Planning and Environmental Consultants

Appendix 6-2 – Bat Survey Report

Seskin Renewable Wind Farm

DOCUMENT DETAILS

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Prepared By:	**MKO** **Tuam Road** **Galway** **Ireland** **H91 VW84**

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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 of a renewable energy development at Seskin and adjacent townlands, near Durrow in Co. Laois. This report provides details of the bat surveys undertaken, including survey design, methods and results, and the assessment of potential effects of the Proposed Development on bats. Where necessary, mitigation is prescribed to minimise any identified significant effects.

Bat surveys were undertaken throughout 2023, with additional emergence surveys completed during the bat activity season of 2024 and are consistent with the methodologies described in NatureScot 2021[1]. Bat surveys employed a combination of methods, including desktop study, habitat and landscape assessments, roost inspections, manual activity surveys and static detector surveys at ground level. Surveys in 2023 were based on an indicative turbine layout of 8 turbines.

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

As detailed in Section 1.1 in Chapter 1 of the EIAR, for the purposes of this Bat Report, the various project components are described and assessed using the following references:

- Where the 'Proposed Development' is referred to this encompasses the entirety of the project for the purposes of this EIA in accordance with the EIA Directive.
- Where the 'Proposed Wind Farm' is referred to, this refers to the wind turbines and associated foundations and hard-standing areas, meteorological mast, access roads, temporary construction compound, underground cabling, borrow pit, spoil management, site drainage, biodiversity enhancement, turbine delivery accommodation areas and all ancillary works and apparatus.
- Where the 'Proposed Grid Connection' is referred to, this refers to the 38kV onsite substation, associated temporary construction compound and 38kV underground cabling connecting to the existing Ballyragget 110kV substation, and all ancillary works and apparatus.
- Where the 'Site' is referred to, this relates to the primary study area for the EIAR, as delineated by the EIAR Site Boundary in green as shown on Figure 1-1, Chapter 1 of this EIAR and encompasses an area of approximately 302 hectares.

A detailed description of the Proposed Description 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

[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).*

shares more similarities with bat assemblages of Great Britain, when compared to those of mainland Europe.

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

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

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).

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) and a derogation licence must be granted before works commence.

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 11 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). Pressures and Threats are ranked from medium importance (M) to high importance (H) in the 2019 Article 17 report.

Bat Species	Conservation Status	Principal Pressurs/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)
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	Favourable	

Bat Species	Conservation Status	Principal Pressurs/Threats
Myotis mystacinus		**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)
Brown long-eared bat *Plecotus auritus*	Favourable	
Lesser horseshoe bat *Rhinolophus hipposideros*	Inadequate	

1.4 Bat Roosting Behaviour

Bats use a variety of natural and manmade structures as roosting or resting places. The type of roost and its level of use is determined by its function in the bat life cycle. Table 1-2 provides a summary of different types of bat roosts (Collins, 2023).

Table 1-2 Bat Roost Types and Definitions

Roost Type	Definition
Day	Where individuals or small groups, rest/shelter in the day but are rarely found by night in summer.
Night	Where bats rest/shelter at night but are rarely found in the day.
Feeding	Where individuals, or a few individuals, rest/feed for short periods during the night but are not present by day.
Transitional	Used by a few individuals for short periods of time prior to or following hibernation.
Maternity	Where females give birth and raise their young.
Hibernation	Where bats are found during winter (constant cool temperature and high humidity).
Satellite	An alternative roost found in close proximity to the main nursery colony used throughout the breeding season.
Swarming Site	Where large numbers gather in late summer to autumn. Important mating sites. Roosting may occur alongside swarming.
Mating Site	Where mating takes place in late summer to winter.

The likelihood of detecting active roosts is determined by the timing of the roost survey. In general:

- April surveys may detect transitional roosts used by bats following hibernation and prior to summer roosting.
- May-August surveys may detect maternity colonies and male/non-breeding female summer roosts.
- August surveys are best to determine maximum counts of adult and juvenile bats.
- August – October surveys may detect swarming and mating bats.
- September and October surveys may detect transitional roosts used by bats following the dispersal of maternity colonies and prior to hibernation.
- Day, night, feeding and satellite roosts may be found anytime between April and October.
- November – March surveys may detect hibernacula.

1.4.1 Bat Roost Significance

Whilst there are no clear Irish guidelines on assessing the significance of a roost, significance should be assessed at an appropriate spatial scale, based on species distribution, conservation status, current population trends, functionality of the site and the Zone of Influence (ZoI) of the project in question as it relates to bats (Reason and Wray, 2023). The significance of a bat roost is dependent on the rarity of the species using the roost and its function to the bat's life cycle, as outlined in Table 1-2 above. Table 3.2 of the CIEEM guidelines (adapted in Table 1-3) provides a starting point on the geographical assessment, which will rely on professional judgement and will be based on the baseline data collected and available information gathered during desktop studies.

Table 1-3 Roost importance at various geographic levels, adapted to Ireland from Table 3.2 of CIEEM guidelines (Reason and Wray, 2023)

Conservation status/ distribution	**Individual or very small occasional/ transitional/ opportunistic roosts**	**Non-breeding day roosts (small numbers of species)**	**Mating sites, small numbers of hibernating bats**	**Larger transitional roosts**	**Hibernation sites**	**Autumn swarming sites**	**Maternity sites**
Widespread all geographies	Site	Site	Site	Site/Local	Local/County [Larger hibernation sites rare in the UK]	Local/County [Very large pipistrelle swarming sites appear uncommon in the Ireland]	Unlikely to exceed Local/County importance unless colonies are atypically large; importance increased for assemblages.
Widespread in many geographies, but not as abundant in all	Site	Site	Site, dependent on local distribution [For *Myotis*, see swarming site column]	Local/County	Local/County importance dependent on size and number of species	County/National importance dependent on size; importance increased for larger sites that serve larger numbers/species	Unlikely to exceed County importance unless colonies are atypically large; importance increased for assemblages.
Rarer or restricted distribution	Site (very well-used night roosts may be of County importance for some species)	Site/Local/County, dependent on local distribution	Site/Local/County dependent on local distribution	Local/County	Local/County importance dependent on size and local distribution; increased value for assemblages.	County/National importance on size and local distribution; increased value for assemblages.	County/National importance on size and local distribution; increased value for assemblages.

Rarest Annex II species and very rare	Site (very well-used night roosts may be of Local/County importance for some species)	Site/Local/County, dependent on local distribution	Site/ Local/County, dependent on local distribution	Local/County	County/Regional importance on size and local distribution; increased value for assemblages	County/National importance on size and local distribution; increased value for assemblages.	County/National importance on size and local distribution; increased value for assemblages

All the largest roosts of Lesser Horseshoe Bat (LHB) in Ireland are of international importance and it is anticipated that all large Leisler's bat roosts (>100) would also have international significance (NRA, 2006) due to the limited distribution of this species in other European countries. Table 1-4 provides some criteria for determining the significance of different building roosts, as determined by the Bat Expert Panel of the Heritage Council in 2003 (NRA, 2006). Geographic criteria will be applied to these values.

Table 1-4 Level of Importance of Various Roosts in Ireland

Species	Indicator	Significance
Lesser horseshoe bat	Special Area of Conservation	Very significant
	If present	Significant
Whiskered bat	>10	Very significant
	If present	Significant
Natterer's bat	>10	Very significant
	If present	Significant
Daubenton's bat	Maternity roost	Significant
Leisler's bat	Maternity roost	Significant
Common pipistrelle	Maternity roost	Significant
Soprano pipistrelle	Maternity roost	Significant
Brown long-eared bat	Maternity roost	Significant

1.5 Statement of Authority

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

Survey scoping was prepared by Aoife Joyce. The daytime walkover survey and inspections were carried out by Ryan Connors and Laura Gránicz. Manual activity surveys were carried out by Ryan Connors, Laura Gránicz, Kate Greaney, Charlie Meehan, Cuan Feely and Cormac Roberts. Data manual ID was carried out by Ryan Connors. This report was also prepared by Ryan and was reviewed and approved by Aoife Joyce. Staff's roles, relevant ecological experience and training is presented in Table 1-5 below.

Table 1-5 Project team experience, qualifications and training.

Staff	Role	Training
Aoife Joyce (B.Sc., M.Sc.) 6 years'	Project Director	B.Sc. (Hons) Environmental Science, University of Galway, Ireland. M.Sc. (Hons) Agribioscience, University of Galway, Ireland. Advanced Bat Survey Techniques – Trapping, biometrics, handling (BCI), Bat Impacts and Mitigation (CIEEM), Bat Tree Roost Identification and Endoscope Training (BCI), Bats in Heritage Structures (BCI), Bats and Lighting (BCI), Kaleidoscope Pro Analysis (Wildlife Acoustics).
Laura Gránicz (B.Sc., MSc.) 6 years'	Project Ecologist	B.Sc. Biology, University of Szeged, Hungary. M.Sc. Biology, University of Pécs, Hungary. Structure & Tree Inspection (Internal), Manual Transect Survey (Internal), Bat Habitat Appraisal (Internal), Emergence and Re-Entry Surveys (Internal), Advanced Bat Survey Techniques (BCI), Kaleidoscope Pro Analysis (Wildlife Acoustics).
Ryan Connors (B.Sc., M.Sc.) 2 years'	Bat Ecologist	B.Sc. (Hons) Zoology, University College Galway, Ireland. M.Sc. (Hons) Conservation Behaviour, Atlantic Technological University, Galway, Ireland. Surveying Trees for Bats (BRTS), Preliminary Ecological Appraisal (CIEEM), Structure & Tree Inspection (Internal), Manual Transect Survey (Internal), Bat Habitat Appraisal (Internal), Emergence and Re-Entry Surveys (Internal), Kaleidoscope Pro Analysis (Internal), Winter Tree Identification (Internal), Wintering Bird Surveying (Internal).
Kate Greaney (B.Sc., M.Sc.) 2 years'	Ecologist	B.Sc. (Hons) Botany and Plant Science National university of Ireland, Galway, M.Sc. (Hons) Climate Change, Agriculture, and Food Security (MScCCAFS) National university of Ireland, Galway, Kaleidoscope Pro Analysis (Wildlife Acoustics). Endoscope Training (Internal), Emergence and Re-Entry Surveys (Internal) Structure & Tree Inspection (Internal), Manual Transect Survey (Internal), Bat Habitat Appraisal (Internal)
Charlie Meehan (B.A., M.Sc.)	Seasonal Bat Ecologist	B.A. History and Classical Studies, National University of Ireland, Galway M.Sc., Sustainable Environments, National University of Ireland, Galway

		Kaleidoscope Pro Analysis (Wildlife Acoustics), Endoscope Training (Internal), Structure and Tree Inspection (Internal), Manual Transect Survey (Internal), Bat Habitat Appraisal (Internal), Emergence and Re-Entry Surveys (Internal)
Cuan Feely (B.Sc.) **1 year**	Graduate Ecologist	BSc. (Hons) Environmental Science, University of Galway Structure & Tree Inspection (Internal), Manual Transect Survey (Internal), Bat Habitat Appraisal (Internal), Emergence and Re-Entry Surveys (Internal)
Cormac Roberts	Student	Summer intern in the bat team Structure & Tree Inspection (Internal), Manual Transect Survey (Internal), Bat Habitat Appraisal (Internal), Emergence and Re-Entry Surveys (Internal)

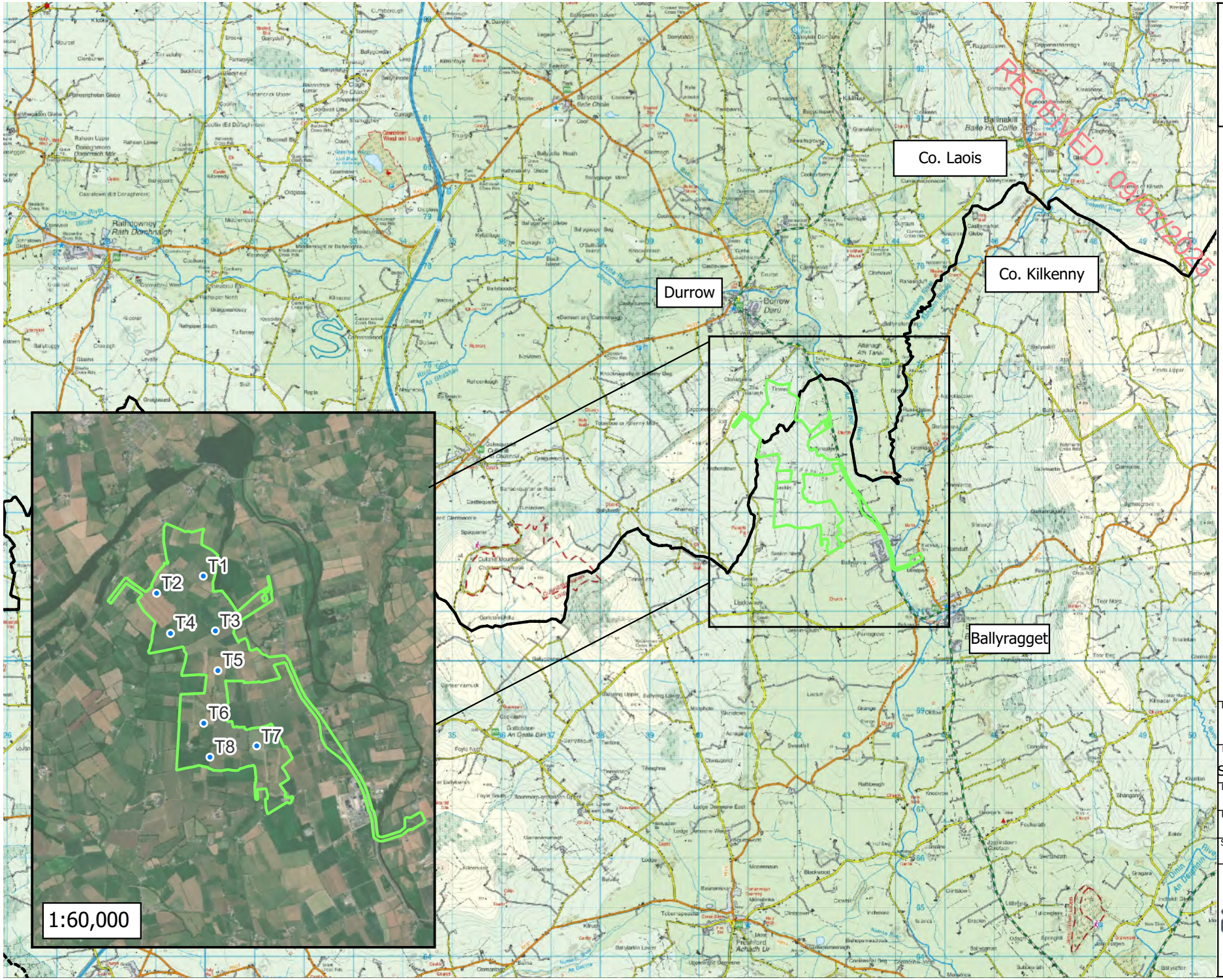
2. PROJECT DESCRIPTION

The core of the Proposed Wind Farm is located approximately 2.5 kilometres south of the town of Durrow, Co. Laois, 3.2 kilometres northwest of the town of Ballyragget, Co Kilkenny and 5.9 kilometres east of the village of Cullahill, Co. Laois. The N77 National Secondary Road runs in a north/south orientation, east of the Site. It is proposed to access the Proposed Development via an existing agricultural access off the L58333 local road, which in turn is accessed off the N77, on the eastern side of the Site. This existing access will be upgraded as part of the Proposed Development. The Site is served by a number of existing public and agricultural roads and tracks. The full description of the Proposed Development is provided in Section 4.1 of Chapter 4 of this EIAR.

The Proposed Grid Connection includes for underground 38kV electrical cabling from the proposed onsite 38kV substation, in the townland of Ballynaslee, Co. Kilkenny, to the existing Ballyragget 110kV substation in the townland of Moatpark, Co. Kilkenny. The total length of the Proposed Grid Connection underground cable route, measures approximately 3.4km in length with approximately 2.2km located within the public road corridor and approximately 1.2km located in agricultural lands. A full description of the Proposed Grid Connection is detailed in Section 4.3.2 of Chapter 4 of this EIAR.

Current land-use within the Proposed Wind Farm comprises agricultural pastural land. Current land-use along the Proposed Grid Connection route comprises of transport, and agricultural pastural land. Land-use in the wider vicinity of the Site comprises a mix of agriculture, low density residential, renewable energy and industrial and commercial.

The Proposed Development site location is shown on Figure 2-1.



RECEIVED: 09/07/2025

Map Legend

EIAR Site Boundary

Proposed Turbine Locations

Drawing Title

Site Location

Project Title

Seskin Renewables Wind Farm

Drawn By	Checked By
RC	AJ
Project No.	Drawing No.
231103	Figure 2-1
Scale	Date
1:100,000	2025-06-25

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

3. METHODS

3.1 Consultation

A scoping exercise was undertaken as part of the EIAR for the Proposed Development. A Scoping Document, providing details of the application site and the Proposed Development, was prepared by MKO and circulated to consultees in May 2024. As part of this exercise, prominent Irish conservation groups were contacted, and Bat Conservation Ireland (BCI), and the Department of Housing, Local Government and Heritage-Development Applications Unit (NPWS) were specifically invited to comment on the potential of the Proposed Development to affect bats.

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

3.2 Desk Study

A desk study of published material was undertaken prior to conducting field surveys. The aim was to provide context to the Proposed Development 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 41976 74120) (BCI 2012, Hundt 2012, NatureScot, 2021). Available bat records were provided by Bat Conservation Ireland on 29th April 2025. 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 a central point of the Site (BCI 2012, Hundt, 2012, NatureScot, 2021). This included European designated sites, i.e. SACs, and nationally designated sites, i.e. NHAs and pNHAs.

3.2.4 Landscape Features

3.2.4.1 Ordnance Survey Mapping

Ordnance survey maps (OSI 1:5,000 and 1:50,000) and aerial photographs were reviewed to identify any habitats and features likely to be used by bats. Maps and images of the 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 23rd April 2025). 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 23rd April 2025).

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

3.2.5 Multidisciplinary Surveys

Multidisciplinary walkover surveys were undertaken throughout 2023, 2024 and 2025. The Site was systematically and thoroughly walked in a ground-truthing exercise with the habitats on the Site assessed and classified. The habitats (including any culverts/bridges) were assessed for bat commuting, foraging and roosting suitability.

Multidisciplinary walkover surveys were undertaken on the following dates:

Table 3-1 Multidisciplinary Survey Effort

Multidisciplinary Survey	Dedicated Bat Survey
30th April 2024	17th May 2023
1st May 2024	1st June 2023
28th May 2024	28th June 2023
29th May 2024	27th July 2023
11th June 2024	14th September 2023
12th June 2024	11th October 2023
24th June 2024	30th May 2024
3rd July 2024	25th July 2024
4th July 2024	23rd September 2024
5th July 2024	
17th July 2024	
18th July 2024	
27th August 2024	
19th December 2024	

3.3 Field Surveys

3.3.1 Bat Habitat Suitability Appraisal

Bat walkover surveys were carried out throughout 2023 and 2024. 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.

At the time of the 2023 surveys, assessments were initially carried out using the guidance outlined in Collins (2016). Following the release of Collins (2023) prior to the 2024 surveys, all 2023 survey data were reviewed and reassessed in line with the updated 2023 guidance to ensure consistency across the dataset. Suitability was assessed using the criteria set out in Collins (2023), which provides a grading protocol for roosting habitats and for commuting and foraging areas. Suitability categories are divided into *High*, *Moderate*, *Low*, *Negligible* & *None* 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. 75m) of the proposed turbine locations. (NatureScot, 2021). The aim was to determine the presence of roosting bats and the need for further survey work or mitigation. The Site was visited in May, June, July, September and October 2023 and May, July and September of 2024. The watercourse crossing associated with the Proposed Grid Connection underground cabling route was assessed in December 2024. A walkover was carried out in search of any structures that could support roosting bats (see **Appendix 1** for criteria in assessing roosting habitats).

Three structures were identified as potential roost features within the Site (IG Ref: S 42041 73614, S 42171 74108, and S 42868 72354). These were subject to roost assessments involving detailed external inspections and, where access was available, internal inspections to search for evidence of bat activity, including live and dead specimens, droppings, feeding remains, urine splashes, fur oil staining and noises. Additionally, one farm complex and five other structures located just outside the Site were identified and assessed externally for their suitability to support roosting bats. The locations of all identified PRFs are provided in Table 3-2.

There is one watercourse along the Proposed Grid Connection underground cabling route; however, no crossing infrastructure is present at this location. The location of the watercourse crossing is presented in Chapter 4 and Appendix 4-1 of this EIAR.

Any potential tree roosts identified within the Site were examined for the presence of rot holes, hazard beams, cracks and splits, partially detached bark, knot holes, gaps between overlapping branches and any other potential roost features (i.e. PRFs) identified by the Bat Tree Habitat Key (BTHK, 2018). Where accessible, an endoscope was used to inspect PRFs in more detail to assess their suitability for roosting bats.

