



APPENDIX 6-2

BAT REPORT

Appendix 6-2 – Bat Survey Report

Crumhach Wind Farm, Co.
Sligo



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APPENDICES

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1.

INTRODUCTION

MKO was commissioned by SSE Renewables (Ireland) Ltd. to undertake an assessment of the potential effects of the Crumhach Wind Farm (the Proposed Project), Co. Sligo, on bats. The Proposed Project comprises a new renewable energy development, involving the removal of the existing 23 turbines at the Dunneill and Kingsmountain Wind Farms (Existing Wind Farm) and the construction of 17 new turbines, together with associated infrastructure. The development will make use of elements of the existing wind farm infrastructure where feasible, alongside new infrastructure required for the operation of the Proposed Project.

The Proposed Project includes the Proposed Wind Farm and the Proposed Grid Connection Route, together with associated and ancillary works. In broad terms, the development includes the removal of existing turbines, the construction and operation of the Proposed Turbines, the use and modification of existing wind farm infrastructure, the installation of new wind farm infrastructure and the proposed underground grid connection to the existing Srananagh 220 kV substation.

This report presents the results of bat surveys undertaken for the Proposed Project and provides an assessment of the potential effects of the development on bats. Where necessary, mitigation measures are proposed to avoid or reduce significant effects.

Bat surveys undertaken between 2024 and 2026 were designed in accordance with current best-practice guidance for wind energy developments and bats, primarily *Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation* (NatureScot, 2021), with additional reference to guidance produced by the Northern Ireland Environment Agency (NIEA) Natural Environment Division (NIEA, 2021; amended 2024). Surveys comprised a combination of desktop study, habitat and landscape appraisal, roost surveys, manual activity surveys and ground-level static detector surveys.

Survey effort in 2024 was undertaken based on an indicative turbine layout comprising 24 turbines, for which a network of ground-level static detectors was deployed across the Site. The layout has since been refined to include 17 proposed turbines and, as a result, some detector locations fall outside the final turbine layout. However, the remaining detectors continue to provide representative coverage of the habitats and landscape features within the Site.

In addition to the primary survey dataset collected for the Proposed Project, this assessment also incorporates supplementary information from previous baseline bat surveys undertaken for the Proposed Project, together with data from ongoing bat activity and fatality monitoring at the existing Dunneill and Kingsmountain Wind Farms. These operational wind farms are located within the Proposed Wind Farm area and provide valuable contextual information on bat activity, species occurrence and turbine collision risk within the local landscape.

As detailed in Section 1.1.1 of Chapter 1 of the EIAR, the following terminology is used throughout this report:

- Proposed Project – the entirety of the development assessed for the purposes of the Environmental Impact Assessment (EIA) Directive.
- the Site – the primary EIAR study area, defined by the EIAR Site Boundary shown in Figure 2-1 and encompassing approximately 1,546 ha.
- Proposed Wind Farm – the turbines and associated infrastructure including foundations, hardstandings, access tracks, temporary construction compounds, onsite 110 kV substation, internal underground cabling, LiDAR compounds, peat and spoil management areas, drainage infrastructure, biodiversity enhancement measures, turbine delivery route (TDR) accommodation works and other ancillary works.
- Proposed Turbines – the 17 turbines forming part of the Proposed Wind Farm.
- Proposed Grid Connection Route – the 110 kV underground cable connecting the proposed onsite 110 kV substation to the existing Srananagh 220 kV substation.

- Existing Wind Farm – the existing Dunneill and Kingsmountain Wind Farms.
- Existing Grid Connection – the existing underground cable connecting the existing wind farm control buildings to the Cunghill 110 kV substation.

For the purposes of the Environmental Impact Assessment, potential impacts on bats are considered across the construction, operational and decommissioning phases of the Proposed Project as defined below:

- The construction phase includes the removal of the existing 23 turbines and the construction of the proposed turbines and associated infrastructure.
- The operational phase includes the operation of the proposed turbines and associated infrastructure.
- The decommissioning phase includes the removal of the proposed turbines at the end of the operational lifespan of the development.

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

1.1

Background

Wind energy is a key component of Ireland's renewable energy strategy; however, operational wind farms have the potential to affect bats through both direct mortality and indirect impacts such as habitat loss, disturbance and displacement. Bat fatalities have been widely reported at wind farms worldwide, and global syntheses highlight the potential for cumulative impacts at population level in some regions (Arnett *et al.*, 2016).

In a European context, studies collated by Voigt *et al.* (2022) estimate that approximately 1.5–30 bats may be killed per turbine per year, although rates vary considerably between sites depending on turbine characteristics, landscape context and bat assemblages. Carcass-search data from the United Kingdom indicate fatality rates of 0–5.25 bats per turbine per month during peak activity periods (July–October) (Mathews *et al.*, 2016). While these figures cannot be directly transferred to an Irish context, the broadly similar bat assemblages of Ireland and Britain mean that they provide a useful reference point when considering potential collision risks. Fatality rates are also influenced by factors such as turbine height, rotor swept area, weather conditions and landscape characteristics that influence bat activity.

Bat mortality at wind farms is primarily associated with collisions with moving turbine blades (Horn *et al.*, 2008; Cryan *et al.*, 2014) and barotrauma, whereby rapid pressure changes near rotating blades can cause internal injuries (Baerwald *et al.*, 2008). In addition, several behavioural and environmental mechanisms have been proposed to explain why bats may be present around turbines, including the attraction of insects to turbine structures, the use of turbines as navigational or mating landmarks, and the influence of weather conditions on bat activity.

Repowering projects, which involve the replacement of existing turbines with modern turbine models, may alter turbine dimensions, rotor swept area and operational characteristics. These changes can influence potential collision risk and therefore require careful consideration during ecological impact assessment. In repowering developments, information from existing operational wind farms can provide valuable insights into local bat activity patterns and collision risk, helping to inform the assessment of potential effects associated with turbine replacement and changes in turbine dimensions. While the Proposed Project is a new renewable energy development, repowering elements are present within sections of the Existing Wind Farm.

For these reasons, robust pre-construction bat surveys are undertaken for proposed wind energy developments to establish baseline activity patterns, identify key habitats and commuting features, and assess potential collision risk associated with turbine operation and related infrastructure.

Bat Survey and Assessment Guidance

A range of guidance documents exists for surveying bats in the context of onshore wind energy developments across Europe, the UK and Ireland, reflecting a hierarchy of strategic, technical and national best practice guidance.

At a European level, the Advisory Committee to the EUROBATS Agreement (to which Ireland is a signatory) published the *Guidelines for Consideration of Bats in Wind Farm Projects* (Rodrigues et al., 2015). These provide a structured framework for assessing potential impacts on bats during the planning, construction and operational phases of wind energy developments. While informed by continental European bat assemblages, which differ in some respects from those in Ireland, the guidance provides an important strategic framework and continues to underpin subsequent national and regional guidance.

In the UK, wind farm-specific recommendations were previously included in Chapter 10 of the second edition of *Bat Surveys: Good Practice Guidelines* (Hundt, 2012). These were removed from the third edition (Collins, 2016) due to limitations in the available evidence base at that time. Natural England (2014) subsequently issued interim guidance interpreting EUROBATS advice for the UK context. Further technical discussion and interpretation have been provided through publications by the Chartered Institute of Ecology and Environmental Management (CIEEM), including technical guidance notes and practitioner updates.

The most comprehensive and widely applied technical guidance for onshore wind energy developments is currently *Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation* (NatureScot, 2021). This document replaced earlier guidance produced by NatureScot and Natural England and provides detailed, evidence-based recommendations on survey design, impact assessment (including collision risk and displacement), and mitigation, including curtailment.

In Ireland, Bat Conservation Ireland (2012) published *Bat Survey Guidelines for Wind Turbine/Wind Farm Developments in Ireland*, which outline surveyor competencies, health and safety considerations, survey methods and reporting standards. These guidelines provide a useful national context but pre-date the substantial growth in the evidence base relating to bat activity and mortality at wind farms and are therefore now considered to be of limited applicability as a standalone source of technical guidance.

Further Ireland-specific clarification has been provided by the Northern Ireland Environment Agency (NIEA) Natural Environment Division (NED) in its guidance on bats and onshore wind energy (NIEA, 2021; amended 2024), which builds on the NatureScot framework and provides additional direction on survey effort, seasonal coverage and mitigation design.

A recently published Irish-specific guidance document, *Bat Survey, Assessment and Mitigation Guidelines for Onshore Wind Turbines in Ireland* (Bat Conservation Ireland, 2026), became available during the preparation of this report, following completion of the baseline bat surveys for the Proposed Project. This document sets out a framework for bat survey, assessment and mitigation in an Irish context, drawing on existing sources such as NatureScot (2021), NIEA (2021; amended 2024), NPWS (2022), EUROBATS (2014/2015) and *Bat Surveys for Professional Ecologists: Good Practice Guidelines* (Collins, 2023). It includes additional detail on aspects such as site risk categorisation, survey effort, interpretation of bat activity and post-construction monitoring. This document is not a statutory or regulatory requirement, and the surveys undertaken for the Proposed Project were completed in accordance with established best practice guidance, in particular NatureScot (2021) with additional reference to NIEA (2021; amended 2024), and informed by Collins (2023), ensuring current best practice was applied throughout. The Bat Conservation Ireland (2026) guidance has been considered in the preparation of this report and has been reviewed and referenced where parameters are consistent with established guidance (e.g. spatial buffers applied within the desk study), but it has not altered the baseline surveys or the impact assessment presented.

1.3

Irish Bats: Legislation, Policy and Status

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

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

The NPWS monitors the conservation status of European protected habitats and species and reports their findings to the European Commission every 6 years in the form of an Article 17 Report. The most recent report for the Republic of Ireland was submitted in December 2025. Table 1-1 summarises the current conservation status of Irish bat species and identified threats to Irish bat populations.

Table 1-1 Irish bat species conservation status and threats (NPWS, 2025). 'Influence' of pressures and threats are ranked from Low to High in the 2025 Article 17 report.

