APPENDIX 6-2

BAT REPORT

DOCUMENT DETAILS

Client:	**Enerco**
Project Title:	**Borrisbeg Renewable Energy Development**
Project Number:	**220302**
Document Title:	**Bat Survey Report**
Document File Name:	**BR D1 – Borrisbeg WF 220302A– 2023.11.108**
Prepared By:	**MKO** **Tuam Road** **Galway** **Ireland** **H91 VW84**

Planning and Environmental Consultants

Rev	Status	Date	Author(s)	Approved By
01	Draft	10.10.2023	LM	AJ
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1. INTRODUCTION

MKO was commissioned to complete a comprehensive assessment of the potential effects on bats, as part of an application for planning permission for a proposed wind farm at Borrisbeg and adjacent townlands, near Templemore, Co. Tipperary. 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 undertaken throughout 2023 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 9 turbines (final design).

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 May 2022).

For the purposes of this EIAR:

- The 'Proposed Wind Farm' refers to the 9 no. turbines and supporting infrastructure which is the subject of this Section 37E application.
- The 'Proposed Grid Connection' refers to the 110kV substation and supporting infrastructure which will be the subject of a separate Section 182A application.
- The 'Proposed Project' comprises the Proposed Wind Farm and the Proposed Grid Connection, all of which are located within the EIAR Study Boundary (the 'Site') and assessed together within this EIAR.

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.

[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).*

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. Survey design and analyses of results at the 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

Scope development and project management was overseen by Aoife Joyce (BSc., MSc.) and John Hynes (BSc., MSc., MCIEEM).

Bat surveys were conducted by MKO ecologists Laura McEntegart (BSc.), Keith Costello (BSc.), Cathal Bergin (BSc.), Shane Connolly (BSc.), David Culleton (BSc., MSc.), Nora Szijarto (BSc., MSc.), and Nathan Finn (BSc., MSc.). All staff have relevant academic qualifications to complete the surveys and assessments that they were required to do.

Data analysis was undertaken, and results were compiled by Laura McEntegart (BSc.). Impact assessment, the design of mitigation and final reporting was completed by Laura McEntegart (BSc.), under the supervision of Sara Fissolo (BSc.), Aoife Joyce and John Hynes, who reviewed and approved the final document. Laura has over 2 years' experience in ecological assessment specialising in bat ecology and has completed training courses with Bat Mitigation and Enhancement (CIEEM), and Kaleidoscope Pro Analysis. Sara has 3 years' experience in undertaking bat surveys and impact assessments and has completed courses in Bat Impacts and Mitigation (CIEEM) and Kaleidoscope Pro Analysis. Aoife has over 4 years' experience in ecological assessments and has completed CIEEM and BCI courses in Bat Impacts and Mitigation, Bat Tree Roost Identification and Endoscope training, Bat ID, Trapping and Handling and Kaleidoscope Pro Analysis. John is a full member of the Chartered Institute of Ecology and Environmental Management (CIEEM) and has over 10 years' professional ecological consultancy experience. He is also a former member of the Bat Conservation Ireland management council.

2. PROJECT DESCRIPTION

The Site is located within a rural setting in north Tipperary, approximately 11km south of Roscrea Town (Figure 2-1). Templemore town centre is located approximately 2.5km southwest of the Site. The N62 National Road runs north-south along the western boundary of the site and the R433 Regional Road runs northeast-southwest, approximately 500m from the southern boundary of the site. Existing access is via farm entrances off the N62 to the west, the L-3248 to the north and the L-70391 to the east.

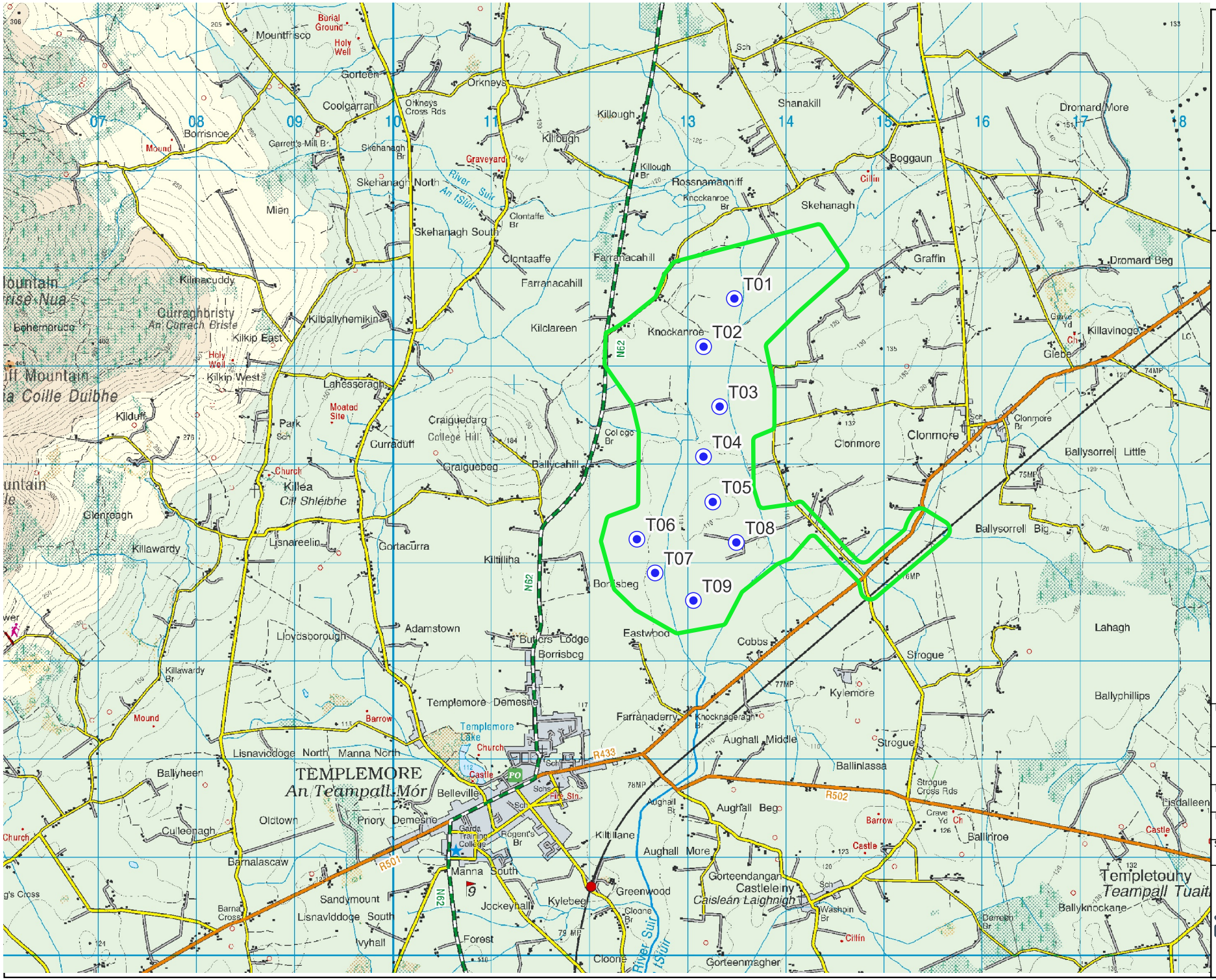
Land use within the Site comprises a mix of predominantly agri-pastoral land and private forestry. The land use within the surrounding areas is predominantly pastoral agriculture, one off rural housing, commercial and residential housing in the nearby town of Templemore.

The Proposed Wind Farm which is the subject of this application comprises:

i. *9 no. wind turbines with an overall turbine tip height of 185 metres; a rotor blade diameter of 163 metres; and hub height of 103.5 metres, and associated foundations and hard-standing areas;*
ii. *A thirty-year operational life of the wind farm from the date of full commissioning of the wind farm and subsequent decommissioning;*
iii. *Underground electrical cabling (33kV) and communications cabling;*
iv. *A temporary construction compound;*
v. *A temporary security cabin;*
vi. *A meteorological mast with a height of 30 metres and associated foundation and hard-standing area;*
vii. *A new gated site entrance on the L3248;*
viii. *Junction accommodation works and a new temporary access road off the L3248, to facilitate turbine delivery to the site;*
ix. *Upgrade of existing site tracks/ roads and provision of new site access roads, junctions and hardstand areas.*
x. *Upgrade of the existing L7039/ L70391 junction for secondary site access off the L70391;*
xi. *A borrow pit;*
xii. *Spoil Management;*
xiii. *Tree felling;*
xiv. *Site Drainage;*
xv. *Biodiversity Enhancement Plan (including restoration of a segment of the Eastwood River, and planting of natural woodland and hedgerow);*
xvi. *Operational Stage site signage; and*
xvii. *All ancillary works and apparatus.*

The full description of the Proposed Wind Farm and Proposed Grid Connection (which will be subject to a separate planning application under Section 182A of the Planning and Development Act, 2000 (as amended)) is provided in Chapter 4 of this EIAR.

Figure 2-1 Site Location



Map Legend

- EIAR Study Boundary
- Proposed Turbine Layout

Drawing Title

Site Location

Project Title	Proposed Borrisbeg Renewable Energy Development
Drawn By: NS	Checked By: LM
Project No.: 220302a	Drawing No.: Fig 2-1
Scale: 1:50,000	Date: 22/11/2023

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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 October 2022 and April 2023. As part of this exercise, prominent Irish conservation groups were contacted, and Bat Conservation Ireland (BCI) and National Parks and Wildlife Service (NPWS) were specifically invited to comment on the potential of the Proposed Project to affect bats. Also, at the request of the Board, a meeting was arranged with the Department of Housing, Local Government and Heritage-Development Applications Unit- NPWS and held over Teams on the 13th of June 2023.

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 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 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 Site (Grid Ref: S 13099 74535) (BCI 2012, Hundt 2012, NatureScot, 2021). Available bat records were provided by Bat Conservation Ireland on 21/11/2023. Results from the National Biodiversity Data Centre were also reviewed for bat species present within the relevant 10km grid squares of the 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 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 Study Area (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 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 Site (BCI, 2012) (last searched on the 8th November 2023. 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 8th November 2023.

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 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 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 Site.

3.2.4.4 Additional Projects in the Wider Landscape

A search for proposed, existing and permitted wind energy developments within 10km of the Site was undertaken (NatureScot, 2021). The Wind Energy Ireland (WEI) interactive wind map (windenergyireland.com) was reviewed in conjunction with wind farm planning applications from Tipperary County Council. Other infrastructure developments and proposals (e.g. large road projects) 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 Site can be found in Chapter 2 of the main EIAR.

3.2.5 Multidisciplinary Surveys

Multidisciplinary walkover surveys were undertaken throughout 2023. 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. The grid connection and turbine delivery accommodation works areas were visited as part of the multidisciplinary surveys outlined in Chapter 6 – Biodiversity of the main EIAR.

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 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 Wind Farm (NatureScot, 2021). The aim was to determine the presence of roosting bats and the need for further survey work or mitigation. The Site was visited in May, June, August and September 2023. 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).

Four structures, and their associated outbuildings, were identified as potential roost features within the Site (IG Ref: S 12955 74344, S 12944 74352, S 12975 75626, S 12826 74445, S 12832 75659, and S 12717 76702). 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.

The proposed underground electrical cabling route, including watercourse crossing infrastructure, was also assessed for any suitability to host roosting bats. Surveys were carried out on the 11th of May 2023 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 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. During these surveys, surveyors were equipped with Bat Logger M bat detectors (Elekon AG, Lucerne, Switzerland). The emergence surveys commenced at least 15 minutes before sunset and concluded 1 hour after sunset. Table 3-1 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 3-1 2023 Survey Effort - Emergence Surveys

Date	Surveyors	Sunrise/ Sunset	Type	Weather
3rd August 2023	Laura McEntegart, Nathan Finn, David Culleton, Neil Campbell	21:22	Emergence	16-12˚C, dry, light breeze/calm, 95% moon visible, 80-10% cloud cover
28th September 2023	Laura McEntegart and Nathan Finn	19:16	Emergence	15-12˚C, light rain, dry, calm, 20% moon non-visible, 95-20% cloud cover

3.3.3 Manual Transects

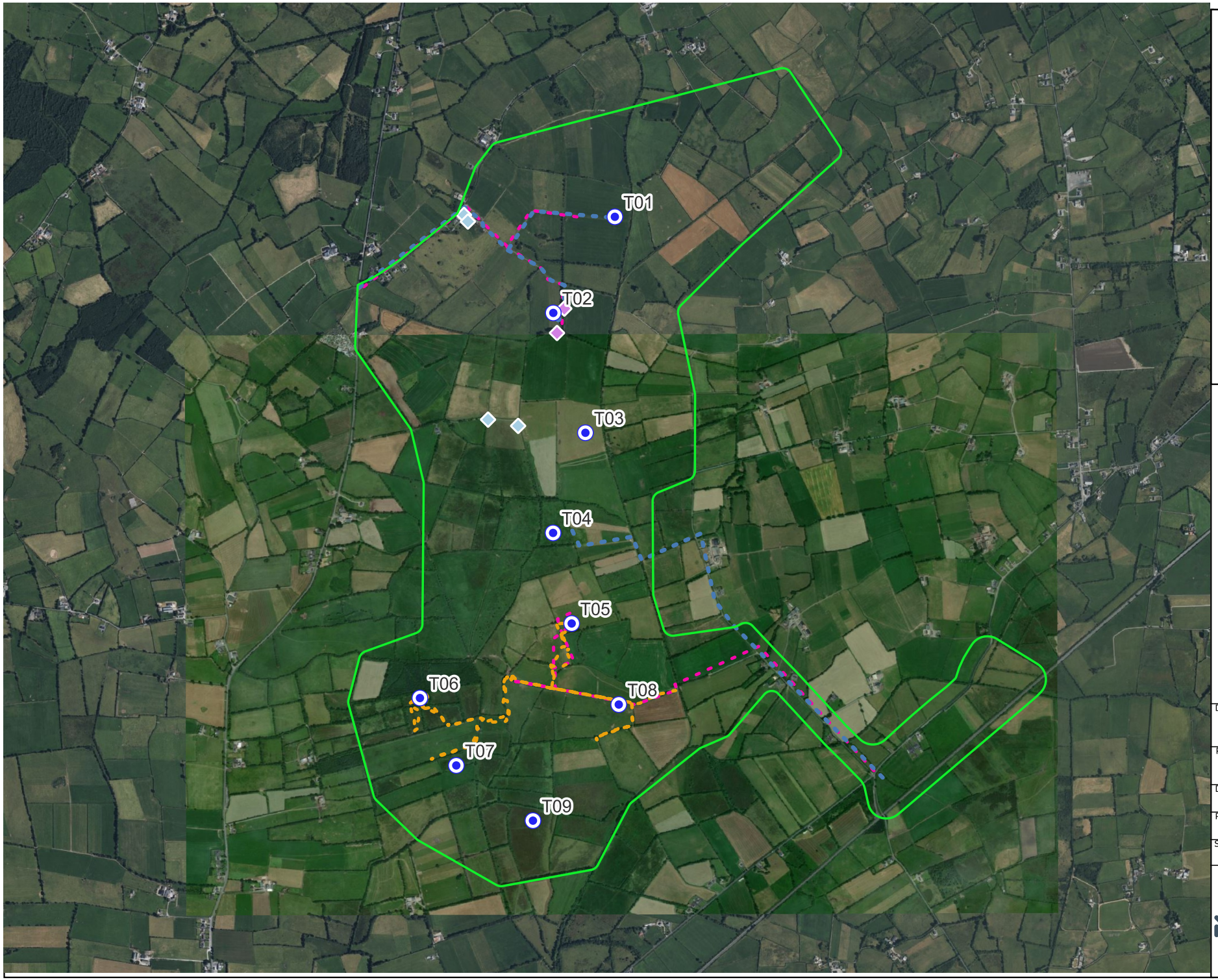
Manual activity surveys comprised walked transects after dusk. A series of representative transect routes were selected throughout the Site. The aim of these surveys was to identify bat species using the Site and gather any information on bat behaviour and important features used by bats. Transect routes were prepared with reference to the proposed 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. Dusk surveys commenced 30 minutes before sunset 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 3-2 summarises survey effort in relation to manual transects.