Table 3-2 PRF locations within and around the Site

Structure	IG Ref	Distance to Site Boundary	Nearest turbine	Distance to nearest turbine
Derelict farmhouse and adjoining shed	S 42041 73614	0m	T5	300m
Archaeological stone structure	S 42171 74108	0m	T5	235m
Inhabited Farmhouse with adjoining sheds	S 40657 74435	0m	T7	735m
Farmhouse	S 40657 74435	500m	T2	750m
Farm sheds	S 40653 74453	480m	T2	730m
Stone ruin	S 40813 75109	400m	T2	530m
Stone ruin 2	S 40793 75073	390m	T2	530m
Farm shed 2	S 42881 73750	100m	T7	850m
Stone farm shed	S 42711 74392	300m	T3	710m
Ivy covered stone structure	S 41083 71556	1,225m	T8	1,545m

Emergence Surveys

Emergence surveys at dusk were carried out which focused on the PRFs identified during the habitat appraisal within the Site. During these surveys, surveyors were equipped with Bat Logger M bat detectors (Elekon AG, Lucerne, Switzerland). The emergence surveys commenced 15 minutes before sunset and concluded 90 minutes after sunset. Table 3-3 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 3-3 Survey Effort - Emergence Surveys 2023 & 2024

Date	Surveyors	Sunrise/ Sunset	PRF	Weather
2023				
17th May 2023	Laura Gránicz and Ryan Connors	21:23	Derelict farmhouse and adjoining shed	18-12˚C, Dry, calm, moon not visible, cloud cover 100%
28th June 2023	Laura Gránicz and Ryan Connors	21:58	Derelict farmhouse and adjoining shed	17-14˚C Dry, light breeze, moon 60%, cloud cover 20%
11th October 2023	Laura Gránicz and Ryan Connors	18:43	Farmhouse	10-11˚C Dry, calm, moon not visible, cloud cover 100%
2024				
30th May 2024	Ryan Connors, Charlie Meehan and Cormac Roberts	21:42	Farmhouse and farm shed	12-10˚C Dry, calm-light breeze, moon not visible, cloud cover 70-90%
25th July 2024	Ryan Connors, Cuan Feely and Cormac Roberts	21:33	Archaeological stone structure	15-13˚C Dry, calm-light breeze, moon not visible, cloud cover 70-90%
23rd September 2024	Ryan Connors and Kate Greaney	19:24	Inhabited farmhouse & adjoining shed	14˚C, Dry, calm, moon not visible, cloud cover 80-40%

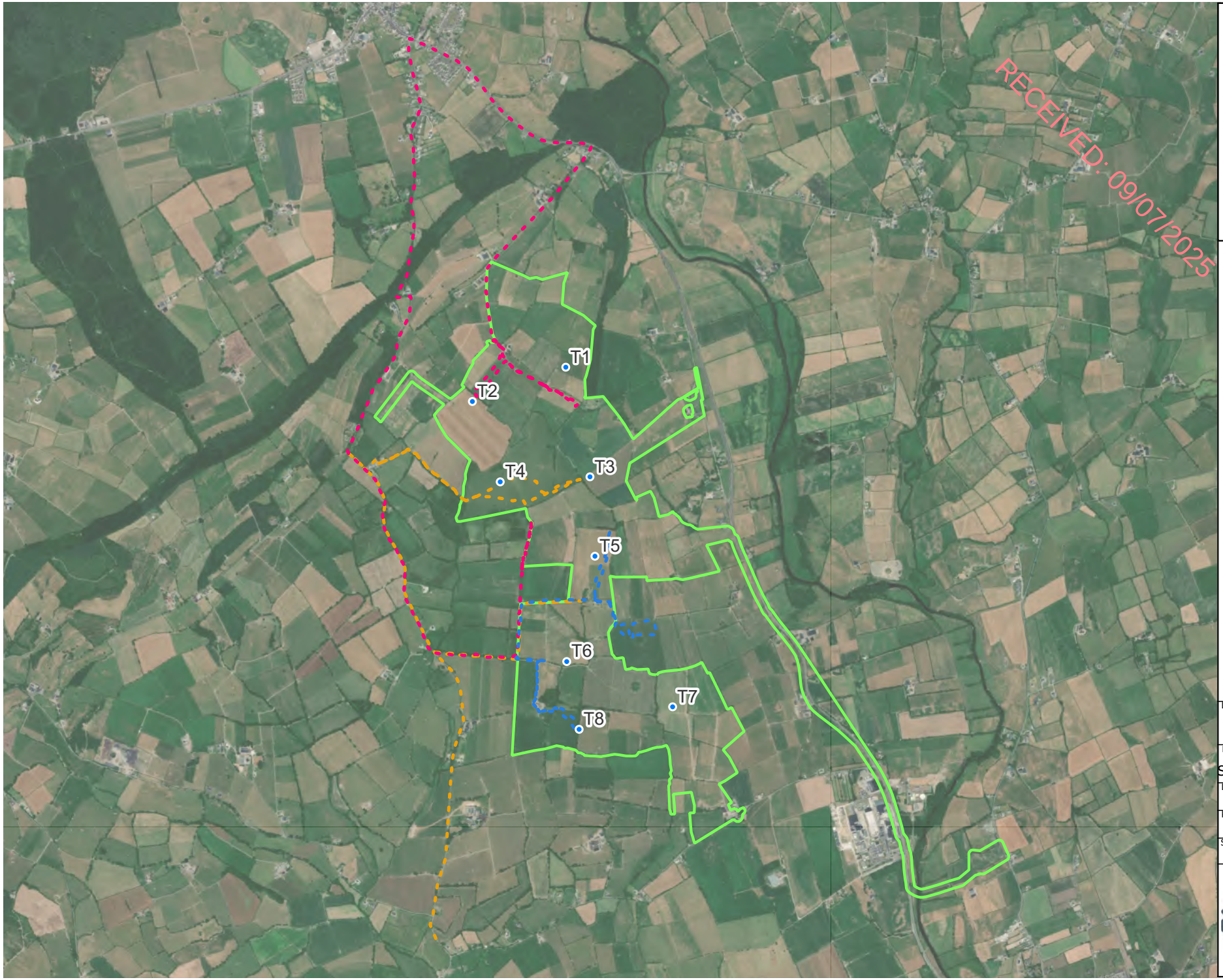
3.3.3 Manual Transects

Manual activity surveys comprised walked transects conducted after dusk. A series of representative transect routes were selected throughout the Site, with the aim of identifying bat species present, gathering information on bat behaviour, and recording important features used by bats. Transect routes were prepared with reference to the Site layout, findings from desktop and walkover surveys, as well as health and safety considerations and access limitations. As such, transects generally followed existing roads and tracks. To ensure adequate coverage of turbine locations, some sections of the summer and autumn transects were partially driven, as it would not have been feasible to reach all turbines within the required survey window by walking alone. The driven transect portions followed the methodology described by Roche *et al.* (2012). Transect routes undertaken in 2023 are presented in Figure 3-1.

Transects were walked/driven by two surveyors, recording bats in real time. Transects commenced immediately after the dusk emergence surveys and were completed for up to 3 hours after sunset. Surveyors were equipped with active full spectrum bat detectors, the Batlogger M bat detector (Elekon AG, Lucerne, Switzerland), and all bat activity was recorded for subsequent analysis to confirm species identifications. Transects surveys were undertaken in spring, summer and autumn 2023. Table 3-4 summarises survey effort in relation to manual transects.

Table 3-4 Survey Effort - Manual Transects 2023

Date	Surveyors	Sunrise/ Sunset	Survey Type	Time	Weather	Transect (km)
17th May 2023	Laura Gránicz and Ryan Connors	21:23	Dusk Emergence and Transect	22:53 – 00:25	12˚C, Dry, 100-30 % cloud cover, calm	4.6 km
28th June 2023	Laura Gránicz and Ryan Connors	21:58	Dusk Emergence and Transect	23:28 – 01:00	14-12˚C, Dry, light breeze, 60% moon visible, 10% cloud cover	11.0 km
11th October 2023	Laura Gránicz and Ryan Connors	18:43	Dusk Emergence and Transect	20:15 – 21:53	10˚C, Dry, calm, moon non-visible, 80-0% cloud cover	8.8 km



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Map Legend

- EIAR Site Boundary
- Proposed Turbine Locations
- Spring Transect Rooute
  17th May 2023
- Summer Transect Route
  28th June 2023
- Autumn Transect Route
  11th October 2023

N

Drawing Title
Survey Effort 2023 - Manual Transects

Project Title
Seskin Renewables Wind Farm

Drawn By	Checked By
RC	AJ
Project No.	Drawing No.
231103	Figure 3-1
Scale	Date
1:30,000	2025-06-25

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

3.3.4 Ground-level Static Surveys

Where developments have less than 10 turbines, NatureScot requires 1 detector per turbine (up to 10 plus 1 detector for every 3 additional turbines). Given that 8 no. turbines were proposed at the time of the surveys, 8 detectors were deployed to ensure compliance with NatureScot guidance. Automated bat detectors were deployed for at least 10 nights in spring (April-May), 20 nights of summer (June-mid August) and 10 nights of autumn (mid-August-October) (NatureScot, 2021/NIEA, 2021). Detector locations were based on indicative turbine locations. However, design layout changes during the summer survey period resulted in minor adjustments to detector locations at three locations. The static detector locations, relative to the final proposed layout, are shown in Figure 3-2 and detailed in Table 3-5.

Table 3-5 Ground-level Static Detector Locations 2023

ID	Location (IG Ref)	Habitat	Linear Feature within 50m	Corresponding/ Nearest Turbine(s)
D01	S 41798 75071	Improved agricultural grassland (GA1), Hedgerow (WL1)	Hedgerow (WL1)	T01
D02	S 41313 74878	Improved agricultural grassland (GA1), Treeline (WL2)	Treeline (WL2)	T02
D03 (Initial)	S 41921 74619	Improved agricultural grassland (GA1), Hedgerow (WL1)	Hedgerow (WL1)	T03
D03	S 41461 74387 / S 41962 74361	Improved agricultural grassland (GA1), Treeline (WL2)	Treeline (WL2)	T03
D04	S 41962 74361	Improved agricultural grassland	N/A	T04
D05	S 42113 73989	Improved agricultural grassland (GA1), Treeline (WL2)	Treeline (WL2)	T05
D06	S 41852 73244 / S 41852 73244	Improved agricultural grassland (GA1), Treeline (WL2)	Treeline (WL2)	T06
D07	S 42592 73019 / S 42592 73019	Improved agricultural grassland (GA1), Treeline (WL2)	Treeline (WL2)	T07
D08	S 41912 72824	Improved agricultural grassland (GA1), Treeline (WL2)	Treeline (WL2)	T08

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 3-6 summarises survey effort achieved in 2023 for each of the detector deployments.

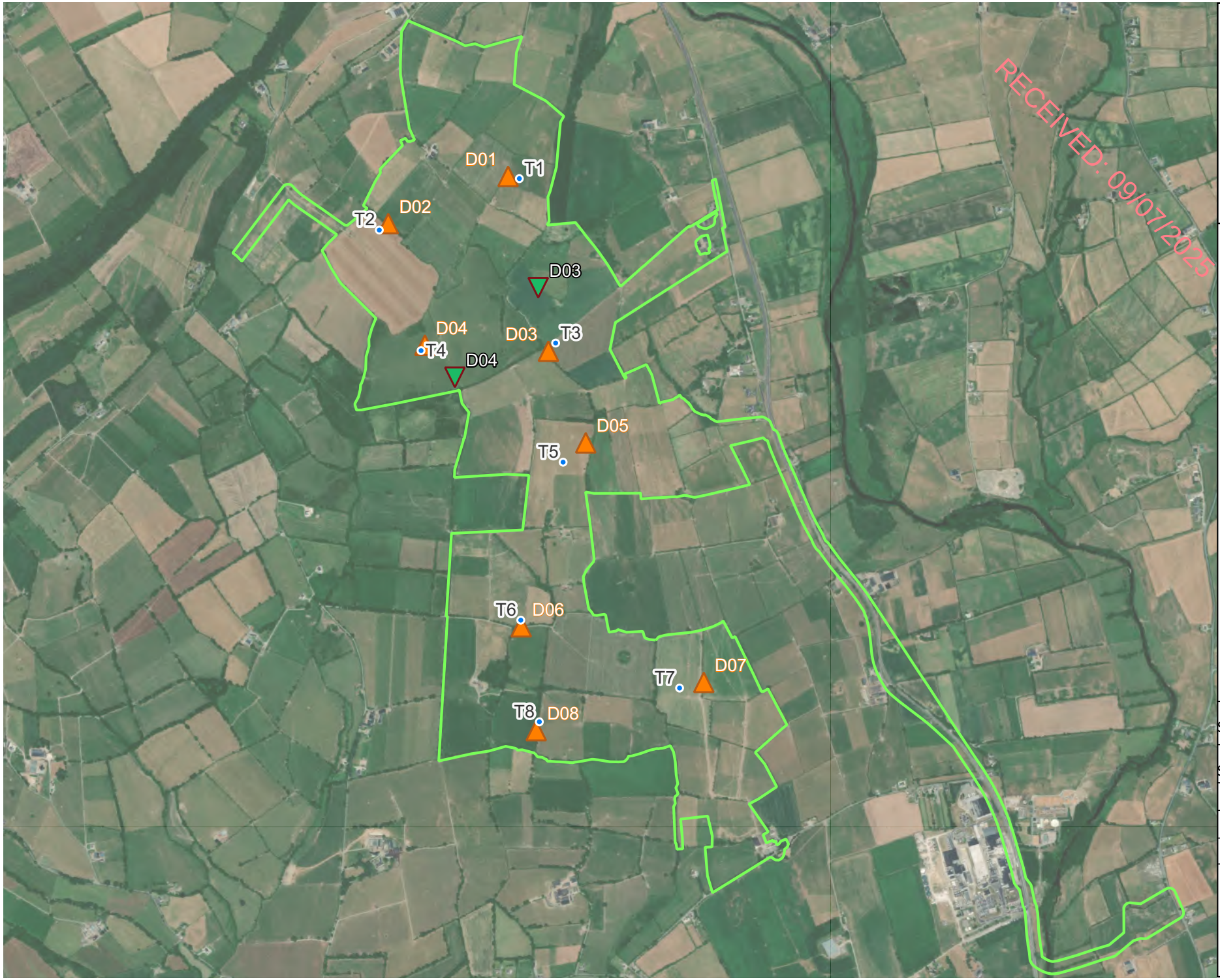
Due to a design layout change during the summer survey period, detectors D03 and D04 were repositioned to reflect the updated turbine layout. The revised deployment began on 27th July 2023, with collection occurring on the 14th September. Detector D03 reached full storage capacity by 7th August,

providing 10 nights of data, while D04 recorded a full 49-night dataset. Prior to relocation, the original D03 position—approximately 275m north of the updated location—had already recorded 29 nights of summer data. Given the short distance between the two locations and the consistent habitat type (improved agricultural grassland), the combined data is considered representative of bat activity at the updated turbine location.

Table 3-6 2023 Survey Effort - Ground-level Static Surveys

Season	Survey Period	Total Survey Nights per Detector Location	Nights with Appropriate Weather
Spring 2023	17th May – 1st June 2023	15	15
Summer 2023	28th June – 27th July 2023*	29	26
Autumn 2023	14th September – 9th October 2023	25	24
Total Survey Effort		**69**	**65**

**Detectors D03 and D04 were redeployed for the summer period from 27th July to 14th September following a design layout change. Detector D03 reached full data capacity on 7th August.*



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Map Legend

- EIAR Site Boundary
- Proposed Turbine Locations
- Initial D03 & D04 Detector Locations Prior to Layout Change
- Final Detector Locations

N

Drawing Title
Static Detector Locations 2023

Project Title
Seskin Renewables Wind Farm

Drawn By	Checked By
RC	AJ
Project No.	Drawing No.
231103	Figure 3-2
Scale	Date
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MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

3.4 Bat Call Analysis

All recordings from were later analysed using bat call analysis software Kaleidoscope Pro v.5.6.3 (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.

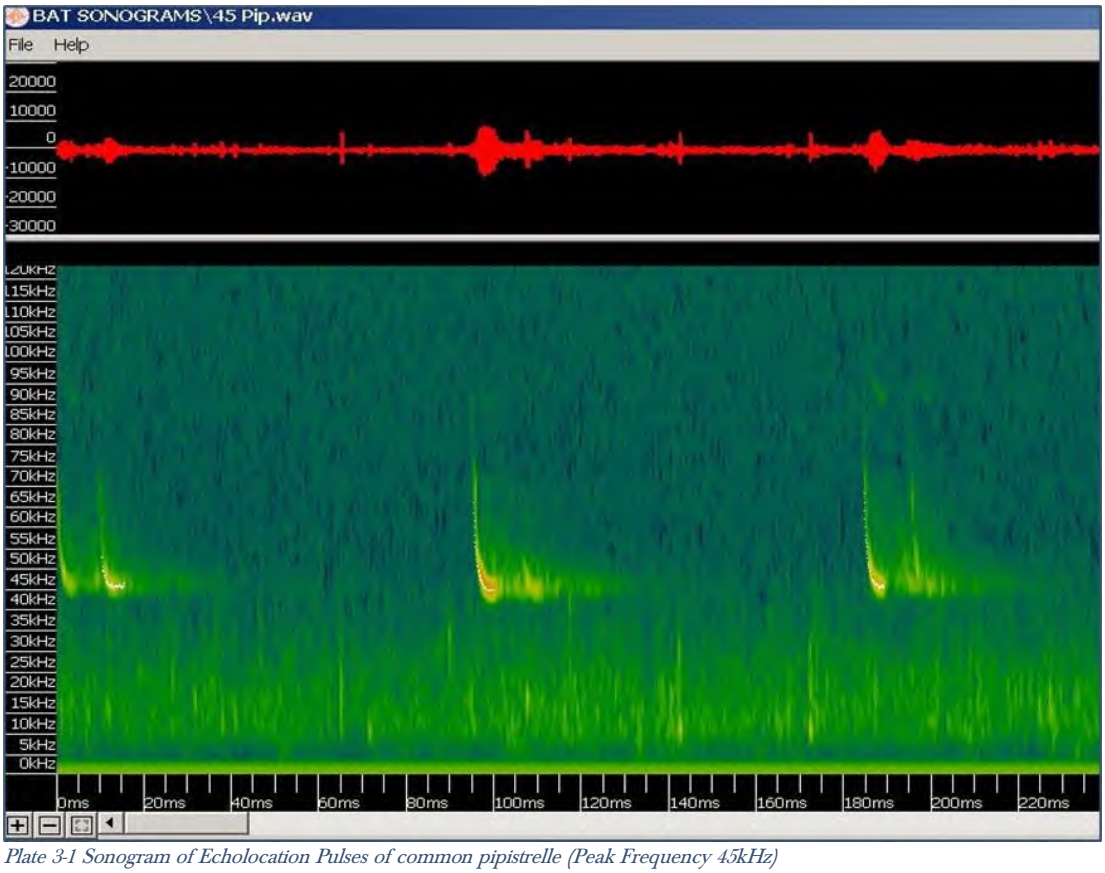


Plate 3-1 Sonogram of Echolocation Pulses of common pipistrelle (Peak Frequency 45kHz)

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 3-7 defines bat activity levels as they relate to Ecobat percentile values (NatureScot, 2021).

Table 3-7 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 and was not fully operational at the time of this report. Therefore, bat activity level data were assessed on a site-specific basis.

Following preliminary analysis and manual verification using Kaleidoscope Pro, statistical analysis and visualisation was performed using RStudio (version 2023.12.1+402.) and R1 (version 4.3.3). RStudio, an integrated development environment for the R programming language, was employed for data cleaning, exploration, and data visualisation. The 'ggplot2' R package was particularly instrumental in creating the data visualisations shown in the results section. Data was standardised into bat pass rates, calculated as bat passes per hour (total bat passes / night length) to account for seasonal changes in night length (Matthews et al. 2016). Activity is often variable between survey nights. Therefore, the median Nightly Pass Rate was used as the most appropriate measure of bat activity (Lintott & Mathews, 2018). During all calculations, data was rounded to at least three decimal places. When visualising the bat pass rates per season, survey effort was defined as detector hours (sum of recorded hours across all detectors). This was defined to circumvent any issues arising from differences in survey effort between detectors in a season.

The methodology used to assess activity levels across the Site was adapted from Mathews et al. (2016), where activity ranges of pipistrelle species were defined using an average of maximum nightly pass rates (in total passes during the survey period) across all detectors, divided into tertiles. In our methodology, widespread species (Pipistrellus pipistrellus, Pipistrellus pygmaeus, Nyctalus leisleri) activity ranges were determined using an average of maximum nightly pass rates (total passes / survey effort) across all detectors, divided into quartiles. For all other species groups, maximum nightly pass rate (bpph) recorded across all detectors, divided into quartiles was used. Activity levels were assessed separately for widespread pipistrelle species (Pipistrellus pipistrellus, Pipistrellus pygmaeus), noctules (Nyctalus leisleri), Myotis spp. and rare or hard to record species (Plecotus auritus, Pipistrellus nathusii). Median and maximum nightly activity (bpph) at each detector location were then categorized as Low, Medium, or High for each recorded season. Any figure below 25% of the maximum/average maximum nightly pass rate was considered Low activity, while figures above 75% were classified as High. Values falling between these two quartiles were defined as Medium. To prevent skewing the activity thresholds, any evident outliers recorded across the detectors were excluded. Table 3-8 presents activity ranges per species group identified.

Table 3-8 Site-specific Activity Level Categories based on Maximum Bat Passes per Hour (bpph)

Assessment Level	Activity Threshold as Bat Passes per Hour (bpph) for Bat Species				
	Myotis spp.	*Nyctalus spp.*	*Nathusius pipistrelle*	*Pipistrellus spp.*	*Plecotus auritus*
Low	< 8.08	< 1.81	< 1.33	< 11.77	< 0.85
Medium	8.08 – 24.23	1.81 – 24.23	1.33 – 3.98	11.77 – 35.32	0.85 – 2.55
High	> 24.23	> 5.43	> 3.98	> 35.32	> 2.55

Based on experience gained surveying a large number of development sites, the calculated activity thresholds were considerably high for all species surveyed. To provide a more precautionary and representative assessment of bat activity in agricultural and wet grassland habitats, the thresholds were adjusted based on MKO's experience with similar habitat types. The thresholds presented in Table 3-9 have been deliberately reduced to reflect a worst-case scenario, ensuring a conservative approach to assessing potential impacts.

