and the removal activity will be supervised by a qualified ecologist.
- On a precautionary basis, works will be undertaken at an appropriate time of year, as determined by a suitably qualified ecologist, to avoid disrupting sensitive life cycle periods for bats. Tree-felling of mature deciduous trees will be carried out according to the following standard mitigating procedures:
    - Trees with suitable potential roost features proposed for felling will be checked for bats by a suitably qualified arborist/ecologist at the time of felling.
    - Trees will be nudged two or three times prior to limb removal, with a pause of 30 seconds in between, to allow bats to wake and move.
    - Rigged felling shall be used to lower the limbs and trunk carefully to ground level and cavities searched by a qualified ecologist.
    - Felled trees will be left in-situ for a minimum of 24 hours prior to sawing or mulching, to allow any bats present to escape (National Roads Authority, 2006).

Compensation for the loss of trees with alternative potential roosting features will be implemented on a like-for-like basis, through the provision of bat boxes. A count of all potential roosting features lost will be required to ensure all features are accounted for by compensation measures. Details regarding the installation, maintenance and monitoring of bat boxes are outlined in Appendix 6-4 in Chapter 6 of this EIAR.

A replanting plan is also proposed to compensate for the loss of commuting/foraging habitat. Details of the proposed habitat replacement are outlined in Section 6.1.5 below and in Appendix 6-4 in Chapter 6.

6.1.5 Biodiversity Management and Enhancement Plan

In the absence of appropriate design, the loss or degradation of commuting/foraging habitat has potential to reduce feeding opportunities and/or displace bat populations. However, the Proposed Project is predominantly located within agricultural grasslands and linear landscape features such as hedgerows, trees and drains which will be largely retained or avoided.

Linear vegetation within the required turbine bat buffers will be removed (Figure 6-1). A replanting design has been curated to provide alternative commuting corridors within the Site. To comply with NatureScot recommendations in relation to habitat buffering to avoid bat fatalities, a total of 1,388m of linear vegetation habitat will be lost as a result of the Proposed Project, including the recommended buffers applied for bats. Further details are outlined in Appendix 6-4 BMEP.

Linear landscape features in the wider area that will be retained, and the loss of gappy hedgerow/treelines is not anticipated to have a significant effect on local bat populations. However, it is proposed to plant new linear features and bolster existing habitat features to offset any potential loss in linear habitat features and to provide additional new opportunities for commuting and foraging bats. Approximately 3,640m of heavily managed hedgerow will be enhanced through additional planting with native species. It is proposed to plant some native tree species within the hedgerow habitat to further increase the biodiversity value within the Site. In addition, around 270 meters of new native hedgerow habitat will be established

within the Proposed Wind Farm site. It is also proposed to create a new native riparian buffer zone adjacent the Tullaroan stream within the Site. Approximately 1.7ha of riparian planting is proposed to be planted on both banks of the Tullaroan stream. The proposed planting and enhancement of linear habitat will enhance foraging and commuting opportunities for bats using the Site.

The locations in which the proposed linear hedgerow planting and enhancement will take place will be carried out along selected boundaries of fields within the Site. Refer to the BMEP outlined in Appendix 6-4 of the EIAR for hedgerow/treeline planting details.

Overall, the proposed planting of new hedgerow, enhancement of existing hedgerow and riparian planting will result in a net gain of the linear landscape features within the Proposed Wind Farm. Planting will be of species indigenous to the local area. Further details are provided in BMEP attached as Appendix 6-4.

Map Legend

- EIAR Site Boundary
- Proposed Turbine Locations
- Bat Buffer
- Proposed Linear Vegetation Removal
- Proposed Hardstands
- Proposed New Roads
- Existing Roads to be Upgraded

Drawing Title
Proposed Linear Vegetation Removal

Project Title
Briskalagh Renewable Energy Development

Drawn By	Checked By
RC	AJ
Project No.	Drawing No.
230502	Figure 6-1
Scale	Date
1:18,000	2024-09-11

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

6.1.6 Blade Feathering

NIEA Guidelines also recommend that, in addition to buffers applied to habitat features, all wind turbines are subject to 'feathering' of turbine blades when wind speeds are below the cut-in speed of the proposed turbine. This means that the turbine blades are pitched at 90 degrees or parallel to the wind to reduce their rotation speed to below two revolutions per minute while idling. This measure has been shown to significantly reduce bat fatalities (by up to 50%) in some studies (NIEA, 2021).