Table 3-2 2023 Survey Effort - Manual Transects

Date	Surveyors	Sunrise/ Sunset	Type	Weather	Transect (km)
10th May 2023	Laura McEntegart and Nora Szijarto	21:13	Dusk Transect	11-09˚C, dry - light drizzle, calm, moon non-visible, 0% cloud cover	5.4
3rd August 2023	Laura McEntegart and Nathan Finn	21:22	Dusk Transect	16-12˚C, dry, light breeze/calm, 95% moon visible, 80-10% cloud cover	5.2
28th September 2023	Laura McEntegart and Nathan Finn	19:16	Dusk Transect	15-12˚C, light rain, dry, calm, 20% moon non-visible, 95-20% cloud cover	4.9

Figure 3-1 Survey Effort 2023



Map Legend

- EIAR Study Boundary
- Proposed Turbine Layout
- Spring Transect 10.05.2023
- Summer Transect 03.08.2023
- Autumn Transect 28.09.2023
- Dusk Emergence 03.08.2023
- Dusk Emergence 28.09.2023

N

Drawing Title

Survey effort 2023

Project Title	Proposed Borrisbeg Renewable Energy Development
Drawn By: NS	Checked By: LM
Project No.: 220302a	Drawing No.: Fig 3-1
Scale: 1:25,000	Date: 22/11/2023

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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). The surveys were designed for a potential layout of up to 9 turbines. Therefore, nine detectors were deployed in 2023 to ensure compliance with NatureScot guidance. Automated bat detectors were deployed at 9 no. 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 3-3.

Table 3-3 Ground-level Static Detector Locations 2023

ID	Location (ITM)	Habitat	Linear Feature within 50m	Corresponding/ Nearest Turbine(s)
D01	613426 676731	Improved agricultural grassland (GA1)	N/A	T1
D02	613130 676204	Improved agricultural grassland (GA1)	Treelines (WL2)	T2
D03	613275 675579	Improved agricultural grassland (GA1)	N/A	T3
D04	613097 675128	Wet grassland (GS4)	Treelines (WL2)	T4
D05	613209 674689	Improved agricultural grassland (GA1)	Treelines (WL2)	T5
D06	612435 674274	Wet grassland (GS4), Mixed broadleaved woodland (WD1)	Woodland (WD1)	T6
D07	612619 673934	Wet grassland (GS4)	Hedgerows (WL1)	T7
D08	613456 674250	Improved agricultural grassland (GA1)	Hedgerows (WL1)	T8
D09	613010 673653	Conifer plantation (WD4)	Treelines (WL2)	T9

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 3-4 3-4 summarises survey effort achieved in 2023 for each of the detector locations.

Table 3-4 2023 Survey Effort - Ground-level Static Surveys

Season	Survey Period	Total Survey Nights per Detector Location	Nights with Appropriate Weather
Spring 2023*	26th April – 11th May 2023	16	15
Summer 2023*	12th July - 3rd August 2023	22	22
Autumn 2023	15th - 28th September 2023	13	12
Total Survey Effort		**51**	**49**

**Due to technical difficulties, detectors D04, D07, D08 were redeployed for additional nights in spring to achieve 10+ nights and D07 in summer to achieve 20+ nights of suitable weather.*

Figure 3-2 Static Detector Locations 2023

Map Legend

- EIAR Study Boundary
- Proposed Turbine Layout
- Detector locations 2023

N

Drawing Title
Static Detector Locations 2023

Project Title
Proposed Borrisbeg Renewable Energy Development

Drawn By	Checked By
NS	LM
Project No.	Drawing No.
220302a	Fig 3-2
Scale	Date
1:22,000	24/11/2023

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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 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.

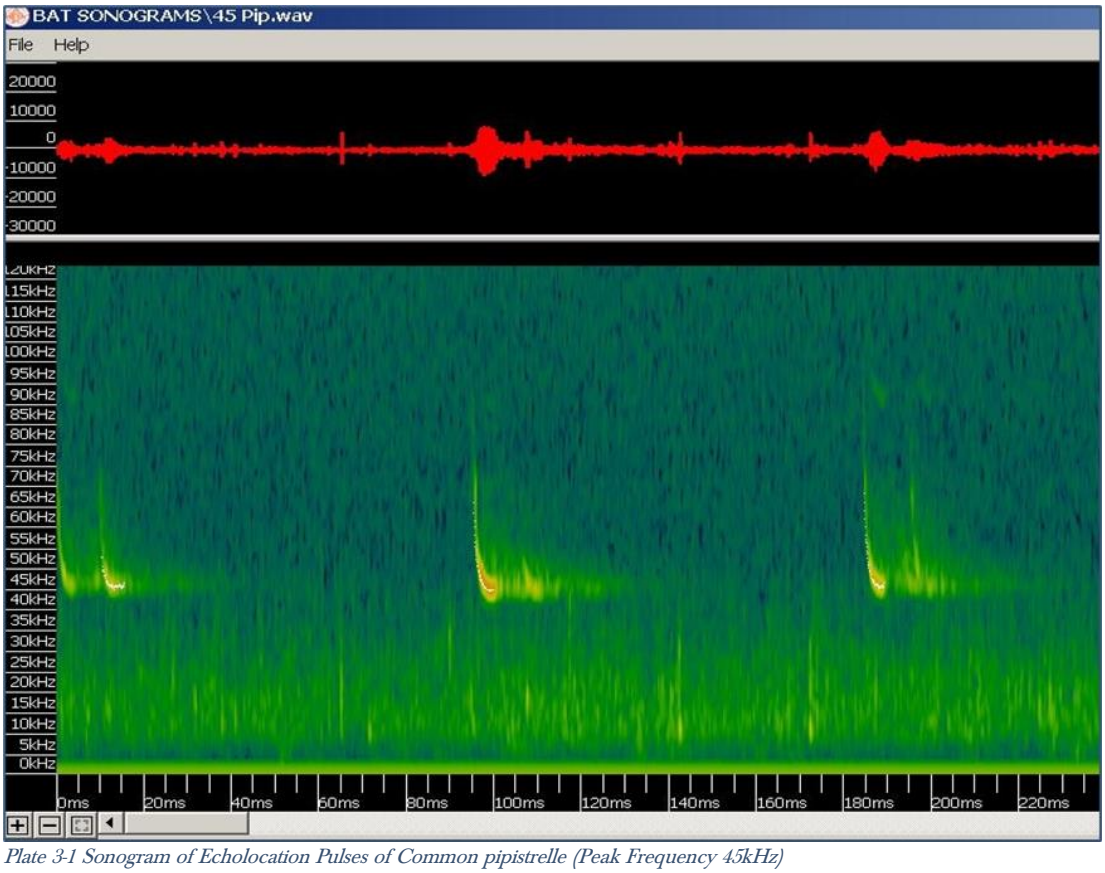

Plate 3-1 Sonogram of Echolocation Pulses of Common pipistrelle (Peak Frequency 45kHz)

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 3-5 defines bat activity levels as they relate to Ecobat percentile values (NatureScot, 2021).

Table 3-5 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.

The methodology used to assess activity levels across the 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) across the Site, divided into tertiles. The use of bat passes per hour rates was deemed more appropriate to account for seasonal changes in night length. The rates were divided into quartiles and the same process was repeated for Leisler's bats. For all other species groups maximum nightly pass rate (bpph) recorded across the site divided into quartiles was used. Activity levels were assessed according to the Site activity and the species were assessed separately, where pipistrelle species (*Pipistrellus pipistrellus, Pipistrellus pygmaeus*), noctules (*Nyctalus leisleri*), *Myotis* spp. are widespread (*Plecotus auritus, Pipistrellus nathusii*) are rare or hard to record species. Median and maximum nightly activity (bpph) at each detector location was then assessed as Low, Medium or High activity for each season recorded based on the quartile ranges identified. Table 3-6 presents activity ranges per species group identified.

Table 3-6 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			
	***Pipistrellus* spp.**	***Nyctalus* spp.**	***Myotis* spp.**	**Other groups**
Low	< 7.9	< 3.8	< 7.3	< 1.2
Medium	7.9 – 23.8	3.8 - 11	7.3 – 21.7	1.2 – 3.4
High	23.8 <	11 <	21.7 <	3.4 <

Based on experience gained surveying a large number of development sites, the calculated activity thresholds were considerably high for some of the species surveyed, in particular *Myotis* and pipistrelle bats. Thresholds were therefore adapted to more representative levels, by excluding outliers, as presented in Table 3-7.

Table 3-7 Adapted Activity Level Categories for 2023

Assessment Level	Activity Threshold as Bat Passes per Hour (bpph) for Bat Species			
	Pipistrellus spp.	*Nyctalus* spp.	*Myotis* spp.	Other groups
Low	< 3.9	< 2.9	< 1.9	< 1.9
Medium	3.9 – 11.7	2.9 – 8.7	1.9– 5.6	1.9 – 2.6
High	11.7<	8.7 <	5.6 <	2.6 <

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 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	15	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 Site in 2023. The surveys undertaken, in accordance with NatureScot Guidance, provide the information necessary to allow a complete, comprehensive and robust assessment of the potential impacts of the Proposed Project 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. A response was received on 26th April 2023 and due to the small organisation status of Bat Conservation Ireland, they do not have the capacity to comment on planning issues. Therefore, no inputs have been provided by BCI for the Proposed Project.

4.1.2 Development Applications Unit - NPWS

A detailed scoping exercise was undertaken for the Proposed Project. A response from the Department of Culture, Heritage and the Gaeltacht (Ref: G 00292/2022) was received on the 26/04/2023.

The Department is not in a position to make specific comment on this particular referral at this time. No inference should be drawn from this that the Department advised that they are not in a position to make specific comment on this particular referral at this time. No inference should be drawn from this that the Department is satisfied or otherwise with the proposed activity. The Department may submit observations/recommendations at a later stage in the process.

A meeting was held with the local NPWS ranger Brian Duffy on 13/06/2023 where the following items were discussed:

- *Static and manual surveys ongoing in 2023.*
- *Bat species present include: Common, Soprano and Nathusius' pipistrelles, Leisler's bat, Brown long-eared bat and Myotis spp.*
- *Some habitat features with PRFs present on site including mature trees and structures.*
- *No bat roosts identified to date within the site.*
- *Bats observed commuting and feeding along mature treelines and hedgerows.*

No additional recommendations related to bats were made by NPWS during the meeting, this is discussed in further detail in Chapter 6.

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 Site (IG Ref: M 98665 02497; last search 17/11/2023). Available bat records were provided by BCI on 21/11/2023. The search included roosts, transects and ad-hoc observations. A number of ad-hoc observations (n=22) have been recorded. At least seven of Ireland's nine resident bat species were recorded within 10km of the Site. The results of the database search are provided in Table 4-1.

Table 4-1 National Bat Database of Ireland Records within 10km

Survey Type	Species	Grid reference	Date	Location
Roost	*Myotis natterreri*	S1383	N/A	Aghsmear, Roscrea, County Tipperary
	Unidentified bat	S0482	N/A	Moneygall, Birr, County Offaly
	Plecotus auritus	S1985	N/A	Tinderry, Co. Tipperary
Transect	*Pipistrellus pygmaeus, Pipistrellus pipistrellus (45kHz), Pipistrellus spp. (45kHz/55kHz), Nyctalus leisleri,* Unidentified bat, *Pipistrellus nathusii*	S174669	N/A	N/A
	Pipistrellus spp. (45kHz/55kHz), Pipistrellus pipistrellus (45kHz), Nyctalus leisleri, Pipistrellus pygmaeus, Unidentified bat	S191711	N/A	N/A
Ad-hoc	*Pipistrellus pygmaeus, Nyctalus leisleri*	S031668	08/08/2009	BATLAS 2010
	Unidentified bat, Pipistrellus pipistrellus (45kHz), Pipistrellus pygmaeus, Nyctalus leisleri, Myotis spp.	S117717	08/08/2009	BATLAS 2010
	Pipistrellus pipistrellus (45kHz), Pipistrellus pygmaeus	S087743	08/08/2009	BATLAS 2010
	Plecotus auritus, Myotis daubentonii, Pipistrellus pipistrellus (45kHz), Pipistrellus pygmaeus, Nyctalus leisleri	S117674	08/08/2009	BATLAS 2010
	Pipistrellus pipistrellus (45kHz), Nyctalus leisleri	S120833	03/08/2009	BATLAS 2010
	Pipistrellus pipistrellus (45kHz), Pipistrellus pygmaeus, Nyctalus leisleri	S062848	11/10/2009	BATLAS 2010
	Pipistrellus pipistrellus (45kHz), Pipistrellus pygmaeus, Myotis spp.	S225828	08/08/2009	BATLAS 2010
	Pipistrellus pipistrellus (45kHz), Pipistrellus pygmaeus, Myotis spp., Myotis daubentonii	S128717	08/08/2009	BATLAS 2010
	Pipistrellus pipistrellus (45kHz), Pipistrellus pygmaeus, Nyctalus leisleri, Myotis daubentonii	S1087571841	26/06/2018	BATLAS 2020
	Pipistrellus pygmaeus, Nyctalus leisleri, Pipistrellus pipistrellus (45kHz)	S0980169407	06/09/2017	BATLAS 2020

	Pipistrellus pygmaeus, Pipistrellus pipistrellus (45kHz)	S1580969055	08/09/2016	BATLAS 2020
	Pipistrellus pygmaeus, Pipistrellus pipistrellus (45kHz)	S0939278234	25/06/2018	BATLAS 2020
	Pipistrellus pipistrellus (45kHz)	S0418171916	25/06/2018	BATLAS 2020
	Pipistrellus pipistrellus (45kHz), Pipistrellus pygmaeus	S1355877644	26/06/2018	BATLAS 2020
	Pipistrellus pipistrellus (45kHz)	S0613381161	17/07/2019	BATLAS 2020
	Pipistrellus pygmaeus	S1755066761	08/09/2016	BATLAS 2020
	Myotis daubentonii	S1182367352	08/09/2016	BATLAS 2020
	Pipistrellus pipistrellus (45kHz), Pipistrellus pygmaeus, Nyctalus leisleri	S0698768524	06/09/2017	BATLAS 2020
	Pipistrellus pipistrellus (45kHz), Pipistrellus pygmaeus	S0418868916	06/09/2017	BATLAS 2020
	Pipistrellus pygmaeus, Myotis daubentonii, Nyctalus leisleri, Pipistrellus pipistrellus (45kHz)	S1700085000	24/08/2003	Consultancy Surveys
	Myotis natterreri	S1300083000	16/05/2007	Consultancy Surveys
	Pipistrellus spp. (45kHz/55kHz)	S153818	08/06/2022	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 Site (last search 20/11/2023). Hectad S17, S07, S06 and S16 lies within 10km of the Site. Four of Ireland's nine resident bat species were recorded within 10 km of the proposed 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
S17, S16, S07, S06	Common pipistrelle (*Pipistrellus pipistrellus*)	National Bat Database of Ireland	HD Annex IV, WA
S17, S16, S07, S06	Soprano pipistrelle (*Pipistrellus pygmaeus*)	National Bat Database of Ireland	HD Annex IV, WA

Hectad	Species	Database	Designation
S17, S16, S06	Daubenton's bat (*Myotis daubentonii*)	National Bat Database of Ireland	HD Annex IV, WA
S06, S16, S17	Leisler's bat (*Nyctalus leisleri*)	National Bat Database of Ireland	HD Annex IV, WA
S16	Brown long-eared bat (*Plecotus auritus)*	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 Site.