Bat Species	Conservation Status	Principal Pressures and Threats
Common pipistrelle <i>Pipistrellus pipistrellus</i>	Favourable	PX04 No pressures or threats
Soprano pipistrelle <i>Pipistrellus pygmaeus</i>	Favourable	PX04 No pressures or threats
Nathusius' pipistrelle <i>Pipistrellus nathusii</i>	Unknown	PD01 Wind, wave and tidal power (including infrastructure)
Leisler's bat <i>Nyctalus leisleri</i>	Favourable	PD01 Wind, wave and tidal power (including infrastructure) - <i>Low</i> PF02 Construction or modification (e.g. of housing and settlements) in existing built-up areas - <i>Low</i>
Daubenton's bat <i>Myotis daubentonii</i>	Favourable	PA22 Drainage for use as agricultural land - <i>Medium</i> PF12 Residential, commercial and industrial activities and structures generating noise, light, heat or other forms of pollution - <i>Medium</i>
Natterer's bat <i>Myotis nattereri</i>	Favourable	PA04 Removal of small landscape features for agricultural land parcel consolidation (hedges, stone walls, rushes, open ditches, springs, solitary trees, etc.) - <i>Low</i> PB09 Clear-cutting, removal of all trees - <i>Low</i> PE01 Roads, paths, railroads and related infrastructure - <i>Low</i> PF01 Conversion from other land uses to built-up areas - <i>Low</i> PF02 Construction or modification (e.g. of housing and settlements) in existing built-up areas - <i>Low</i>
Whiskered bat <i>Myotis mystacinus</i>	Favourable	PA04 Removal of small landscape features for agricultural land parcel consolidation (hedges, stone walls, rushes, open ditches, springs, solitary trees, etc.) - <i>Low</i> PB09 Clear-cutting, removal of all trees - <i>Low</i> PE01 Roads, paths, railroads and related infrastructure - <i>Low</i> PF01 Conversion from other land uses to built-up areas - <i>Low</i> PF02 Construction or modification (e.g. of housing and settlements) in existing built-up areas - <i>Low</i>

Bat Species	Conservation Status	Principal Pressures and Threats
Brown long-eared bat <i>Plecotus auritus</i>	Favourable	PX04 No pressures or threats
Lesser horseshoe bat <i>Rhinolophus hipposideros</i>	Inadequate	PA04 Removal of small landscape features for agricultural land parcel consolidation (hedges, stone walls, rushes, open ditches, springs, solitary trees, etc.) - <i>Medium</i> PA15 Use of other pest control methods in agriculture (excluding tillage) - <i>Medium</i> PB09 Clear-cutting, removal of all trees - <i>Medium</i> PE01 Roads, paths, railroads and related infrastructure - <i>Medium</i> PF01 Conversion from other land uses to built-up areas - <i>Medium</i> PF02 Construction or modification (e.g. of housing and settlements) in existing built-up areas - <i>Medium</i> PF13 Drainage, land reclamation and conversion of wetlands, marshes, bogs, etc. for built-up areas - <i>Low</i> PH04 Vandalism or arson (incl. human introduced wild fire) - <i>Low</i> PJ01 Temperature changes and extremes due to climate change - <i>Low</i> PM07 Natural processes without direct or indirect influence from human activities or climate change - <i>Low</i>

1.4

Statement of Authority

MKO employs a dedicated bat unit within its Ecology Team, with expertise in scoping, undertaking and reporting bat surveys, as well as preparing ecological impact assessments. MKO ecologists have relevant academic qualifications and licences and are qualified in undertaking surveys to the levels required.

Survey scoping was prepared by Ryan Connors and Aoife Joyce. The daytime walkover survey and inspections were carried out by Ryan Connors, Nathan Finn and Emma Fitzgerald. Manual activity surveys were carried out by Ryan Connors, Charlie Meehan, David Culleton and Nathan Finn. Data manual ID was carried out by Ryan Connors and Charlie Meehan. This report was also prepared by Molly O'Hare and Emma Fitzgerald and was reviewed by Clare Mifsud and approved by Aoife Joyce. Staff's roles, relevant ecological experience and training is presented in Table 1-2 below.

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

Staff	Role	Qualifications and Training
Aoife Joyce (B.Sc., M.Sc., MCIEEM)	Project Director	B.Sc. (Hons) Environmental Science, University of Galway, Ireland M.Sc. (Hons) Agribioscience, University of Galway, Ireland Full member of Chartered Institute of Ecology and Environmental Management. Ecological Impact Assessments, Appropriate Assessment Screening Reports, Natura Impact Statements, Advanced Bat Survey Techniques (BCI), Bat Impacts and Mitigation (CIEEM), Bat Tree Roost Identification (BCI), Bats in Heritage Structures (BCI), Endoscope Training (BCI), Bats and Lighting (BCI), Kaleidoscope Pro Analysis (Wildlife Acoustics).
Molly O'Hare (B.Sc., M.Sc.)	Project Bat Ecologist	B.Sc. Ecology and Environmental Biology, University College Cork, Ireland M.Sc. Marine Biology, University College Cork, Ireland Bat Habitat Appraisal (Internal), Manual transect (Internal) Emergence surveys (ABC), Hand netting (ABC), Harp trapping (ABC), Mist netting

		(ABC). Kaleidoscope Pro Analysis (Wildlife Acoustics), Bat Impacts and Mitigation (CIEEM).
Emma Fitzgerald (B.Sc.)	Bat Ecologist	B.Sc. (Hons) Zoology, University College Cork, Ireland Kaleidoscope Pro Analysis (Wildlife Acoustics), Structure & Tree Inspection (Internal), Manual Transect Survey (Internal), Bat Habitat Appraisal (Internal), Emergence and Re-Entry Surveys (Internal), Introduction to Bats and Using Detectors (BCI).
Clare Mifsud (Ph.D.)	Project Bat Ecologist	B.Sc. (Hons) Biology and Chemistry (Hons), University of Malta M.Sc. Bat Ecology and Conservation, University of Malta Ph.D. Bat Ecology, Genetics and Conservation, University of Malta Bat Habitat Appraisal. Bat acoustic surveys (manual transects and statics deployment). Bat echolocation analysis and species identification (Kaleidoscope, Wildlife Acoustics). Roost survey techniques and winter bat hibernation census surveys (Wroclaw University, Poland). Preliminary Roost Assessments (PRA) - buildings and trees. Thermal Imaging for bat surveys. Bat capture, tissue sampling and handling techniques (University of Leeds, UK).
Ryan Connors (B.Sc., M.Sc.)	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).
Nathan Finn (B.Sc., M.Sc.)	Bat Ecologist	B.Sc. (Hons) Science, National University of Ireland, Galway M.Sc. (Hons) Environmental Science, University College Dublin Bat Detector and Survey Training (BCI), Kaleidoscope Pro Analysis (Internal), Endoscope Training (Internal), Structure & Tree Inspection (Internal), Manual Transect Survey (Internal), Bat Habitat Appraisal (Internal), Emergence and Re-Entry Surveys (Internal).
David Culleton (B.Sc., M.Sc.)	Bat Ecologist	B.Sc. Zoology, University College Cork, Ireland M.Sc. Conservation Behaviour, Atlantic Technological University, Galway, Ireland Specialist Bat Trapping, Handling and Identification (BCI), Bat Detector and Survey Training (BCI), Kaleidoscope Pro Analysis (Wildlife Acoustics), Endoscope Training (Internal), Structure & Tree Inspection (Internal), Manual Transect Survey (Internal), Bat Habitat Appraisal (Internal), Emergence and Re-Entry Surveys (Internal).
Charlie Meehan (B.A, M.Sc)	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)

2.

PROJECT DESCRIPTION

The Proposed Wind Farm is located on the northwest slopes of the Ox Mountains, approximately 4.5 km south of the village of Dromore West and approximately 3 km southwest of the village of Templeboy, Co. Sligo, at their nearest points. The Proposed Wind Farm will be accessed via the L6309 and L2702 Local Roads from the N59 National Road, which runs in an east–west direction north of the site, and the N17 National Road, which runs in a north–south direction to the southeast of the site. The existing entrance to the Existing Wind Farm will serve as the main site entrance for the Proposed Project, making use of existing access roads and infrastructure where feasible. Upgrades to additional existing site entrances along the L6309 and L2702 Local Roads and the provision of a new site entrance on the L2702 are also proposed to facilitate access to adjoining lands. The Site location is shown on Figure 2-1.

The Proposed Project comprises a new renewable energy development, involving the removal of the existing 23 turbines at the Dunneill and Kingsmountain Wind Farms (Existing Wind Farm) and the construction of 17 new turbines, each with an overall blade tip height of 176.6 to 180 metres, hub height of 105 metres to 110 metres and rotor diameter of 133.2 metres to 150 metres.

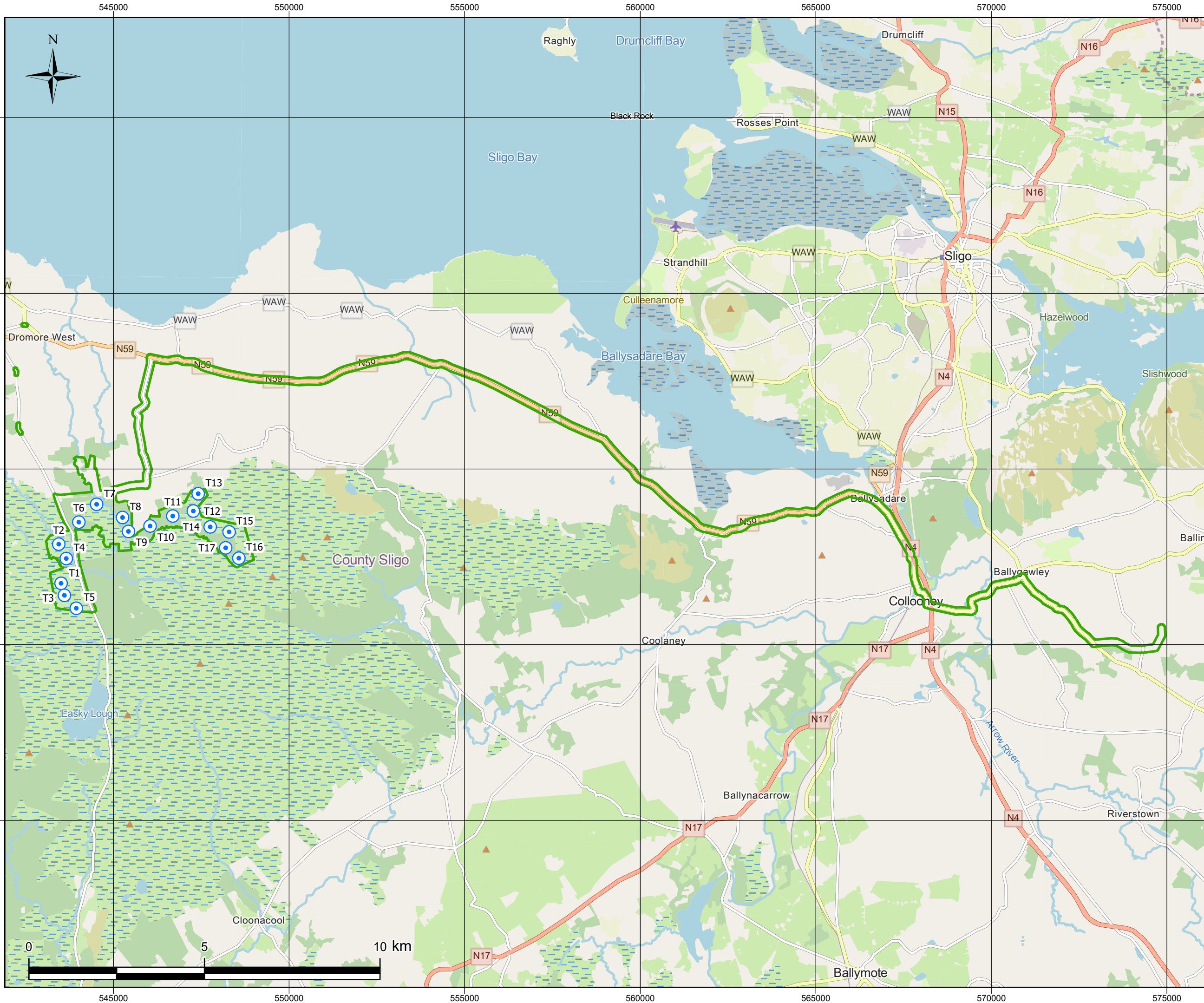
The Proposed Project will make use of elements of the existing wind farm infrastructure where feasible, together with the installation of new infrastructure required for the construction and operation of the development. Associated works will include turbine foundations and hardstanding areas, access tracks, an onsite 110 kV substation, internal underground electrical cabling, site drainage infrastructure and other ancillary works required for the construction and operation of the wind farm.