Table 3-9 Adapted Activity Level Categories

Assessment Level	Activity Threshold as Bat Passes per Hour (bpph) for Bat Species				
	Myotis spp.	*Nyctalus* spp.	*Nathusius pipistrelle*	*Pipistrellus* spp.	*Plecotus auritus*
Low	< 1.90	< 1.66	< 0.33	< 11.77	< 0.20
Medium	1.90 – 5.70	1.66 – 4.98	0.33 – 0.98	11.77 – 35.32	0.20 – 0.60
High	> 5.70	> 4.98	> 0.98	> 35.32	> 0.60

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

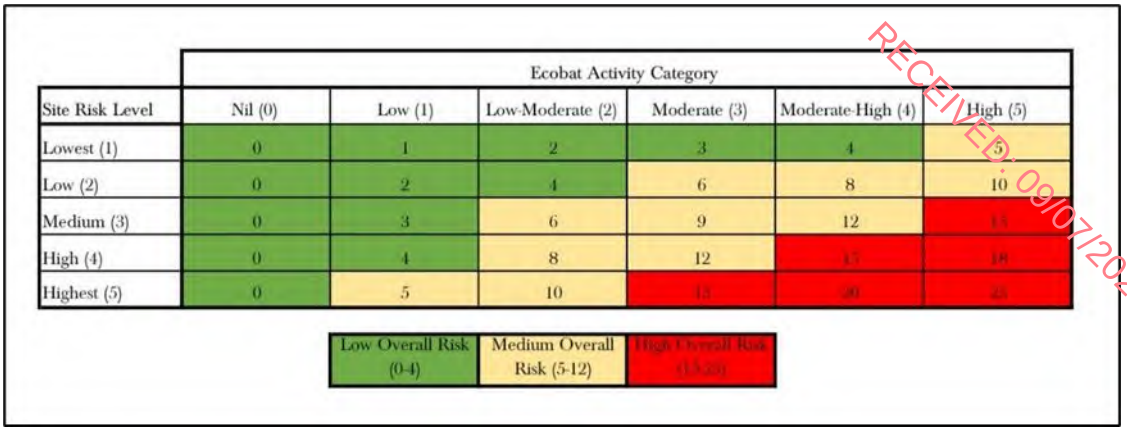
The likely impact of a proposed development on bats is related to site-based risk factors, including habitat and development features. The cross-tablature result of habitat risk and project size determines the site risk (i.e. Low, Medium or High) (Plate 3-3) i.e. Table 3a (NatureScot, 2021). Table 5-1 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	16	18
Highest (5)	0	5	10	15	20	25

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

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

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

3.7 Limitations

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

The information provided in this report accurately and comprehensively describes the baseline environment; provides an accurate prediction of the likely potential effects of the Proposed Development; 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 Development to affect bats. A response was received on the 15th May 2024 in which they stated that, due to limited resources, they do not have the capacity to engage with or provide comments on planning matters.

4.1.2 Development Applications Unit - NPWS

The Development Applications Unit were also invited to provide any feedback, comments or suggestions they might have relating to the Proposed Development. A response was received from the Department of Housing, Local Government and Heritage on the 24th June 2024. The response primarily addressed archaeological considerations on the Site and did not make any reference to bats.

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 (Grid Ref: S 4216 273744). Available bat records were provided by BCI on 29th April 2025. The search included roosts, transects and ad-hoc observations. A number of ad-hoc observations (n=38) have been recorded. At least eight 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 Bat Conservation Ireland Records within 10km of the Site centre

Survey Type	Species	Grid reference	Date	Location
Roost	*Myotis natterreri*, *Myotis daubentonii*, *Plecotus auritus*	S5096964968	N/A	Dunmore Cave, County Kilkenny
	Pipistrellus pygmaeus	S440808	N/A	Clonkeen, Abbeyleix, County Laois
	Pipistrellus pipistrellus (45kHz)	S4381	N/A	Abbeyleix, County Laois
	Myotis natterreri	S4906182679	N/A	Dysartgallen Church, County Laois
	Pipistrellus pygmaeus	S5183	N/A	Graiguenahown, Spink, Abbeyleix, County Laois R32 D562
	Myotis daubentonii	S4412066003	N/A	Lismaine Bridge, Coolcraheen, County Kilkenny
	Pipistrellus pipistrellus (45kHz), *Pipistrellus* spp. (45kHz/55kHz), *Myotis mystacinus*	S4681	N/A	Ballinakill, County Laois
	Plecotus auritus	S3379	N/A	Grantstown, Clogh, Co. Laois
	Plecotus auritus, *Pipistrellus pipistrellus* (45kHz), *Pipistrellus pygmaeus*	S3479	N/A	Grantstown, Clogh, Co. Laois

	Pipistrellus pipistrellus (45kHz), *Pipistrellus pygmaeus*	S5167	N/A	Lisnafunchin, Jenkinstown, Co. Kilkenny
Transect	Unidentified bat, *Myotis daubentonii*	S506662	N/A	Corbettstown Transect
	Myotis natterreri, Unidentified bat, *Myotis daubentonii*	S4050077500	N/A	Footbridge u/s Durrow Drive Transect
	Myotis daubentonii	S4410566004	N/A	Lismaine Bridge Transect
	Pipistrellus pipistrellus (45kHz), *Pipistrellus* spp. (45kHz/55kHz), Unidentified bat, *Nyctalus leisleri*, *Pipistrellus pygmaeus*	S393647	N/A	S15 (1) 2005-
	Nyctalus leisleri, *Pipistrellus* spp. (45kHz/55kHz), *Pipistrellus pipistrellus* (45kHz)	S326725	N/A	S15 (19) 2005-2008
	Pipistrellus pipistrellus (45kHz), *Nyctalus leisleri*	S372742	N/A	S15 (20) 2005-2008
	Myotis daubentonii, Unidentified bat, *Nyctalus leisleri*	S4235776207	N/A	Tally Ho Bridge, Durrow Transect
Ad-Hoc	*Myotis* spp., *Pipistrellus pipistrellus* (45kHz)	S466808	2008-00-00	Consultancy Surveys
	Pipistrellus pipistrellus (45kHz), *Pipistrellus pygmaeus*, *Plecotus auritus*	S466815	20/09/2012	Consultancy Surveys
	Myotis natterreri, *Nyctalus leisleri*, *Pipistrellus pygmaeus*	S437811	26/09/2005	Consultancy Surveys
	Pipistrellus pygmaeus, *Myotis daubentonii*, *Nyctalus leisleri*	S4086777445	20/07/2008	BATLAS 2010
	Pipistrellus pipistrellus (45kHz)	S4702071755	20/07/2008	BATLAS 2010
	Unidentified bat, *Pipistrellus pipistrellus* (45kHz), *Pipistrellus pygmaeus*, *Nyctalus leisleri*, *Myotis daubentonii*, *Plecotus auritus*	S342778	08/08/2009	BATLAS 2010
	Pipistrellus pipistrellus (45kHz), *Pipistrellus pygmaeus*, *Nyctalus leisleri*	S357686	08/08/2009	BATLAS 2010
	Pipistrellus pipistrellus (45kHz), *Pipistrellus pygmaeus*, *Nyctalus leisleri*, *Myotis daubentonii*	S491827	07/06/2009	BATLAS 2010
	Pipistrellus pipistrellus (45kHz)	S5079864643	25/09/2018	BATLAS 2020
	Pipistrellus pipistrellus (45kHz)	S4058164716	11/08/2018	BATLAS 2020
	Pipistrellus pipistrellus (45kHz), *Nyctalus leisleri*, Unidentified bat	S4490470846	05/09/2018	BATLAS 2020
	Pipistrellus pipistrellus (45kHz), *Pipistrellus pygmaeus*, *Nyctalus leisleri*, *Myotis daubentonii*, *Plecotus auritus*	S4440770905	05/09/2018	BATLAS 2020
	Pipistrellus pipistrellus (45kHz), *Pipistrellus pygmaeus*	S4706471788	05/09/2018	BATLAS 2020
	Pipistrellus pygmaeus, *Nyctalus leisleri*	S4784371997	05/09/2018	BATLAS 2020
	Pipistrellus pipistrellus (45kHz), *Pipistrellus pygmaeus*, *Nyctalus leisleri*, *Myotis daubentonii*	S4227076238	05/09/2018	BATLAS 2020
	Pipistrellus pipistrellus (45kHz), *Pipistrellus pygmaeus*, *Nyctalus leisleri*, *Myotis daubentonii*	S4083177472	05/09/2018	BATLAS 2020

	Pipistrellus pipistrellus (45kHz), *Pipistrellus pygmaeus*, *Nyctalus leisleri*	S3733481427	27/06/2019	BATLAS 2020
	Pipistrellus pipistrellus (45kHz), *Pipistrellus pygmaeus*, *Nyctalus leisleri*, *Plecotus auritus*	S5110067400	24/08/2003	Consultancy Surveys
	Nyctalus leisleri	S3300079000	01/10/2005	Consultancy Surveys
	Nyctalus leisleri	S3300080000	01/10/2005	Consultancy Surveys
	Pipistrellus pipistrellus (45kHz)	S3400079000	01/10/2005	Consultancy Surveys
	Pipistrellus pygmaeus, *Pipistrellus pipistrellus* (45kHz), *Nyctalus leisleri*	S3400078000	01/10/2005	Consultancy Surveys
	Myotis daubentonii	S3400077000	01/10/2005	Consultancy Surveys
	Pipistrellus pygmaeus, *Myotis daubentonii*, *Pipistrellus pipistrellus* (45kHz)	S4000077000	01/10/2005	Consultancy Surveys
	Pipistrellus pygmaeus, *Myotis daubentonii*, *Pipistrellus pipistrellus* (45kHz)	S4000079000	01/10/2005	Consultancy Surveys
	Pipistrellus spp. (45kHz/55kHz)	S372814	29/09/2018	National Biodiversity Data Centre Bat Records
	Myotis daubentonii	S423763	15/08/2019	National Biodiversity Data Centre Bat Records
	Pipistrellus pipistrellus (45kHz)	S372814	08/08/2019	National Biodiversity Data Centre Bat Records
	Myotis daubentonii	S494644	22/06/2019	National Biodiversity Data Centre Bat Records
	Pipistrellus pipistrellus (45kHz), *Pipistrellus pygmaeus*	S437830	08/06/2013	National Biodiversity Data Centre Bat Records
	Pipistrellus spp. (45kHz/55kHz)	S392661	30/05/2021	National Biodiversity Data Centre Bat Records
	Myotis daubentonii	S445711	14/06/2022	National Biodiversity Data Centre Bat Records
	Pipistrellus spp. (45kHz/55kHz)	S372814	01/04/2020	National Biodiversity Data Centre Bat Records
	Pipistrellus spp. (45kHz/55kHz)	S446711	08/11/2021	National Biodiversity Data Centre Bat Records
	Myotis daubentonii	S420828	08/09/2023	National Biodiversity Data Centre Bat Records
	Pipistrellus pipistrellus (45kHz)	S421831	08/09/2023	National Biodiversity Data Centre Bat Records
	Myotis mystacinus, *Pipistrellus pipistrellus* (45kHz), *Pipistrellus pygmaeus*, *Pipistrellus nathusii*	S4392083597	28/07/2017	Pilot Woodland Monitoring Scheme 2016-2017
	Myotis mystacinus, *Myotis natterreri*, *Plecotus auritus*, *Nyctalus leisleri*, *Pipistrellus pipistrellus* (45kHz), *Pipistrellus pygmaeus*	S4392083597	30/08/2017	Pilot Woodland Monitoring Scheme 2016-2017

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 centre (last search 03/04/2025). Eight of Ireland's nine bat species were recorded in the hectads located within 10km of the site. The results of the database search are provided in Table 4-2.

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

Hectad	Species	Database	Designation
S36, S37, S38, S46, S47, S48	Brown Long-eared Bat (*Plecotus auritus*)	National Bat Database of Ireland	HD Annex IV, WA
S36, S37, S38, S46, S47, S48	Common Pipistrelle (*Pipistrellus pipistrellus*)	National Bat Database of Ireland	HD Annex IV, WA
S36, S37, S38, S46, S47, S48	Leisler's Bat (*Nyctalus leisleri*)	National Bat Database of Ireland	HD Annex IV, WA
S36, S37, S38, S46, S47, S48	Soprano Pipistrelle (*Pipistrellus pygmaeus*)	National Bat Database of Ireland	HD Annex IV, WA
S37, S46, S47, S48	Daubenton's Bat (*Myotis daubentonii*)	National Bat Database of Ireland	HD Annex IV, WA
S36, S38, S46, S47, S48	Natterer's Bat (*Myotis nattereri*)	National Bat Database of Ireland	HD Annex IV, WA
S48	Nathusius' Pipistrelle (*Pipistrellus nathusii*)	National Bat Database of Ireland	HD Annex IV, WA
S48	Whiskered Bat (*Myotis mystacinus*)	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, and just outside the current known range for the whiskered bat. The Site is within the range of all other species.

4.2.3 Designated Sites

Within Ireland, the lesser horseshoe bat is the only bat species requiring the designation of Special Areas of Conservation (SACs). The Site is located outside the current known range of this species (NPWS, 2019) and is approximately 87km away from the nearest designated SAC for the lesser horseshoe bat (Danes Hole, Poulnalecka SAC).

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

4.2.4 Landscape Features and Habitat Suitability

A review of mapping and photographs provided insight into the habitats and landscape features present at the Site. In summary, the primary land use within the Site is improved agricultural grassland.

A review of the GSI online mapper did not indicate the possible presence of any subterranean sites within the Site. A search of the National Monuments Database revealed the presence of two ringforts and two enclosures within the Site (Table 4-3).

A search of the UBSS Cave Database for the Republic of Ireland found no caves within the Site and one cave within 10km of the Site boundary (Table 4-4).

A review of the NBDC bat landscape map provided a habitat suitability index of 27.89 (Yellow) to 36.11 (Orange). This indicates that the Site has Low to Moderate habitat suitability for bat species.

Table 4-3 National monument sites within the Site.

National Momument	Description
KK004-010	Ringfort
KK004-036	Ringfort
KK004-003	Enclosure
KK004-059	Enclosure

Table 4-4 Caves and subterranean sites within 10km of the Site centre

Caves	Distance from Site	Description
Within 10km of the Site		
Dunmore Cave	9.6km	300m of large calcited chambers and tunnels

4.2.5 Additional Projects in the Wider Landscape

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

Table 4-5 Wind farm developments within 10km of the proposed turbine locations

Wind Farm	Status	No. of Turbines	Turbine Height
Less than 5km			
Ballynalacken Wind Farm	Proposed	12	Tip Height 155m
Lisdowney Wind Farm	Existing	4	Tip Height 121.5m
Single Turbine	Existing	1	Tip Height Unknown
5 to 10km			
Pinewoods Wind Farm	Permitted	10	Tip Height 136.5m

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

- EIA Portal Ref: 2021145 - The installation of 31.489 km of 38 KV cable ducting and associated electrical cabling and all other ancillary works including joint bays, culverts, maker posts and all associated development
- EIA Portal Ref: 2021211 - Area of 8.5 Ha. comprising of: Removal of vegetation and overburden; Extraction of sand and gravel; Upgrading of existing entrance and site lines; Construction of screening berms, wheel wash & refuelling area; Landscaping and restoration; 10 yr permission. EIA Portal Ref: 2023156 - Extraction of sand and gravel (c. 787,310m3 total or c. 1.57 million tonnes total, at a maximum extraction rate of c. 200,000 tonnes per annum) over the proposed 10-year permission sought.
- EIA Portal Ref: 2024094 – The development will consist of the extension to an existing pig farm consisting of five modern animal house units, three feed silo's, together with all ancillary site works.

4.3 Field Surveys

4.3.1 Bat Habitat Suitability Appraisal

4.3.1.1 Proposed Wind Farm

A total of twelve habitats were recorded within the Proposed Wind Farm including:

- *Improved Agricultural Grassland (GA1)*
- *Wet grassland (GS4)*
- *Arable Crops (BC1)*
- *(Mixed) Broadleaved Woodland (WD1)*
- *(Mixed) Broadleaved / Conifer Woodland (WD2)*
- *Wet Willow-Alder Ash Woodland (WN6)*
- *Scrub (WS1)*
- *Earth Banks associated with hedgerows and treelines*
- *Hedgerows (WL1)*
- *Treelines (WL2)*
- *Drainage Ditches (FW4)*
- *Eroding Upland Rivers/Streams (FW1)*
- *Depositing / lowland river (FW2)*
- *Buildings and Artificial Surfaces (BL3)*

Further details on habitats within the Proposed Wind Farm can be found in Chapter 6 of the main EIAR. The majority of the land cover within the Proposed Wind Farm site were characterised as improved agricultural grassland pasture, with smaller areas of wet grassland, scrub, treelines/hedgerow and mixed broadleaf woodland habitats also prevalent.

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 (2023). Suitability categories, divided into *High, Moderate, Low, Negligible* and *None and* 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 were considered *Low* suitability, i.e. *Habitat that could be used by small numbers of bats as flight-paths such as a gappy hedgerow or unvegetated stream, but isolated* (Collins, 2023). Areas of scrub, earth banks associated with hedgerows and treelines, eroding upland rivers/streams 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, 2023). Due to their varying levels of maturity and connectivity, treelines and hedgerows were assessed as having *Moderate* to *High* suitability. While mixed woodland areas 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 bats for flight-paths such as river valleys, streams, hedgerows, lines of trees and woodland edge.* (Collins, 2023).

Trees within the Proposed Wind Farm area primarily comprise a mixture of mature and immature broadleaved species, with a small area of mixed broadleaved and coniferous woodland also present. The dominant broadleaved species recorded were ash, oak, beech, and sycamore, with understory species including hawthorn, hazel, elder, holly, and willow. Mixed broadleaved/conifer woodland was dominated by ash and *Pinus spp.*.

With regards to roosting bats, a number of mature broadleaf trees were identified within the bat buffers which present *Negligible* to *High* roosting potential. In relation to bat 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 buffers is outlined in in Section 6.1.3 below.

The trees assessed varied in characteristics with some containing extensive ivy cover as well as branch damage and wounds providing potential roosting features suitable for opportunistic and/or regular roosting. Habitat suitability assessment for trees with potential for roosting bats are outlined in further detail in Section 4.3.2 below. Additionally, three structures located within the Site, along with several others situated outside the EIAR site boundary (*buildings and artificial surfaces*) are also further assessed for roosting potential in Section 4.3.2 below. All other habitats present were assigned a *Negligible* value for roosting bats.

4.3.1.2 Proposed Grid Connection

The Proposed Grid Connection underground cabling route has an approximate length of 3.4km. It will originate at the onsite 38kV substation, which is located within an area of improved agricultural grassland (GA1) in the eastern vicinity of the Proposed Wind Farm site. The cable will run east towards the national road, N77 and will continue south towards Ballyragget, Co. Kilkenny for 2.2km. At the entrance to Tirlán Ballyragget integrated dairy plant, the cable turns east in to improved agricultural grassland (GA1) and will travel south for approximately 300m to the launch pit. From the launch pit the cable will travel under the River Nore by HDD and arrive at the reception pit. From here, the cable will cut through a treeline (WL2) and improved agricultural grassland (GA1) to reach the Ballyragget 110kV substation.

Habitats along the Proposed Grid Connection footprint include:

- *Improved agricultural grassland (GA1)*
- *Hedgerow (WL1)*

Further details of habitats along the Proposed Grid Connection footprint are outlined in Chapter 6, Section 6.4.2.

The proposed 38kV on-site substation is located to the east of the Proposed Wind Farm within an area characterised by improved agricultural grassland (GA1) and hedgerow (WL1) habitats.

Hedgerows adjacent to the proposed substation were assessed as having *High* suitability for commuting bats. No trees with potential roost features (PRFs) were identified within the proposed substation footprint. The majority of hedgerows at the proposed substation will be retained as part of the Proposed Development, aside from a section that will be removed to facilitate construction.

With regard to commuting and foraging bats, features along the Proposed Grid Connection underground cabling route such as agricultural grassland habitats were assessed as having *Low* suitability i.e. *Habitat that could be used by small numbers of bats as flight-paths such as a gappy hedgerow or unvegetated stream, but isolated, i.e. not very well connected to the surrounding landscape by other habitat.* Linear habitat features such as hedgerows (WL1) were assessed as having *Moderate* to *High* suitability i.e. *Continuous, high-quality habitat that is well connected to the wider landscape that is likely to be used regularly by bats for flight-paths such as river valleys, streams, hedgerows, lines of trees and woodland edge.*

With regard to roosting bats, habitat features along the Proposed Grid Connection underground cabling route, including grassland habitats and hedgerows were assessed as having *Negligible* suitability i.e. Negligible habitat features on site likely to be used by roosting bats (Collins, 2023).

The Proposed Grid Connection underground cabling route will traverse one watercourse at the River Nore via Horizontal Directional Drilling (HDD). This crossing point was assessed for bat roost potential on the 19th December 2024. As there is no watercourse crossing structure present at this location, it does not provide any features suitable for roosting bats, and therefore no roosting potential was identified. The location of the watercourse crossing is shown in Chapter 4, Figure 4-1.

While no structure is present at the watercourse crossing, trees along the Proposed Grid Connection underground cabling route were assessed as having *Negligible* to *PRF-I* potential for roosting bats, i.e. *PRF is only suitable for individual bats or very small numbers of bats either due to size or lack of suitable surrounding habitats* (Collins, 2023). However, these trees are to be retained as part of the Proposed Development. Further details on the Proposed Grid Connection can be found in Chapter 4, Section 4.3.2.