The Site is located outside the current known range for lesser horseshoe bat, Nathusius' pipistrelle, 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) and the Site is situated outside the known range of this species.

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 Site found two sites designated for the conservation of bats. Four additional pNHAs occur between 10km and 15km of the Site. Potential pathways for impacts are outlined in further detail in Chapter 6 of the main EIAR.

Table 4-3 pNHAs within 10km designated for bats

pNHA	Approx. Distance to Site	Description
Ormond's Mill, Loughmoe, Templemore pNHA [002066]	6km	This pNHA is designated for a roost of Natterer's bat (*Myotis nattereri*) and Brown long-eared bat (*Plecotus auritus*).
Aghsmear House pNHA [002060]	6.5km	This pNHA is designated for a nursery roost of Natterer's bat (*Myotis nattereri*).
St. Anne's, (Sean Ross Abbey), Roscrea pNHA [000656]	11.1km	This pNHA is designated for a roost of Leisler's bat (*Nyctalus leisleri*).
St. Joseph's, Mountheaton pNHA [002063]	13.5km	This pNHA is designated for a roost of Brown long-eared bat (*Plecotus auritus*).
Drumakeenan National School pNHA [002064]	14.5km	This pNHA is designated for a roost of Brown long-eared bat (*Plecotus auritus*).
Miltown, Shinrone pNHA [002065]	14.7km	This pNHA is designated for a Natterer's bat roost (*Myotis nattereri)* of National Importance.

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 Site. In summary, the primary land use within the Site is agricultural grassland.

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

A search of the UBSS Cave Database for the Republic of Ireland found no caves within the Site or within 10km of the Site.

A review of the NBDC bat landscape map provided a habitat suitability index of 27.33 (Yellow) to 29.0 (Red). This indicates that the Site has moderate to high habitat suitability for bat species.

4.2.5 Additional Projects in the Wider Landscape

Table 4-4 provides an overview of wind farms in the vicinity of the Site.

Table 4-4 Wind Farm Developments within 10km of the Proposed Project

Wind Farm Name and Location	No. Turbines	Status
Within 5km of Proposed Borrisbeg Wind Farm		
None	N/A	N/A
Within 10km of Proposed Borrisbeg Wind Farm		
Monaincha Wind Farm, Co. Tipperary	2 within 10km (13 outside 10km)	Existing
Ballinveny Wind Farm, Co. Tipperary	3	Existing
Lisheen I Wind Farm, Co. Tipperary	16 within 10km (2 outside 10km)	Existing
Lisheen II Wind Farm, Co. Tipperary	5	Existing
Bruckana Wind Farm, Co. Kilkenny	14	Existing

In addition to wind energy developments, two other EIA planning applications were noted within 10km of the Site. These include the following:

- EIA Portal Ref: 2021253 - Establishment of 206.1 hectares of native woodland on industrial cutaway bog areas that cannot be rewetted to restore active, Raised bogs. Seeding & planting of native trees will stabilise exposed bogs, reduce wind & water erosion, & enhance biodiversity. Decision: N/A
- EIA Portal Ref: 2022140 - Development of a Bioproduct Campus comprising a Biorefinery, Bioenergy Plant (wood fuelled) Compost Plant and Anaerobic Digestion Plant with associated biogas fuelled electricity generators. Decision: Conditional

Extractive industries in the wider area include:

- QS-00566 - Liam Campion, Tipperary
- QS-00564 - Roadstone Provinces Ltd. QY05/37, Laois
- QS-00925 - Harney Masonry Ltd., Tipperary
- QS-00400 - George Hodgins, Tipperary
- QS-00829 - Patrick O'Brien, Tipperary
- QS-00427 - Ambrose Madden, Tipperary
- QS-00447 - Coillte Teoranta Site 3, Tipperary
- QS-00467 - Mae Smith, Laois
- QS-01004 - Thomas Deegan, Tipperary
- QS-00448 - Coillte Teoranta Site 4, Tipperary
- QS-00547 - Campions Quarry, Laois

4.3 Field Surveys

4.3.1 Bat Habitat Suitability Appraisal

4.3.1.1 Proposed Wind Farm Infrastructure

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

- *Improved Agricultural Grassland (GA1)*
- *Hedgerow (WL1)*
- *Treeline (WL2)*
- *Conifer Plantation (WD4)*
- *(Mixed) Broadleaved Woodland (WD1)*
- *Wet Grassland (GS4)*
- *Arable Crops (BC1)*
- *Tilled Land (BC3)*
- *Scrub (WS1)*
- *Buildings and Artificial Surfaces (BL3)*
- *Amenity Grassland (GA2)*
- *Depositing Lowland Rivers (FW2)*
- *Drainage Ditches (FW4)*
- *Non-calcareous springs (FP2)*
- *Dry Meadows and Grassy Verges (GS2)*
- *Spoil and Bare Ground (ED2)*
- *Recolonising Bare Ground (ED3)*

Further details on habitats within the Site can be found in Chapter 6 of the main EIAR. The Site is 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* potential. 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 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 *High* 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 are outlined in in Section 6.1.3 below.

The trees assessed were characterised by extensive ivy cover as well as presence of branch damage and cuts providing potential roosting features suitable for opportunistic and regular roosting. 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 assessed below for roosting potential. All other habitats present were assigned a *Negligible* value for roosting bats.

The Eastwood River will require crossing by a new proposed wind farm road. It is proposed to construct a new clear span watercourse crossing on the Eastwood River to facilitate access to T6. It is also required to pass IPP cables under an existing concrete culvert on the River Suir to the east of T8. No alterations will occur as this crossing will be undertaken via directional drilling. These crossings were assessed on 11th May 2023 for their suitability to support roosting bats (Table 4-5). The wind farm watercourse crossings are further detailed in Chapter 4 of the EIAR.

Table 4-5 Proposed Watercourse Crossings for the Proposed Wind Farm

Watercourse Crossing Reference No.	Location (Irish Grid Ref.)	Watercourse Bridge Type	Extent of Works Proposed	Bat Roosting Habitat Suitability
WCA	S 12796 74256	N/A	Construction of new clearspan watercourse crossing	N/A
WCB	S 13798 74308	Existing Concrete culvert crossing	Directional Drilling	Negligible

4.3.1.2 Proposed Grid Connection

It is proposed to construct a 110kV substation within the Site, as shown in Chapter 4, Figure 4-2. The underground cabling will run through the L-7039 road (approx. 870m) and within new track on agricultural land (approx.1.2km) and connect to the existing 110kV Ikerrin to Thurles overhead line (OHL) via 2 no. new end masts.

Habitats along the Grid Connection footprint include:

- *Improved agricultural grassland (GA1)*
- *Buildings and artificial surfaces (BL3)*
- *Treelines (WL2)*
- *Hedgerows (WL1)*
- *Wet grassland (GS4)*
- *Amenity grassland (GA2)*
- *Dry meadows and grassy verges (GS2)*

Further details of habitats along the Grid Connection footprint are outlined in Chapter 6, Section 6.6.1.4.

The habitat within the proposed substation consists entirely of *Improved agricultural grassland (GA1).* No loss of commuting/foraging or roosting habitat are anticipated.

With regard to commuting and foraging bats, features along the underground cabling route 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 underground cabling route, including grassland habitats, 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).

There are a total of two identified watercourse crossings along the underground cabling route, both of which are EPA/OSI mapped crossings. The crossings were assessed on 11th May 2023 for their suitability to support roosting bats. Only one location has existing crossing infrastructure i.e. WC1 (Table 4-6). The

other crossing presents no roosting suitability and will include the construction of a new clearspan bridge. The grid connection watercourse crossings are further detailed in Section 4.9.8.6 in Chapter 4 of the EIAR, and in Chapter 6, Section 6.6.1.10.

The underground cabling route will run through a mix of local road (L7039) and new access track across agricultural land. Other than the feature presented in Table 4-6 below, no potential roost features were identified along the underground cabling route. There will be some requirement to remove trees to facilitate the underground grid cabling. However, any trees removed as part of the construction works will be replanted elsewhere within the Site. Further details on replanting are outlined in Section 6.1.5 below.

Table 4-6 Proposed Grid Connection Watercourse Crossings

Watercourse Crossing Reference No.	Location (Irish Grid Ref.)	Watercourse Bridge Type	Extent of Works Proposed	Bat Roosting Habitat Suitability
WC1	S 14639 74022	Stone Arch	Directional Drilling	Low – high water levels

4.3.1.3 Turbine Delivery Accommodation Works

For the purpose of this EIAR, the port of Dublin has been selected as the port of entry for the proposed turbines and will reach the Site from the port via the M50–N7/M7–N62. An assessment of the turbine delivery route is discussed in Chapter 15 of this EIAR. The assessment determined that to facilitate the delivery of turbine components to the Site, minor temporary accommodating works in the form of stoning up small areas of the verge at junction 22 off the M7 will be required. These temporary works areas were the subject of an ecological walkover survey as discussed in Chapter 6. The works areas are contained within the existing road infrastructure classified as *buildings and artificial surfaces* and traverse small areas of habitats common and widespread within the surrounding area such as *improved agricultural grassland, hedgerow* and *dry meadows and grassy verges.* Once the abnormal loads have been delivered, these areas will be reseeded. There may also be a requirement to complete minor hedge or tree trimming in these areas to accommodate the turning of the blades onto the N62. To facilitate the delivery of turbine components into the Site a temporary abnormal load entrance off the L-3248 will be inserted and a temporary abnormal load access track will be constructed. Once turbines have been delivered, this entrance will be reinstated and the track reseeded. In the unlikely event that turbine components are replaced during the operational life, this abnormal entrance and track, and the accommodating works areas at Junction 22 will be opened again temporarily for the delivery period.

With regard to commuting and foraging bats, these works have been assessed as having *Low-Moderate* suitability. With regard to roosting bats, the habitat features at the works areas, including hedgerows, buildings and artificial surfaces and grassland habitats were assessed as having *Negligible- Low* suitability. Any areas of tree and hedgerow loss will be assessed by a licenced ecologist prior to removal and any loss will be replaced within the Site with species indigenous to the area. Further details on replanting are outlined in Section 6.1.5 below.

4.3.2 Roost Surveys

4.3.2.1 Daytime Roost Inspections

Following the search for roosts , four structures and their associated outbuildings containing potential suitable bat roost features were identified within the 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.

1) Stone Shed and Hay Storage Shed

A stone shed and open hay shed (Plate 4-1 and 4-2) were identified on agricultural land to the south-west of the Site at (IG Ref: S 12955 74344). The single-storey stone shed consisted of two sections with an extensively damaged slate roof with collapsing wooden rafters. There is an open doorway and small window to the rear of the building allowing for potential bat access. The building was overgrown with ivy (Plate 4-2). The adjacent hay shed (IG Ref: S 12944 74352) was constructed from galvanised metal and was open to the elements on two sides.

No bats or evidence of bats were found during the roost inspection surveys. Due to the state of disrepair of the stone shed, it was assigned a *Low* roosting potential. There is some potential for small numbers of bats to roost beneath the ivy. The hay storage shed was assigned a *Negligible* roosting potential due to the lack of suitable roosting features. The nearest proposed turbine is 420m from the structures.

Plate 4-1 *Exterior stone shed and hay barn*

Plate 4-2 Stone shed with roof damage and ivy cover

2) Hay Barn and Cow Shed

A joint hay barn and cow shed was identified within improved agricultural grasslands to the west of the Site, near T03 (IG Ref: S 12975 75626). The structure was comprised of cavity block walls with steel beams covered by corrugated iron sheets and lean-to (Plates 4-3 and 4-4). The roof consisted of a curved corrugated iron roof with steel beams and wooden rafters.

Gaps and cracks were present in the concrete blocks throughout the structure. However, there is significant light penetration throughout the structure as the it is open to the elements on three sides. No bats or evidence of bats were found during the roost inspection surveys. As such, the structure was

classified as having *Low* suitability. The structure could be used opportunistically by individual bats. The nearest proposed turbine is 350m from the structures.

Plate 4-3 Exterior hay barn with cow shed

Plate 4-4 Interior hay barn and cow shed with light penetration

3) Derelict Farm Shed

A derelict farm shed structure was located within agricultural grassland to the west of the Site, on the field boundary beside the hay shed described above (IG Ref: S 12832 75659). There were two access points, a doorway to the north section and farm gate to access the southern section. The corrugated steel walls and roof were covered in sections of ivy and briars growing on the roof of the shed (Plates 4-5 and 4-6). There were gaps and cracks in the corrugated sheets throughout the building. The northern section was dark with more roosting potential than the southern brighter section.

No bats or evidence of bats were found during the roost inspection survey. The structure was classified as having *Low* suitability due to the presence of a small number of cracks suitable for opportunistic use by individual crevice-dwelling species. The nearest proposed turbine is 507m from the structures.

Plate 4-5 Derelict corrugated steel farm shed showing northern facing aspect

Plate 4-6 Southern section showing old hay feeders and rubbish with ivy and briars growing through the sheets

4) Dairy Farm and associated Buildings

The farm sheds, associated farmyard and milking parlour, were located within agricultural grassland to the northwest of the Site (IG Ref: S 12717 76702). The animal sheds consisted of block cavity walls with plaster and corrugated steel roof with metal and wooden rafters. The sheds contained feeding and bedding areas as well as storage for straw. A row of wooden stables was also present.

Gaps and cracks were present in the plaster and blockwork throughout the buildings, particularly in the west wall of the main shed. The stone wall contains crumbling cement, leaving gaps throughout the wall. To the north of the farmyard is a farm office building with corrugated shed cladding and adjacent milking parlour. The sheds were generally bright and open with light penetration through open doors, walls and

windows. No bats or evidence of bats were found in the sheds during any of the roost inspection surveys. The structures were identified as having *Low* to *Moderate* suitability as they could be used opportunistically by small numbers of bats (Plate 4-7 to 4-10). The nearest proposed turbine is 640m from the structures.