The Proposed Project also includes a Proposed Grid Connection Route comprising a 110 kV underground cable linking the proposed onsite substation to the existing Srananagh 220 kV substation. Existing grid infrastructure connecting the existing wind farms to the Cunghill 110 kV substation will also continue to be utilised.

Wind energy is an established land use within the area of the Site. The Proposed Wind Farm encompasses the existing Dunneill and Kingsmountain Wind Farms, which are currently owned and operated by SSE. Land use within the Proposed Wind Farm primarily comprises peatland habitats, with coniferous forestry located to the north-west, east and south of the site. Transitional woodland scrub occurs to the south of the Proposed Wind Farm, while the northern part of the site comprises pastoral agriculture and areas of low-density rural housing.

The Proposed Project is located within the EIAR Site Boundary, which encompasses an area of approximately 1,546ha.

The components of the Proposed Project described above represent the elements of the development considered in the assessment of potential impacts on bats presented in this report.



Map Legend

- Proposed Turbine Layout
- EIAR Site Boundary

Spatial Reference
Name: IREN95 Irish Transverse Mercator
Datum: IREN95
Projection: Transverse Mercator

SITE LOCATION - NOT TO SCALE

Site Location

Project Title
**Crumhach Wind Farm,
Co. Sligo**

Project No. 230841	Drawing No. 2-1	Scale 1:100,000
Drawn By AM	Checked By MNR	Date 29/06/2026

Email: info@mkofireland.ie / Website: www.mkofireland.ie

3. METHODS

3.1 Consultation

A Scoping Document outlining the Proposed Project was prepared by MKO and circulated to consultees in September 2024. As part of this exercise, relevant stakeholders were contacted, including Bat Conservation Ireland (BCI) and the Department of Housing, Local Government and Heritage – Development Applications Unit (DAU), who were invited to comment on the potential for the Proposed Project to affect bats.

Members of the Project Team, including project ecologists, also met with the National Parks and Wildlife Services (NPWS) on 10th February 2026 to discuss the Proposed Project and the scope of ecological assessments.

Details of consultation responses relevant to bats are provided in Section 4.1 below. Full consultation and scoping details are presented in Chapter 2 of this EIAR.

3.2 Desk Study

A desk study was undertaken prior to field surveys to provide ecological context for the Proposed Project and to inform both the design of bat surveys and the subsequent assessment of potential impacts. The desk study included a review of published and publicly available information, together with relevant project-specific datasets and reports available to MKO or obtained from the relevant parties. These sources included baseline bat survey data prepared in support of the proposed lifetime extension of the existing Dunneill Wind Farm, previous baseline bat survey data for the Proposed Project, post-construction monitoring information from the existing Dunneill Wind Farm and bat collision monitoring data from Kingsmountain Wind Farm, bat records, bat species distribution, designated site information, landscape mapping, and information on other developments in the wider area. The sources consulted for the desk study are described below.

3.2.1 Dunneill Wind Farm Lifetime Extension Baseline Surveys (2021)

Baseline bat surveys were undertaken by MKO in 2021 at the operational Dunneill Wind Farm to inform the Environmental Impact Assessment Report (EIAR) prepared in support of the proposed lifetime extension of the wind farm. These surveys included roost inspections and emergence surveys, manual activity surveys, ground-level static detector surveys, height monitoring surveys, and collision monitoring. The survey information was reviewed as part of the desk study to provide contextual information on bat activity, species composition, habitat use, collision risk and mortality patterns within the wider wind farm landscape surrounding the Proposed Project.

3.2.2 Previous Proposed Project Baseline Surveys (2023)

Baseline bat surveys were undertaken by MKO within the Proposed Wind Farm in 2023. These surveys included a bat habitat appraisal, roost surveys, manual activity surveys and ground-level static detector surveys. Although the 2023 data are now outside the standard temporal validity period typically applied in EIAR assessments, the survey information was reviewed as part of the desk study and is presented as supplementary information to provide additional context on baseline conditions and to complement the 2024 survey results. Full methods and summary results from the 2023 surveys are provided in **Appendix 1**.

3.2.3

Operational Monitoring Information from Existing Wind Farm

Operational monitoring reports and associated datasets from the Existing Wind Farm were reviewed as part of the desk study to inform the current assessment. At the time of writing, post-construction monitoring reports from Dunneill Wind Farm for 2024 and 2025 were available. These reports were prepared to satisfy planning condition compliance requirements associated with the Dunneill Wind Farm Lifetime Extension permission (Pl. Ref. 22/291) granted by Sligo County Council and were undertaken in accordance with the Bat Mitigation and Monitoring Plan described in Section 6.2 of the Bat Survey Report (Appendix 6-2 of the EIAR; MKO, 2022), as required under Condition 1 of the granted permission.

In addition, bat collision monitoring data from Kingsmountain Wind Farm for 2024 were reviewed to provide contextual information on bat mortality patterns within the wider operational wind farm landscape surrounding the Proposed Project.

The Dunneill Wind Farm reports included information on bat activity, fatalities and roosting habitat, while the Kingsmountain dataset was limited to collision monitoring data. These sources were used, where relevant, to inform the bat assessment for the Proposed Project, including contextual information on bat activity and fatalities within the wider area. The collision monitoring methodology used for both Dunneill Wind Farm and Kingsmountain Wind Farm is provided in **Appendix 2**.

3.2.4

Bat Records

The National Bat Database of Ireland holds records of bat observations maintained by Bat Conservation Ireland (BCI), including records from national monitoring schemes, roost records and ad-hoc observations. A search of the National Bat Database of Ireland was undertaken on 13th January 2026 for bat records within a 10 km radius of the Proposed Wind Farm central point (Irish Grid Reference: G 45675 28003). The 10 km radius is consistent with best-practice guidance for wind farm bat assessments (NatureScot, 2021; BCI, 2026). Available bat records were subsequently provided by BCI on 3rd February 2026.

Records from the National Biodiversity Data Centre (NBDC) were also reviewed to identify bat species recorded within the relevant 10 km grid squares (hectads) surrounding the Proposed Project.

3.2.5

Bat Species' Range

EU Member States are required to monitor the conservation status of natural habitats and species listed under the Habitats Directive and report their findings to the European Commission every six years under Article 17. In August 2025, Ireland submitted the fourth national assessment of conservation status for Annex-listed habitats and species, including all bat species (NPWS, 2025).

The 2025 Article 17 Reports were reviewed to determine the distribution and range of bat species in relation to the Proposed Wind Farm. Particular attention was given to identifying species occurring at the edge of their known range, as these may present higher sensitivity in the context of wind energy developments (NatureScot, 2021).

3.2.6

Designated Sites

A search for designated conservation sites relevant to bats was undertaken within a 10 km radius of the Proposed Wind Farm (NatureScot, 2021; BCI, 2026). Data was obtained from the National Parks and Wildlife Service (NPWS) website and map viewer. The search included European designated sites

(Special Areas of Conservation, SACs) and nationally designated sites (Natural Heritage Areas, NHAs and proposed Natural Heritage Areas, pNHAs) relevant to bat conservation.

3.2.7 Landscape Features

3.2.7.1 Ordnance Survey Mapping

Ordnance Survey Ireland (OSI) mapping (1:5,000 and 1:50,000 scale) and aerial imagery were reviewed to identify landscape features that may provide suitable commuting or foraging habitat for bats. Features examined included woodlands, forestry plantations, hedgerows, treelines and watercourses. Potential roosting features such as buildings and bridges were also identified for further investigation during field surveys.

3.2.7.2 Underground Sites

The Geological Survey Ireland online mapping tool and the University of Bristol Speleological Society Cave Database for the Republic of Ireland were consulted to identify any natural subterranean sites, such as caves, with potential to support bat roosts within 10 km of the Proposed Wind Farm (NatureScot, 2021). In addition, the National Inventory of Architectural Heritage and National Monuments Service datasets were reviewed for records of manmade underground structures, such as souterrains, within 10 km of the Proposed Wind Farm that may provide suitable bat roosting habitat (NatureScot, 2021). These sources were last consulted on 13th January 2026.

3.2.7.3 National Biodiversity Data Centre Bat Landscape Mapping

The National Biodiversity Data Centre map viewer includes “Bat Landscape” models developed by Lundy *et al.* (2011) which assess habitat suitability for bat species across Ireland using Maximum Entropy modelling. The model outputs provide a habitat suitability index on a five-point scale ranging from high suitability (red) to low suitability (green).

The location of the Proposed Wind Farm was reviewed in relation to these habitat suitability indices in order to assess modelled bat habitat suitability within the Proposed Wind Farm and the surrounding landscape. It should be noted that the model outputs are based on predictive habitat modelling rather than confirmed bat records. Nevertheless, they provide a useful indication of areas where conditions may be favourable for bats within the wider landscape.

3.2.7.4 Additional Projects in the Wider Landscape

A search for existing, permitted and proposed wind energy developments within 10 km of the Proposed Wind Farm was undertaken in line with best practice guidance (NatureScot, 2021). The interactive wind energy map maintained by Wind Energy Ireland (windenergyireland.com) was reviewed in conjunction with wind farm planning applications from Sligo County Council. Other infrastructure developments and proposals, such as road projects and extractive industries, were also noted. Information on the location and scale of these developments was gathered to inform the cumulative impact assessment. More details on other infrastructure developments within the vicinity of the Proposed Project are provided in Chapter 2 of the main EIAR.

All information gathered during the desk study was used to inform the design and spatial coverage of bat surveys undertaken for the Proposed Project. In particular, the identification of potential roosting features, landscape connectivity and records of bat activity within the wider area helped guide the location of survey effort and informed the assessment of potential effects on bats associated with the Proposed Project, including potential cumulative effects with other developments in the wider landscape.