In accordance with NIEA Guidelines, blade feathering will be implemented as a standard across all proposed turbines when wind speeds are below the cut-in speed of the turbine.

6.2 Bat Monitoring Plan

Overall risk levels for high collision risk bat species were typically *Low* to *Medium.* This risk level is reflective of the nature of the Proposed Wind Farm site, which is agricultural grassland surrounded by treelines and hedgerows, with smaller areas of wet grasslands, broadleaf woodland and commercial forestry with low levels of bat activity recorded during the walked transects undertaken.

However, taking a precautionary approach and given that high collision risk was recorded at median and peak activity levels, an adaptive monitoring and mitigation strategy has been devised for the Proposed Project, in line with the case study example provided in Appendix 5 of the NatureScot, (2021) and based on the site-specific data.

6.2.1 Operational Monitoring

To assess the effects of the Proposed Project on bat activity, at least 3 years of post-construction monitoring is proposed. Post-construction monitoring will include static detector surveys, walked survey transects and corpse searching to record any bat fatalities resulting from collision.

The results of post-construction monitoring shall be utilised to assess any potential changes in bat activity patterns and to monitor the implementation of the mitigation strategy as outlined in Section 6 above.. If the monitoring identifies a curtailment requirement (i.e. significant bat fatalities encountered), a curtailment programme, in line with relevant guidelines, will be devised around key activity periods and weather parameters, as well as a potential increase in buffers.

At the end of each year, the efficacy of the mitigation and monitoring plan will be reviewed, and any identified efficiencies incorporated into the programme. This approach allows for an evidence-based review of the potential for bat fatalities at the Proposed Wind Farm, post construction, to ensure that the necessary measures, based on a new baseline post-construction, are implemented for the protection of bat species locally. The effectiveness of any mitigation/curtailment needs to be monitored in order to determine (a) whether it is working effectively (i.e. the level of bat mortality is incidental), and (b) whether the curtailment regime can be refined such that turbine down-time can be minimised whilst ensuring that it remains effective at preventing casualties.

The below subsections provide additional detail on the proposed survey effort, timing, and mitigation.

6.2.1.1 Monitoring Year 1

Bat activity surveys

The post-construction surveys will be carried out as per the pre-construction survey effort. Static monitoring will take place at each turbine during the bat activity season (between April and October) (NatureScot, 2021, NIEA, 2021). Full spectrum recording detectors will be utilised for the same duration

as during pre-application surveys and at the same density (NatureScot, 2021). As described in Section 3.5 above, the assessment of bat activity levels will include the use of 'Ecobat' (or similar alternative), a web-based interface, allowing uploaded activity data to be contrasted with a comparable reference range, allowing objective and robust interpretation. Walked survey transects will also be conducted.

Key weather parameters and other factors that are known to influence collision risk will be monitored and shall include:

- Windspeed in m/s (measured at nacelle height)
- Temperature (ºC)
- Precipitation (mm/hr)

Carcass searches

Carcass searches, to monitor and record bat fatalities, shall be conducted at each turbine in accordance with NIEA Guidance. This shall include searcher efficiency trials and an assessment of scavenger removal rates to determine the appropriate correction factor to be applied in relation to determining an accurate estimate of collision mortality. Surveys should cover all activity seasons and the use of a trained dog detection team will be carried out to ensure maximum efficiency.

6.2.1.2 Monitoring Years 2 & 3

Monitoring surveys shall continue in Year 2 and 3, and where a curtailment requirement has been identified, the success of the curtailment strategy shall be assessed in line with the baseline data collected in the preceding year(s). The performance of any curtailment programme in terms of its ability to respond to the changes in bat abundance based on temperature and wind speed shall be analysed to confirm it is neither significantly over- nor under- curtailing during different periods of bat activity.