Plate 4-7 Long cow cubicle shed and yard, open on both sides

Plate 4-8 Cubicle shed, straw storage and stables

Plate 4-9 Open Slatted shed

Plate 4-10 Stone wall with crumbling cement and gaps

5) Tree Inspections

Mature broadleaf tree species forming field boundaries consisted primarily of hawthorn, beech, sycamore, willow, oak, rowan, blackthorn and ash. The majority of trees within the Site will be retained as part of the Proposed Wind Farm; however, there will be some requirement to remove trees to facilitate the required bat buffers. A summary of trees/tree groups of note within a 100m radius (likely requiring removal) of the proposed turbine locations, their general location, PRFs and their respective suitability for bat roosting, are outlined in Table 4-7 below. Further details are included in the Tree Inspection map (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). Two trees were assessed as containing *High* roosting potential, i.e. a tree with one or more potential roost sites that's are suitable for use by larger numbers of bats on a more regular bases due to their size, shelter, protection, conditions and surrounding habitat (Plate 4-12, Plate 4-14).

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 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.

Overall, the Site contains a number of mature trees, hedgerows and treelines. All trees assessed are outlined in Table 4-7, Figure 4-1 and shown in Plates 4-11 to 4-30. Some of these features will require removal to facilitate the bat felling buffer (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 inspections.

Table 4-7 Summary of Trees/Tree Groups Inspected within the Site

Nearest Turbine	Inspection Date	PRF	Trees/Hedgerows to be removed/retained. North, South, East or West of Turbine	Bat Suitability
T01	10th May 2022	*N/A*	Trees to be retained on east, no other treelines to be felled.	• *Negligible*
T02	10th May & 28th September 2023	*Canker holes, Missing limbs, small rot hole, broken branches*	Bat buffer felling: • S 13215 76200 (east) Partial tree removal: • S 13159 76123 (south)	• *East Treeline - Negligible to High* • *South Treeline - Negligible & Low*
T03	10th May 2023	*N/A*	No felling: Trees to be retained on east	• *East Treeline - Negligible*
T04	10th May & 28th September 2023	Lifting bark, mature ivy, knotholes, rot holes, lifting bark, butt rot or transverse snaps that could be used by bats.	Bat buffer felling: • S 13166 75026 (south) • S 13101 75134 (west) Trees for retention: • S 13150 75260 (north) outside felling buffer • S 13246 75119 (east) within felling buffer	• *North - Moderate* • *East - Negligible* • *South – Negligible, Low & one Moderate* • *West - Negligible*
T05	10th May 2023	Mature ivy, knotholes, rot holes, lifting bark, missing branches	Bat buffer felling: • S 13295 74598 (south) • S 13295 74564 (southern field) Trees for retention: • S 13185 74634 (west)	• *East Treeline - Negligible* • *South Treeline – Negligible, Low & one Moderate*
T06	10th May 2023	*Ivy cover, twisted branches, small knot holes*	Bat buffer felling: • S 12596 74266 (Felling linear woodland north, east, south and west)	• *Extensive mature broadleaf trees within bat felling buffer, conifer plantation to the north - Negligible to Low suitability.*
T07	10th May & 28th September 2023	*N/A*	Bat buffer felling: • S 12656 73968 (north) • S 12672 73892 (south)	• *North – Negligible* • *South – Negligible (sparse linear vegetation)*
T08	10th May & 28th September 2023	*N/A*	Bat buffer felling: • S 13571 74189 (east) • S 13491 74235 hedgerow (north) Trees for retention: • S 13507 74098 (south) outside buffer	• *North and East Hedgerow - Negligible* • *Southern Treeline – Negligible*
T09	10th May & 28th September 2023	*N/A*	Bat buffer felling: • S 13063 73644 (north-south) • S 13057 73688 (east-west)	• *North Treeline and Hedgerow – Negligible*

Plate 4-11 Example of Negligible PRF hawthorn, west of T02, outside bat felling buffer.

Plate 4-12 *Mature Beech tree near T02 with High roosting potential, outside bat felling buffer.*

Plate 4-13 Chestnut tree showing Moderate PRF, west of T02, outside bat felling buffer.

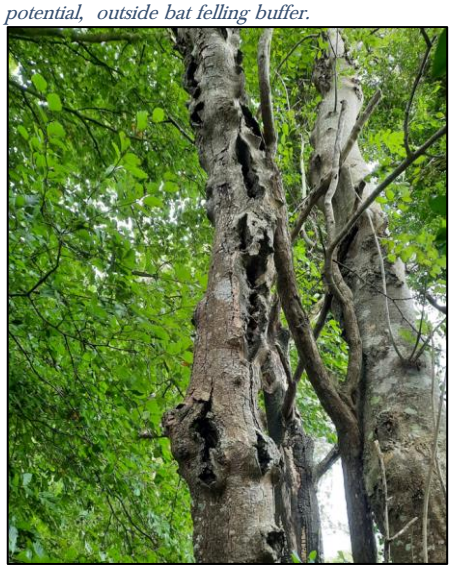

Plate 4-14 Ash tree with die back showing High PRF within the bat felling buffer on T02.

Plate 4-15 Trees south-east of T02 with Negligible and Low features, partially within bat felling buffer.

Plate 4-16 Low PRF to the east of T02, outside bat felling buffer.

Plate 4-17 Treeline to the west of T04 containing Negligible and Low PRF's, outside bat felling buffer.

Plate 4-18 Treeline to the south of T04 containing Negligible, Low and Moderate PRF's, outside bat felling buffer.

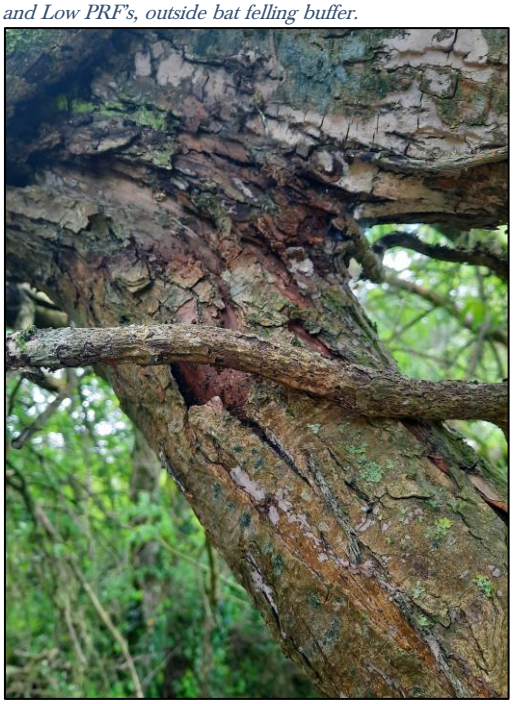

Plate 4-19 Lifting bark on a tree near T04 with Moderate roosting potential, within bat felling buffer.

Plate 4-20 Tree containing Moderate potential, south of T04, within bat felling buffer.

Plate 4-21 Low level linear vegetation east of T05 with Negligible PRF's, within bat felling buffer but proposed for retention.

Plate 4-22 Treeline south of T05 with Negligible, Low and Moderate PRF's, within bat felling buffer.

Plate 4-23 Tree to the south of T05 with Moderate roosting suitability, within bat felling buffer.

Plate 4-24 Two ash trees and hedgerow to the southeast of T05 containing negligible PRF's, within bat felling buffer.

Plate 4-25 Linear woodland to the north of T06 with Negligible to Low potential, within bat felling buffer.

Plate 4-26 Linear woodland to the northwest of T06, including Ash, whitethorn and crab apple trees, within bat felling buffer.

Plate 4-27 Sample linear woodland at T06 – Northern Aspect.

Plate 4-28 Sample linear woodland near T06 – Southern Aspect.

Plate 4-29 Immature Conifer Plantation south of T09 with Negligible potential, within bat felling buffer.

Plate 4-30 Hedgerow north of T09 showing Negligible PRF features, within bat felling buffer.

4.3.2.2 Emergence Surveys

An emergence survey was carried out on 3rd August 2023 by four surveyors. The derelict stone shed and hay barn, and derelict farm including associated buildings were surveyed. No bats were observed emerging from the structures; however, bats were observed commuting and foraging in the wider area. Two common pipistrelles were noted commuting over the structure and a small number of bats were observed repeatedly foraging along nearby linear features including broadleaf trees.

An emergence survey was also carried out on 28th September 2023 along a mature treeline present in the vicinity of proposed T02. No bats were observed emerging from the trees during the surveys and overall, activity was very low. Table 4-8 summarises the findings of the bat activity surveys carried out on the structures.

Table 4-8 Emergence Survey Results 2023

Structure	PRF Suitability	IG Ref	Survey Type	Date Surveyed	Survey Results
Hay Barn and cow shed	*Low and Negligible*	S 12975 75626	Dusk Emergence Summer 2023	3rd August 2023	No bats emerging. Small number of bats foraging at nearby watercourse.
Derelict farm shed structure	*Low*	S 12832 75659	Dusk Emergence Summer 2023	3rd August 2023	One soprano pipistrelle recorded commuting & two bats recorded foraging nearby for a short period.
Dairy Farm and associated Buildings	*Moderate, Low and Negligible*	S 12717 76702	Dusk Emergence Summer 2023	3rd August 2023	No bats emerging, two to three bats feeding in the sheds close to sunset, recorded at 17 and 22 minutes past sunset, potential roosting nearby.
Treeline at T02	*Negligible, Low and Moderate*	S 12826 74445	Dusk Emergence Summer 2023	28th September 2023	No bats emerging, one pipistrelle bats recorded commuting to T2 and foraging in the vicinity. Recorded 41 minutes after sunset.

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 869 bat passes were recorded, including emergence surveys. In general, soprano pipistrelle (n=625) was recorded most frequently, followed the common pipistrelle (n=208). Leisler's bat (n=35) and *Myotis spp.* (n=1) were less frequent (Plate 4-31).

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 4-32 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, and hedgerows, and linear (road/track) habitats. Soprano pipistrelle occurred the most often in Summer and Autumn 2023. Common pipistrelle occurred more frequently in Spring 2023.

Map Legend

- EIAR Study Boundary
- Proposed Turbine Layout

Potential Roosting Suitibility (PRF)

- High
- Moderate
- Low
- Negligible
- Negligible (grouped)

Drawing Title

Trees inspected for PRF's

Project Title	
Proposed Borrisbeg Renewable Energy Development	
Drawn By: NS	Checked By: LM
Project No.: 220302a	Drawing No.: Fig 4-1
Scale: 1:22,000	Date: 11/12/2023

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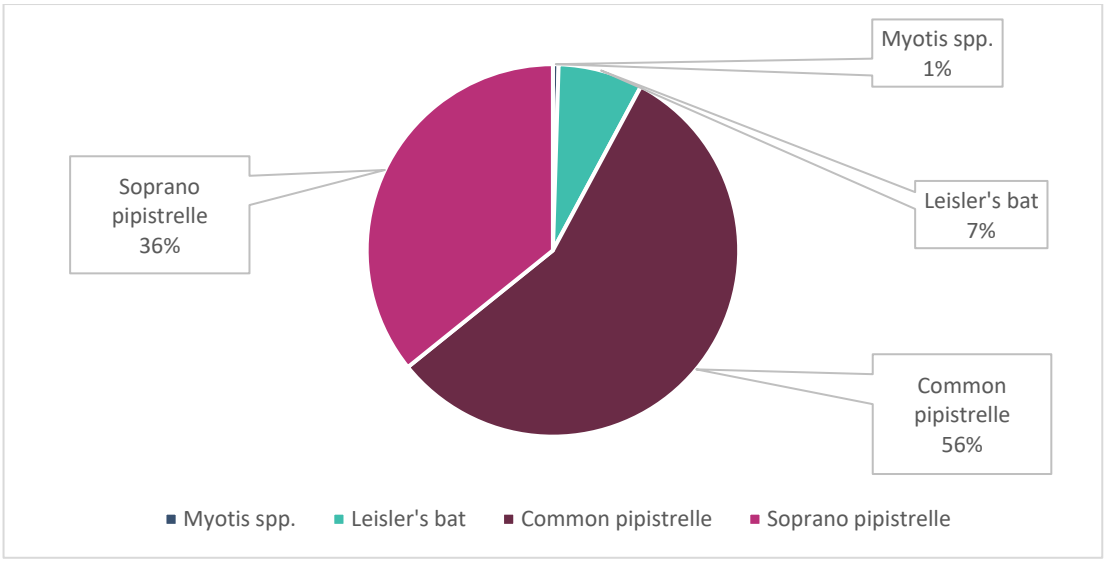


Plate 4-31 2023 Manual Activity Surveys (Total Species Composition)