3.3 Field Surveys

3.3.1 Multidisciplinary Surveys

Multidisciplinary walkover surveys were undertaken throughout 2023, 2024, 2025 and 2026. These comprised systematic site walkovers to ground-truth habitat mapping and inform the baseline ecological assessment of the Site.

Habitats were classified in accordance with standard ecological practice, and features of ecological relevance, including watercourses, treelines and structures such as bridges and culverts, were identified. These surveys provided an initial high-level assessment of habitat suitability for fauna, including bats, and informed the design and targeting of dedicated bat surveys.

Dates for multidisciplinary walkover surveys and dedicated bat surveys are provided in Table 3-1.

Table 3-1 Multidisciplinary and dedicated bat survey effort

Multidisciplinary Survey	Dedicated Bat Survey
21 st June 2023	20 th April 2023
4 th July 2023	10 th May 2023
2 nd August 2023	15 th June 2023
2 nd July 2024	17 th August 2023
3 rd July 2024	5 th September 2023
16 th September 2025	11 th June 2024
17 th September 2025	13 th August 2024
18 th September 2025	17 th September 2024
19 th February 2026	17 th July 2025
	12 th August 2025
	2 nd March 2026

3.3.2 Bat Habitat Suitability Appraisal

Targeted bat habitat suitability surveys were undertaken throughout 2023, 2024, 2025 and 2026. These surveys focused on assessing habitats and features within the Site for their potential to support roosting, foraging and commuting bats.

Particular attention was given to features with roost potential, including trees, structures and watercourse crossings, as well as linear features that may function as commuting routes. Connectivity with the wider landscape was also considered.

Assessment was undertaken in accordance with the criteria set out in Collins (2023), which provides a standardised approach to classifying bat roost potential and the suitability of habitats for foraging and commuting. Habitats were assigned to one of the following categories *High*, *Moderate*, *Low*, *Negligible* or *None*, as described in **Appendix 3**.

3.3.3 Roost Surveys

Daytime Roost Inspections

A search for roosts was undertaken within the Proposed Wind Farm and within 200 m plus the maximum rotor radius (75 m) of each proposed turbine location, in line with NatureScot (2021). The aim was to determine the presence of roosting bats and the need for further survey work or mitigation.

Daytime roost inspections within the Proposed Wind Farm were carried out in June, August and September 2024. Walkover surveys were carried out and included a search for Potential Roosting

Features (PRFs) in trees, buildings, and other structures where present. These were assessed for their potential to support roosting bats according to Collins (2023) (see **Appendix 3** for roost assessment criteria).

A total of five structures of potential relevance to bats were identified within the Proposed Wind Farm and were subject to detailed inspection of the exterior and interior where accessible (Table 3-2). These comprised one derelict stone ruin (S1), three bridges (S2, S7 and S8), and one operational building (S16). Inspections included a search for evidence of bat use, including live or dead specimens, droppings, feeding remains, urine splashes, fur oil staining and audible vocalisations.

Table 3-2 Structures inspected during daytime roost surveys (2024)

Structure ID	Description	Irish Grid Reference	Nearest Proposed Turbine	Distance to nearest turbine (m)
S1	Derelict stone ruin	G 44004 27332	T4	350
S2	Bridge 1	G 43872 28157	T6	360
S7	Bridge 6	G 44585 25662	T5	600
S8	Bridge 7	G 44065 26993	T1	580
S16	Kingsmountain Control building	G 47500 28570	T12	280

Targeted ground-level inspections were undertaken of broadleaved trees within the wind farm development footprint, including the Turbine Delivery Route (TDR) works areas with particular emphasis on trees scheduled for felling. Commercial conifer plantations were excluded from detailed tree inspection as they do not provide suitable roosting features for bats due to their species composition, uniform structure and intensive management regime, which limits the development of cavities, cracks, loose bark or other potential roost features.

Each broadleaved tree scheduled for felling was systematically inspected for rot holes, hazard beams, cracks and splits, partially detached bark, knot holes, gaps between overlapping branches and any other potential roost features (PRFs), in accordance with Andrews (2018). Inspections were undertaken using a high-output torch, thermal imaging camera and endoscope, with safe ladder access used where required to facilitate closer inspection of features at height.

The Proposed Grid Connection Route, including watercourse crossing infrastructure, and turbine delivery route accommodations works areas, were also assessed for any suitability to host roosting bats. Surveys were carried out in September 2025 and March 2026 and comprised an inspection of existing infrastructure to look for evidence of bat use and assess the roosting suitability according to Collins (2023).

Emergence Surveys

Emergence surveys at dusk were carried out which focused on the potential roost features (PRFs) identified during the bat habitat appraisal. During these surveys, surveyors were equipped with Batlogger M bat detectors (Elekon AG, Lucerne, Switzerland). The emergence surveys commenced at least 15 minutes before sunset and concluded approximately 1 hour and 30 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 and features used). All bat echolocation was recorded for subsequent analysis to confirm species identifications.

Surveyors were positioned at PRFs identified during the daytime roost inspection surveys with a focus on potential access points and roosting features. The purpose was to identify any bat species present, the number of individuals emerging, access points used and potential roost locations within the structure. Surveys were undertaken in weather conditions considered suitable for bat activity in accordance with best practice guidance.

Table 3-3 Emergence survey effort (2024)

Date	Surveyors	Sunset	Weather Conditions
11 th June 2024	Ryan Connors and Charlie Meehan	22:08	11-12 °C, Dry, calm
17 th September 2024	Ryan Connors and Nathan Finn	19:45	16-18 °C, Dry, calm

3.3.4

Manual Transects

Manual activity surveys comprised walked transects conducted after dusk. A series of representative transect routes were selected throughout the Proposed Wind Farm, 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.

Transects were walked by two surveyors, recording bats in real time. Transects commenced immediately after the dusk emergence surveys (where undertaken) 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 2024. Table 3-3 summarises survey effort in relation to manual transects and routes are shown in Figure 3-1.

Table 3-3 Manual transect survey effort (2024)

Date	Surveyors	Sunset	Start Time	Weather Conditions	Transect Length (km)
11 th June 2024	Ryan Connors and Charlie Meehan	22:08	23:38	10-11 °C, Dry, calm	7.2
13 th August 2024	Ryan Connors and Charlie Meehan	21:09	21:09	12-14 °C, Dry, calm	8
17 th September 2024	Ryan Connors & Nathan Finn	19:45	21:00	16-18 °C, Dry, calm	8.4

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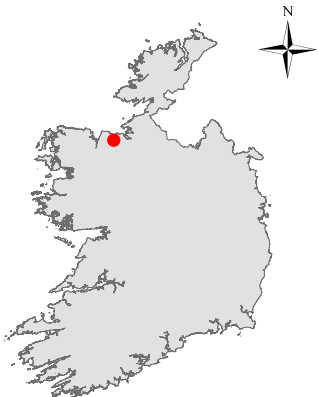
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Map Legend

- Proposed Turbine Layout
- EIAR Site Boundary
- Spring Transect Route
11.06.2024
- Summer Transect Route
13.08.2024
- Autumn Transect Route
17.09.2024

Spatial Reference
Name: IREN95 Irish Transverse Mercator
Datum: IREN95
Projection: Transverse Mercator

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SITE LOCATION - NOT TO SCALE

Drawing Title

Survey Effort 2024

Project Title

Crumhach Wind Farm,
Co. Sligo

Project No.

230481

Drawing No.

3-1

Scale

1:20,000

Drawn By

AM

Checked By

MNR

Date

29/06/2026



Email: info@mkofireland.ie / Website: www.mkofireland.ie

3.3.5 Ground-level Static Surveys

Where developments have less than 10 turbines, NatureScot (2021) recommends one detector per turbine, while for larger developments the guidance suggests an additional detector for every three turbines. Given that 17 turbines are proposed, 13 detectors were deployed across the Proposed Wind Farm during the 2024 survey season in line with NatureScot (2021) guidance. Turbines T4, T10, T12 and T14 were not directly associated with a dedicated detector location; however, all habitat types and landscape features present around these turbines were represented within the deployed detector network across the Proposed Wind Farm.

Detector placement was based on indicative turbine locations available at the time of survey and therefore differs slightly from the final proposed layout. Detector locations are described in Table 3-4, and Figure 3-2 presents static detector locations in relation to the final proposed turbine layout. Overall, a good spatial spread in relation to the Proposed Turbines and a representative sample of the range of available habitats was achieved.

Table 3-4 Ground-level static detector locations (2024 and 2025)

Detector ID	Irish Grid Reference	Habitat Context	Linear Feature within 50m	Nearest Turbine(s)
D01	G 45555 25191	Upland blanket bog (PB2), Conifer plantation (WD4)	Conifer firebreak	T5
D05	G 44246 26950	Conifer plantation (WD4)	Stream	T1
D06	G 43771 26345	Upland blanket bog (PB2), Wet heath (HH3)	None	T3
D07	G 43393 27788	Upland blanket bog (PB2), Wet heath (HH3)	None	T2
D08	G 44078 28219	Upland blanket bog (PB2), Wet heath (HH3), Conifer plantation (WD4)	Conifer edge & stream	T6
D09	G 44602 28906	Wet heath (HH3), Conifer plantation (WD4)	Conifer edge	T7
D10	G 45398 28673	Conifer plantation (WD4)	Conifer firebreak	T8
D11	G 45540 28038	Buildings and artificial surfaces (BL3), Conifer plantation (WD4)	Conifer edge	T9
D12	G 46722 28866	Upland blanket bog (PB2), Conifer plantation (WD4)	Conifer edge	T11
D13	G 47501 29118	Conifer plantation (WD4)	Conifer edge	T13
D14*	G 48290 28237	Buildings and artificial surfaces (BL3), Recolonising bare ground (ED3), Upland blanket bog (PB2)	None	T15
D15	G 48457 27796	Recolonising bare ground (ED3), Buildings and artificial surfaces (BL3), Upland blanket bog (PB2)	Conifer edge	T17
D16	G 48902 27448	Buildings and artificial surfaces (BL3), Recolonising bare ground (ED3), Upland blanket bog (PB2)	None	T16

*D14 was redeployed in summer 2025.

Automated bat detectors were deployed to achieve at least 10 nights in spring, 20 nights in summer and 10 nights in autumn, in accordance with NatureScot (2021). Due to site access and weather constraints, the spring survey period was undertaken between 29th May and 11th June 2024 (Table 3-5). This period overlaps with early summer; however, it coincides with the onset of regular bat activity at upland sites and is considered appropriate to characterise early-season bat activity. For the purposes of analysis and presentation, this survey period is referred to as the ‘spring’ survey period.

One detector (D14) was redeployed in summer 2025 due to detector failure in summer 2024 and is included in this report to supplement the seasonal dataset.