At the end of each year, the efficacy of any mitigation/curtailment programme shall be reviewed, and any identified efficiencies incorporated into the programme. The requirement for continued post-consent monitoring will also be considered. Should no bat fatalities be recorded in Year 1, curtailment (where applicable) in Year 2 and Year 3 could be reduced/re-evaluated or removed with monitoring continuing to inform this strategy.

6.3 Residual Impacts

Not Significant Effect

Taking into consideration the sensitive design of the project, the proposed best practice and adaptive mitigation measures; significant residual effects on bats with regard to 1) Collision mortality, barotrauma and other injuries, 2) Loss or damage to commuting and foraging habitat, 3) Loss of, or damage to, roosts and 4) Displacement of individuals or populations are not anticipated.

6.4 Cumulative Effects

The Proposed Project was considered in combination with other projects and/or plans (existing approved and pending decision), in the surrounding area that could result in cumulative impacts on bats. This included a review of online Planning Registers and served to identify past, present and future plans and projects, their activities and their predicted environmental effects. The projects and/or plans considered are detailed in Section 2.8 in Chapter 2 of the EIAR.

Following the detailed assessment provided in the preceding sections, it is concluded that, the Proposed Project will not result in any residual adverse effects on bats, when considered on its own. There are two existing, permitted or proposed wind farms located within 5km of the Proposed Wind Farm, and three located within 10km. There are four further EIA projects including one extractive industry within 10km.

No potential for the Proposed Project to contribute to any cumulative adverse effects on any bat populations is anticipated when considered in-combination with other plans and projects.

In the review of the projects that was undertaken, no connection, that could potentially result in additional or cumulative impacts was identified. Neither was any potential for different (new) impacts resulting from the combination of the various projects and plans in association with the Proposed Project.

Taking into consideration the reported residual impacts from other plans and projects in the area and the predicted impacts with the current proposal, no residual cumulative impacts have been identified regarding bats.

7. CONCLUSION

This report provides a full and comprehensive assessment of the potential for impact on bat populations arising from the Proposed Project. The surveys provided in this report are in accordance with NatureScot guidance and assessment/mitigation are in accordance with NatureScot guidance. Following consideration of the residual effects (post mitigation) it is noted that the Proposed Project will not result in any significant effects on bats.

Provided that the Proposed Project is constructed and operated in accordance with the design, best practice and mitigation that is described within this report, significant effects on bats are not anticipated at any geographic scale.

8. BIBLIOGRAPHY

Abbott, I., Aughney, T., Langton, S. and Roche, N. (2015) BATLAS 2020 Pilot Project Report. Bat Conservation Ireland, Virginia, Cavan.

Amorim, F., Rebelo, H., & Rodrigues, L. (2012). Factors influencing bat activity and mortality at a wind farm in the Mediterranean region. Acta Chiropterologica, 14(2), 439-457.

Andrews, H. (2013) Bat Tree Habitat Key. AEcol, Bridgewater.

Arnett, E. B. (2006). A preliminary evaluation on the use of dogs to recover bat fatalities at wind energy facilities. Wildlife Society Bulletin, 34(5), 1440-1445.

Arnett, E. B., Baerwald, E. F., Mathews, F., Rodrigues, L., Rodríguez-Durán, A., Rydell, J., ... & Voigt, C. C. (2016). Impacts of wind energy development on bats: a global perspective. In Bats in the Anthropocene: Conservation of Bats in a Changing World (pp. 295-323). Springer International Publishing.

Aughney, T. (2008) An investigation of the impact of development projects on bat populations: Comparing pre- and post-development bat faunas. Irish Bat Monitoring Programme. Bat Conservation Ireland, Virginia, Cavan.

Aughney, T., Langton, S. and Roche, N. (2011) Brown long-eared bat roost monitoring scheme for the Republic of Ireland: synthesis report 2007-2010. Irish Wildlife Manuals, No.56. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

Aughney, T., Langton, S. and Roche, N. (2012) All Ireland Daubenton's bat Waterway Monitoring Scheme 2006-2011. Irish Wildlife Manuals, No. 61. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Ireland.

Barataud, M. and Tupinier, Y. Écologie acoustique des chiroptères d'Europe: identification des espèces, étude de leurs habitats et comportements de chasse. Biotope, 2012.