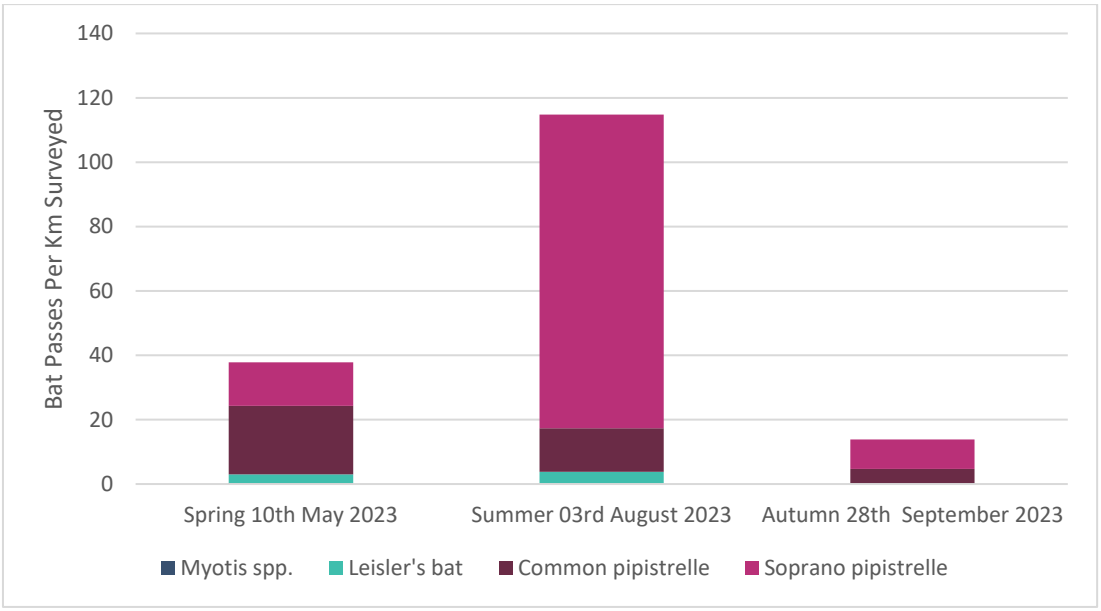
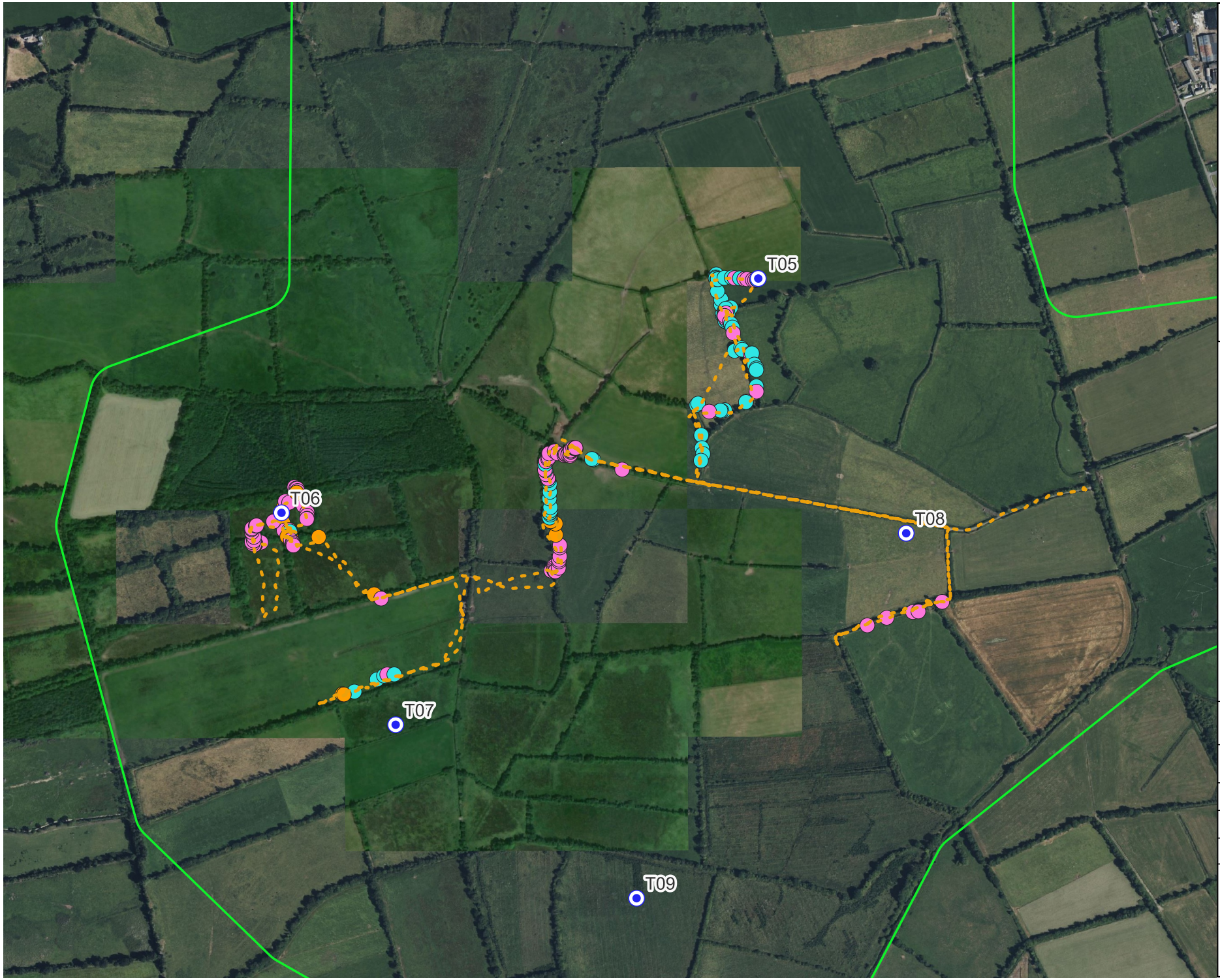


Plate 4-32 2023 Transect Results – Species Composition Per Survey Period



Map Legend

- EIAR Study Boundary
- Proposed Turbine Layout
- Spring Transect 10.05.2023

Manual Results 10.05.23

- Leisler's bat
- Common pipistrelle
- Soprano pipistrelle

N

Drawing Title

Spring Manual Results 2023

Project Title

Proposed Borrisbeg Renewable Energy Development

Drawn By	Checked By
NS	LM
Project No.	Drawing No.
220302a	Fig 4-2
Scale	Date
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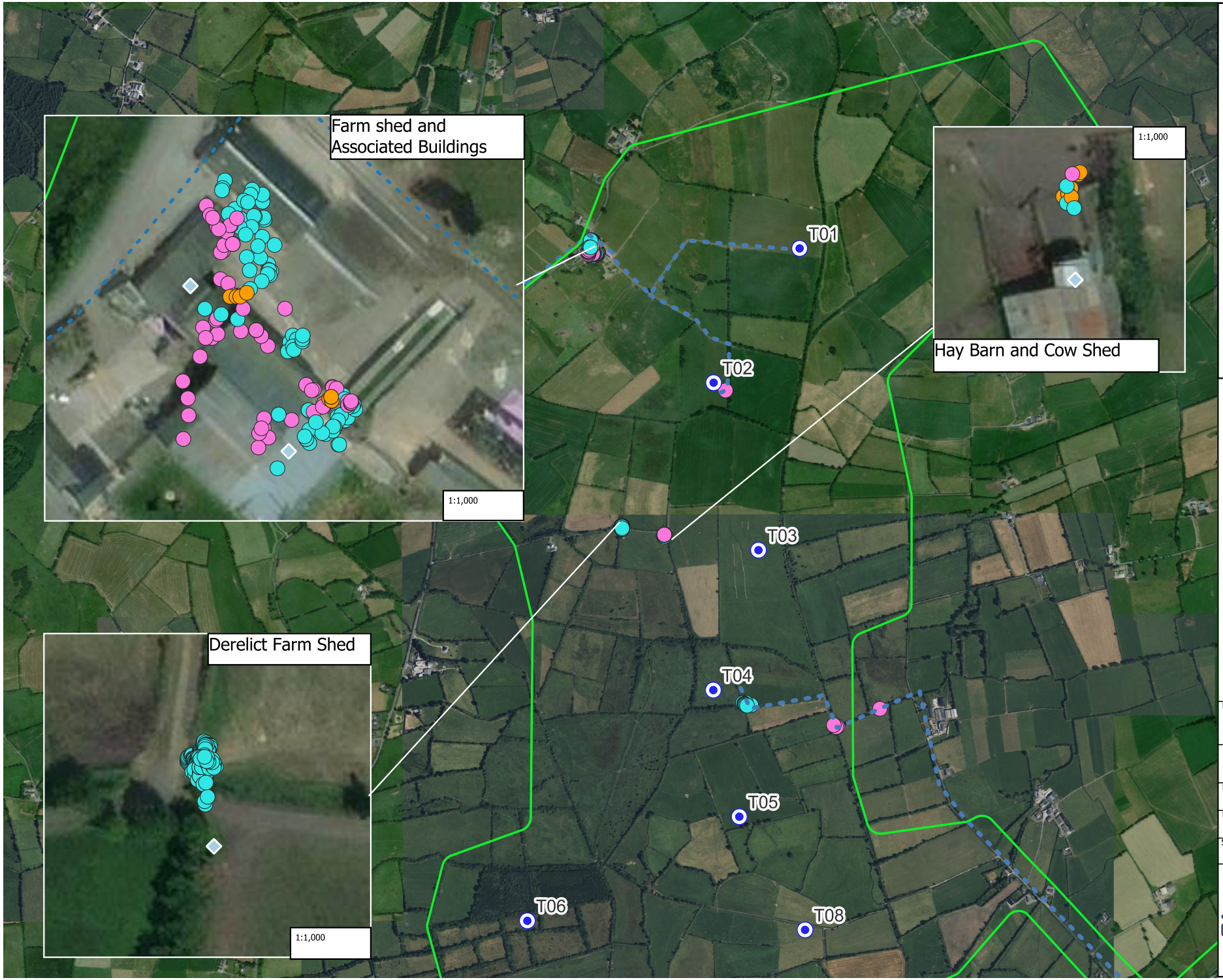
Farm shed and Associated Buildings
1:1,000
Hay Barn and Cow Shed
1:1,000
Derelict Farm Shed
1:1,000
T01
T02
T03
T04
T05
T06
T08
Map Legend
EIAR Study Boundary
Proposed Turbine Layout
Summer Transect 03.08.2023
Dusk Emergence 03.08.2023
Manual Results 03.08.2023
Leisler's bat
Common pipistrelle
Soprano pipistrelle
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Drawing Title
Summer Manual Results 2023
Project Title
Proposed Borrisbeg Renewable Energy Development
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Drawing No.
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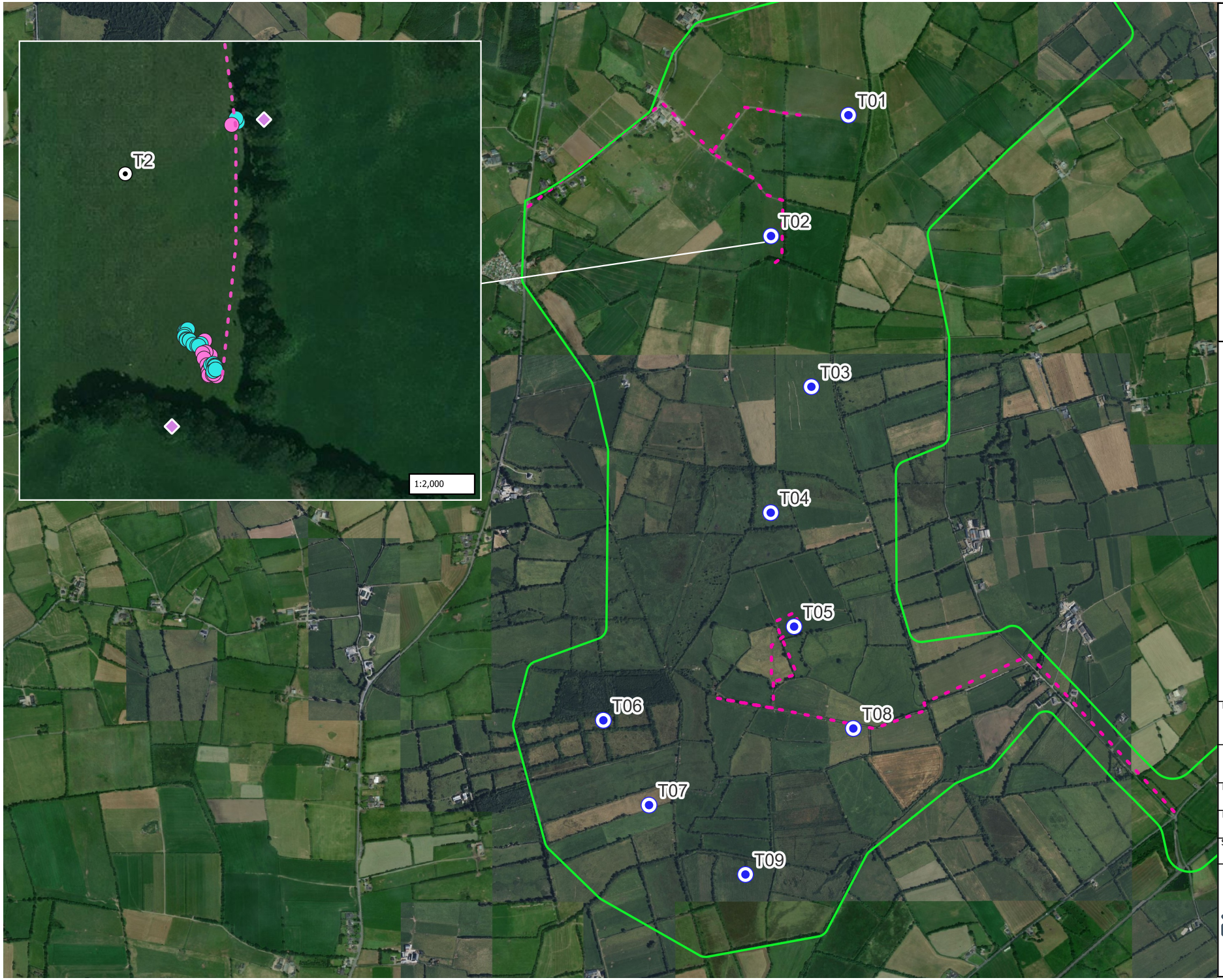
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Dusk Emergence 28.09.2023
Manual Results 28.09.2023
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Soprano pipistrelle
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Project Title
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4.3.4 Ground-level Static Surveys

In total, 36,389 bat passes were recorded across all deployments. In general, Leisler's bat (n=18,388) occurred most frequently, followed by Common pipistrelle (n=12,495). Soprano pipistrelle (n=3,737) were recorded less frequently. Instances of *Myotis spp.* (n=1,402) and brown long-eared bat (n=367) were less. Nathusius' pipistrelle were not recorded during the 2023 survey period. Plate 4-33 presents relative species composition across all ground-level static detector surveys.

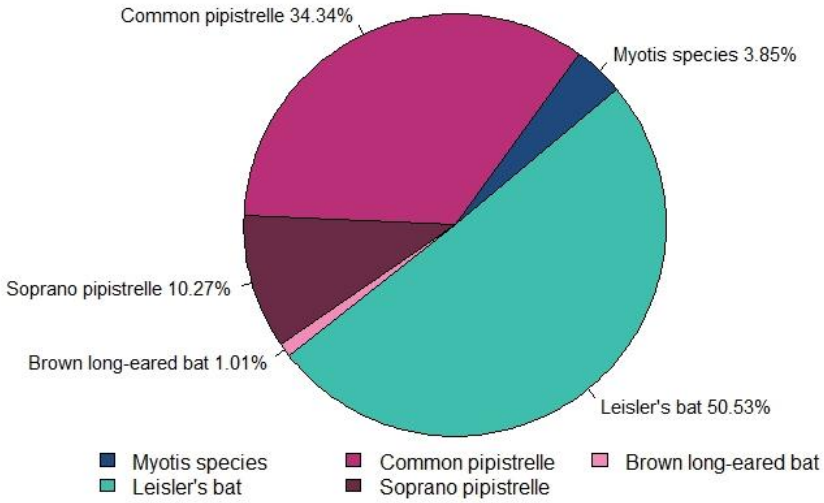


Plate 4-33 2023 Static Detector Surveys: Species Composition Across All Deployments (Total Bat Passes)

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 4-34 and Table 4-10 presents these results for each species per season. Bat activity was dominated by Leisler's bat and common pipistrelle across all seasons. This was followed by lower numbers of soprano pipistrelle across all seasons. *Myotis spp.* occurred most frequently in Spring with lower levels in Summer and Autumn. Brown long-eared bat instances were relatively rare, except in Autumn where numbers increased.