Full spectrum bat detectors (Song Meter SM4BAT, Wildlife Acoustics, Maynard, MA, USA) were deployed using manufacturer-recommended settings for bat surveys, with minor adjustments to gain and band pass filters to reduce background noise. Detectors were programmed 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, USA) was deployed during each survey period, and night-time hourly data were tracked remotely to ensure that a sufficient number of survey nights were undertaken under appropriate weather conditions (i.e. dusk temperatures above 8°C, wind speeds below 5 m/s and no or only very light rainfall). Table 3-5 summarises the survey effort achieved in 2024 and 2025 for each detector location.

Table 3-5 Ground-level static detector survey effort (2024 and 2025)

Season	Survey Period	Total Survey Nights per Detector Location	Nights with Appropriate Weather
Late spring - early summer 2024	29 th May – 11 th June 2024	13	13
Summer 2024	17 th July – 12 th August 2024	27	26
Autumn 2024	29 th August – 17 th September 2024	19	17
Total Survey Effort (2024)		59	56
Summer 2025 (Detector D14 only)	17 th July – 12 th August 2025	26	20
Total Survey Effort (2025)		26	20
Overall Total Survey Effort		85	76

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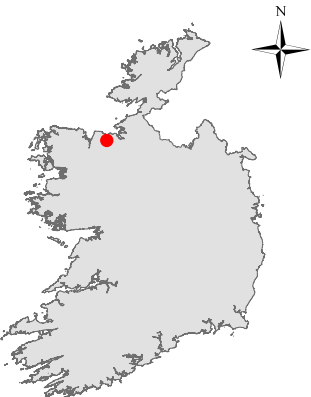
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Map Legend

- ElAR Site Boundary
- Proposed Turbine Layout
- 2024 Static Detector Locations

Spatial Reference
Name: IRENET95 Irish Transverse Mercator
Datum: IRENET95
Projection: Transverse Mercator



SITE LOCATION - NOT TO SCALE

Static Detector Location
2024

Project Title
Crumhach Wind Farm,
Co. Sligo

Project No. 230481	Drawing No. 3-2	Scale 1:20,000
Drawn By AM	Checked By MNR	Date 29/06/2026



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3.4 Bat Call Analysis

All sound recordings were analysed using bat call analysis software, Kaleidoscope Pro v.5.4.8 (Wildlife Acoustics, MA, USA). The aim was to identify, to a species or genus level, the bats present at the Proposed Wind Farm. All recordings were first processed using the Auto ID function of Kaleidoscope, utilising a site-specific custom classifier that included only species found within Ireland.

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 against published signal characteristics for local bat species (Russ, 2012) to manually verify species identification. All recordings were manually reviewed in Kaleidoscope to determine the final species identification.

Myotis species potentially including Daubenton's bat (*Myotis daubentonii*), whiskered bat (*Myotis mystacinus*) and Natterer's bat (*Myotis nattereri*) were classified as a single *Myotis* spp. group, due to the recognised difficulty in reliably distinguishing these species based on echolocation parameters alone (Russ, 2012). The echolocation calls of soprano pipistrelle (*Pipistrellus pygmaeus*) and common pipistrelle (*Pipistrellus pipistrellus*) are more readily distinguished based on peak frequency of maximum energy in search-phase calls (approximately 55 kHz and 45 kHz respectively; Jones & van Parijs, 1993).

Plate 3-1 below shows typical sonograms of echolocation pulses for the different pipistrelle bat species recorded with an SM4BAT static bioacoustics recording device. The recordings are illustrated using Wildlife Acoustics Kaleidoscope software.

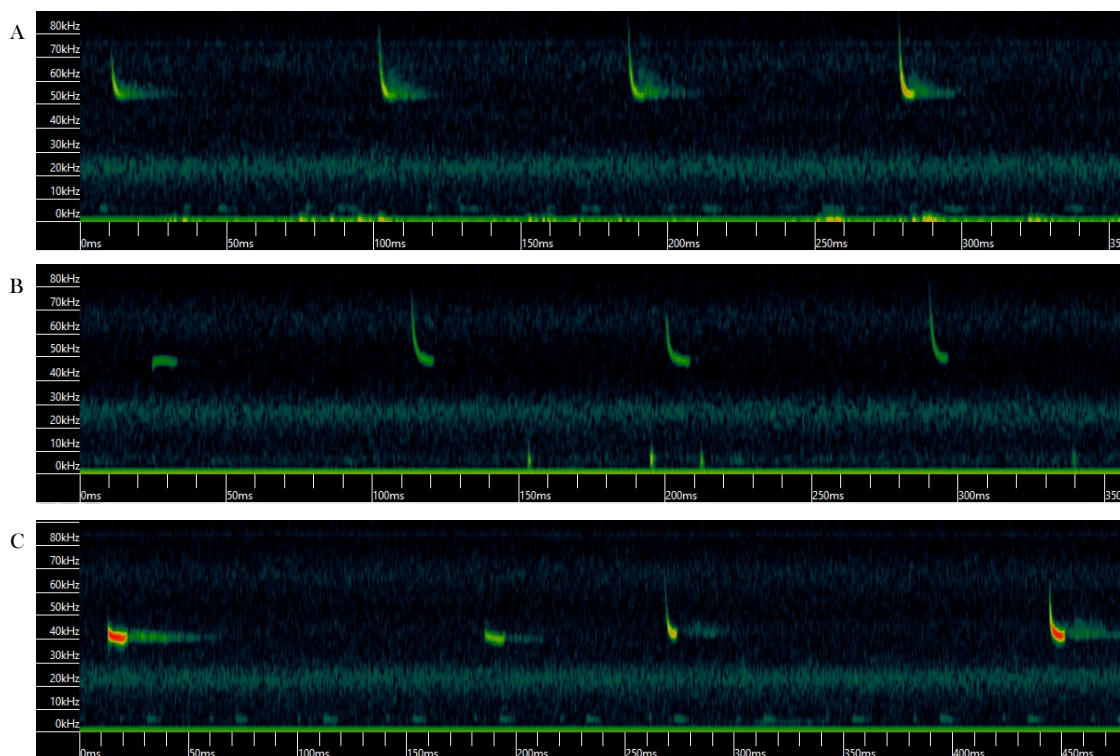


Plate 3-1 Spectrogram of echolocation pulses of (A) Soprano pipistrelle (Peak Frequency 55kHz), (B) Common pipistrelle (Peak Frequency 45kHz) and (C) Nathusius' pipistrelle (Peak Frequency 39kHz).

Echolocation calls produced by brown long-eared bats (*Plecotus auritus*) are intrinsically low in amplitude and therefore more difficult to detect using static acoustic equipment, while calls produced by lesser horseshoe bats (*Rhinolophus hipposideros*) are highly directional and may be missed by detectors, particularly during manual surveys. To reduce the potential for under-recording of the latter species, MKO deploys omni-directional microphones as part of the acoustic survey methodology.

Manual verification of recorded data also included the review of files classified by Kaleidoscope as ‘Noise’ and ‘No ID’. This approach ensures that calls from quieter or more difficult-to-detect species are not overlooked during automated processing. Despite this additional level of scrutiny, some degree of underrepresentation is still expected for these species, and this limitation has been taken into account in the interpretation of activity levels and subsequent assessment.

Plate 3-2 illustrates typical spectrograms of echolocation pulses for *Myotis* spp., brown long-eared bat and Leisler’s bat, as well as an example of a non-bat noise file, all recorded using an SM4BAT static bioacoustics recording device and displayed within Wildlife Acoustics Kaleidoscope software.

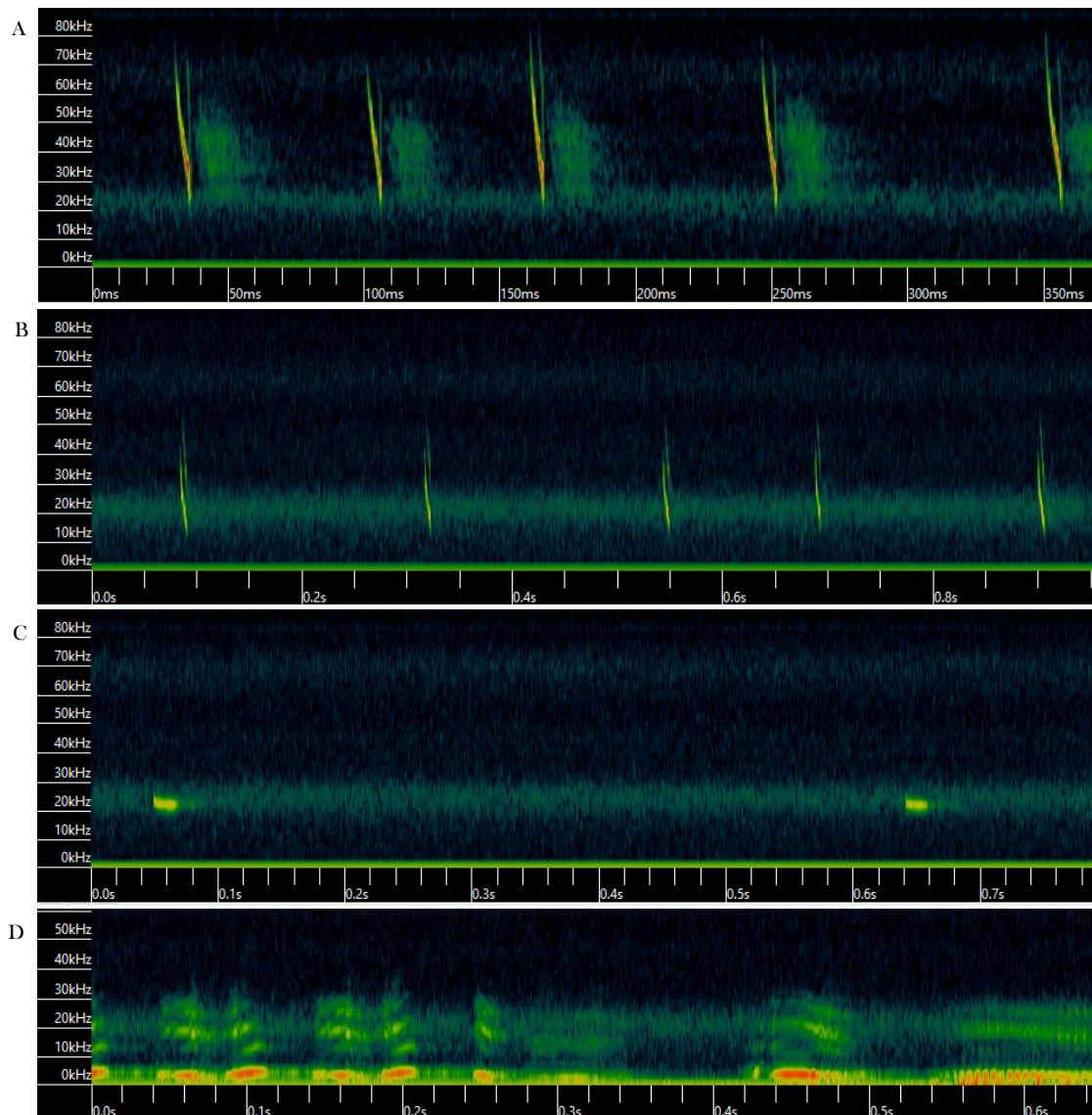


Plate 3-2 Spectrogram of typical echolocation pulses of (A) *Myotis* spp., (B) Brown long-eared bat, (C) Leisler’s bat and (D) typical non-bat sounds.