Table 4-6 Bat Roost Suitability of Watercourse Crossings along the Proposed Grid Connection Underground Cabling Route

Crossing ID	Grid Ref	Structure type	Photo	Bat Roost Potential	Crossing Type Description
WC1	S 43987 71859	None		No structure present at proposed crossing location. *No* bat roost potential.	Horizontal Directional Drilling

4.3.1.3 Turbine Delivery Accommodation Works

As described in Chapter 4, Section 4.4.3 of this EIAR, turbine delivery route accommodation works will be required at two locations to facilitate the delivery of turbine components and other abnormal loads to the Proposed Wind Farm during the construction phase. The accommodation works will be located within the village of Durrow, Co. Laois and at the junction between the N77/L58333 in the townland of Ballynaslee, Co. Kilkenny. The proposed locations are shown in Figures 4-22 to 4-24 of Chapter 4.

In the townland of Durrow Townparks, Co Laois, it is proposed to carry out temporary accommodation works within and adjacent to the green space, located at the Chapel Street/Mary Street (N77) junction. The existing trees, ornamental street furniture, signage and electricity/telecommunication poles, within and around the green space will be temporarily removed for the duration of the turbine component delivery phase. Upon completion of the turbine component delivery phase, the crushed stone and ground protection mats will be removed and the trees, ornamental street furniture, signage and electricity/telecommunication poles will be reinstated. The trees identified for temporary removal were assessed as providing *Negligible* suitability for commuting and foraging bats, with no potential roost features (PRFs) recorded. As such, a short-term loss of potential commuting and foraging habitat is anticipated, with no loss of roosting habitat.

In the townland of Ballynaslee, Co. Kilkenny, it is proposed to construct an accommodation area, using crushed stone within the grass verge of the junction between the L58333 local road and N77. No loss of commuting, foraging or roosting habitat is anticipated at this location.

4.3.2 Roost Surveys

4.3.2.1 Daytime Roost Inspections

Following the search for roosts in 2023 and 2024, three structures containing potential suitable bat roost features were identified within the Site, with several additional structures recorded outside the site boundary.

The grading protocol described by Collins (2023) 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 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 individual bats opportunistically at any time of the year.

The structures were subject to interior (where accessible) and exterior inspections to search for evidence of bats. Details of the inspection surveys are presented in Table 4-7 and illustrated in Figure 4-1. All identified structures will be retained and avoided as part of the Proposed Development.

Table 4-7 Structures assessed for bat roost potential in 2023 & 2024

Structure	Potential	IG Ref	Approx. distance to Site	Nearest turbine	Approx. distance to nearest turbine
Derelict farmhouse and adjoining shed	Moderate	S 42041 73614	0m	T5	300m
Archaeological stone structure	Low	S 42171 74108	0m	T5	235m

Inhabited Farmhouse with adjoining sheds	Low	S 42868 72354	0m	T7	735m
Farmhouse	Moderate	S 40657 74435	500m	T2	750m
Farm sheds	Low	S 40653 74453	480m	T2	730m
Stone ruin	Low	S 40813 75109	400m	T2	530m
Stone ruin 2	Low	S 40793 75073	390m	T2	530m
Farm shed 2	Moderate	S 42881 73750	100m	T7	850m
Stone farm shed	Moderate	S 42711 74392	300m	T3	710m
Ivy covered stone structure	Moderate	S 41081 71557	1,225m	T8	1,545m

4.3.2.1.1 *Derelict farmhouse and adjoining shed*

A derelict two-storey farmhouse with an adjoining shed (Plates 4-1 - 4-6) was identified near the centre of the Site (Grid Ref: S 42041 73614), approximately 300 m south of the nearest proposed turbine (T05). The farmhouse, constructed of stone, has a severely compromised roof with only wooden rafters remaining and vegetation present throughout. Two fireplaces and chimneys were inspected, but no evidence of bat use was found. Several potential access points for bats were present, including open windows, doorways, and the roof. A small number of individual bat droppings were observed on a second-floor window frame.

The adjoining stone shed (Plates 4-7 & 4-8), with wooden rafters and a corrugated metal roof, contained gaps in the stonework that offered limited roosting potential. These were inspected using a torch and endoscope where accessible. Dense ivy cover on the western wall was also present and may have obscured additional PRFs. No evidence of bat use was recorded during the daytime inspection.

The derelict farmhouse and adjoining shed were assessed as having *Moderate* roosting potential i.e. A structure with one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions and surrounding habitat but unlikely to support a roost of high conservation status (Collins, 2023).

Plate 4-1 South aspect of derelict farmhouse and adjoining shed

Plate 4-2 North aspect of farmhouse

Plate 4-3 Window frame containing bat droppings

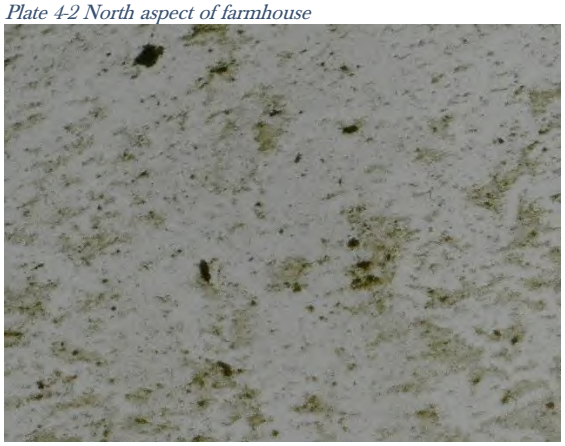


Plate 4-4 Droppings found on window frame of derelict farmhouse

Plate 4-5 First floor ceiling with roosting potential

Plate 4-6 Fireplace in derelict farmhouse

Plate 4-7 North aspect of adjoining shed

Plate 4-8 Interior of adjoining shed

4.3.2.1.2 Archaeological stone structure

An archaeological stone structure is located approximately 235 m northeast of T05 (Grid Ref: S 42172 74107). The structure is heavily vegetated, with only limited sections of the northern stonework visible. A thermal camera was used to check for any signs of roosting bats, and small gaps in the stonework on the northern side were examined with an endoscope. No evidence of bats was found. However, due to the dense ivy cover and limited visibility, the structure was precautionarily assessed as having *Low* roosting potential—i.e. A structure with one or more potential roost sites that could be used by individual bats opportunistically at any time of the year (Collins, 2023).

Plate 4-9 North aspect of archaeological stone structure

4.3.2.1.3 Inhabited farmhouse with adjoining shed

An inhabited farmhouse with an adjoining shed is located in the south of the Site, approximately 735 m south of T7 (IG Ref: S 42868 72354). The buildings are of stone block construction, with the farmhouse featuring a slate roof and the adjoining shed covered by a corrugated metal roof (Plates 4–10 & 4-11). Internal access to the structures was not available; therefore, a detailed external inspection was undertaken using binoculars and a thermal camera to identify potential access points and signs of roosting bats.

Several potential access points were noted on the shed, including open windows and gaps in other boarded-up windows. Damage to the gable on the western aspect of the shed was also observed, offering additional access and roosting potential (Plate 4–12). Dense ivy cover on the western shed wall may have obscured further PRFs. In contrast, the roof of the inhabited dwelling appeared to be in good condition, with no visible access points for bats. Bright security lighting was active around the dwelling during the dusk emergence survey, which may reduce the suitability of the area for bats (Plates 4–13 & 4-14).

The farmhouse and adjoining shed was assessed as having *Low* roosting potential – i.e., A structure with one or more potential roost sites that could be used by individual bats opportunistically at any time of the year (Collins, 2023).

Several corrugated metal farm sheds are also present near the farmhouse (Plates 4–15 to 4-17). These were subject to internal and external inspection, and no evidence of bat roosting was recorded. All sheds were assessed as having *Negligible* roosting potential, i.e. Negligible habitat features on site likely to be used by roosting bats (Collins, 2023).

Plate 4-10 North aspect of inhabited farmhouse and adjoining shed.

Plate 4-11 West aspect of adjoining shed with dense ivy cover.

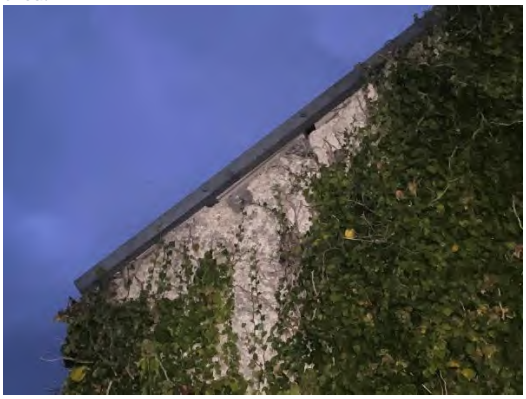


Plate 4-12 Damage to adjoining shed gable structure offering access and roosting potential.

Plate 4-13 Example of security lighting on the premises.

Plate 4-14 Another example of security lighting on the premises.

Plate 4-15 Corrugated metal hay storage shed.

Plate 4-16 Large corrugated metal shed storing machinery.

Plate 4-17 Interior of one of the corrugated metal hay sheds.

4.3.2.1.4 *Potential roost features outside the Site*

In addition to the three structures located within the Site, a further seven structures with potential roost features were identified and assessed in 2023 and 2024 at locations outside the defined Site boundary. These structures are situated between approximately 100 m and 1,225 m from the Site edge and between 530 m and 1,545 m from the nearest proposed turbines.

Farmhouse (IG Ref: S 40657 74435)

Located approximately 500 m west of the Site, this inhabited farmhouse was assessed externally due to internal access constraints. The structure exhibited some minor damage to the roof structure presenting access for bats and was considered to have *Moderate* roosting potential (Plates 4-18 & 4-19).

Plate 4-18 South aspect of farmhouse.

Plate 4-19 East aspect of farmhouse.

Farm Sheds (IG Ref: S 40653 74453)

Several stone and corrugated metal sheds were located adjacent to the farmhouse and were subject to internal and external inspection. No evidence of bat use was recorded during the assessments. However, one stone shed contained felt underlining which could provide roosting opportunities and was therefore assessed as having *Low* roosting potential (Plates 4-20 & 4-21). All remaining sheds were considered to have *Negligible* suitability for roosting bats (e.g. Plates 4-22 & 4-23).

Plate 4-20 Stone shed north of the farmhouse.

Plate 4-21 Felt underlining within shed.

Plate 4-22 Corrugated metal shed assessed as Negligible.

Plate 4-23 Interior of Negligible shed.

Stone Ruins (IG Refs: S 40813 75109 & S 40793 75073)

These two small stone ruins, located approximately 400m northwest of the Site, were heavily degraded with limited structural cover. Vegetation and small crevices were present but offered minimal shelter. Both structures were assessed as having *Low* roosting potential (Plates 4-24 & 4-25).

Plate 4-24 Stone Ruin 1.

Plate 4-25 Stone Ruin 2.

Farm Shed 2 (IG Ref: S 42881 73750)

This stone block shed is located approximately 100m east of the Site boundary. Several accessible features were noted, including multiple gaps in the stonework. These were examined using an endoscope, but no evidence of bat activity was recorded. Based on the available features, the structure was assessed as having *Moderate* roosting potential (Plates 4-26 to 4-29).

Plate 4-26 West aspect of farm shed 2.

Plate 4-27 Interior of shed.

Plate 4-28 Gaps offering roosting potential within stone structure.

Plate 4-29 Other holes within stone structure.

Stone Farm Shed (IG Ref: S 42711 74392)

Located 300 m east of the Site boundary, this stone structure was heavily covered in vegetation and contained PRFs such as gaps in stonework and between the rafters and stone wall, and was assessed as having *Moderate* roosting potential. Evidence of bat presence was not recorded during inspection (Plates 30 & 4-31).

Plate 4-30 East aspect of stone farm shed.

Plate 4-31 Interior of stone farm shed.

Ivy-Covered Stone Structure (IG Ref: S 41081 71557)

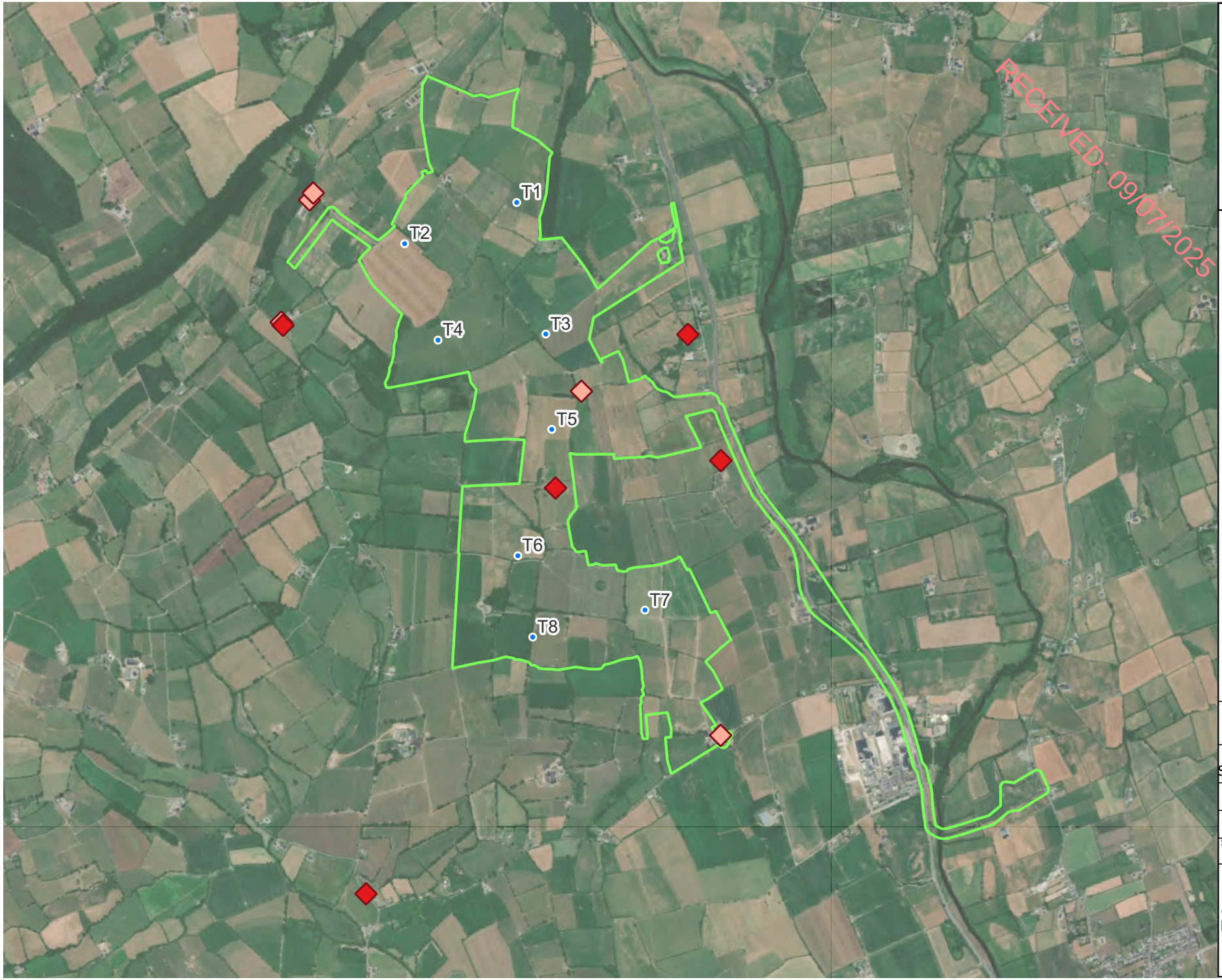
Located approximately 1,225 m south of the Site boundary, this stone structure exhibited several gaps in the stonework that could provide roosting opportunities for bats. Dense ivy and vegetation cover obscured large portions of the structure, potentially concealing additional PRFs. Numerous butterfly wings were observed inside, indicating bat feeding activity. Based on the structural features and presence of feeding remains, the structure was assessed as having *Moderate* roosting potential (Plates 4-32 to 4-35).

Plate 4-32 Southwest aspect of structure.

Plate 4-33 South aspect of structure.

Plate 4-34 Butterfly wings found in structure.

Plate 4-35 More feeding remains observed.



Map Legend

- EIAR Site Boundary
- Proposed Turbine Locations

Potential Roost Features

- Low
- Moderate

N

Drawing Title
Potential Roost Features around the Site

Project Title
Seskin Renewables Wind Farm

Drawn By	Checked By
RC	AJ
Project No.	Drawing No.
231103	Figure 4-1
Scale	Date
1:25,000	2025-06-25

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

4.3.2.1.5 Ground-Level Tree Assessments

Mature broadleaf tree species forming field boundaries within the Site consisted primarily of ash, oak, beech, and sycamore. The majority of trees within the Site will be retained as part of the Proposed Development; however, there will be some requirement to remove trees to facilitate the required bat buffers (outlined in Section 6.1.3). Included below is a summary of trees/tree groups of note within an approx. 87m radius (requiring removal) of the proposed turbine locations. Their general location, PRFs and respective suitability for bat roosting, are outlined in Table 4-8, illustrated in Figure 4-2 and shown in Plates 4-30 to 4-49 below.

Trees assessed ranged in roosting suitability from no potential *(None)* i.e. *Either no PRFs in the tree or highly unlikely to be any*, to *PRF-I* i.e. *PRF is only suitable for individual bats or very small numbers of bats either due to size or lack of suitable surrounding habitats* (Collins, 2023).

Immature trees and hedgerow do not provide potential roosting habitat of significance for bats and as such were assessed as having no *(None)* roosting potential (Collins, 2023).

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

A treeline and hedgerow are located to the north and west of the proposed met mast site. The trees within the treeline vary in roosting suitability, ranging from *None* to *PRF-I*. No vegetation removal is planned for the installation of the proposed met mast.

Overall, the Site contains a number of mature trees and hedgerows. Some of these features will require removal to facilitate the bat buffer (see Section 6.1.3). Several trees proposed for removal provide potential suitable habitat for roosting bats. However, no evidence of roosting bats was identified during the ground level assessment.

Table 4-8 Summary of Trees/Tree Groups Inspected within the Site

Nearest Turbine	Inspection Date	PRFs	Trees/Hedgerows to be removed/retained. North, South, East or West of Turbine	Bat Suitability
T01	1st June 2023	*N/A. Heavily managed hedgerow*	*Portion of hedgerow 1A to the north to be removed.*	• *None*
T02	1st June 2023	*Dense ivy cover and broken limbs*	*Treeline 2A northeast of T02 to be largely removed.*	• *4 PRF-I*
T03	27th July 2023	*Dense ivy cover, broken and dead limbs*	Section of 3A and 3B west of T03 to be removed.	• *8 PRF-I*
T04	1st June 2023	N/A, comprised of managed hedgerow and small clusters of scrub.	Sections of 4A and 4B to be removed. Scrub at 4C to be removed entirely.	• *None*
T05	1st June 2023	N/A	No loss associated with turbine bat buffer.	• *None*
T06	27th July 2023	Dense ivy cover	Section of 6D south of T06 to be removed.	• 2 *PRF-I*
T07	1st June 2023	*N/A*	No trees to be removed within bat buffer	• *None*
T08	1st June 2023	*Broken limbs, dense ivy cover, wounds, cavities*	Section of 8B west of T08 to be removed.	• *9 PRF-I*

Proposed Grid Connection	19th December 2024	*N/A*	No removal proposed.	• *None*
Met Mast	1st May 2024	N/A	No removal proposed.	• *None*