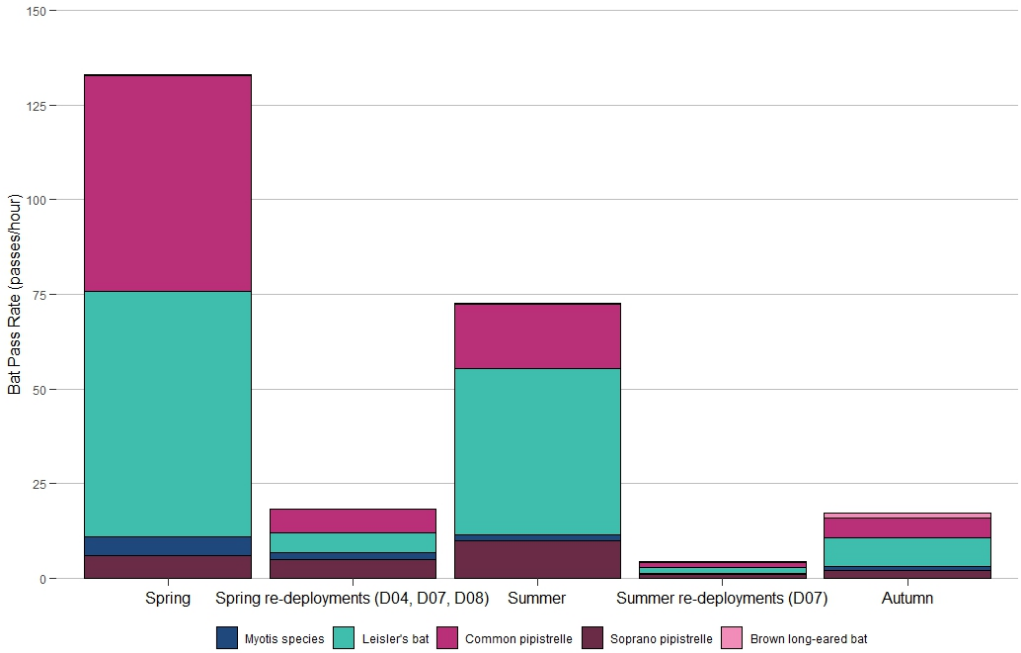


Plate 4-34 2023 Static Detector Surveys: Species Composition Across All Deployments (Total Bat Passes Per Hour, All Nights)

Table 4-9 Static Detector Surveys: Species Composition Across All Deployments (Total Bat Passes Per Hour, All Nights)

	Spring	Spring Redeployment (D04, D07, D08)	Summer	Redeployments Summer (D07)	Autumn
Total Survey Hours	**133.5**	**115.6**	**174.5**	**261.5**	**152**
Myotis spp.	4.94	1.93	1.56	0.29	1.12
Leisler's bat	64.77	5.19	43.75	1.37	7.54
Common pipistrelle	57.12	6.23	16.93	1.46	5.32
Soprano pipistrelle	5.95	4.98	10.03	1.14	2.10
Brown long-eared bat	0.26	0.04	0.49	0.20	1.26

The Median Bat Pass Rate, Per Detector, Per Survey period is shown in Plates 4-35 and 4-36 (varied axis scale). Bat activity varied across seasons and detector locations. Activity at D06 in spring was significantly higher than all other detector locations. Detector D04 had the highest activity in summer, followed by D02. All other detector locations had lower activity in summer. Activity in autumn was very low when compared to spring and summer.

The Median Nightly Pass Rate (i.e. total bat passes per hour, per night) was used to determine typical bat activity at the Site (Plate 4-37). Activity was often variable between survey nights. Plates 4-38 to 4-40 (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.

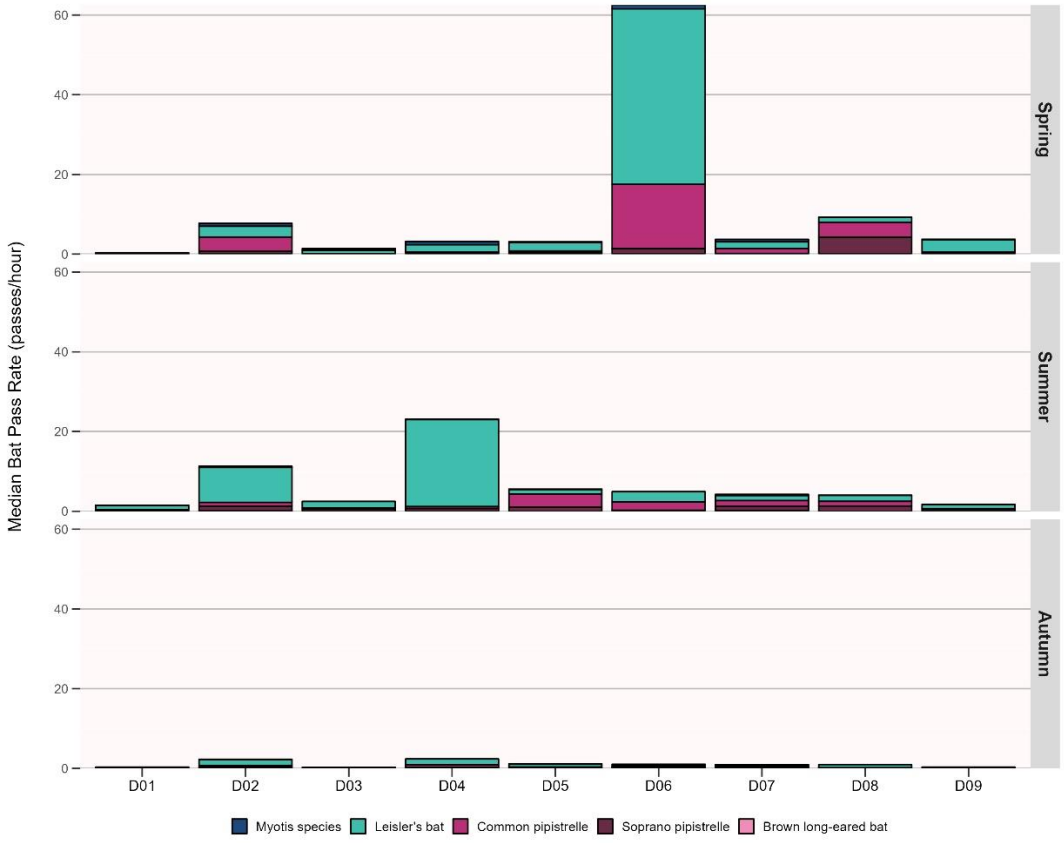


Plate 4-35 Static Detector Surveys: Median Bat Pass Rate (bpph) Including Absences, Per Location Per Survey Period (incl. spring D04, D07, D08 and summer D07 redeployments)

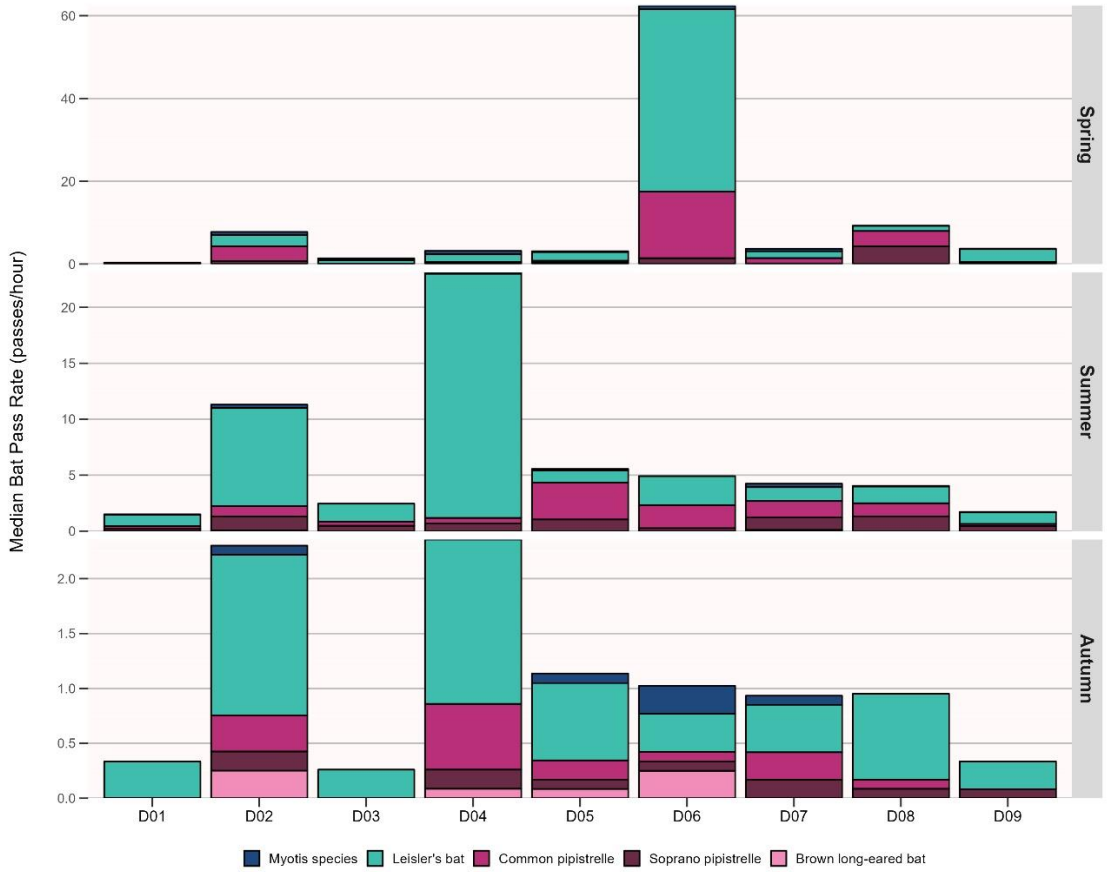


Plate 4-36 Static Detector Surveys: Median Bat Pass Rate (bpph) Including Absences, Per Location Per Survey Period (Varied Axis Scale) *(incl. spring D04, D07, D08 and summer D07 redeployments)*

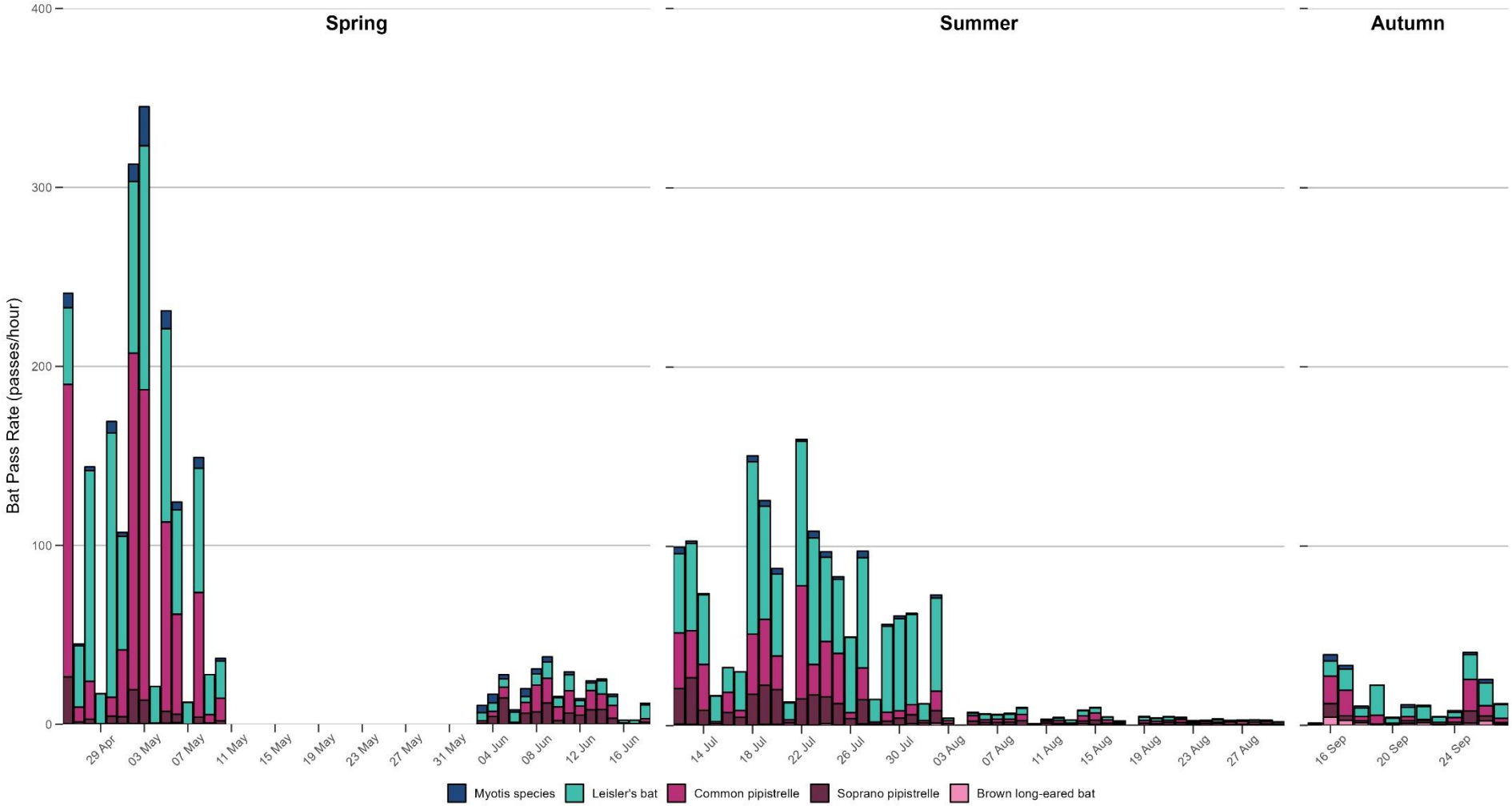


Plate 4-37 Static Detector Surveys: Median Bat Pass Rate (bpph) Including Absences, Per Season Per Night (incl. redeployments)

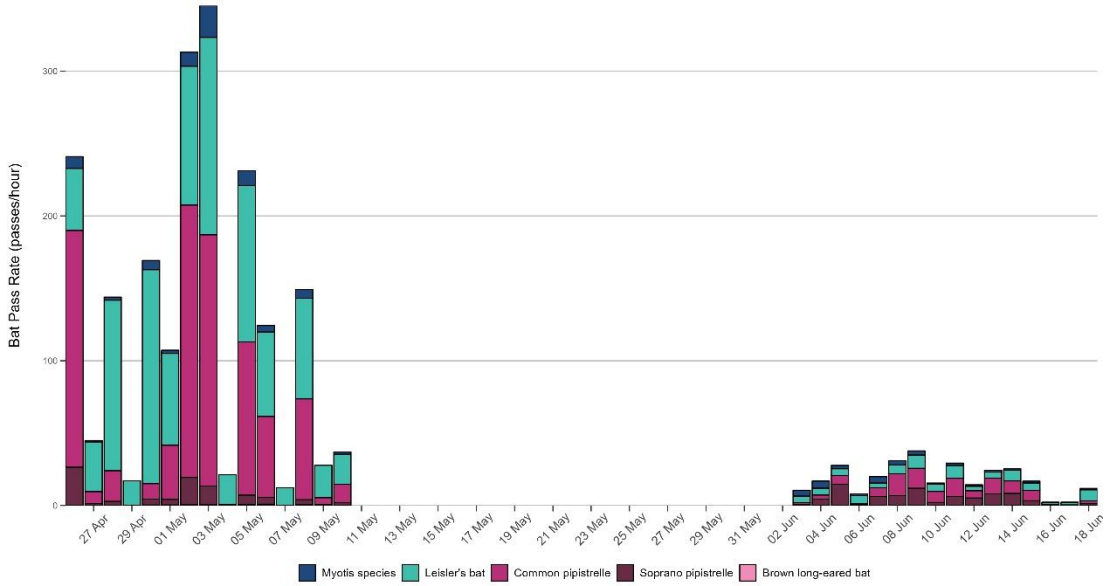


Plate 4-38 Static Detector Surveys: Spring Median Bat Pass Rate (bpph) Including Absences, Per Night (incl. redeployments)