Individual bats of the same species cannot be distinguished using echolocation alone; therefore, ‘bat passes’ were used as a measure of activity (Collins, 2023). A bat pass was defined as a recording of an individual species or species group’s echolocation sequence containing at least two pulses and of a maximum duration of 15 seconds. All bat passes recorded during the surveys were classified in accordance with these criteria, allowing consistent comparison across survey periods and locations.

In some instances, more than one bat pass occurred within a single recording file. In such cases, the final species classification assigned to the file was based on the rarer or more difficult-to-detect species

present. This precautionary approach minimises the risk of under-representing less frequently encountered taxa within multi-pass recordings. This conservative treatment ensures that activity levels are not biased towards more common, highly detectable species and supports a precautionary interpretation of potential impacts within the Environmental Impact Assessment Report.

3.5 Assessment of Bat Activity Levels

Data Processing and Standardisation

Following automated classification and full manual verification using Kaleidoscope Pro, statistical analysis and data visualisation were undertaken using RStudio (version 2025.05.0+496) and R (version 4.4.2). RStudio, an integrated development environment for the R programming language, was employed for data cleaning, standardisation, exploration and visualisation. Bat activity was standardised to bat passes per hour (bp/h), calculated as the total number of bat passes per night divided by the duration of each recording period, to account for seasonal variation in night length (Matthews *et al.*, 2016). As bat activity is inherently variable between survey nights, the median nightly bp/h was used as the primary measure of activity at each detector location (Lintott & Mathews, 2018), with maximum nightly values used to characterise peak activity. During all calculations, values were rounded to three decimal places. When visualising seasonal activity patterns, survey effort was defined as total detector hours (i.e. the cumulative recorded hours across all detectors within a season) to account for any variation in deployment effort.

Derivation of Site-Specific Activity Thresholds

The methodology used to assess activity levels across the Proposed Wind Farm was adapted from Matthews *et al.* (2016). For widespread species (*Pipistrellus pipistrellus*, *Pipistrellus pygmaeus*, *Nyctalus leisleri*), activity ranges were determined using the average of the maximum nightly bat pass rate (bp/h) across all detectors, divided into quartiles. For all other species groups (*Myotis* spp., *Plecotus auritus* and *Pipistrellus nathusii*), the maximum nightly bat pass rate (bp/h) recorded across all detectors, divided into quartiles, was used.

Median and maximum nightly activity (bp/h) at each detector location were categorised as Low, Moderate or High for each recorded season. Figures below 25% of the maximum or mean maximum nightly pass rate were classified as Low activity, while values above 75% were classified as High activity. Values falling between these two quartiles were defined as Moderate activity. To avoid distortion of thresholds, statistical outliers were identified using box-and-whisker plots and excluded prior to final threshold calculation. The resulting site-specific activity thresholds for each species group are presented in Table 3-6.

Table 3-6 Site-specific activity level categories based on maximum bat passes per hour (bp/h)

Assessment Level	Activity thresholds (bat passes per hour, bp/h) by species				
	Soprano and common pipistrelles	Nathusius' pipistrelle	Leisler's bat	<i>Myotis</i> spp.	Brown long-eared bat
Low	< 1.91	< 0.03	< 0.82	< 1.78	< 0.45
Moderate	1.91 – 5.73	0.03 – 0.08	0.82 – 2.47	1.78 – 5.33	0.45 – 1.35
High	> 5.73	> 0.08	> 2.47	> 5.33	> 1.35

Site-Specific Ranked Activity Scoring (1–5 Risk Scale)

A weighted site-specific activity score was also calculated for each detector and season. This method integrates the relative contribution of Low, Moderate and High activity records using a weighted mean approach, where numeric weights of 1 (Low), 2 (Moderate) and 3 (High), were applied to the number of records falling within each activity class. The weighted mean score was then rescaled and converted

into a five-tier ranked activity scale, as shown in Table 3-7. This approach ensures that detectors with a higher proportion of moderate and high activity records receive proportionately higher ranked scores, rather than relying solely on maximum values. This ranked system provides a five-class site-specific activity framework aligned in terminology with commonly used bat activity classifications but is derived entirely from absolute site-specific bpph values rather than from regional percentile comparison. These ranked scores are applied within the subsequent collision risk and impact assessment to provide a consistent and transparent basis for comparative risk evaluation across detector locations and seasons.

Table 3-7 Site-specific ranked bat activity intensity classes for risk assessment use

Ranked Score	Bat Activity Class
1	Low
2	Low – Moderate
3	Moderate
4	Moderate – High
5	High

A site-specific activity threshold approach was adopted for this assessment in preference to reliance on third-party percentile-based tools, as it allows full transparency, reproducibility and long-term comparability of results. While regional benchmarking tools provide useful contextual summaries, they do not provide access to the underlying comparator datasets, thereby limiting independent interrogation and re-analysis of results. In contrast, the use of absolute bat pass rates (bpph), median and maximum values, together with weighted activity scoring and graphical outputs, enables clear spatial and species-specific interpretation of activity patterns in direct relation to detector locations, habitats and turbine layout.

This approach also ensures that the current baseline dataset remains fully future-proofed and directly comparable with any future post-construction or long-term monitoring datasets, independent of changes in third-party platforms, reference databases or classification algorithms. For these reasons, the site-specific approach is considered the most robust and appropriate method for informing turbine-scale impact assessment and mitigation design for the Proposed Project.

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 Table 3-8, 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 2025 Article 17 reports (NPWS, 2025). Feeding and commuting behaviours, and habitat preferences for bat species in Ireland were also considered.

Table 3-8 Population Vulnerability of Irish Bat Species (Adapted from NatureScot, 2021)

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
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3.6.2 Site Risk

The likely impact of a Proposed Project on bats is related to site-based risk factors, including habitat and development features. The cross-tabulation result of habitat risk and project size determines the site risk (i.e. Low, Medium or High) (Table 3-6) i.e. Table 3a from NatureScot (2021). Table 5-1 in the results section describes the criteria and site-specific characteristics used to determine an indicative risk level for the Proposed Wind Farm. All site assessment levels, as per NatureScot (2021) are presented in **Appendix 4**.

Table 3-9 Site-risk Level Assessment Matrix (Table 3a, NatureScot, 2021)

		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)
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3.6.3 Overall Risk Assessment

An overall risk assessment was made by combining the site risk level (i.e. Low/Medium/High) and the Ecobat activity category (or the equivalent site-specific activity level thresholds), as shown in the overall risk assessment matrix table (Table 3-10) i.e. Table 3b from 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 5**).

Table 3-10 Overall Risk Assessment Matrix (Table 3b, NatureScot 2021)

Site Risk Level	Ecobat activity category (equivalent site-specific activity level thresholds)					
	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

Low Overall Risk (0-4)	Medium Overall Risk (5-12)	High Overall Risk (15-25)
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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 (Table 3-8 above).

3.7

Limitations

A comprehensive suite of bat surveys was undertaken for the Proposed Project in 2024, with additional targeted and supplementary surveys completed in 2025 and 2026. The surveys were undertaken in accordance with NatureScot (2021) and other relevant guidance and provide a robust evidence base to inform the assessment of potential impacts of the Proposed Project on bats.

The information presented in this report is considered sufficient to characterise the baseline environment, inform the assessment of likely effects, and identify appropriate mitigation measures. The specialist surveys, analysis and reporting have been undertaken in accordance with current best practice guidance.

While minor constraints such as weather conditions and access limitations are inherent to ecological field surveys, these did not materially influence the overall findings. Overall, the assessment is considered robust and proportionate to the scale and nature of the Proposed Project.

4.

SURVEY RESULTS

4.1

Consultation

A scoping consultation exercise was undertaken in September 2024 to inform ecological survey requirements and the assessment of potential impacts associated with the Proposed Project.

Bat Conservation Ireland (BCI)

Bat Conservation Ireland (BCI) provided a response on 7th October 2024 indicating that, as a small organisation with limited resources, it does not have the capacity to engage with planning consultations and therefore did not provide comments on the Proposed Project.

Department of Housing, Local Government and Heritage – Development Applications Unit (DAU)

The Department of Housing Local Government and Heritage – Development Applications Unit (DAU) acknowledged receipt of the pre-planning consultation request on 9th September 2024 through an automated response indicating that the normal target turnaround time for pre-planning consultations is six weeks from the date of receipt. No specific comments relating to bats were received as part of this correspondence.

National Parks and Wildlife Service (NPWS)

Representatives of the Project Team met with representatives of the National Parks and Wildlife Service (NPWS) on 10th February 2026 to discuss the Proposed Project and the ecological assessments undertaken for the EIAR. The discussion focused primarily on peatland habitats, habitat assessment methodologies and ecological mitigation measures associated with the Proposed Project. No specific comments or recommendations relating to bats were raised during this meeting.

4.2

Desk Study

4.2.1

Dunneill Wind Farm Lifetime Extension Baseline Surveys (2021)

Bat surveys were undertaken in 2021 at the operational Dunneill Wind Farm to inform the EIAR supporting the application for a 15-year extension to the existing wind farm. The purpose of the surveys was to establish baseline bat activity at the operating wind farm, assess species presence, identify any roosts in proximity to turbines, and determine spatial and temporal patterns of bat activity across the site. The 2021 surveys included roost inspections and emergence surveys, seasonal manual walked transects, seasonal ground-level and height acoustic monitoring.

Roost inspections were carried out on four structures (a derelict farmhouse, two outbuildings and Electrical control building) within the EIAR study area. Dusk emergence surveys were conducted on the derelict farmhouse and associated outbuildings to further assess use by bats. No bats were observed emerging during these surveys.

Manual walked transect surveys were undertaken during the 2021 bat activity season to assess commuting and foraging activity around the site.

Ground-level static acoustic monitoring was undertaken across the site, with detectors deployed at all thirteen turbine locations.

Activity levels were interpreted using the Ecobat analytical tool, which provides a percentile ranking for nightly activity relative to a wider reference dataset.

A summary of the 2021 baseline survey results is provided in Table 4-1.