Plate 4-36 T02 – Ash tree with broken limb and dense ivy cover

Plate 4-37 T02 Ash tree with broken limbs and ivy cover

Plate 4-38 T03 Ash tree with dense ivy cover and broken limbs

Plate 4-39 T03 Ash tree with dense ivy cover

Plate 4-40 T04 Ash tree with broken limbs and ivy cover

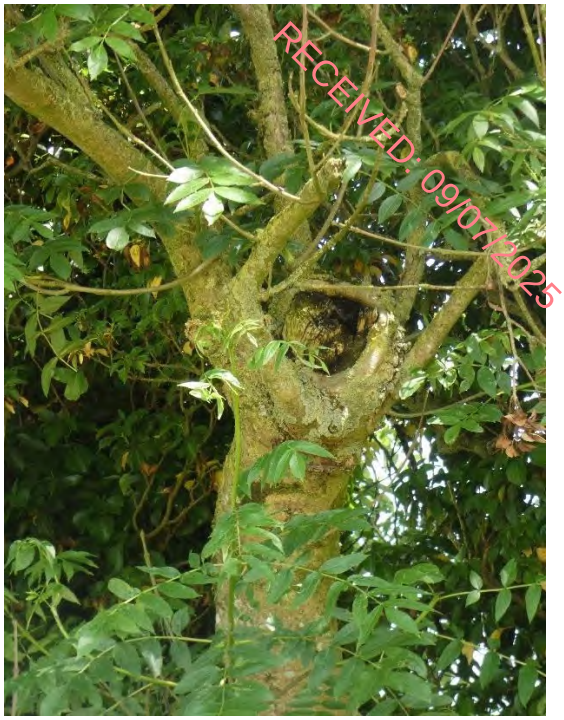


Plate 4-41 T05 Ash tree with tear out

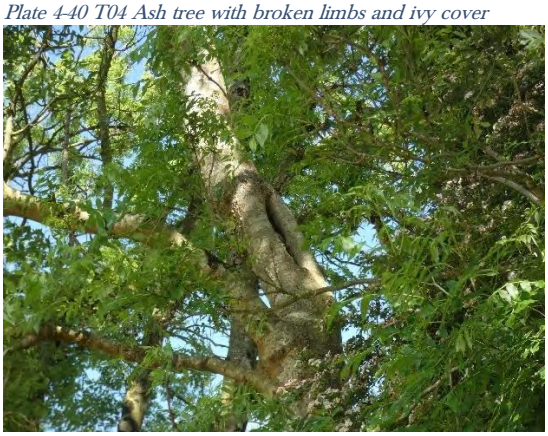


Plate 4-42 T05 Ash tree with wound

Plate 4-43 T05 Ash tree with hazard beam

Plate 4-44 T06 Ash tree with dense ivy cover

Plate 4-45 T06 Ash tree with dense ivy cover

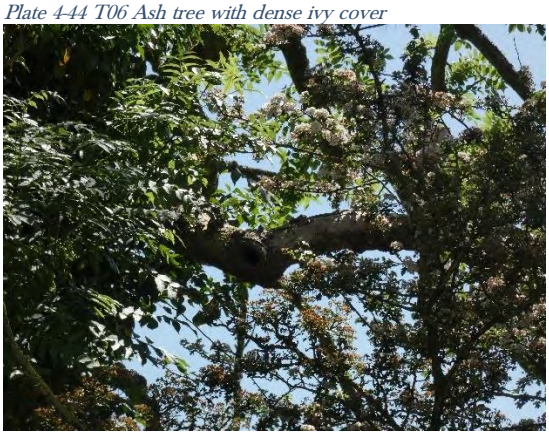
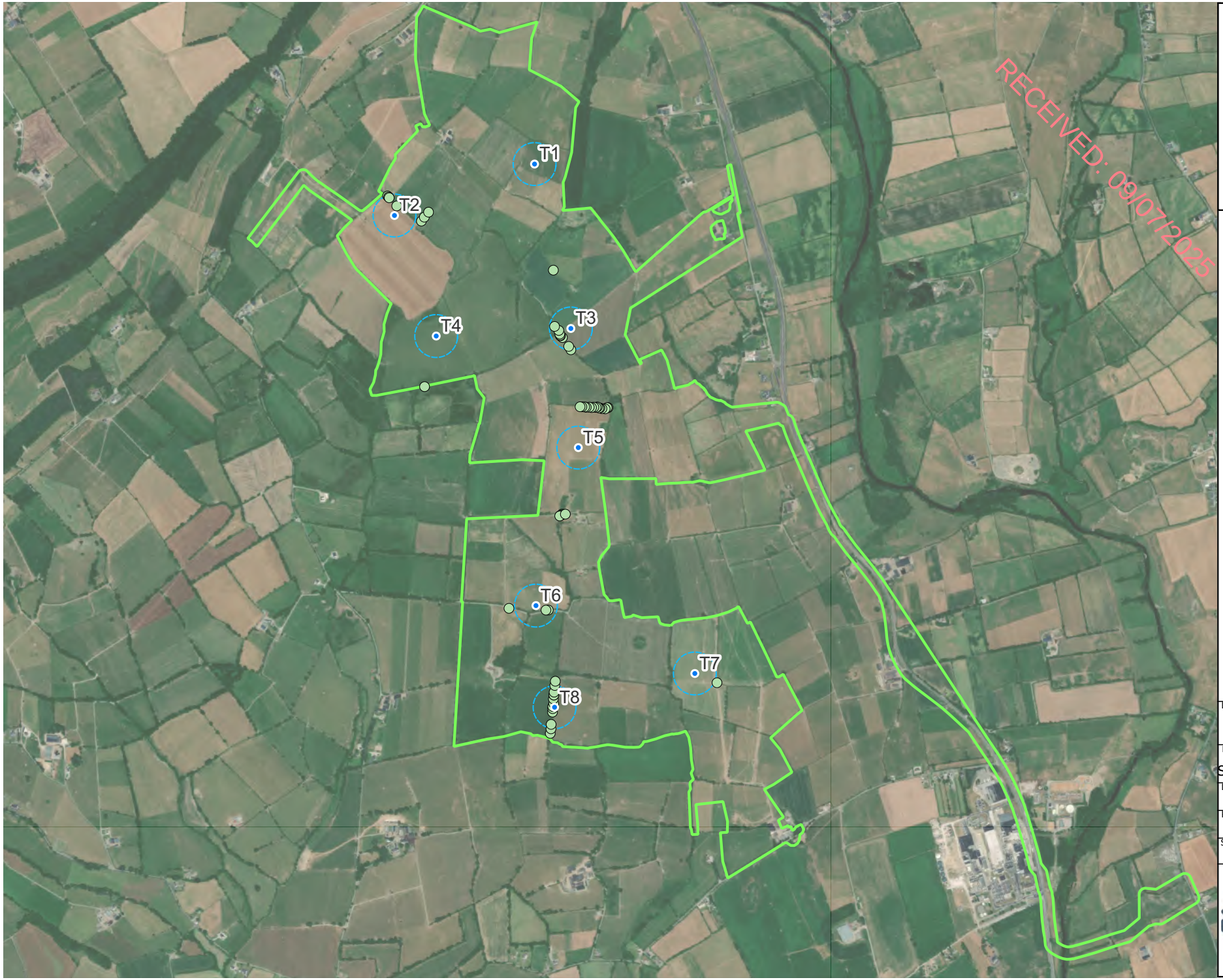


Plate 4-46 T08 Ash tree with knot hole

Plate 4-47 T08 Same ash with wound

Plate 4-48 T08 Ash tree with broken limbs, knot hole and ivy cover

Plate 4-49 Hedgerow north of proposed met mast



Map Legend

- EIAR Site Boundary
- Proposed Turbine Locations
- Bat Felling Buffer

Ground-Level Tree Assessment

- PRF-I

N

Drawing Title
Ground-Level Tree Assessment

Project Title
Seskin Renewables Wind Farm

Drawn By	Checked By
RC	AJ
Project No.	Drawing No.
231103	Figure 4-2
Scale	Date
1:20,000	2025-06-25

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

4.3.2.2 Emergence Surveys

Following the initial roost suitability assessments detailed in Section 4.3.2.1, a series of dusk emergence surveys were undertaken to confirm the presence or absence of roosting bats at structures identified as having *Low* to *Moderate* potential to support roosting bats. Surveys were conducted across spring, summer, and autumn in 2023 and 2024 to capture seasonal variation in bat activity.

In spring and summer 2023, emergence activity was recorded at the derelict farmhouse and adjoining shed (IG Ref: S 42041 73614), which had previously been assessed as having *Moderate* roost suitability. During both surveys, two common pipistrelles were observed emerging—first from the shed itself and later from a southern first-floor window of the farmhouse, confirming this structure as a roost.

In autumn 2023, a dusk emergence survey was carried out at a farmhouse (IG Ref: S 40657 74435), also assessed as *Moderate* suitability. No bats emerged, although commuting and foraging activity by common and soprano pipistrelles was observed in the vicinity. During spring 2024, the same farmhouse and an adjacent farm shed (IG Refs: S 40657 74435 & S 40653 74453) were re-surveyed. No emergence was recorded from either structure; however, a common pipistrelle briefly entered and exited the farm shed, and Leisler's bats, common and soprano pipistrelles were recorded commuting and foraging nearby.

In summer 2024, a dusk emergence survey was undertaken at the archaeological stone structure (IG Ref: S 42172 74107), which was classified as having *Low* suitability. Although no emergence was observed, consistent foraging by 3–4 common and soprano pipistrelles was recorded, along with sporadic Leisler's bat passes overhead.

The final survey took place in autumn 2024 at an inhabited farmhouse and adjoining shed (IG Ref: S 42868 72354), assessed as having *Low* suitability. A soprano pipistrelle was observed emerging from a crack in the west-facing eaves of the shed, confirming it as a roost. In addition, a common pipistrelle was recorded echolocating faintly from within the shed, however, no emergence was observed.

Table 4-9 Emergence Survey Results 2023 & 2024

Structure	PRF Suitability	IG Ref	Survey Type	Date Surveyed	Survey Results
2023					
Derelict farmhouse and adjoining shed	*Moderate*	S 42041 73614	Dusk Emergence Spring 2023	17th May 2023	2no. common pipistrelles emerged from adjoining shed.
Derelict farmhouse and adjoining shed	*Moderate*	S 42041 73614	Dusk Emergence Summer 2023	28th June 2023	2no. common pipistrelles emerged from southern 1st floor window.
Farmhouse	*Moderate*	S 40657 74435	Dusk Emergence Autumn 2023	11th October 2023	No bats emerging.
2024					
Farmhouse and farm shed	*Moderate & Low*	S 40657 74435 & S 40653 74453	Dusk Emergence Spring 2024	30th May 2024	No bats emerged from either structure. A common pipistrelle flew into the farm shed briefly before exiting shortly after.
Archaeological stone structure	*Low*	S 42172 74107	Dusk Emergence Summer 2024	25th July 2024	No bats emerged.
Inhabited farmhouse & adjoining shed	*Low*	S 42868 72354	Dusk Emergence Autumn 2024	23rd September 2024	Soprano observed emerging from crack in eave on west aspect of the adjoining shed.

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 1,049 bat passes were recorded, including emergence survey activity. In general, common pipistrelle (n=761) was recorded most frequently, followed by soprano pipistrelle (n=177). *Myotis spp.* (n=78) and Leisler's bat (n=32) were less frequent with only one brown long-eared bat pass (n=1) (Plate 4-50).

Species composition and activity levels varied across the survey periods. Transect survey results were calculated as bat passes per km surveyed (to account for differences in survey effort). Plate 4-51 presents the results for individual species per survey period. Figures 4-3 – 4-5 present the spatial distribution of bat activity across surveys. Bat activity was concentrated along treelines, hedgerows, and linear (road/track) habitats. Common and soprano pipistrelle were most frequently recorded in spring and autumn 2023, whereas Leisler's bat was mainly detected during spring and summer. *Myotis spp.* species showed peak activity in summer, and brown long-eared bat was recorded only during the spring.

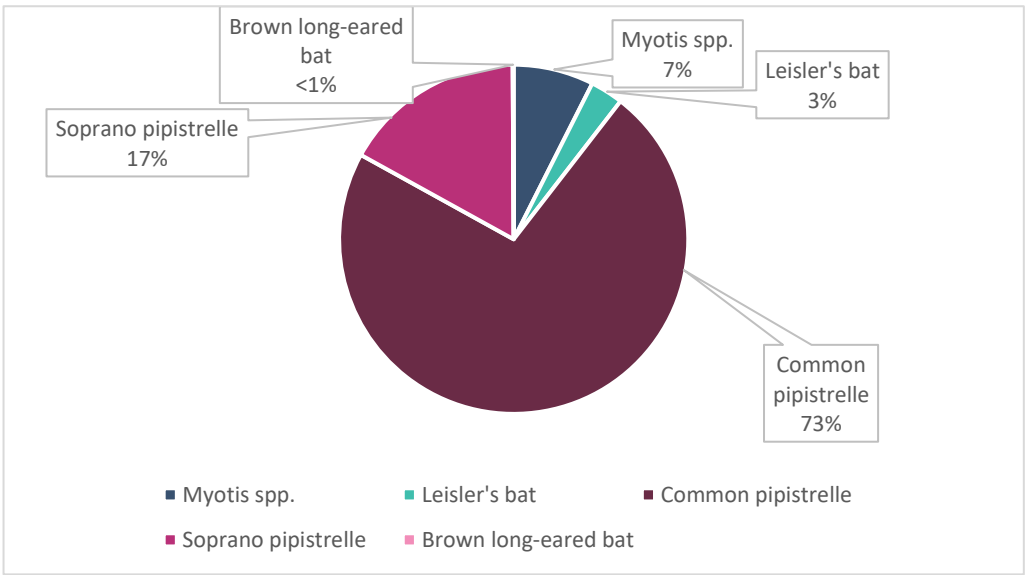


Plate 4-50 2023 Manual Activity Surveys (Total Species Composition)

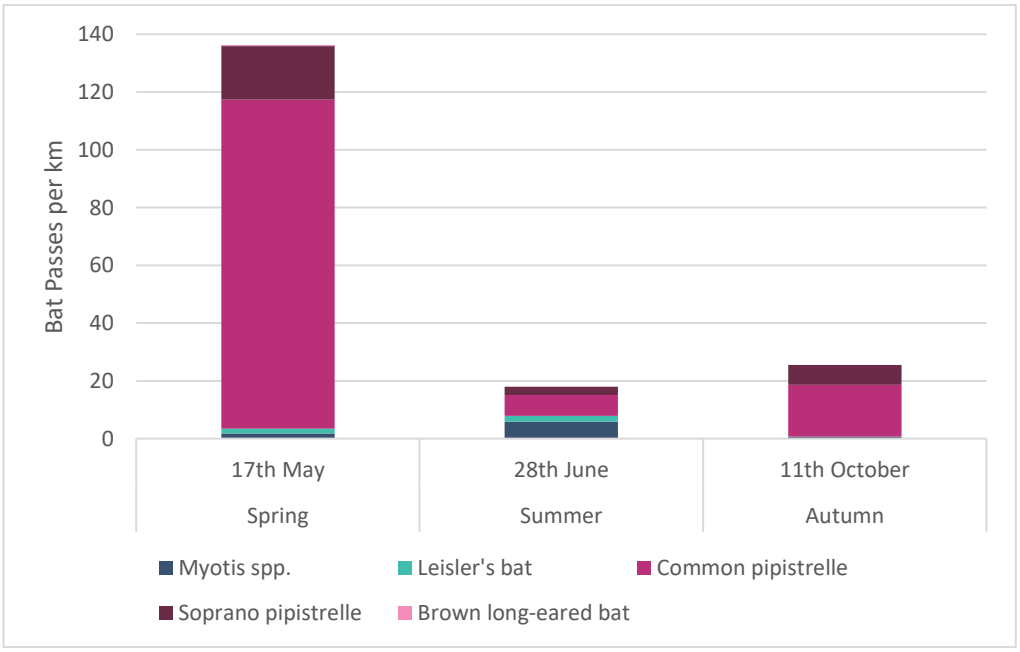
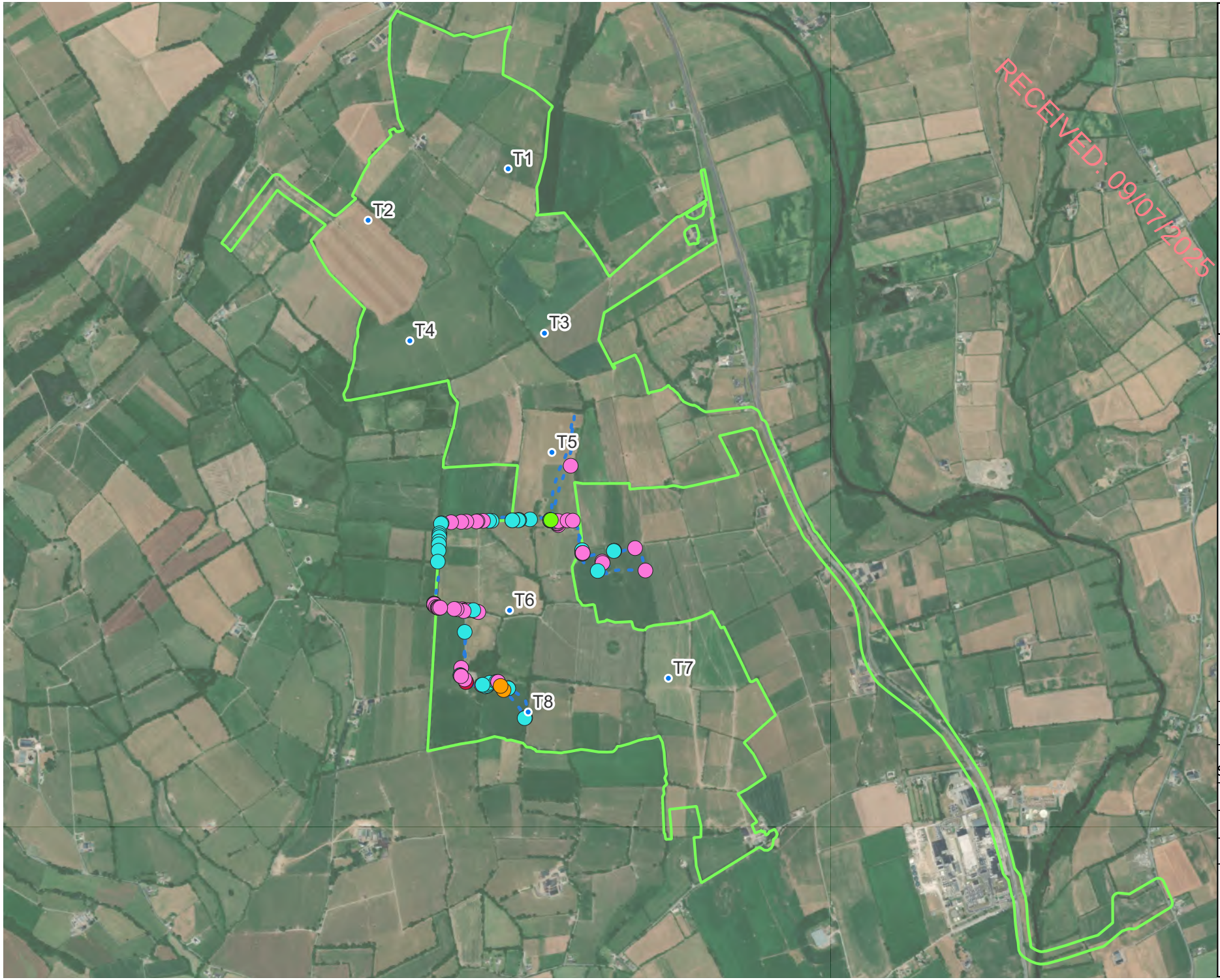


Plate 4-51 2023 Transect Results – Species Composition Per Survey Period



Map Legend

- EIAR Site Boundary
- Proposed Turbine Locations
- Spring Transect Route
  17th May 2023

Manual Spring Results

- Myotis spp.
- Leisler's bat
- Common pipistrelle
- Soprano pipistrelle
- Brown long-eared bat

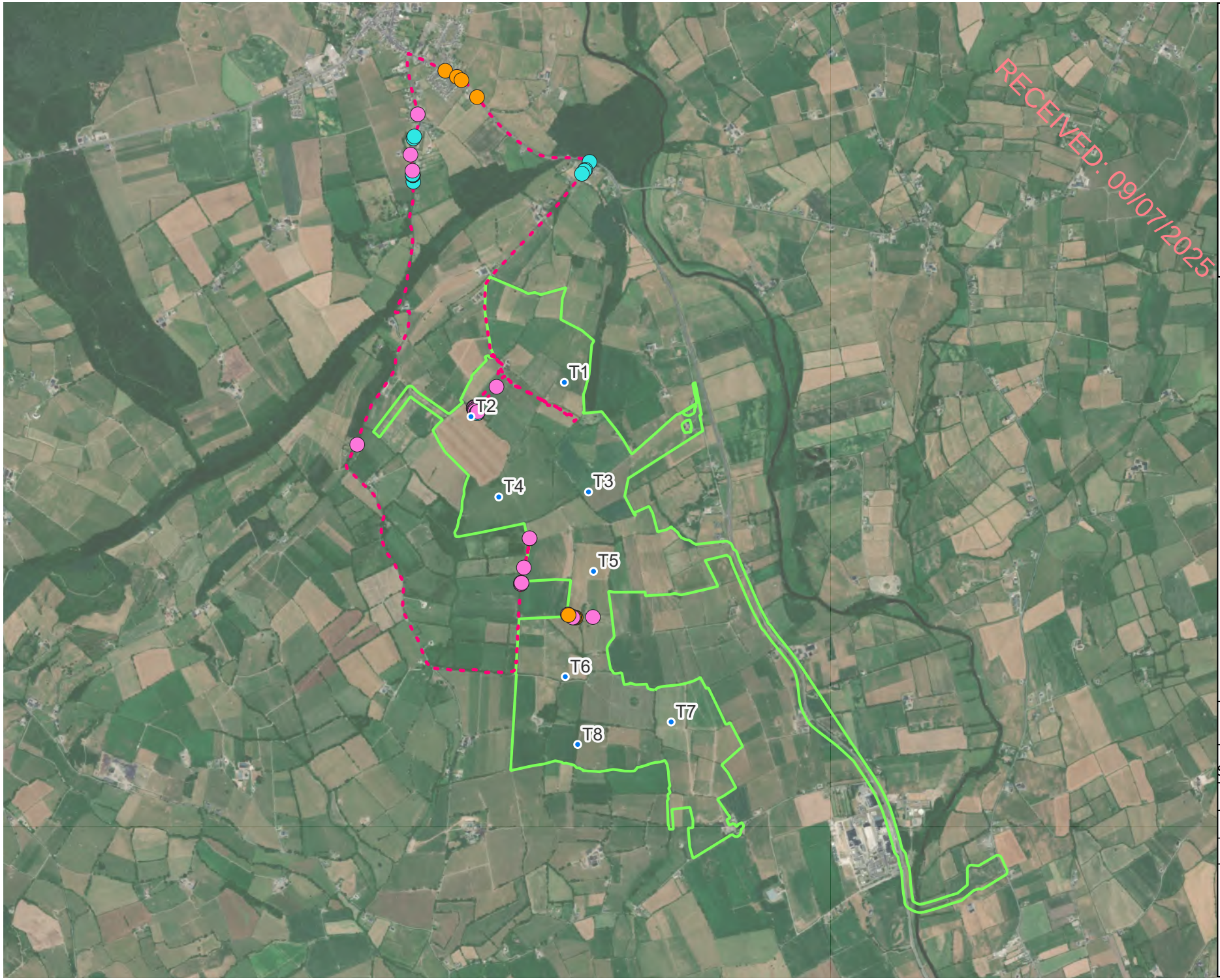
N

Drawing Title
Spring Manual Transect Results 2023

Project Title
Seskin Renewables Wind Farm

Drawn By	Checked By
RC	AJ
Project No.	Drawing No.
231103	Figure 4-3
Scale	Date
1:20,000	2025-06-25

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



Map Legend

- EIAR Site Boundary
- Proposed Turbine Locations
- Summer Transect Route 28th June 2023