Baerwald, E. F., D'Amours, G. H., Klug, B. J., & Barclay, R. M. (2008). Barotrauma is a significant cause of bat fatalities at wind turbines. Current biology, 18(16), R695-R696.

Baerwald, E. F., & Barclay, R. M. (2009). Geographic variation in activity and fatality of migratory bats at wind energy facilities. Journal of Mammalogy, 90(6), 1341-1349.

BCI (2012a). Wind Turbine/Wind Farm Development Bat Survey Guidelines, Version 2.8, December 2012. Bat Conservation Ireland, Virginia, Co. Cavan

BCI (2012b) Bats and Appropriate Assessment Guidelines, Version 1, December 2012. Bat Conservation Ireland, Virginia, Co. Cavan Berthinussen, A., Richardson. O.C. and Altringham, J.D. (2014) Bat Conservation: Global evidence for the effects of interventions. Exeter: Pelagic Publishing.

Carden, R., Aughney T., Kelleher C. and Roche, N. (2010) Irish Bat Monitoring Schemes. BATLAS Republic of Ireland Report for 2008-2009.

Collins, J. (ed.) (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn). The Bat Conservation Trust, London.

Collins, J., and Jones, G. (2009). Differences in bat activity in relation to bat detector height: implications for bat surveys at proposed windfarm sites. Acta Chiropterologica, 11(2), 343-350.

Cryan, Paul M., et al. (2014) Behavior of bats at wind turbines. Proceedings of the National Academy of Sciences 111.42: 15126-15131.

EUROBATS (2016) Report of the Intersessional Working Group on Wind Turbines and Bat Populations at 21st Meeting of the Advisory Committee, Zandvoort, the Netherlands, 18 – 20 April 2016.

Hein, C.D., Gruver, J. and Arnett, E.B. (2013). Relating pre-construction bat activity and post-construction bat fatality to predict risk at wind energy facilities: a synthesis. A report submitted to the National Renewable Energy Laboratory. Bat Conservation International, Austin, TX, USA.

Hill D., Fasham, M., Tucker P., Shewry, M. and Shaw, P (eds) (2005) Handbook of Biodiversity Methods: Survey, Evaluation and Monitoring, 433-449. Cambridge University Press, Cambridge.

Horn, J.W., Arnett, E.B. and Kunz, T.H. (2008). Behavioral responses of bats to operating wind turbines. Journal of wildlife management, 72(1), 123-132.

Hundt L. (2012) Bat Surveys: Good Practice Guidelines, 2nd edition. Bat Conservation Trust ISBN-13: 9781872745985.

ILP (2023) Guidance Note 08/23: Bats and Artificial Lighting at Night.

Korner-Nievergelt, F., Brinkmann, R., Niermann, I., & Behr, O. (2013). Estimating bat and bird mortality occurring at wind energy turbines from covariates and carcass searches using mixture models. PloS one, 8(7), e67997.

Kunz, Thomas H., Edward B. Arnett, Brian M. Cooper, Wallace P. Erickson, Ronald P. Larkin, Todd Mabee, Michael L. Morrison, M. Dale Strickland, and Joseph M. Szewczak. Assessing impacts of wind-energy development on nocturnally active birds and bats: a guidance document. Journal of Wildlife Management 71, no. 8 (2007): 2449-2486.

Kunz, T.H. and Parsons, S. (2009). Ecological and Behavioral Methods for the Study of Bats, 2nd Edition. The Johns Hopkins University Press, USA.

Marnell, F., Kelleher, C. & Mullen, E. (2022) Bat mitigation guidelines for Ireland v2. Irish Wildlife Manuals, No. 134. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage, Ireland.

Mathews, F., Swindells, M., Goodhead, R., August, T. A., Hardman, P., Linton, D. M., and Hosken, D. J. (2013). Effectiveness of search dogs compared with human observers in locating bat carcasses at wind-turbine sites: A blinded randomized trial. Wildlife Society Bulletin, 37(1), 34-40.

Mathews, F., Richardson, S., Lintott, P. and Hosken, D. (2016) Understanding the risk to European protected species (bats) at onshore wind turbine sites to inform risk management. Final Report. University of Exeter.