Table 4-1 Summary of results from baseline bat surveys for Dunneill Wind Farm Lifetime Extension (2021)

Survey Type	Summary of Findings
Roost Inspections	No bat roosts confirmed or evidence of roosting bats identified during surveys
Emergence Surveys	No bats observed emerging from inspected structures
Manual Transects	Dominated by soprano pipistrelle and common pipistrelle, followed by Leisler's bat. Bat activity increased from spring to summer to autumn.
Static Ground Detectors	Soprano pipistrelle was the dominant species followed by common pipistrelle, Leisler's bat, <i>Myotis</i> spp. and brown long-eared bat. Nathusius' pipistrelle was rare. Soprano and common pipistrelle activity showed a seasonal peak in summer while Leisler's bat activity peaked during spring. Detector D03 (T03) showed the highest level of activity overall during the summer months.
Static Height Detector	Lower overall activity at height; Leisler's bat most frequent species at height and overall activity peaked in summer.
Ecobat Analysis	Median activity levels within the <i>Moderate</i> and <i>Moderate to High</i> range for high collision risk species. A <i>High</i> median activity level was only observed for soprano pipistrelle during autumn.
Collision Monitoring	Two bat fatalities, one soprano pipistrelle at T3 and one common pipistrelle at T2. Mortality estimated at 3.5 bats per turbine per year incorporating searcher efficiency and carcass persistence trials.

4.2.2 Previous Baseline Surveys (2023)

Bat surveys were undertaken within the Proposed Wind Farm in 2023 to establish baseline bat activity and inform the assessment of potential impacts associated with the Proposed Project. The surveys comprised roost inspections, dusk emergence surveys, manual activity surveys and ground-level static detector surveys.

Overall, bat activity within the Proposed Wind Farm is considered typical of upland landscapes dominated by commercial conifer plantation and peatland habitats, with activity largely associated with forestry edges and transitional habitats and more limited use of open peatland areas.

A summary of the 2023 baseline survey results is provided in Table 4-2.

Table 4-2 Summary of results from the 2023 baseline bat surveys

Survey Type	Summary of Findings
Roost Inspections	Sixteen structures were inspected for bat roost potential including one derelict stone ruin, twelve bridges and three operational wind farm infrastructure buildings. The majority of structures were assessed as having <i>Negligible</i> or <i>Low</i> suitability for roosting bats. Under the current project design, four bridges (Structures S2, S3, S4 and S8) occur along the access road to be upgraded; however, no works are proposed that would affect their structural integrity or roosting potential. The derelict building (Structure S1) and the operational wind farm buildings (Structures S14, S15 and S16) occur within the EIAR site boundary and will be retained, with no works proposed to these structures.
Emergence Surveys	One brown long-eared bat (<i>Plecotus auritus</i>) was observed emerging from a derelict stone ruin (Structure S1), confirming the presence of a bat roost within the Site (Irish Grid Reference: G44004 27332). The structure occurs within the EIAR site boundary but lies outside the infrastructure footprint and will be retained and avoided as part of the Proposed Project. and no works are proposed that would result in disturbance or loss of the confirmed roost.

Manual Activity Surveys	Bat activity was dominated by pipistrelle species (soprano and common pipistrelle) and Leisler's bat, with <i>Myotis</i> spp. and brown long-eared bat recorded less frequently.
Static Detector Surveys	Approximately 56,554 bat passes were recorded across the Site. Activity was dominated by Leisler's bat, soprano pipistrelle and common pipistrelle. <i>Myotis</i> spp. and brown long-eared bat were recorded at lower levels, while Nathusius' pipistrelle was recorded infrequently.
Activity Interpretation	Activity levels were interpreted using site-specific thresholds. <i>High</i> median activity was recorded for common pipistrelle at two detector locations during spring and for soprano pipistrelle at one location in spring and two in autumn. <i>High</i> peak activity levels were recorded for Leisler's bat at several detector locations during spring, with fewer instances for pipistrelle species during spring and autumn.

Full details of the survey methods and results from the 2023 baseline bat surveys are provided in **Appendix 1**.

4.2.3 Operational Monitoring Reports for the Existing Wind Farm

Operational monitoring information from the Existing Wind Farm was reviewed as part of the desk study. At the time of writing, relevant information was available from Dunneill Wind Farm for 2024 and 2025, and from Kingsmountain Wind Farm for 2024. Figure 4-1 presents the locations of turbines associated with the Existing Wind Farm in relation to the Proposed Project.

Dunneill Wind Farm Post-Construction Monitoring Report (2024)

Bat surveys were undertaken in 2024 at the operational Dunneill Wind Farm as part of Year 1 post-construction monitoring required under planning permission for the Dunneill Wind Farm Lifetime Extension (Pl. Ref. 22/291). The monitoring programme comprised roost inspections and emergence surveys, seasonal manual activity surveys, seasonal ground-level and at-height static detector surveys, and monthly carcass searches.

Overall, the results indicated bat activity typical of upland conifer plantation landscapes, with activity concentrated along linear habitat features and dominated by pipistrelle species. Roosting bats were confirmed at three structures, limited activity was recorded within the rotor-swept zone, and four bat fatalities were recorded during the carcass monitoring programme. A summary of the 2024 post-construction monitoring results is provided in Table 4-3.

Table 4-3 Summary of results from the 2024 bat post-construction monitoring (Dunneill Wind Farm)

Survey Type	Summary of Findings
Roost Inspections	Four structures (DS1–DS4) were inspected. DS1 (derelict farmhouse) had <i>Moderate</i> suitability, while DS2–DS4 had <i>Low</i> suitability.
Emergence Surveys	Roosting bats were confirmed at three structures. Two soprano pipistrelles emerged from DS2, seven pipistrelle bats (soprano and common) from DS4, and six soprano pipistrelles from DS1. No emergence was recorded from DS3.
Manual Transects	Activity dominated by soprano pipistrelle followed by common pipistrelle. Leisler's bat and <i>Myotis</i> spp. showed peak activity during summer. Overall activity decreased from spring to autumn.
Ground-level Static Detectors	Approximately 49,195 bat passes recorded. Activity dominated by pipistrelle species, followed by Leisler's bat, <i>Myotis</i> spp. and brown long-eared bat. Nathusius' pipistrelle was recorded infrequently. Activity concentrated along linear features.
Static Detector at Height	Limited activity recorded at height compared to ground level. Of 1,845 passes, only 27 were recorded exclusively at height. Leisler's bat was the most frequently recorded species at height.
Activity Interpretation	Median activity levels ranged from <i>Low</i> to <i>Moderate</i> . <i>High</i> median activity recorded for soprano pipistrelle (summer) and common pipistrelle (spring) at individual detector locations. A shift in seasonal activity was observed compared to 2021, with peak activity occurring in spring.

Carcass Searches	Four bat fatalities recorded (one soprano pipistrelle, two common pipistrelles and one Leisler's bat). Carcasses located 5–37 m from turbine bases on hardstands at turbines T1, T2, T3 and T8. Estimated mortality of 0.55 bats per turbine per year .
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Dunneill Wind Farm Post-Construction Monitoring Report (2025)

Bat surveys were undertaken in 2025 at the operational Dunneill Wind Farm as part of Year 2 post-construction monitoring. The monitoring programme comprised emergence surveys, manual activity surveys, ground-level and at-height static detector surveys and monthly carcass searches.

Overall, the results were broadly consistent with those recorded during Year 1 monitoring. A bat roost was reconfirmed at one previously confirmed roost structure, bat activity remained dominated by pipistrelle species and Leisler's bat, and activity at height remained low relative to ground-level activity. Median activity levels for high collision risk species ranged from *Low* to *Moderate*, with peak activity occurring during spring. Three bat fatalities were recorded during the 2025 monitoring period. A summary of the 2025 post-construction monitoring results is provided in Table 4-4.

Table 4-4 Summary of results from the 2025 bat post-construction monitoring (Dunneill Wind Farm)

Survey Type	Summary of Findings
Emergence Surveys	Roost reconfirmed at DS4 (onsite electrical control building), with two common pipistrelles observed emerging. No bats recorded at DS2 during autumn surveys.
Manual Transects	Activity dominated by Leisler's bat, followed by soprano and common pipistrelle. Activity decreased from spring to autumn. Brown long-eared bat and <i>Myotis</i> spp. were recorded less frequently.
Ground-level Static Detectors	Approximately 56,833 bat passes recorded. Soprano pipistrelle dominant, followed by common pipistrelle, Leisler's bat, <i>Myotis</i> spp. and brown long-eared bat. Nathusius' pipistrelle was rare.
Static Detector at Height	Lower activity recorded at height compared to ground level. Leisler's bat was the most frequently recorded species at height. Patterns consistent with 2024 monitoring.
Activity Interpretation	Median activity ranged from <i>Low</i> to <i>Moderate</i> . <i>High</i> median activity recorded for Leisler's bat (spring) at two locations and for soprano pipistrelle (spring) at one location. Activity peaked in spring.
Carcass Monitoring	Three bat fatalities recorded (two common pipistrelles and one soprano pipistrelle), located 13–16 m from turbine bases at turbines T3, T7 and T12. Estimated mortality of 0.70 bats per turbine per year .

Kingsmountain Wind Farm Collision Monitoring (2024)

Information reviewed for Kingsmountain Wind Farm comprised monthly collision monitoring data.

Monthly carcass searches were undertaken over a 12-month period from May 2024 to April 2025 at the wind farm comprising 10 turbines. A total of three bat carcasses were recorded during this period, comprising two pipistrelle species (*Pipistrellus* spp.) and one Leisler's bat (*Nyctalus leisleri*). Carcasses were located between 6 m and 13 m from turbine bases and were recorded on turbine hardstands at T1 and T5.

Searcher efficiency trials indicated a high detection rate, with a median searcher efficiency of 0.97 (97%) [CI: 0.86–0.99]. Carcass persistence trials estimated a median persistence time of 2.89 days. Detection probability was estimated at 0.14 [CI: 0.09–0.21], reflecting the relatively rapid removal of carcasses from the search area.

Using these correction factors, the model estimated a total bat mortality of 20.18 bats over the study period [90% CI: 4.5–51.11]. This corresponds to an estimated mortality rate of **2.02 bats per turbine per year** [CI: 0.45–5.11].

A summary of the available collision monitoring results is provided in Table 4-5.