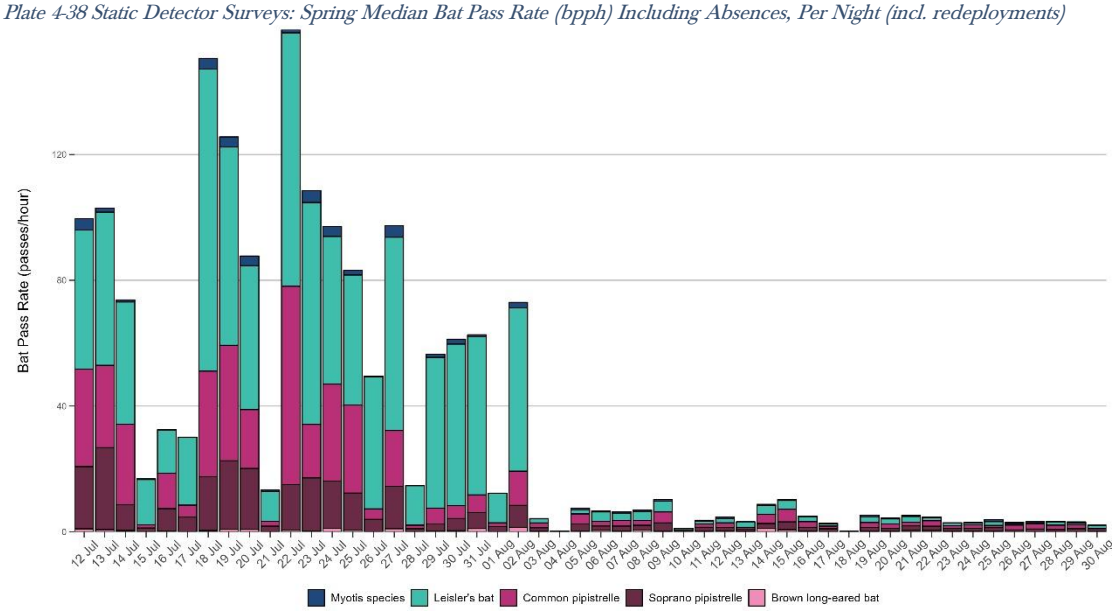


Plate 4-39 Static Detector Surveys: Summer Median Bat Pass Rate (bpph) Including Absences, Per Night (incl. redeployments)

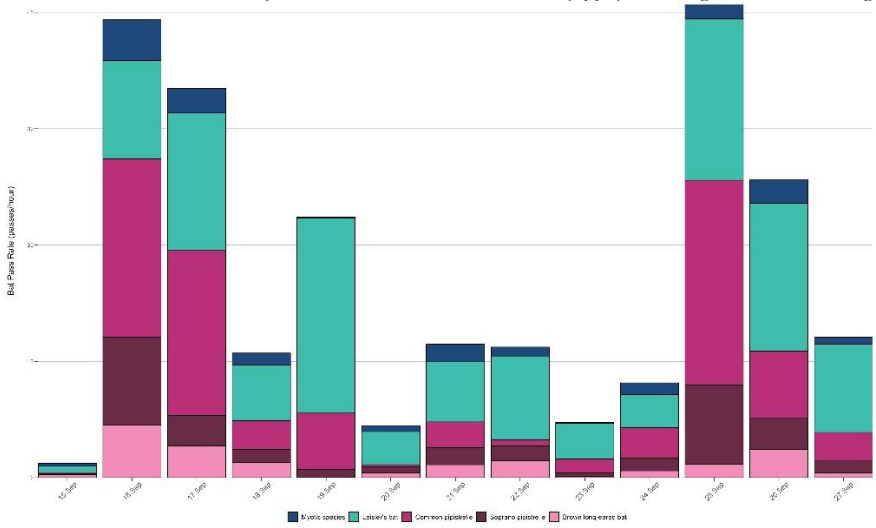


Plate 4-40 Static Detector Surveys: Autumn Median Bat Pass Rate (bpph) Including Absences, Per Night

Assessment of Bat Activity Levels 2023

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 Site, as adapted from Mathews *et al.* (2016). Table 4-10 shows the results of the site-level assessment as calculated on a site-specific activity level. Where no median activity at a detector is reported, no data was recorded for that species throughout the deployment.

Leisler's bat typically recorded *Low* Median Activity Levels in spring, summer and autumn. However, D06 recorded *High* Median Activity. *Moderate* Maximum Activity levels was recorded in spring at D03, D04, D05 and D07 and *High* Maximum Activity was recorded at D02, D06 and D09. *Moderate* or *High* Maximum Activity was generally recorded at most the detector locations for Leisler's bat in spring and summer. In autumn, *Low* Maximum Activity was generally recorded at most detectors i.e. D01, D03, D06, D07 and D09. *Moderate* Maximum Activity was recorded at D02, D04, D05, and D08 in Autumn.

Overall, common pipistrelle Median Bat Activity was generally *Low* in all seasons. However, D06 recorded *High* Median Activity in spring. *High* Maximum Activity was recorded in D02, D05, D06 and D08 in spring, and D04 and D05 in summer. *Moderate* Maximum Activity was recorded in spring at D07, in summer at D03, D06, D07 and D08 and in autumn at D02 and D04. Median Activity peaked in Spring at D06.

Soprano pipistrelle Median and Maximum Bat Activity was generally *Low* across all three seasons. Maximum Activity peaked in summer at D05. *Moderate* Maximum Bat Activity was recorded in spring at D08 only, summer at D02, D04 and D08, and autumn D02. Median Activity peaked at *Moderate* at D08 in autumn.

Myotis spp. recorded relatively *Low* activity in comparison to other species, on a site-specific level. Typical Median and Maximum Activity recorded in all three seasons was *Low*. *Moderate* Maximum Activity was recorded in spring at D02, D03, D04, and D07. *High* Maximum Activity was recorded at D05, and D06 in spring.

Brown long-eared bat activity was generally *Low* throughout the Site across all seasons. *Moderate* Max Activity levels for this species were recorded at D02 autumn.

Nathusius' pipistrelle activity was not recorded in 2023.

Table 4-10 Median Nightly Bat Activity (bpph) per Species, per Season, per Detector Location 2023 Low, Moderate, High

Species	Season	Bat activity (bpph)	D01	D02	D03	D04	D05	D06	D07	D08	D09
Myotis Species	*Spring*	Median	0.00	0.77	0.46	0.84	0.22	0.93	0.62	0.07	0.11
		Maximum	0.23	3.93	2.75	3.94	5.96	11.13	2.33	0.55	0.33
	Summer	Median	0.06	0.31	0.00	0.12	0.13	0.00	0.31	0.06	0.06
		Maximum	0.74	1.47	0.38	0.49	1.28	1.51	0.61	0.26	1.43
	Autumn	Median	0.00	0.04	0.00	0.04	0.04	0.22	0.08	0.00	0.00
		Maximum	0.18	1.15	0.26	0.18	0.35	1.50	0.26	0.09	0.66
Leisler's bat	*Spring*	Median	0.12	2.70	0.81	1.80	2.09	44.06	1.66	1.23	3.08
		Maximum	1.06	23.13	5.50	5.31	5.36	125.63	4.84	2.74	11.01
	Summer	Median	1.00	8.77	1.61	21.81	1.11	2.59	1.25	1.50	1.03
		Maximum	2.79	32.73	4.63	55.51	4.12	7.52	3.38	15.30	4.28
	Autumn	Median	0.33	1.46	0.22	1.53	0.69	0.30	0.43	0.79	0.21
		Maximum	0.70	3.23	1.75	6.23	5.35	1.41	0.96	4.67	1.16
Common pipistrelle	*Spring*	Median	0.11	3.58	0.12	0.27	0.44	16.07	1.29	3.72	0.22
		Maximum	0.67	110.71	0.68	1.66	34.39	121.48	5.16	14.60	1.65
	Summer	Median	0.25	0.92	0.37	0.49	3.29	2.06	1.48	1.16	0.19
		Maximum	1.00	3.32	7.84	14.50	56.66	5.84	4.01	5.60	1.69
	Autumn	Median	0.00	0.29	0.00	0.63	0.17	0.04	0.25	0.08	0.00
		Maximum	0.26	10.44	0.44	5.18	0.96	0.58	1.14	8.76	0.62
Soprano pipistrelle	*Spring*	Median	0.11	0.71	0.00	0.28	0.35	1.41	0.14	4.26	0.32
		Maximum	0.45	9.60	0.44	1.54	8.89	10.18	0.98	14.45	0.57
	Summer	Median	0.19	1.25	0.48	0.69	1.04	0.26	1.10	1.32	0.44
		Maximum	1.00	5.19	2.24	8.02	12.31	1.97	2.71	9.31	0.96
	Autumn	Median	0.00	0.17	0.00	0.25	0.09	0.09	0.17	0.09	0.04
		Maximum	0.25	5.37	0.26	0.61	0.53	0.62	0.44	0.44	0.26
Brown long-eared bat	*Spring*	Median	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Maximum	0.00	0.34	0.22	0.14	0.23	0.46	0.27	0.14	0.11
	Summer	Median	0.00	0.06	0.00	0.00	0.00	0.00	0.11	0.00	0.00
		Maximum	0.13	0.40	0.26	0.26	0.67	1.06	1.09	0.25	0.13
	Autumn	Median	0.00	0.17	0.00	0.09	0.04	0.21	0.00	0.00	0.00
		Maximum	0.26	2.29	0.26	0.42	0.34	0.44	0.35	0.18	0.79

4.4 Importance of Bat Population Recorded at the 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 Receptors have been assigned ***Local Importance (Higher value)*** on the basis that the habitats within the Site are utilized by a regularly occurring bat population of Local Importance.

No roosting bats were identified during the surveys and no roosting site of National Importance (i.e. site greater than 100 individuals) was recorded within the Site. It is suspected that some PRFs within the Site may provide potential roosting habitat for small numbers of roosting bats. The Site was not found to host a roosting site of ecological significance.

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 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	No roosts identified during surveys carried out at the Site. However, a number of trees and other structures with *Low-High* potential as roost sites on or near the Site. The habitats within the Site, consist predominantly of agricultural grassland with treelines/hedgerows delineating field boundaries. These features, along with smaller areas of forestry/woodland and a watercourse, provide suitable commuting and foraging habitat for bats and are connected to the wider landscape by linear features such as further treelines, hedgerows, drains and streams consistent with the moderate-risk criteria as set out in Table 3a of NatureScot 2021.	Moderate
Project Size	Following the criteria set out in NatureScot 2021the project is of Medium scale as it consists of 9 no. turbines. Whilst those turbines are over 100m in height, it is below the number of turbines that would constitute a Large development (NatureScot, 2021). Small scale development (≤10 turbines) with five wind energy developments within 10km and no wind energy developments within 5km. Comprising turbines >100 m in height.	Medium
Site Risk Assessment (from criteria in Plate 3-3)		**Medium Site Risk (3)**

The Proposed Project is located in an area of predominantly Improved Agricultural Grassland with broadleaf treelines and hedgerows forming field boundaries throughout the Site. As per Table 3a of the NatureScot Guidance (2021), the Proposed Project has a *Moderate* habitat risk and *Small* project size (Small project including 9 turbines but other large developments within 10km). The cross tabulation of a moderate project on 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

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 were low for the above species; therefore, no significant collision related effects are anticipated. 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 Project 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 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 ***Low*** across all seasons at typical activity levels. ***Moderate*** peak activity levels were recorded in spring and summer and ***Low*** peak activity in autumn (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 Site, which is primarily agricultural grassland, treelines/hedgerows with low levels of bat activity recorded during the walked transects undertaken on the Site.

Thus, there is ***Low*** overall collision risk level assigned to the local population of Leisler's bat.

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)	Low (1)	Typical Risk is Low (3)	Moderate (3)	Peak Risk is Medium (9)
Summer 2023		Low (1)	Typical Risk is Low (3)	Moderate (3)	Peak Risk is Medium (9)
Autumn 2023		Low (1)	Typical Risk is Low (3)	Low (1)	Peak Risk is Low (3)

Detector locations with High median Leisler's bat activity levels

A summary of per detector bat activity results (Table 4-10) provides key metrics for Leisler's bat recorded, per detector, per survey period. In 2023, Leisler's bat median activity was *High* at Detector D06 in spring, and at D02 and D04 in summer. These detectors correspond to Turbines T2, T4 and T6 respectively (Figure 3-1). Given that high median activity levels were recorded near Turbines 2, 4 and 6, 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 Guidance, in addition to best practice measures.

5.1.2.2 Soprano pipistrelle

This 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 were recorded during activity surveys across the 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 and ***Low*** at peak activity levels 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 Site, which is agricultural grassland, treelines/hedgerows with low levels of bat activity recorded during the walked transects undertaken.

Thus, there is ***Low*** 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)	Low (1)	Peak Risk is Low (3)
Summer 2023		Low (1)	Typical Risk is Low (3)	Low (1)	Peak Risk is Low (3)
Autumn 2023		Low (1)	Typical Risk is Low (3)	Low (1)	Peak Risk is Low (3)

5.1.2.3 Common pipistrelle

This 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 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*** across all three seasons in 2023.

Peak risk levels for common pipistrelle were found to be ***Medium*** in Spring and Summer and ***Low*** in autumn (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 Site, which agricultural grassland, treelines/hedgerows with low levels of bat activity recorded during the walked transects undertaken.

Thus, there is a ***Low*** 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)	Moderate (3)	Peak Risk is Medium (9)
Summer 2023		Low (1)	Typical Risk is Low (3)	Moderate (3)	Peak Risk is Medium (9)
Autumn 2023		Low (1)	Typical Risk is Low (3)	Low (1)	Peak Risk is Low (3)

Detector locations with High median Common pipistrelle activity levels

A summary of bat activity results provides key metrics for Common pipistrelle recorded, per detector, per survey period (Table 4-10). In 2023, D06 in spring recorded *High* median activity. This detector corresponds to Turbines T6. Given that high median activity levels were recorded here in spring, 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 Guidance, in addition to best practice measures.

5.1.3 Collision Risk Summary

Site-level collision risk for high collision risk bat species was typically ***Low***. Overall bat activity levels were typical of the nature of the Site, which is predominantly agricultural grasslands, treelines and hedgerows with relatively low levels of bat activity recorded during the static detector surveys as well as the walked transects undertaken.

However, following per detector R-analysis, Detectors D02, D04 and D06 recorded *High* median activity levels across in either spring or summer (Table 5-6). During manual transect surveys, higher activity was noted in the vicinity of D06 and to the north of D06.

While *High* median activity was recorded at three 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. 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.

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

Detector ID	Turbine	Species	High Median Activity Survey Period
D02	T02	Leisler's bat	Summer 2023
D04	T04	Leisler's bat	Summer 2023
D06	T06	Leisler's bat, Common pipistrelle	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 Project is predominantly located on agricultural grassland with treelines/hedgerows delineating field boundaries. Smaller areas of wet grasslands and commercial/private forestry are also present.

The majority of turbines will be located in agricultural grassland resulting in minimal loss of linear habitat features. However, tree-felling and linear vegetation removal will be required within and around the Proposed Project infrastructure footprint to allow for the construction of the turbine bases, access roads, underground cabling, and the other ancillary infrastructure and also to establish adequate separation between the proposed turbine blades and surrounding vegetation. Approximately 3.44 hectares of conifer forestry will be permanently felled to accommodate Turbine 9 and the proposed bat felling buffer around Turbine 6. In addition, the bat buffer around Turbine 6 includes 0.78 ha of (mixed) broadleaved woodland in the form of thin strips of woodland and ash plantation forestry, which will require felling. Therefore, a total of 4.22 ha of commercial forestry and broadleaved woodland will be felled to facilitate the construction of the Proposed Project. Further details on tree felling required within and around development footprint is detailed in Chapter 6 of this EIAR.