Mitchell-Jones, A. J. and McLeish, A. P. (2004). The Bat Worker's Manual, 3rd Edition. JNCC, Peterborough.

Mitchell-Jones, A.J. (2004). Bat Mitigation Guidelines. English Nature.

Montgomery, W. I., Provan, J., McCabe, A. M., and Yalden, D. W. (2014). Origin of British and Irish mammals: disparate post-glacial colonisation and species introductions. Quaternary Science Reviews, 98, 144-165.

NRA (2006a) Best practice guidelines for the conservation of bats in the planning of national road schemes. National Roads Authority, Dublin, Ireland.

NRA (2006b) Guidelines for the treatment of bats during the construction of national road schemes. National Roads Authority, Dublin, Ireland.

Natural England (2014). Bats and Onshore Wind Turbines: Interim Guidance. Third Edition TIN051. English Nature.

NatureScot (2021). Bats and onshore wind turbines: survey, assessment and mitigation. August 2021 (updated with minor revisions).

Nealon, Ú.C. (2016) Bats and wind farms in Ireland: An assessment of current practices in surveying and monitoring. Oral presentation at the 1st Ecology and Evolution Ireland conference, Sligo.

Northern Ireland Environment Agency (2011) Bat Survey – Specific Requirements for Wind Farm Proposals.

NIEA, Natural Environment Division (2021). Guidance on Bat Surveys, Assessment & Mitigation for Onshore Wind Turbine Developments.

Perrow, M. (Ed.). (2017). Wildlife and Wind Farms-Conflicts and Solutions, Pelagic Publishing Ltd.

Regini, K. (2000) Guidelines for ecological evaluation and impact assessment, In Practice: Bulletin of the Institute of Ecology and Environmental Management, 29, 1-7.

Roche, N., Langton, S. & Aughney T. (2012) Car-based bat monitoring in Ireland 2003-2011. Irish Wildlife Manuals, No. 60. National Parks and Wildlife Service, Department of the Arts, Heritage and the Gaeltacht, Ireland.

Roche, N., T. Aughney, F. Marnell, and M. Lundy (2014). Irish Bats in the 21st Century. Bat Conservation Ireland, Virginia, Co. Cavan, Ireland.

Roche, N., Aughney T. & Langton S. (2015) Lesser horseshoe bat: population trends and status of its roosting resource. Irish Wildlife Manuals, No 85. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Ireland.

Rodrigues, L., L. Bach, M. J. Dubourg-Savage, B. Karapandža, D. Kovač, T. Kervyn, J. Dekker, A. Kepel, P. Bach, J. Collins, C. Harbusch, K. Park, B. Micevski, and J. Minderman (2015). Guidelines for consideration of bats in wind farm projects - Revision 2014. UNEP/EUROBATS Secretariat Bonn, Germany.

Russ, J. (2012). British bat calls: a guide to species identification. Pelagic publishing.

Rydell, J., Bach, L. Dubourg-Savage, M.-J., Green, M., Rodrigues, L. and Hedenström, A. (2010). Bat mortality at wind turbines in northwestern Europe. Acta Chiropterologica 12. 2: 261 – 274.

Schofield H. (2008). The Lesser horseshoe Bat: Conservation Handbook. The Vincent Wildlife Trust, Ledbury, UK.

Schuster, E., L. Bulling, and J. Köppel (2015). Consolidating the State of Knowledge: A Synoptical Review of Wind Energy's Wildlife Effects. Environmental Management 56:300-331.

SNH (2019). Bats and onshore wind turbines: survey, assessment and mitigation.

Wray, S., Wells, D., Long, E. and Mitchell-Jones, T. December (2010). Valuing Bats in Ecological Impact Assessment, CIEEM In-Practice.