Manual Summer Results

- Leisler's bat
- Common pipistrelle
- Soprano pipistrelle

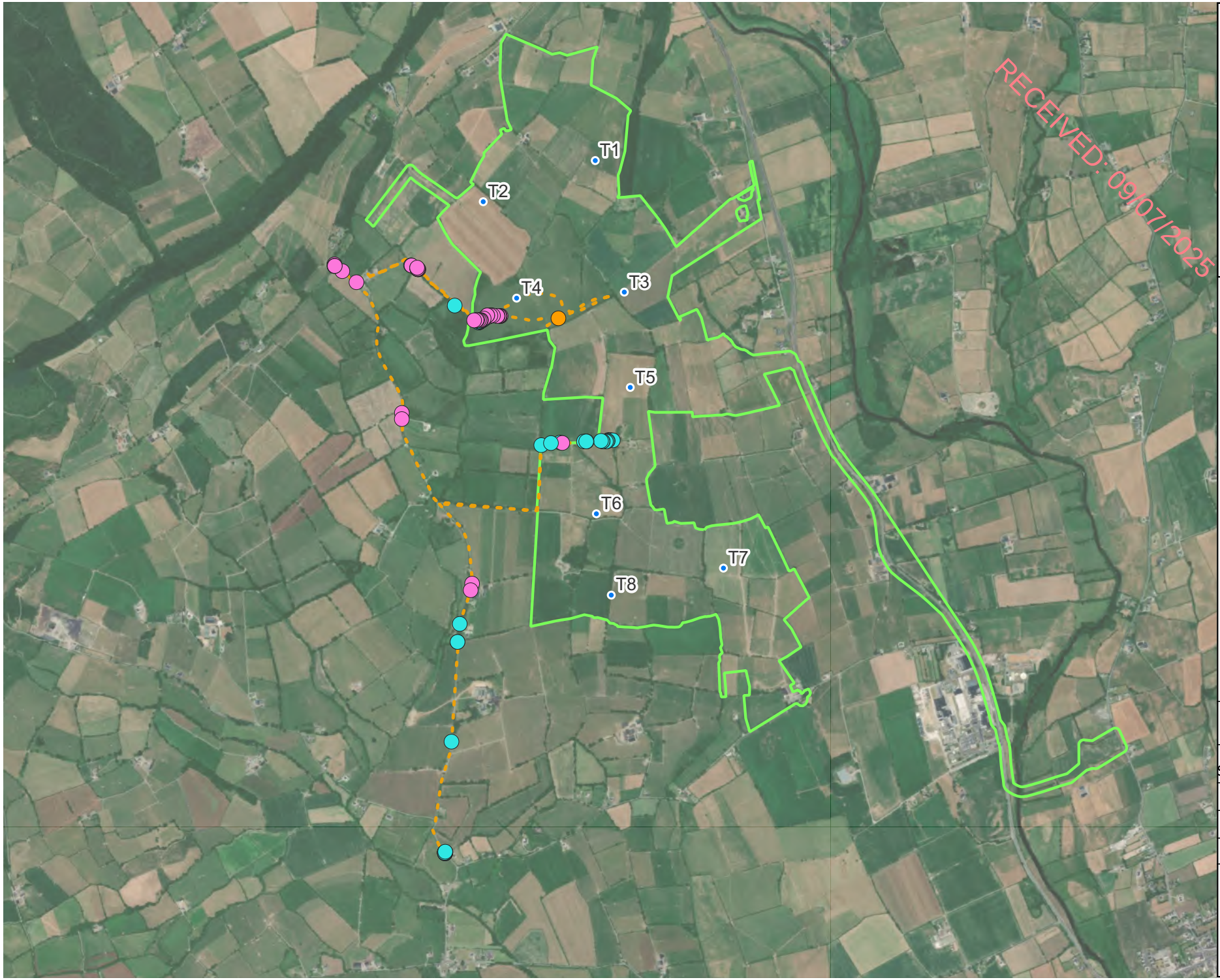
N

Drawing Title
Summer Manual Transect Results 2023

Project Title
Seskin Renewables Wind Farm

Drawn By	Checked By
RC	AJ
Project No. 231103	Drawing No. Figure 4-4
Scale 1:30,000	Date 2025-06-25

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



Map Legend

- EIAR Site Boundary
- Proposed Turbine Locations
- Autumn Transect Route 11th October 2023

Manual Autumn Results

- Leisler's bat
- Common pipistrelle
- Soprano pipistrelle

N

Drawing Title
Autumn Manual Transect Results 2023

Project Title
Seskin Renewables Wind Farm

Drawn By	Checked By
RC	AJ
Project No.	Drawing No.
231103	Figure 4-5
Scale	Date
1:25,000	2025-06-25

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

4.3.4 Ground-level Static Surveys

In total, 183,141 bat passes were recorded across all deployments. In general, common pipistrelle (n=106,096) occurred most frequently, followed by soprano pipistrelle (n=63,201) and Leisler's bat (n=10,416). Instances of *Myotis spp.* (n=2,429), brown long-eared bat (n=555) and Nathusius' pipistrelle (n=444) were recorded less frequently during the 2023 survey period. Plate 4-52 presents relative species composition across all ground-level static detector surveys.

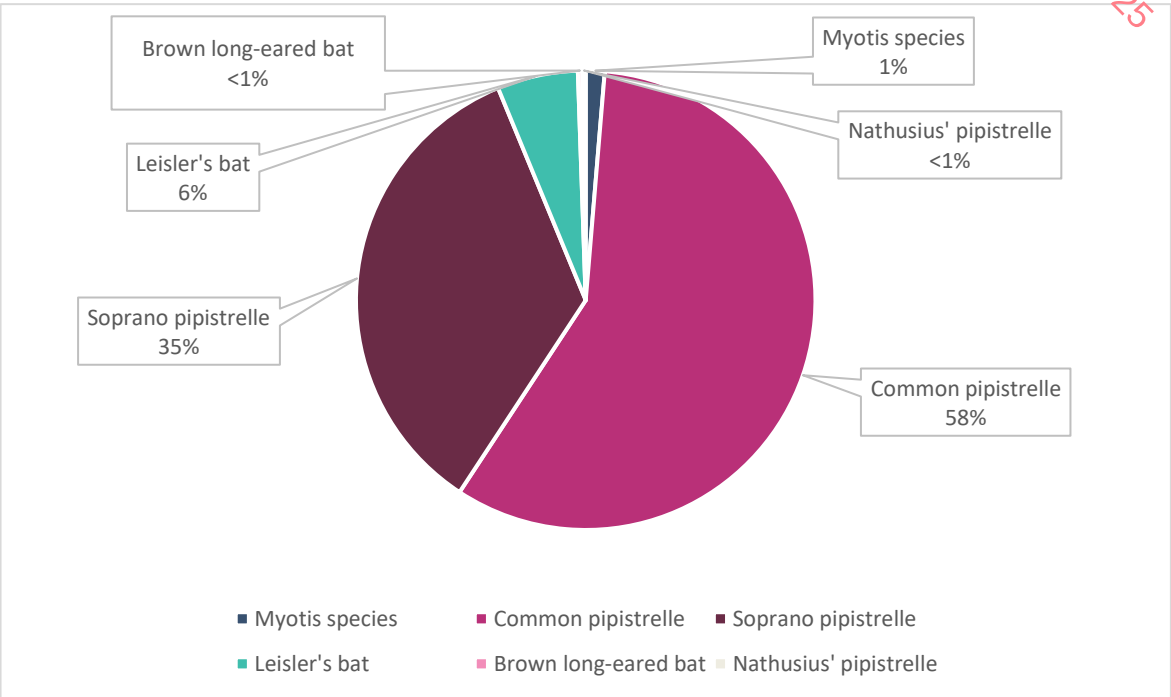


Plate 4-52 2023 Static Detector Surveys: Species Composition Across All Deployments (Total Bat Passes)

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. Table 4-10 presents these results for each species per season. Spring and summer activity was dominated by common pipistrelle with contributions from soprano pipistrelle and Leisler's bat. During the autumn, activity was more evenly distributed between common and soprano pipistrelle, with reduced representation from Leisler's bat. *Myotis spp.* were consistent but uncommon across the three seasons. Instances of brown long-eared bat and Nathusius' pipistrelle were relatively rare throughout the survey periods.

Table 4-10 Static Detector Surveys: Species Composition Across All Deployments (Total Bat Passes Per Hour, All Nights)

	Spring	Summer	Autumn
Total Survey Hours	**116.7**	**645.2**	**300.9**
Myotis spp.	3.4	1.6	3.4
Leisler's bat	21.7	7.1	11.0
Nathusius' pipistrelle	2.5	0.2	0.0
Common pipistrelle	158.2	83.5	112.3
Soprano pipistrelle	29.9	37.8	117.3
Brown long-eared bat	2.0	0.3	0.5

The Median Bat Pass Rate per detector, per survey period is shown in Plates 4-53 & 4-54 (varied axis scale) and demonstrates clear seasonal and spatial variation in bat activity. In spring, activity was highest at D02 (98.8 bpph), with notable levels also at D04 (26.1 bpph) and D08 (25.7 bpph), while the remaining detectors recorded low activity. Summer showed the highest overall bat activity, led by D03 (161.1 bpph), followed by D02 (106.7 bpph), D06 (60.7 bpph), and D07 (43.8 bpph); in contrast, D01, D04, and D05 recorded minimal activity. In autumn, D03 remained the most active site (71.5 bpph), with moderate activity at D06 (48.6 bpph) and D07 (38.0 bpph), and reduced levels elsewhere.

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 4-55). Activity was often variable between survey nights. Plates 4-56 to 4-58 (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.

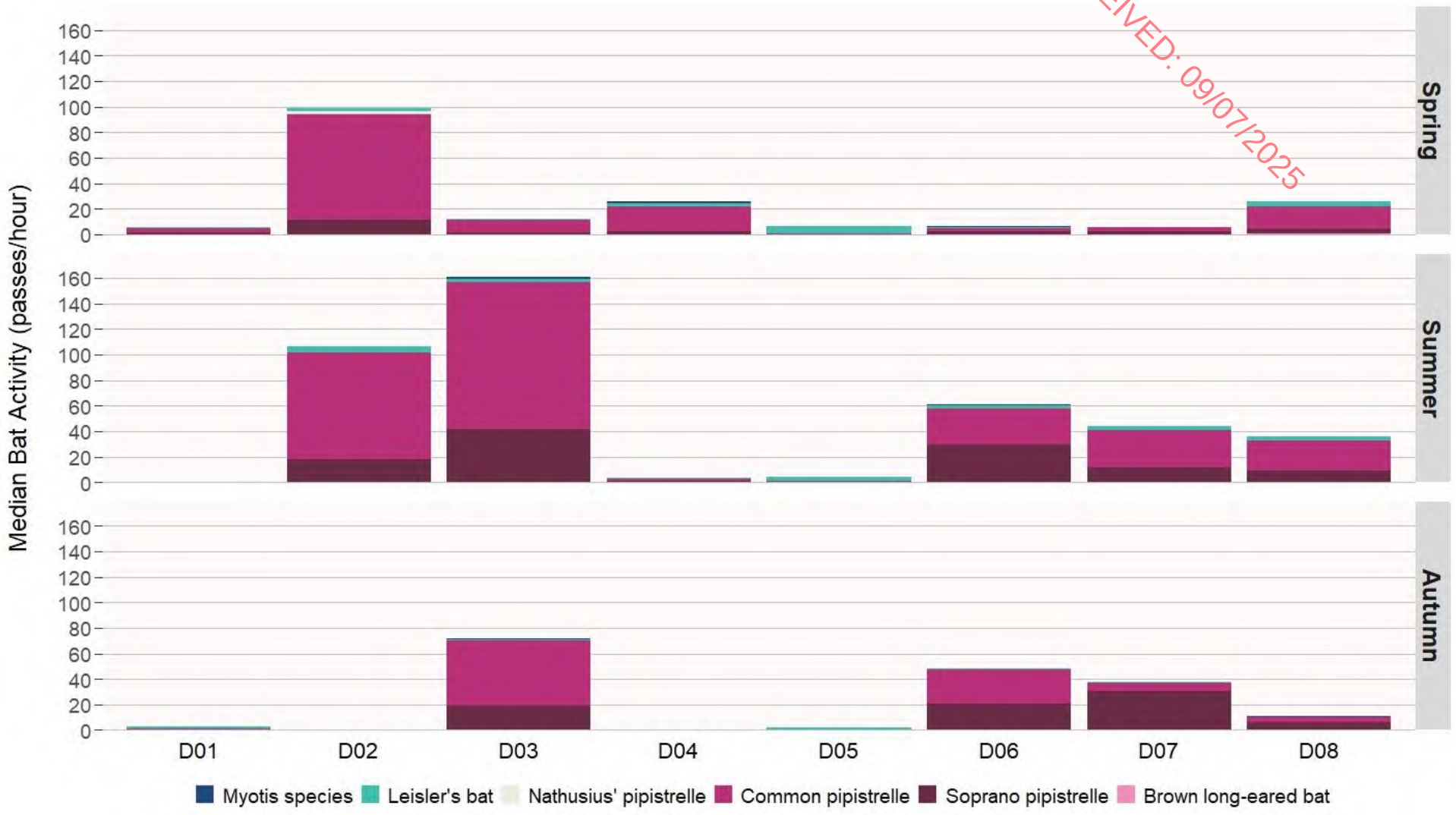


Plate 4-53 Static Detector Surveys: Median Bat Pass Rate (bpph) Including Absences, Per Location Per Survey Period.

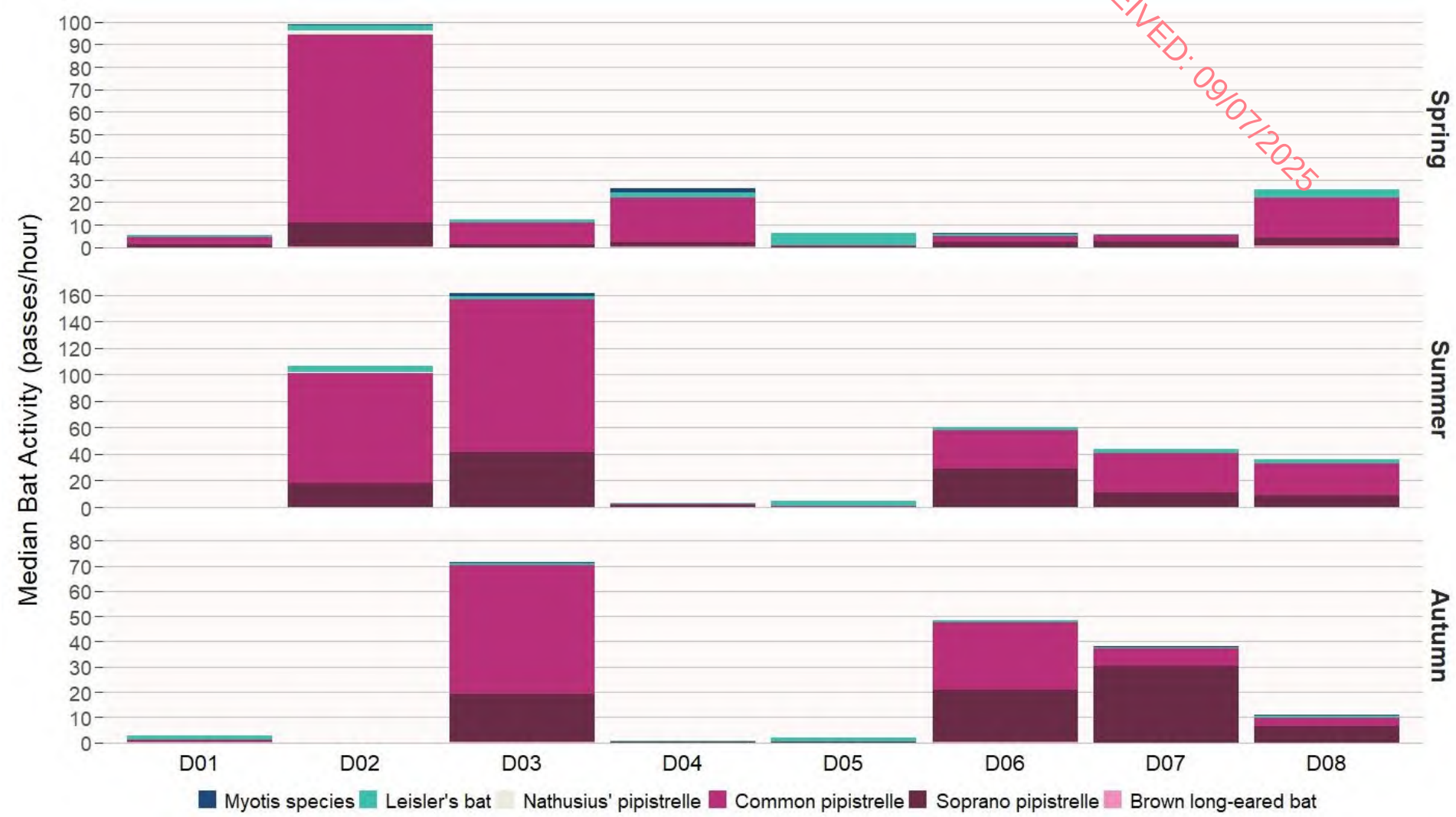


Plate 4-54 Static Detector Surveys: Median Bat Pass Rate (bpph) Including Absences, Per Location Per Survey Period (Varied Axis Scale).

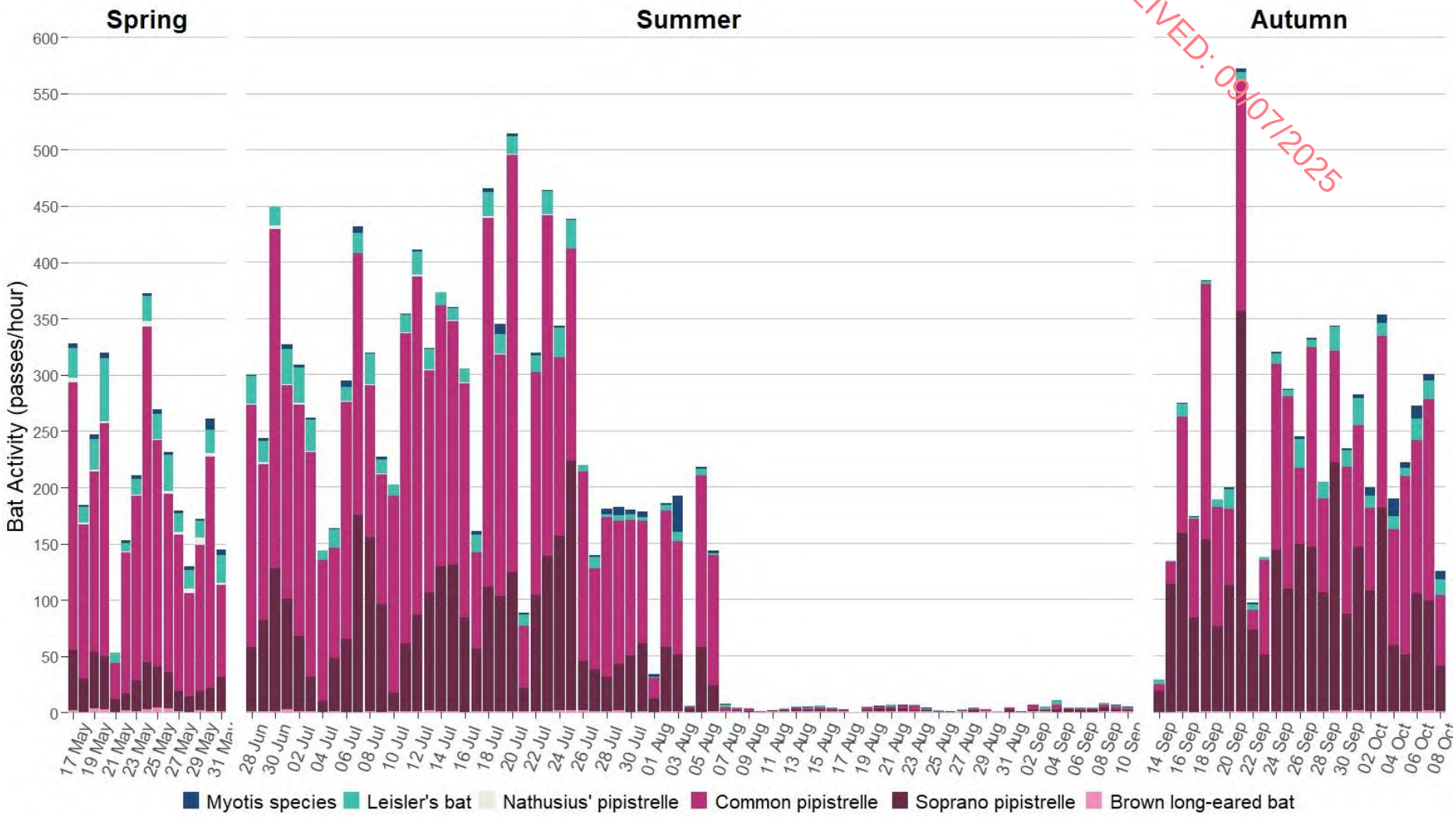


Plate 4-55 Static Detector Surveys: Median Bat Pass Rate (bpph) Including Absences, Per Season Per Night (plus redeployed D03 & D04)