It should be noted that conifer forestry on the Site was originally planted as a commercial crop and will be felled in the future should the Proposed Project proceed or not. The felling of trees is provided to achieve the required buffer distance for the protection of bats, from the turbine blades to the surrounding vegetation, 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. Chapter 4, Figure 4-14 shows the extent of the commercial forestry to be permanently felled as part of the Proposed Project.

Approximately 1.8km of linear vegetation, primarily treeline/hedgerows, will require removal to facilitate the construction of the Proposed Project, including underground cabling, as outlined above. The habitat within the proposed substation, end masts and temporary construction compounds consists entirely of *Improved agricultural grassland (GA1).* Therefore, no loss of commuting/foraging habitat are anticipated.

A replanting plan has been developed to mitigate the loss of bat foraging/commuting habitat associated with the Proposed Project and is presented in Section 6.1.5. The replanting design will ensure habitat connectivity is maintained and enhanced around the Site resulting in an overall net gain of suitable habitat features for bats.

It is proposed to plant by hand, approximately 1.8 hectares of natural woodland within the Site along a segment of the Eastwood River, as shown in Figure 6-1. Further details are outlined in Appendix 6-4 Biodiversity Management and Enhancement Plan. An additional 5.17km of linear hedgerow planting is proposed, which will result in a net gain of approximately 3.37km in linear habitat features within the Site. Linear vegetation removal will result in a short-term effect, with connectivity re-established within approximately 2-5 years. No permanent loss of, or damage to, commuting or foraging habitats is anticipated as a result of the Proposed Project or associated infrastructure. The proposed replanting area is shown in Figure 6-1 and discussed in Appendix 6-4, Biodiversity Management and Enhancement Plan. Following the implementation of the replanting plan within the Proposed Wind Farm, no significant effects in relation to habitat fragmentation or loss of foraging habitat for bats is anticipated.

To facilitate the transportation of turbine components, minor temporary accommodating works are required which involves the temporary stoning up of the verges and may require minor hedge or tree trimming to transport the turbine components. All works are minor, temporary and contained within the road carriage. Once the abnormal loads have been delivered, these areas will be reseeded. Any areas of tree and hedgerow loss will be assessed by a licenced ecologist prior to removal and any required tree removal will be replaced within the Site with species indigenous to the area.

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

5.3 Loss of, or Damage to, Roosts

The Proposed Project is predominantly located within agricultural grassland surrounded by treelines and hedgerows, with smaller areas of wet grasslands, broadleaf woodland and commercial forestry. The trees in the commercial forestry do not provide potential roosting habitat of significance for bats.

Four structures, and their associated outbuildings, were identified within the Site and were subjected to inspections and dusk activity surveys. While a small number of bats were observed commuting and foraging in the wider area at dusk, no structures were confirmed as roosts. These structures and the surrounding linear habitat features will be impacted by the Proposed Project.

The majority of trees within the Site will be retained as part of the Proposed Project; however, there will be some requirement to remove trees to facilitate the bat felling buffers. Trees within the bat buffers varied in suitability from *Negligible* to *High* 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 6.1.3. No evidence of bat use was identified during daytime inspection of the trees. However, a potential for indirect effects on bats was identified in the form of loss of roosting habitat resources, as well as direct effects such as temporary disturbance and harm or death as a result of 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. 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, end masts and temporary construction compounds consists entirely of *Improved agricultural grassland (GA1).* Therefore, no loss of roosting habitat is anticipated. The underground cabling will be following existing roads and agricultural grassland. There will be some requirement to remove trees to facilitate the underground cabling route. However, any trees removed as part of the construction works will be replanted elsewhere within the Site. Further details on replanting are outlined in Section 6.1.5 below.

Two watercourse crossings are present within the Proposed Wind Farm, only one of which has an existing bridge. This crossing was assessed as having *Negligible* roosting potential. Horizontal Directional Drilling (HDD) is proposed for this watercourse; therefore, there will be no loss of roosting habitat associated with these works. Two watercourse crossings are present along the underground cabling route, only one of which has an existing bridge. This crossing was assessed as having *Low* roosting potential; however, Horizontal Directional Drilling (HDD) is proposed for this watercourse; therefore, there will be no loss of roosting habitat associated with these works.

The TDR accommodation works areas are contained within the existing road infrastructure and traverse small areas of habitats common and widespread within the surrounding area such as *improved agricultural grassland, hedgerow* and *dry meadows and grassy verges.* There may be a requirement to complete minor hedge or tree trimming to transport the turbine components. However, no PRFs were identified during the inspection survey. Therefore, no loss of roosting habitat is anticipated.

On a precautionary basis, a potential for significant effect with regard to the loss of, or damage to, roosting habitat and mitigation measures have been outlined in Section 6.1.4.

5.4 Displacement of Individuals or Populations

The Proposed Project is predominantly located within an area of agricultural grassland, treelines/hedgerows with smaller areas of wet grassland, private forestry. A number of treelines/hedgerows 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 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 Site, 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 Site shall be designed in accordance with the Institute of Lighting Professionals Guidance Note 08/23 Bats and artificial lighting at night.

In addition, the applicant commits to the use of lights during construction, operation and decommissioning (such that they are necessary) in line with 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 aviation 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 Guidance, a minimum 50m buffer to all habitat features used by bats (e.g., hedgerows, treelines etc.) will be applied to the siting of all wind turbines (See example provided in Plate 6-1 below). It is noted that 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 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 and updated where necessary, as described in Section 6.2.

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 Site will have an overall ground-to-blade tip height of 185m; rotor diameter of 163m and hub height of 103.5m.

This mitigation measure is included within the commercial forestry felling calculation outlined in Chapter 4, Section 4.3.1.7 of the EIAR. Figure 4-14, Chapter 4 shows the extent of the commercial forestry area to be felled as part of the bat buffer requirement. Commercial forestry felling will be required for Turbine 6 and Turbine 9 only. The bat felling buffer formula has also been used to identify the extent of vegetation removal around all other proposed turbines (Figure 6-1). 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)

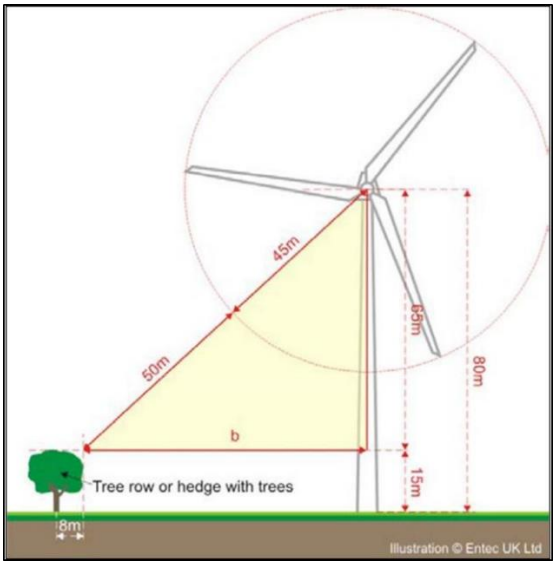


Plate 6-1 Calculate buffer distances (Natural England, 2014).

6.1.4 Confirmatory Pre-construction Tree Survey

A number of mature trees presenting potential roosting features were identified within turbine felling buffers. Areas subject to removal are shown in Figure 6-1. 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.
- A bat derogation licence will be obtained from the NPWS for the loss of any confirmed roost resource, prior to felling, and the felling activity will be supervised by a qualified ecologist.
- 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 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).
    - Any tree felling will be undertaken outside the bat maternity season (May-August) and the hibernation period (December-February) (Marnell, Kelleher and Mullen, 2022).

Compensation for the loss of trees with alternative potential roosting features will be implemented on a like-for-like basis, through veteranisation of retained trees or 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.
- Veteranisation (i.e. artificially ageing trees by producing non-lethal damage) will be undertaken by professionally trained arborists.
- Bat-boxes produced with woodcrete materials (i.e. Schwegler) will be utilised where veteranisation of existing broadleaves is not possible.

6.1.5 Proposed Habitat Replacement

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.

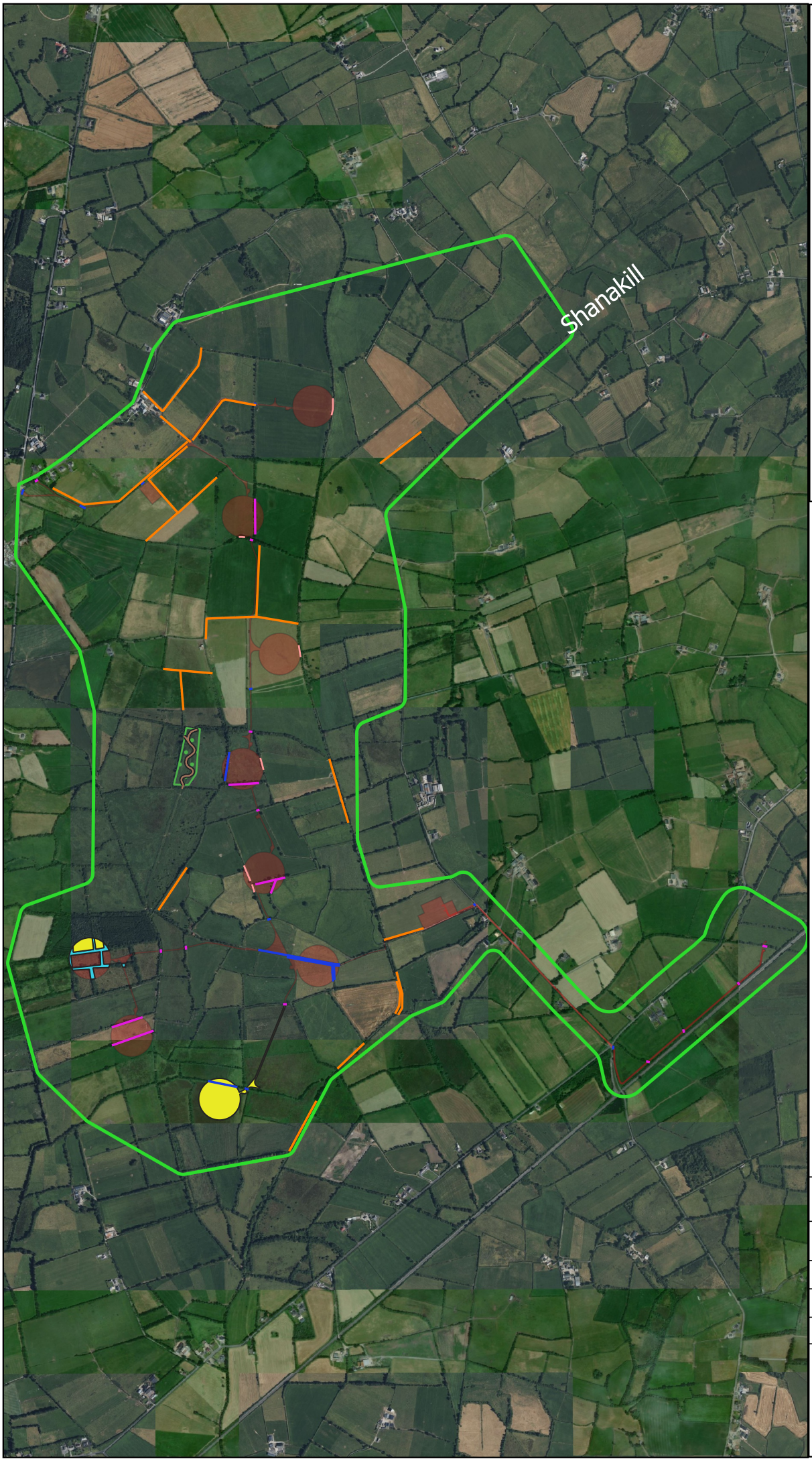
Some linear vegetation within the required turbine bat buffers will be removed. A replanting design has been curated to provide alternative commuting corridors within the Site. To comply with NatureScot recommendations in relation to habitat buffering to avoid bat fatalities, a total of 4.22ha of conifer plantation commercial forestry and (mixed) broadleaf woodland comprised of strips of linear woodland and ash plantation will be lost. 1.8km of treeline/hedgerow habitat will also be lost as a result of the recommended buffers applied for bats.

It is proposed to plant by hand, approximately 1.8 hectares of natural woodland within the Site along a segment of the Eastwood River, as shown in Figure 6-1. The remaining replanting will be undertaken outside of the hydrological catchment plus 10km from the Site. Further details are outlined in Appendix 6-4 Biodiversity Management and Enhancement Plan.

There is an extensive network of existing linear landscape features in the wider area that will be retained, and the loss of hedgerow/trees 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. A total of 5.17km of linear habitat will be added, which will result in a net gain in linear habitat features within the Site.

The locations in which the proposed linear hedgerow planting will take place are illustrated in Figure 6-1. To ensure connectivity is maintained across the Site, the proposed replanting will be located primarily in the north, eastern and southern section of the Site, enhancing the existing linear features along the watercourse which runs north to south of the Site. Should any alteration of planting locations be required it will be subject to review by the Project Ecologist.

Overall, the proposed replanting will result in a net gain of approximately 3.37km in the linear landscape features within the Site. Planting will be of semi-mature, indigenous species local to the area, to ensure connectivity gains are immediate. Further details are provided in the Chapter 6 of the EIAR.



Map Legend

- EIAR Study Boundary
- Linear Vegetation Replanting
- Linear Vegetation within Bat Buffers to be Retained
- (Mixed) Broadleaved Woodland (WD1) to be Felled
- Conifer Plantation (WD4) to be Felled
- Hedgerow (WL1) to be Felled
- Treeline (WL2) to be Felled
- River Enhancement Stream Concept
- River Enhancement 5m Riparian Buffer
- River Enhancement 1.8ha Natural Woodland Planting
- Infrastructure Footprint and Bat Buffers

Drawing Title
Proposed Tree Felling/ Vegetation Removal and Replanting Areas

Project Title
Borrisbeg Renewable Energy Development

Drawn By	Checked By
AvdGM	AJ
Project No.	Drawing No.
220310	Fig 6-1
Scale	Date
1:22,499.959176	23.11.2023

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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 was typically *Low.* This risk level is reflective of the nature of the 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, Bat box monitoring 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. 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.

Monitoring and maintenance of the Bat boxes will take place yearly for the first three years of the operational Wind Farm. The results of the first three years of monitoring will inform the need for and frequency of further monitoring and maintenance of the Bat Boxes, to be reviewed by the Project Ecologist and agreed with the wind farm operator.

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 Site, 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 the 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 the 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. A monitoring programme will be submitted to, and agreed with, the Planning Authority. Any subsequent changes will be agreed with the Planning Authority.

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 no other wind farm sites located within 5km of the Site; however, five existing, permitted or proposed wind farm sites are located within 10km of the Proposed Project. There are two further EIA projects and eleven extractive industries 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 at the Site. 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.

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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 conditions1 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 hibernation2. 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 potential3.	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

SITE RISK ASSESSMENT

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

Site Risk Level (1-5)*		**Project Size**		
		Small	**Medium**	**Large**
Habitat Risk	**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

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).