APPENDIX 1

BAT HABITAT SUITABILITY APPRAISAL

HABITAT SUITABILITY ASSESSMENT

Guidelines for assessing the potential suitability of a site for bats, based on the presence of habitat features (taken from Collins, 2016)

Suitability	Roosting Habitats	Commuting and Foraging Habitats
Negligible	Negligible habitat features on site likely to be used by roosting bats.	Negligible habitat features on site likely to be used by commuting or foraging 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[1] 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[2]. 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[3].	Habitat that could be used by small numbers of commuting bats such as a gappy hedgerow or unvegetated stream, but isolated, i.e. not very well connected to the surrounding landscape by other habitats. Suitable, but isolated habitat that could be used by small numbers of foraging bats such as a lone tree (not in a parkland situation) or a patch of scrub.
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).	Continuous habitat connected to the wider landscape that could be used by bats for commuting such as lines of trees and scrub or linked back gardens. Habitat that is connected to the wider landscape that could be used by bats for foraging such as trees, scrub, grassland or water.
High	A structure or tree with one or potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions and surrounding habitat.	Continuous, high-quality habitat that is well connected to the wider landscape that is likely to be used regularly by commuting bats such as river valleys, streams, hedgerows, lines of trees and woodland edge. High-quality habitat that is well connected to the wider landscape that is likely to be used regularly by foraging bats such as broadleaved woodland, tree-lined watercourses and grazed parkland. Site is close to and connected to known roosts.

[1] For example, in terms of temperature, humidity, height above ground, light levels or levels of disturbance.

[2] Larger numbers of Common pipistrelle may be present during autumn and winter in large buildings in highly urbanised areas, based on evidence from the Netherlands (Korsten et al. 2015).

[3] Categorisation aligns with BS 8596:2015 Surveying for bats in trees and woodland (BSI, 2015).

APPENDIX 2

SITE RISK ASSESSMENT

Table 3a: *Stage 1 - Initial site risk assessment*

Site Risk Level (1-5)*	**Project Size**			
Habitat Risk		**Small**	**Medium**	**Large**
	Low	1	2	3
	Moderate	2	3	4
	High	3	4	5

Key: Green (1-2) - low/lowest site risk; Amber (3) - medium site risk; Red (4-5) - high/highest site risk.

* Some sites could conceivably be assessed as being of no (0) risk to bats. This assessment is only likely to be valid in more extreme environments, such as above the known altitudinal range of bats, or outside the known geographical distribution of any resident British species.

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 roost sites on or near the site. Habitat could be used extensively by foraging bats. Site is connected to the wider landscape by linear features such as scrub, tree lines and streams.
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.

Project Size	**Description**
Small	Small scale development (≤10 turbines). No other wind energy developments within 10km. Comprising turbines <50m in height.
Medium	Larger developments (between 10 and 40 turbines). May have some other wind developments within 5km. Comprising turbines 50-100m in height.
Large	Largest developments (>40 turbines) with other wind energy developments within 5km. Comprising turbines >100m in height.

APPENDIX 3

OVERALL SITE RISK

Planning and Environmental Consultants

Bat Survey Report

Appendix 3 – Overall Risk Assessment (Table 3b, NatureScot)

Table 3b: *Stage 2 - Overall risk assessment*

Site risk level (from Table 3a)	Ecobat activity category (or equivalent justified categorisation)					
	Nil (0)	Low (1)	Low-moderate (2)	Moderate (3)	Moderate-high (4)	High (5)
Lowest (1)	0	1	2	3	4	5
Low (2)	0	2	4	6	8	10
Med (3)	0	3	6	9	12	15
High (4)	0	4	8	12	15	18
Highest (5)	0	5	10	15	20	25

The scores in the table are a product of multiplying site risk level and the Ecobat activity category (or equivalent). The activity categories equate to those given in Table 1 for high collision risk species. Nil (0) means no bat activity was recorded across the whole site, but caution is needed here, because although the values given in this column are "0", at sites where pre-construction surveys found no bat activity, there remains the possibility that new turbines could attract some bat species, thereby altering the level of risk that applies in reality.

Overall assessment:

Low (green)	0-4
Medium (amber)	5-12
High (red)	15-25

It is important to have an understanding of both "typical" and unusually high levels of bat activity at a site so that potentially important peaks in activity are not overlooked. It is therefore recommended that both the highest Ecobat activity category and the most frequent activity category (i.e. the median) are assessed separately in Table 3b and presented in the overall risk assessment. A judgement can then be made on which is the most relevant. It should be noted that presenting mean activity levels can be highly misleading where the data are highly skewed, as is frequently the case with bat activity at wind turbines (Lintott & Mathews, 2018).