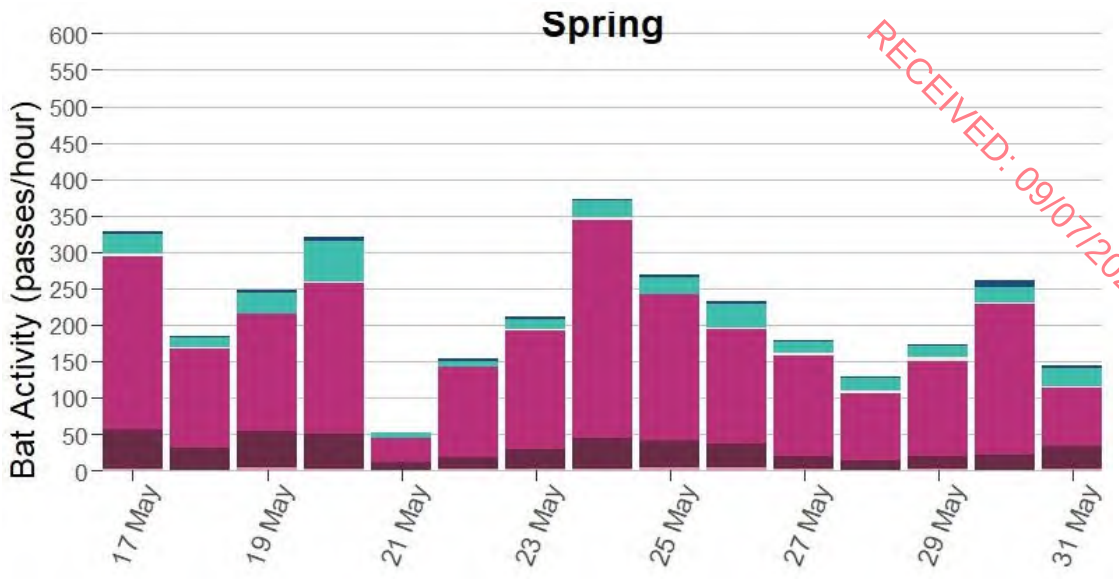


Plate 4-56 Static Detector Surveys: Spring Median Bat Pass Rate (bpph) Including Absences, Per Night

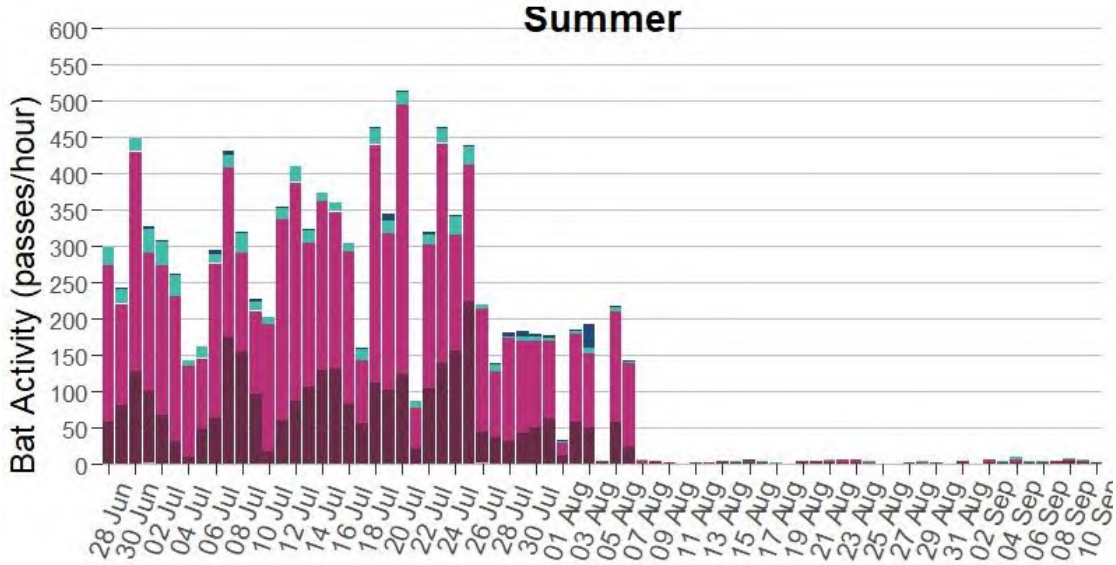


Plate 4-57 Static Detector Surveys: Summer Median Bat Pass Rate (bpph) Including Absences, Per Night (plus redeployed D03 & D04)

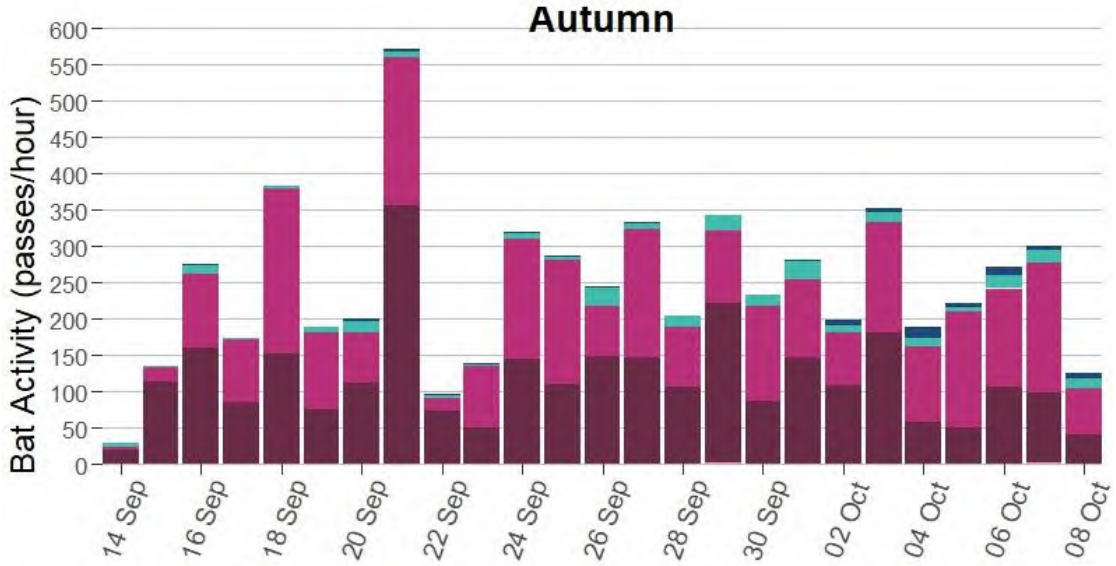


Plate 4-58 Static Detector Surveys: Autumn Median Bat Pass Rate (bpph) Including Absences, Per Night

4.4 Assessment of Bat Activity Levels 2023

4.4.1 Adapted Site-specific Ranges

Low, *Moderate* 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 4-11 shows the results of the site-level assessment as calculated on a site-specific activity level. Where no maximum activity at a detector is reported, no data was recorded for that species throughout the deployment.

Leisler's bat generally exhibited *Low* to *Moderate* median activity across spring and summer, with activity levels dropping to *Low* in autumn. The highest median activity was observed at detector D05 during spring, reaching 5.5 bat passes per hour (bpph), classified as *High*, with a corresponding maximum of 9.8 bpph. This was the only *High* median activity recorded for the species across all detectors in 2023. Median rates declined to *Low* at all locations in autumn.

Common pipistrelle demonstrated predominantly *Moderate* median activity throughout the year, punctuated by several notable *High* outliers. In spring, D02 recorded a *High* median of 83.4 bpph (maximum 128.0 bpph). During summer, both D02 and D03 registered *High* medians of 83.1 bpph and 114.7 bpph, respectively. In autumn, D03 again showed *High* median activity at 50.9 bpph, with a maximum of 137.0 bpph. All other detectors remained within the *Moderate* or lower activity range.

Soprano pipistrelle activity remained mostly within the *Low* to *Moderate* range. A single *High* median value was recorded at D03 in autumn (41.6 bpph, maximum 59.2 bpph). Spring median activity was uniformly *Low*, while summer and autumn showed a mix of *Low* to *Moderate* readings.

Myotis species exhibited *Low* median activity across most detectors and seasons. Only two *Moderate* medians were recorded—at D04 in spring (1.9 bpph) and D03 in summer (2.3 bpph). However, notable maximum values were recorded at D03, with 32.3 bpph in summer and 14.5 bpph in autumn, both within the *High* range, indicating infrequent but concentrated activity.

Brown long-eared bats were generally within the *Low* median activity category throughout the year. *Moderate* median activity was recorded in spring at D02 and D04, while D08 exhibited a *High* median activity in spring (0.7 bpph; maximum 3.4 bpph).

Nathusius' pipistrelle activity was largely absent, with zero median activity recorded at most detectors in all seasons. The only exceptions were at D02 in spring, with a *High* median of 1.7 bpph (maximum 5.3 bpph), and in summer, with a *Moderate* median of 0.4 bpph (maximum 2.9 bpph).

Common pipistrelle was the most consistently active species across the site, with multiple *High* median records throughout the year, especially at D02 and D03. Leisler's bat, soprano pipistrelle, and *Myotis spp.* showed more sporadic or location-specific *High* activity levels. Nathusius' pipistrelle and brown long-eared bat activity was minimal and restricted to isolated detections. Overall, bat activity patterns suggest a spatial and temporal variation in species presence and intensity, with a few key detectors (notably D02, D03, and D05) recording the highest activity rates.

Table 4-11 Median Nightly Bat Activity (bpph) per Species, per Season, per Detector Location 2023 Low, Moderate, High

2023 Season	Detector	*Myotis spp.*		Leisler's bat		Nathusius' pipistrelle		Common pipistrelle		Soprano pipistrelle		Brown long-eared bat	
		Median Bat Activity	Max Bat Activity	Median Bat Activity	Max Bat Activity	Median Bat Activity	Max Bat Activity	Median Bat Activity	Max Bat Activity	Median Bat Activity	Max Bat Activity	Median Bat Activity	Max Bat Activity
Spring	D01	0	0.1	1	5.7	0	0.1	3.1	36.1	1.4	4.5	0	0
	D02	0.2	3.6	2.5	11.2	1.7	5.3	83.4	128	10.7	30.5	0.3	0.7
	D03	0.1	0.9	1.2	3.1	0	0.3	9.7	18.9	1.3	8	0.1	0.8
	D04	1.9	4.3	2.3	20.9	0.1	0.6	19.5	80.7	2.1	6.5	0.2	0.8
	D05	0	0.2	5.5	9.8	0	0.3	0.6	5.4	0.3	1.5	0	0.3
	D06	0.1	0.3	1.1	3.4	0	0.2	2.6	29.6	2.3	7.4	0	0.2
	D07	0.1	1.3	0.5	2.5	0	0.1	2.6	11.9	2.7	7.2	0	0.2
	D08	0.1	2.1	3.5	10.1	0.3	1	17.7	51.8	3.4	9.3	0.7	3.4
Summer	D01	0	0.1	0	4.8			0	0.7	0	0.1	0	0.3
	D02	0.3	7.6	4.7	11.1	0.4	2.9	83.1	166.4	18.2	90.5	0	0.4
	D03	2.3	32.3	2.5	8.5	0	0	114.7	152.9	41.6	59.2	0	0.6
	D04	0.1	0.5	0.8	3.7	0	0.1	1.1	4.5	1.2	3.8	0.1	0.5
	D05	0	0.5	3.8	10			0.4	4.4	0.3	1.6	0	0.1
	D06	0.4	5.6	2.2	7.5	0	0.1	28.9	103.3	29.2	128.4	0	0.7
	D07	0.1	1.3	2.7	5.8	0	0.1	29.8	142	11.2	33.2	0	1.9
	D08	0	0.6	3.1	8.7	0	1.3	23.9	107.2	9	48.7	0	0.6
Autumn	D01	0	0.3	1.5	13.4			0.7	25.8	0.5	10.2	0.1	0.4
	D02	0	0.1	0	0.1	0	0	0	30.6	0	9.9		
	D03	0.4	14.5	1	5.5	0	0.1	50.9	137	19.1	83.7	0.1	0.3
	D04	0	0.3	0.4	1.8			0.1	1.1	0.3	5.1	0	0.4
	D05	0	0.1	1.3	15.6			0.3	4.4	0.2	1.7	0	0.2
	D06	0.2	0.8	0.8	4.7	0	0.2	26.7	58.4	20.8	113	0.1	0.5
	D07	0.2	0.7	0.6	2.5	0	0.1	6.7	34.1	30.5	158	0	0.2
	D08	0.3	1.6	0.6	3.2			3.5	63.3	6.4	39.8	0	0.6

4.5 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 Receptor 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.

During the 2023 and 2024 surveys, two roosts containing common and soprano pipistrelles were identified. However, these roosts were characterized by limited emergences, with only single-digit counts observed. No roosting site of National Importance (i.e. site greater than 100 individuals) was recorded within the Site during the 2023 or 2024 surveys.

5. RISK AND IMPACT ASSESSMENT

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

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

For each of these four risks, the detailed knowledge of bat distribution and activity within the Site has been utilized to predict the potential effects of the Proposed Development 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 Development (Adapted from NatureScot, 2021)

Criteria	Site-specific Evaluation	Site Assessment
Habitat Risk	Two low-value roosts (≤10 specimens) containing common and soprano pipistrelles were identified within the Site. One other PRF within the Site was surveyed, and no evidence of the presence of roosting bats was identified. A number of trees with *PRF-I* potential as roost sites on or near the Site turbine locations. The habitats within the Site provide suitable commuting and foraging habitat for bats and is connected to the wider landscape by linear features such as tree lines, hedgerows and streams. Despite the presence of these linear features, it does not provide an extensive and diverse habitat mosaic of high quality or meet any of the criteria of a High risk site as set out in Table 3a of NatureScot, 2021.	Medium
Project Size	Following the criteria set out in NatureScot, 2021 the project is of Small scale as it consists of <10 turbines (8 no. turbines). However, since these turbines exceed 100m in height, the project falls into the Medium project size category. The project is not a strategic infrastructural development and is well below the number of turbines that would constitute a Large development (NatureScot, 2021). The project has therefore been assessed as being of Medium size. There are three wind energy developments within 5km and one within 10km of the Site.	Moderate
Site Risk Assessment (from criteria in Plate 3-3)		**Medium Site Risk (3)**

The Site 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 Site has a *Moderate* habitat risk and *Medium* project size (Small scale development

including 8 turbines but comprised of turbines >100m in height). The cross tabulation of a ***Medium*** project on a ***Moderate*** risk site results in an overall risk score of ***Medium*** (NatureScot Table 3a).

5.1.2 Assessment of Collision Risk

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

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

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

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

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

Overall activity levels for brown long-eared bat and *Myotis spp.* were generally low. While there was High median activity recorded for brown long-eared bat at D08 in spring, the overall activity levels for the species were low; therefore, no significant collision related effects are anticipated. Loss of habitat is assessed further in Section 5.2 and 5.3. below. Activity levels for these species will continue to be assessed during operational monitoring following the implementation of best practice mitigations provided. Further mitigation will be implemented after Year 1 if deemed necessary.

5.1.2.1 Leisler's bat

The Site is within the current range of the Leisler's bat (NPWS, 2019). Leisler's bats are classed as a rarer species of a high population vulnerability which have a high collision risk (Plate 3-2). Leisler's bats were recorded during all activity surveys across the 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-Moderate*** in spring, **Moderate** in summer, and ***Low*** in autumn at median activity levels. Maximum activity ranged from ***Moderate*** in the autumn to ***High*** in summer. (See Table 5-2 below).

Based on site visit and survey data, including transects, it is determined that the Typical Activity (i.e. Median) is reflective of the nature of the Site, which is primarily agricultural grassland with treelines and hedgerows at field boundaries with low levels of bat activity recorded during the walked transects undertaken at the Site.

Thus, the overall collision risk level for the local population of Leisler's bat is generally assessed as ***Low-Moderate*** across all seasons and detectors with the sole exception of D05, which was assessed as having a ***High*** individual collision risk level in spring.

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

Survey Period	Site Risk	Typical Activity (Median)	Typical Risk Assessment (as per Table 3b NatureScot 2021)	Activity Peaks (Maximum)	Peak Risk Assessment (as per Table 3b NatureScot 2021)
Spring 2023	Medium (3)	Low-Moderate (2)	Typical Risk is Medium (6)	Moderate-High (4)	Peak Risk is Medium (12)
Summer 2023		Moderate (3)	Typical Risk is Medium (9)	High (5)	Peak Risk is High (15)
Autumn 2023		Low (1)	Typical Risk is Low (3)	Moderate (3)	Peak Risk is Medium (9)

5.1.2.2 Soprano pipistrelle

The Site is within range for soprano pipistrelle bat (NPWS, 2019). Soprano pipistrelle are classed as a common species of a medium population vulnerability which have a high potential collision risk (Plate 3-2). Soprano pipistrelle was recorded during activity surveys across the 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 median activity levels for spring, and ***Medium*** for summer and autumn. Peak activity levels were identical to the median values, as outlined in Table 5-3 below.

Based on site visit and survey data, including 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 moderate levels of bat activity recorded during the walked transects undertaken at the Site.

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

Table 5-3 Soprano pipistrelle - Overall Risk Assessment

Survey Period	Site Risk	Typical Activity (Median)	Typical Risk Assessment (as per Table 3b NatureScot 2021)	Activity Peaks (Maximum)	Peak Risk Assessment (as per Table 3b NatureScot 2021)
Spring 2023	Medium (3)	Low (1)	Typical Risk is Low (3)	Low (1)	Peak Risk is Low (3)
Summer 2023		Low-Moderate (2)	Typical Risk is Medium (6)	Moderate (3)	Peak Risk is Medium (9)
Autumn 2023		Low-Moderate (2)	Typical Risk is Medium (6)	Moderate (3)	Peak Risk is Medium (9)

5.1.2.3 Common pipistrelle

The 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 ***Medium*** in all seasons in 2023. Peak risk levels for common pipistrelle was also found to be ***Medium*** in all seasons. (See Table 5-4 below).

Based on site visit and survey data, including transects, it is determined that the Typical Activity (i.e. Median) is reflective of the nature of the Site, which is primarily agricultural grassland with treelines and hedgerows delineating field boundaries with moderate levels of bat activity recorded during the walked transects undertaken.

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

Table 5-4 Common pipistrelle - Overall Risk Assessment

Survey Period	Site Risk	Typical Activity (Median)	Typical Risk Assessment (as per Table 3b NatureScot 21	Activity Peaks (Maximum)	Peak Risk Assessment (as per Table 3b NatureScot 2021)
Spring 2023	Medium (3)	Low-Moderate (2)	Typical Risk is Medium (6)	Moderate - High (4)	Medium (12)
Summer 2023		Moderate (3)	Typical Risk is Medium (9)	Moderate - High (4)	Medium (12)
Autumn 2023		Low-Moderate (2)	Typical Risk is Medium (6)	Moderate (3)	Medium (9)

5.1.2.1 Nathusius' pipistrelle

The Site is within the current range of the Nathusius' pipistrelle bat (NPWS, 2019). Nathusius' pipistrelle bats are classed as a rarer species of a high population risk which have a high collision risk (Plate 3-4). Nathusius' pipistrelle activity was sporadic 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 Nathusius' pipistrelle was found to be ***Low*** at median activity levels across all seasons. Maximum activity levels were also ***Low*** in summer and autumn, and ***Medium*** in spring (See Table 5-5 below).

Based on site visit and survey data, including transects, it is determined that the Typical Activity (i.e. Median) is reflective of the nature of the Site, which is primarily agricultural grassland with treelines and hedgerows along field boundaries, with no activity recorded during the walked transects undertaken.

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

Table 5-5 Nathusius' pipistrelle - Overall Risk Assessment

Survey Period	Site Risk	Typical Activity (Median)	Typical Risk Assessment (as per Table 3b NatureScot 2021)	Activity Peaks (Maximum)	Peak Risk Assessment (as per Table 3b NatureScot 2021)
Spring	Medium (3)	Low (1)	Typical Risk is Low (3)	Low - Moderate (2)	Peak Risk is Medium (6)
Summer		Low (1)	Typical Risk is Low (3)	Low (1)	Peak Risk is Low (3)
Autumn		Low (1)	Typical Risk is Low (3)	Low (1)	Peak Risk is Low (3)

5.1.3 Collision Risk Summary

Site-level collision risk for high collision risk bat species was typically ***Low*** to ***Medium***. Overall bat activity levels were typical of the nature of the Site, which is predominantly agricultural grassland with treelines and hedgerows delineating field boundaries with moderate levels of bat activity recorded during the static detector surveys and the transects undertaken.

However, following per-detector R-analysis, Detectors D02, D03, and D05 recorded ***High*** Median Activity levels in either spring, summer, or autumn (see Table 5-6). During manual transect surveys, Leisler's bat activity was sporadic and rare, while soprano and common pipistrelle activity was more evenly distributed across the Site. Nathusius' pipistrelle was not recorded during the manual transects.

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 Development with the required implementation of the bat buffers (Section 6.1.3). A monitoring and mitigation strategy has been devised for the Proposed Development, in line with the case study example provided in Appendix 5 of the NatureScot 2021 Guidance and based on the site-specific data. After year 1 monitoring, if a curtailment requirement is identified, a curtailment programme, in line with relevant guidelines, will be devised around key activity periods and weather parameters, as well as a potential increase in buffers if deemed necessary.

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

Detector ID	Turbine	Species	High Median Activity Survey Period
D02	T02	Common pipistrelle	Spring 2023
D02	T02	Common pipistrelle	Summer 2023
D03	T03	Common pipistrelle	Summer 2023
D03	T03	Common pipistrelle	Autumn 2023
D03	T03	Soprano pipistrelle	Summer 2023
D02	T02	Nathusius' pipistrelle	Spring 2023
D05	T05	Leisler's bat	Spring 2023

5.2 Loss or Damage to Commuting and Foraging Habitat

In the absence of appropriate design, the loss or degradation of commuting/foraging habitat has potential to reduce feeding opportunities and/or displace bat populations. The Site is predominantly located on improved agricultural grassland with hedgerows and treelines delineating the vast majority of field boundaries.

The majority of turbines will be located in agricultural grassland resulting in minimal loss of linear habitat features. Approximately 1.8km of linear vegetation removal will be required within and around the Site infrastructure footprint to allow for the construction of the turbine bases, access roads, and the other ancillary infrastructure. This also includes vegetation removal in accordance with the proposed bat buffers detailed in Section 6.1.3. Further details on vegetation removal required within and around development footprint is detailed in Chapter 4, Section 4.3.1.7 of this EIAR. To compensate for this loss, approximately 2.1km of hedgerow reinstatement and 2.4km of hedgerow enhancement will be undertaken within the Site. Hedgerow reinstatement will comprise both translocation of existing hedgerows and new hedgerow planting across the Site, contributing to long-term habitat connectivity and ecological value within the Site. While these measures will maintain and enhance ecological corridors in the long term, a short-medium term reduction in connectivity may occur until newly planted or enhanced hedgerow becomes fully established.

Further details on linear vegetation removal required within and around development footprint is detailed in Chapter 6, Appendix 6-4 of this EIAR. Existing hedgerow habitat throughout the Site will be enhanced through additional native hedgerow species. It is proposed to plant some native tree species within the hedgerow habitat to further increase the biodiversity value within the Site. The enhancement design will ensure habitat connectivity is maintained and improved around the Site. No permanent loss of, or damage to, commuting or foraging habitats is anticipated as a result of the Site or associated infrastructure. The proposed replanting area is shown and discussed in Appendix 6-4, Biodiversity Management and Enhancement Plan (BMEP). Following the implementation of the replanting plan as outlined in the BMEP, no significant effects in relation to habitat fragmentation or loss of commuting or foraging habitat for bats is anticipated.

The habitat within the location of the proposed substation consists primarily of improved agricultural grassland with an existing hedgerow bisecting the proposed location. It is proposed to remove this hedgerow to facilitate the proposed substation. This loss will be compensated for by the replanting plan proposed in the BMEP. Therefore, no permanent loss of significant commuting/foraging habitat are anticipated.

As described in Chapter 4, Section 4.5.2 of this EIAR, accommodation works along the turbine delivery route are limited to the temporary removal and reinstatement of individual trees and street furniture to facilitate the delivery of components to the Site. Therefore, no significant effects on commuting and foraging bats associated with the turbine delivery route are anticipated.

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

5.3 Loss of, or Damage to Roosts

The Site is predominantly located within agricultural grasslands, with hedgerows and treelines delineating field boundaries with occasional areas of scrub and several structures also present.

Three structures located within the Site boundary were identified as having roosting potential and were subsequently subject to dusk emergence surveys. Two of these structures were confirmed to support bat roosts. A derelict farmhouse and adjoining shed located in the centre of the Site was confirmed to host a common pipistrelle roost, with two individuals recorded emerging during both dusk surveys. Additionally, a single soprano pipistrelle was observed emerging from the adjoining shed of an inhabited farmhouse in the south of the Site. Both of these structures, along with the associated linear habitat features surrounding them, will be retained and avoided by the Proposed Development.

Seven further structures located outside the Proposed Development boundary were assessed and, where possible dusk emergence surveys were carried out. These structures are situated outside the development footprint and will not be directly or indirectly affected by the Proposed Development.

There will be some requirement to remove trees to facilitate the proposed bat buffers, as detailed in Section 6.1.3 below. Trees within the bat buffers varied in suitability from no potential *(None)* to *PRF-I* for roosting bats. A number of trees identified during the roost surveys as having potential to host roosting bats were located within the bat buffers detailed in Section 4.3.2 above. Although no evidence of bat use was found during daytime inspections, there is a potential for indirect effects on bats, such as the loss of potential roosting habitats, and direct effects, including temporary disturbance, harm, or death due to the proposed tree removal. On a precautionary basis, as the trees provide some potential roosting habitat, the proposed linear vegetation removal has been designed to retain as much of the suitable treelines as possible and post-construction monitoring will be carried out. A confirmatory pre-construction tree survey will be conducted on trees identified as having roosting potential prior to removal to ensure no bats are present. Additional roosting opportunities will be provided throughout the Site in the form of bat boxes, as detailed in Section 6.1.4.

The proposed substation is located within improved agricultural grassland (GA1). Some hedgerow removal will be necessary to accommodate these works. However, no roosting habitat was identified at these locations, and as such, no loss of bat roosts is anticipated.

The Proposed Grid Connection underground cabling route will largely follow existing roads and improved agricultural land, and no removal of treelines or other linear vegetation is required. One watercourse crossing is located along the cabling route. It comprises a crossing of the River Nore and will be achieved via Horizontal Directional Drilling. As no physical structure exists at the crossing point, and drilling will occur below the riverbed, no loss or disturbance of roosting habitat is anticipated.

Temporary removal and reinstatement of trees and minor infrastructure (e.g., signage, electrical/telecommunication poles) will be required along the turbine delivery route. These trees were assessed as having no potential roost features. Therefore, no loss or damage to roosting habitat is anticipated in these areas.

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

5.4 Displacement of Individuals or Populations

The Proposed Development is predominantly located within agricultural grassland with treelines/hedgerows delineating field boundaries. A number of treelines and hedgerows within the turbine buffers to be removed provide potential roosting and/or 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, as amended).

6.1.2 Lighting Restrictions

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

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

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

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

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

6.1.3 Bat Buffers

In accordance with NatureScot and NIEA Guidance, a minimum 50m buffer to all habitat features used by bats (e.g., hedgerows, tree lines etc.) should be applied to the siting of all wind turbines (See example provided in Plate 6-1 below). However, Eurobats No. 6 guidance and NIEA recommends increased

buffers of 100m and 200m around woodland/forestry areas, however, there is no scientific evidence to support these increased buffer distances in Ireland or the UK.

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

The formula below is presented to provide appropriate mitigation in relation to bats, and the relevant input required from turbine parameters, is the combination of the blade length and hub height. The turbine model to be installed on the Proposed Wind Farm will have an overall ground-to-blade tip height of 175m, rotor diameter of 150m, and hub height of 100m.

There will be a requirement to remove linear vegetation i.e. treelines/hedgerows, to facilitate the required bat buffers at the Proposed Wind Farm. This is outlined in further detail in Section 6.1.4 below. These vegetation-free areas will be maintained during the operational life of the Proposed Development.

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

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

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

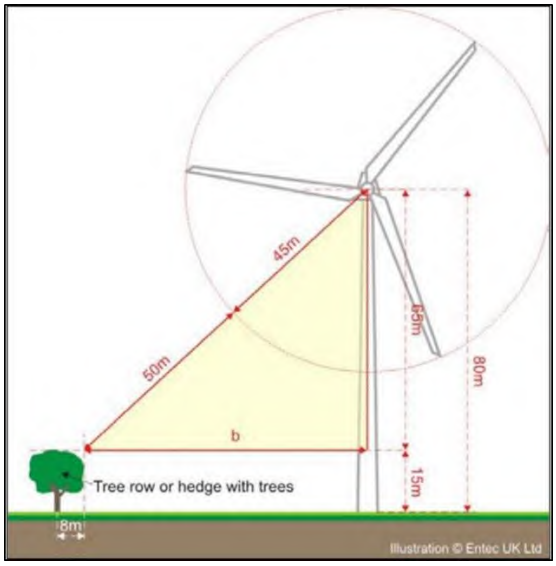


Plate 6-1 Calculate buffer distances (Natural England, 2014).

6.1.4 Confirmatory Pre-construction Tree Survey

A number of mature trees presenting potential roosting features were identified within the bat buffers. Areas subject to removal are shown in Figure 6-1. Although no evidence of bats was found at these locations during the inspections, 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 recommendations have been provided to account for the loss of the resource. The following procedures are proposed prior to removal of trees with PRFs:

- A pre-commencement survey will be carried out by a suitably qualified ecologist on trees with PRFs proposed for removal.
- If a bat roost is identified within any of the trees to be removed/pruned, a bat derogation licence will be obtained from the NPWS, prior to removal and the removal activity will be supervised by a qualified ecologist.
- On a precautionary basis, works will be undertaken at an appropriate time of year, as determined by a suitably qualified ecologist, to avoid disrupting sensitive life cycle periods for bats. Tree-removal of mature deciduous trees will be carried out according to the following standard mitigating procedures:
    - Trees with suitable potential roost features proposed for removal will be checked for bats by a suitably qualified arborist/ecologist at the time of removal.
    - 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 tree removal shall be used to lower the limbs and trunk carefully to ground level and cavities searched by a qualified ecologist.
    - 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).

To ensure continued availability of potential roost features following the removal of trees, it is proposed to erect 5no. bat boxes of varying styles/models throughout the Site. Details regarding the installation, maintenance and monitoring of bat boxes are outlined in Appendix 6-4 in Chapter 6 of this EIAR.

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

6.1.5 Biodiversity Management and Enhancement Plan

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

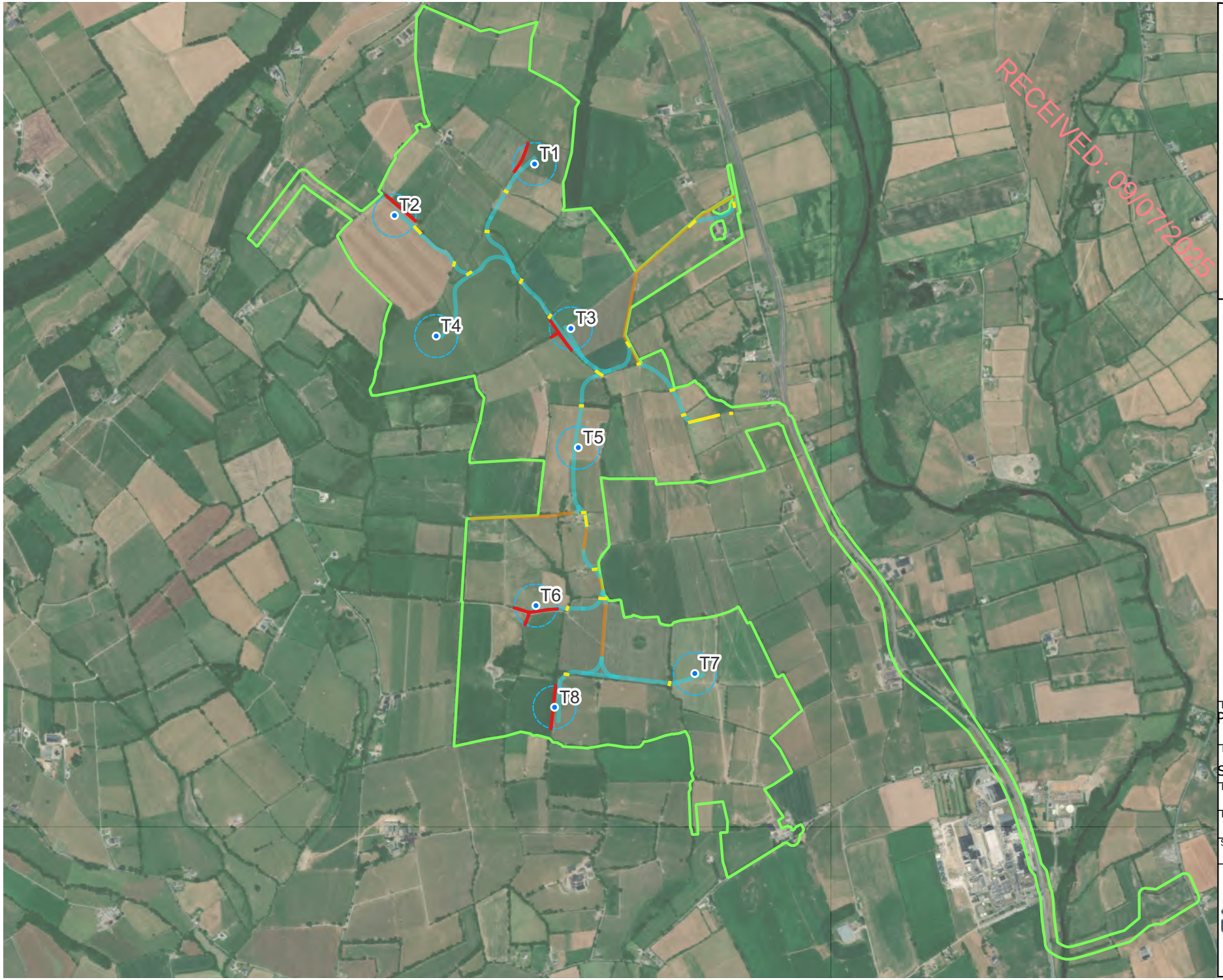
Linear vegetation within the required turbine bat buffers will be removed (Figure 6-1). A replanting design has been curated to provide alternative commuting corridors within the Site. To comply with NatureScot recommendations in relation to habitat buffering to avoid bat fatalities, approx. 1,794m of linear vegetation habitat will be removed as a result of the Proposed Development, including the recommended buffers applied for bats. Further details are outlined in Chapter 6, Appendix 6-4 BMEP.

Linear landscape features in the wider area that will be retained, and the loss of gappy hedgerow/treelines is not anticipated to have a significant effect on local bat populations. However, it is proposed to plant new linear features and bolster existing habitat features to offset any potential loss in linear habitat features and to provide additional new opportunities for commuting and foraging bats. Approximately 2,375m of heavily managed hedgerow will be enhanced through additional planting with native species. It is proposed to plant some native tree species within the hedgerow habitat to further increase the biodiversity

value within the Site. Additionally, approximately 2,097m of hedgerow will be translocated or planted within the Site

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

Overall, the proposed planting of new native hedgerow, along with the enhancement and translocation of existing hedgerow, will result in a net gain of linear landscape features within the Site. These measures will enhance both foraging and commuting opportunities for bats that use the area. All planting will consist of species indigenous to the local area. Further details are provided in Appendix 6-4, Biodiversity Management and Enhancement Plan (BMEP).



Map Legend

- EIAR Site Boundary
- Proposed Turbine Locations
- Bat Felling Buffer
- Bat Buffer Hedgerow Loss
- Hedgerow Loss from Infrastructure
- Proposed Amendments to Existing Roads
- Proposed New Roads

N

Drawing Title
Proposed Linear Vegetation Removal

Project Title
Seskin Renewables Wind Farm

Drawn By	Checked By
RC	AJ
Project No.	Drawing No.
231103	Figure 6-1
Scale	Date
1:20,000	2025-06-25

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

6.1.6 Blade Feathering

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

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

6.2 Bat Monitoring Plan

Overall risk levels for high collision risk bat species were typically *Low* to *Medium.* This risk level is reflective of the nature of the Site, which is agricultural grassland with treelines and hedgerows delineating field boundaries with low-moderate 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 Development, 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 Development on bat activity, at least 3 years of post-construction monitoring is proposed. Post-construction monitoring will include static detector surveys, walked survey transects and corpse searching to record any bat fatalities resulting from collision.

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

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

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

6.2.1.1 Monitoring Year 1

Bat activity surveys

The post-construction surveys will be carried out as per the pre-construction survey effort. Static monitoring will take place at each turbine during the bat activity season (between April and October) (NatureScot, 2021, NIEA, 2021). Full spectrum recording detectors will be utilised for the same duration as during pre-application surveys and at the same density (NatureScot, 2021). As described in Section 3.5

above, the assessment of bat activity levels will include the use of 'Ecobat' (or similar alternative), a web-based interface, allowing uploaded activity data to be contrasted with a comparable reference range, allowing objective and robust interpretation. Walked survey transects will also be conducted.

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

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

Carcass searches

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

6.2.1.2 Monitoring Years 2 & 3

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

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

6.3 Residual Impacts

Taking into account the sensitive design of the project and the implementation of best practice and adaptive mitigation measures, no significant long-term residual effects on bats are anticipated with regard to:

1. Collision mortality, barotrauma and other injuries,
2. Loss or damage to roosts, and
3. Displacement of individuals or populations.

However, a temporary residual effect at the local geographic scale is anticipated in relation to the loss of commuting and foraging habitat, due to the removal of hedgerows required to facilitate construction and bat buffers. While this loss will be offset through a comprehensive hedgerow enhancement and replanting programme, it will take approximately 5–10 years for newly planted hedgerows to establish and restore full habitat functionality. As such, a minor temporary reduction in ecological connectivity may occur during this period.

6.4 Cumulative Effects

The Proposed Development 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 Development will not result in any residual adverse effects on bats, when considered on its own. There are two existing, permitted or proposed wind farms located within 5km of the Proposed Wind Farm, and three located within 10km. There are four further EIA projects including one extractive industry within 10km. No potential for the Proposed Development 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 Development.

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

7. CONCLUSION

This report provides a full and comprehensive assessment of the potential for impact on bat populations arising from the Proposed Development. 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 Development will not result in any significant effects on bats.

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

8. BIBLIOGRAPHY

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

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

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

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

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

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

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

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

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

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

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

BTHK (2018). Bat Roosts in Trees – A guide to Identification and Assessment for Tree-Care and Ecology Professionals. Exeter: Pelagic Publishing.

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

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

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

Collins, J. (ed.) (2023) Bat Surveys for Professional Ecologists: Good Practice Guidelines (4th edition). The Bat Conservation Trust, London.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

APPENDIX 1

BAT HABITAT SUITABILITY APPRAISAL

HABITAT SUITABILITY ASSESSMENT

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

Potential Suitability	Description	
	Roosting Habitats in Structures	**Potential Flight- Paths and Foraging Habitats**
Negligible	Negligible habitat features on site likely to be used by roosting bats.	Negligible habitat features on site likely to be used by commuting or foraging bats.
Low	A structure with one or more potential roost sites that could be used by individual bats opportunistically. However, these potential roost sites do not provide enough space, shelter, protection, appropriate conditions[a] and/or suitable surrounding habitat to be used on a regular basis or by larger numbers of bats (i.e. unlikely to be suitable for maternity or hibernation[b]). A tree of sufficient size and age to contain PRFs but with none seen from the ground or features seen with only very limited roosting potential.[c]	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 habitat. 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[a] 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	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.	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, treelined watercourses and grazed parkland. Site is close to and connected to known roosts.

a) For example, in terms of temperature, humidity, height above ground, light levels or levels of disturbance.
b) 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).
c) Categorisation aligns with BS 8596:2015 Surveying for bats in trees and woodland (BSI, 2015).

Updated guidelines for assessing the potential suitability of a site for bats, based on the presence of habitat features (taken from Collins, 2023)

Potential Suitability	Description	
	Roosting Habitats in Structures	**Potential Flight- Paths and Foraging Habitats**
None	No habitat features on site likely to be used by any roosting bats at any time of the year. (i.e. a complete absence of crevices/ suitable shelter at all ground/ underground levels).	No habitat features on site likely to be used by any commuting or foraging bats at any time of the year (i.e. no habitats that provide continuous lines of shade/protection for flight-lines or generate/shelter insect populations available to foraging bats).
Negligible[a]	Negligible habitat features on site likely to be used by roosting bats; however, a small element of uncertainty remains as bats can use small and apparently unsuitable features on occasion.	No obvious habitat features on site likely to be used as flight-paths or by foraging bats; however, a small element of uncertainty remains in order to account for non-standard bat behaviour.
Low	A structure with one or more potential roost sites that could be used by individual bats opportunistically at any time of the year. However, these potential roost sites do not provide enough space, shelter, protection, appropriate conditions[b] 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 and not a classic cool/stable hibernation site but could be used by individual hibernating bats[c].	Habitat that could be used by small numbers of bats as flight-paths such as a gappy hedgerow or unvegetated stream, but isolated, i.e. not very well connected to the surrounding landscape by other habitat. 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 with one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions[b] and surrounding habitat but unlikely to support a roost of high conservation status (with respect to roost type only, such as maternity and hibernation - the categorisation described in this table is 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 flight-paths 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 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[b], and surrounding habitat. These structures have the potential to support high conservation status which is established after presence is confirmed.	Continuous, high-quality habitat that is well connected to the wider landscape that is likely to be used regularly by bats for flight-paths 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.

a) Negligible is defined as 'so small or unimportant as to be not worth considering, insignificant'. This category may be used where there are places that a bat could roost or forage (due to one attribute) but it is unlikely that they actually would (due to another attribute).

b) For example, in terms of temperature, humidity, height above ground level, light levels or levels of disturbance.

c) Evidence from the Netherlands shows mass swarming events of common pipistrelle bats in the autumn followed by mass hibernation in a diverse range of building types in urban environments (Korsten et al., 2016 and Jansen et al., 2022). Common pipistrelle swarming has been observed in the UK (Bell, 2022 and Tomlinson, 2020) and winter hibernation of numbers of this species has been detected at Seaton Delaval Hall in Northumberland (National Trust, 2018). This phenomenon requires some research in the UK, but ecologists should be aware of the potential for larger numbers of this species to be present during the autumn and winter in prominent buildings in the landscape, urban or otherwise.

BCT Protocol for categorising the suitability of trees for bats (Collins, 2023).

Assessment	Description
NONE	Either no PRFs in the tree or highly unlikely to be any
FAR	Further assessment required to establish if PRFs are present in the tree
PRF	A tree with at least one PRF present

BCT Guidance for categorising suitability of PRFs for bats (Collins, 2023).

Assessment	Description
PRF-I	PRF is only suitable for individual bats or very small numbers of bats either due to size or lack of suitable surrounding habitats.
PRF-M	PRF is suitable for multiple bats and may therefore be used by a maternity colony

APPENDIX 2

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

OVERALL RISK ASSESSMENT

Table 3b: Stage 2 – Overall Risk Assessment

Site Risk Level (from Table 3a)	**Ecobat activity category**					
Site Risk Level	Nil (0)	Low (1)	Low-Moderate (2)	Moderate (3)	Moderate-High (4)	High (5)
Lowest (1)	0	1	2	3	4	5
Low (2)	0	2	4	6	8	10
Medium (3)	0	3	6	9	12	15
High (4)	0	4	8	12	16	20
Highest (5)	0	5	10	15	20	25

Overall assessment

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

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.

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).