Table 4-5 Summary of bat collision monitoring results from Kingsmountain Wind Farm (2024)

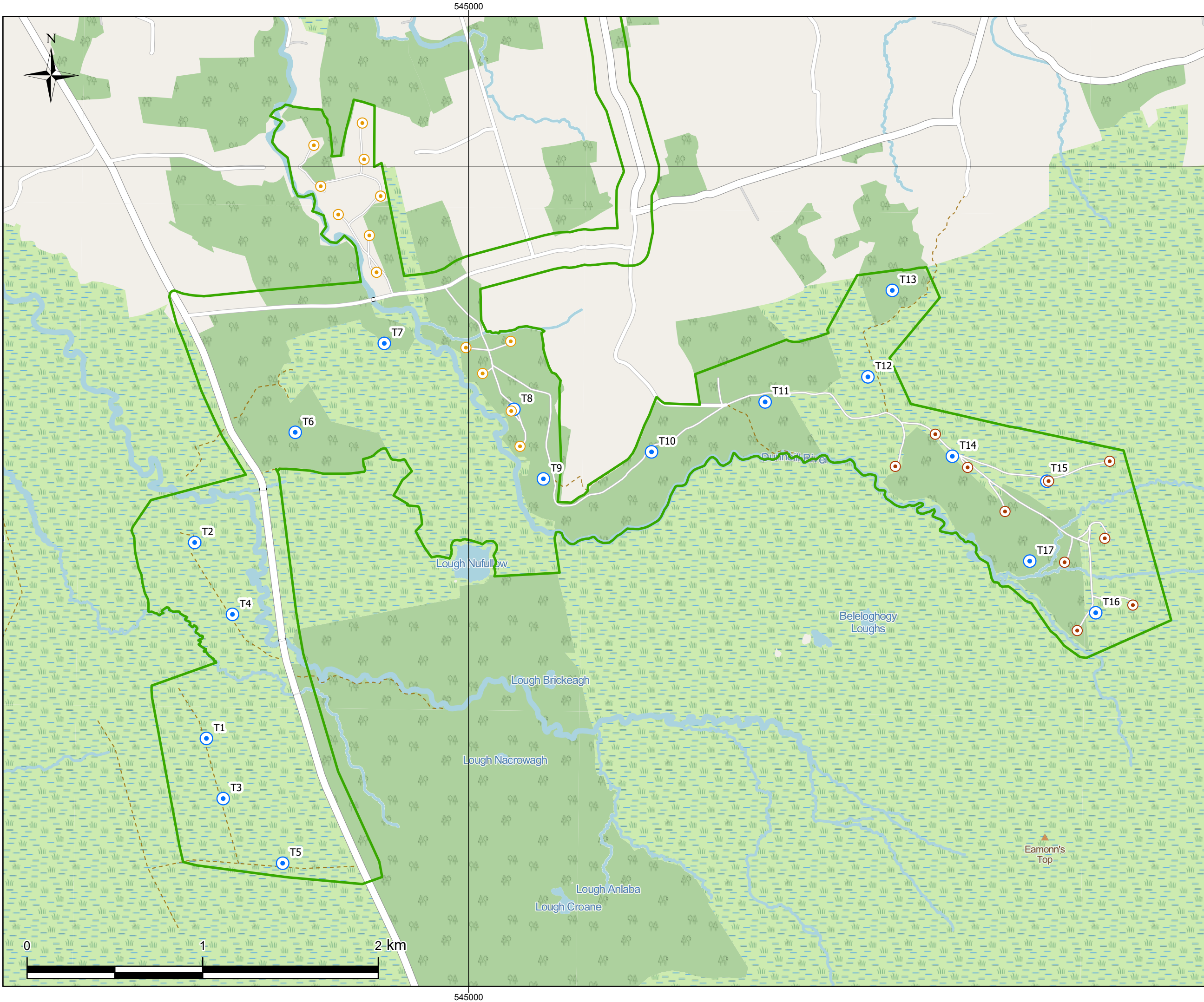
Survey Type	Summary of Findings
Carcass Searches	Three bat fatalities recorded (two pipistrelle species and one Leisler's bat), located 6–13 m from turbine bases on hardstands at turbines T1 and T5.
Searcher Efficiency	High detection rate (median = 0.97; CI: 0.86–0.99).
Carcass Persistence	Median carcass persistence time of 2.89 days.
Detection Probability	Estimated at 0.14 (CI: 0.09–0.21).
Mortality Estimate	Estimated 20.18 bat fatalities (CI: 4.5–51.11), equivalent to 2.02 bats per turbine per year (CI: 0.45–5.11).

Overall, the operational monitoring data from the Existing Wind Farm indicate consistent patterns of bat activity across survey years. Bat activity is dominated by pipistrelle species, with Leisler's bat and *Myotis* spp. recorded at lower levels, reflecting a typical assemblage for upland landscapes dominated by conifer plantation and peatland habitats.

A shift in seasonal activity patterns has been observed, with post-construction monitoring indicating peak activity in spring, in contrast to summer peaks recorded during earlier baseline surveys. Bat activity is largely associated with linear features such as forestry edges and access tracks, with limited use of open habitats.

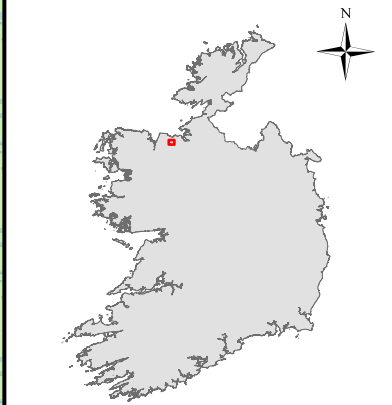
Height monitoring data indicate consistently low levels of bat activity within the rotor-swept zone, suggesting limited exposure to turbine blades. Collision monitoring at both Dunneill and Kingsmountain Wind Farms recorded low numbers of bat fatalities, with corrected mortality estimates within the range expected for operational wind farms in similar landscapes. Bat fatalities were recorded across multiple seasons, with records occurring in spring, early summer and autumn, and no clear concentration within a single period of the activity season.

Overall, these findings indicate stable bat activity patterns, limited use of high-risk zones, and no evidence of elevated collision risk at the Existing Wind Farm.



- Map Legend
- Proposed Turbine Layout
 - EIAR Site Boundary
 - Kingsmountain Turbines
 - Dunneill Turbines

Spatial Reference
Name: IRENET95 Irish Transverse Mercator
Datum: IRENET95
Projection: Transverse Mercator



SITE LOCATION - NOT TO SCALE

Drawing Title		
Existing Wind Farm		
Project Title		
Crumhach Wind Farm, Co. Sligo		
Project No.	Drawing No.	Scale
230481	4-1	1:20,000
Drawn By	Checked By	Date
AM	MNR	22/05/2026



Email: info@mkofireland.ie Website: www.mkofireland.ie

4.2.4

Bat Records

Bat Conservation Ireland

Available bat records were provided by Bat Conservation Ireland (BCI) on 3rd February 2026. The search included roost records, transect records and ad hoc observations.

BCI records indicate that at least eight bat species or species groups have been recorded within 10 km of the Proposed Wind Farm. These records include brown long-eared bat, common pipistrelle, soprano pipistrelle, Leisler's bat, Daubenton's bat, Natterer's bat, lesser horseshoe bat and *Myotis* spp.

The results of the BCI data search are summarised in Table 4-6.

Table 4-6 Summary of Bat Conservation Ireland records within 10 km of the Proposed Wind Farm

Survey Type	Species	Grid reference	Date	Location
Roost	<i>Pipistrellus pygmaeus</i>	G52000 30000	N/A	Carrowcullen, Ladies Brae, Lecarrow, Skreen, County Sligo
	<i>Myotis</i> spp.	G54200 32700	N/A	Drumard, Co. Sligo
	<i>Plecotus auritus</i>	G52300 32600	N/A	Screen, Co. Sligo
Transect	<i>Myotis daubentonii</i> , <i>Pipistrellus pygmaeus</i> , <i>Nyctalus leisleri</i>	G53100 34300	N/A	Ardnaglass Bridge Transect
	<i>Nyctalus leisleri</i> , <i>Pipistrellus pygmaeus</i> , <i>Pipistrellus pipistrellus</i> , <i>Myotis</i> spp.	G39200 25800	N/A	Footbridge u/s Durrow Drive Transect
Ad-Hoc	<i>Pipistrellus pygmaeus</i>	G55024 21571	26/09/2009	BATLAS 2010
	<i>Myotis daubentonii</i>	G44897 23734	26/09/2009	BATLAS 2010
	<i>Pipistrellus pygmaeus</i> , <i>Nyctalus leisleri</i>	G48800 33700	26/09/2009	BATLAS 2010
	<i>Myotis daubentonii</i> , <i>Pipistrellus pygmaeus</i>	G43700 32500	26/09/2009	BATLAS 2010
	<i>Nyctalus leisleri</i>	G53100 34300	25/09/2009	BATLAS 2010
	<i>Pipistrellus pygmaeus</i>	G51100 30700	25/09/2009	BATLAS 2010
	<i>Myotis daubentonii</i> , <i>Pipistrellus pygmaeus</i>	G36400 35400	29/09/2009	BATLAS 2010
	<i>Pipistrellus</i> spp.	G39300 31700	25/09/2009	BATLAS 2010
	<i>Myotis daubentonii</i>	G51047 18294	28/05/2018	BATLAS 2020
	<i>Pipistrellus pygmaeus</i>	G52925 20503	09/07/2017	BATLAS 2020
	<i>Pipistrellus pygmaeus</i> , <i>Nyctalus leisleri</i>	G53902 27058	08/07/2017	BATLAS 2020
	<i>Pipistrellus pygmaeus</i>	G42126 29629	18/05/2018	BATLAS 2020
	<i>Pipistrellus pygmaeus</i> , <i>Myotis nattereri</i> , <i>Myotis</i> spp.	G51049 31623	03/08/2017	BATLAS 2020
	<i>Pipistrellus pygmaeus</i>	G50760 32491	18/05/2018	BATLAS 2020
	<i>Pipistrellus pipistrellus</i>	G44826 32733	07/09/2017	BATLAS 2020
	<i>Pipistrellus pygmaeus</i> , <i>Myotis</i> spp.	G46303 33118	18/05/2018	BATLAS 2020
	<i>Pipistrellus pipistrellus</i> , <i>Pipistrellus pygmaeus</i> , <i>Nyctalus leisleri</i> , <i>Myotis daubentonii</i>	G53466 33318	03/08/2017	BATLAS 2020
	<i>Pipistrellus pipistrellus</i> , <i>Pipistrellus pygmaeus</i> , <i>Myotis daubentonii</i>	G39918 33328	18/05/2018	BATLAS 2020
	<i>Pipistrellus pipistrellus</i> , <i>Pipistrellus pygmaeus</i>	G43183 33687	07/09/2017	BATLAS 2020
	<i>Pipistrellus pygmaeus</i>	G43886 35121	07/09/2017	BATLAS 2020
	<i>Pipistrellus pygmaeus</i>	G49059 35200	04/08/2017	BATLAS 2020
	<i>Pipistrellus pygmaeus</i>	G50920 35216	03/08/2017	BATLAS 2020

	<i>Pipistrellus pygmaeus</i> , <i>Nyctalus leisleri</i>	G41370 35417	07/09/2017	BATLAS 2020
	<i>Pipistrellus pygmaeus</i>	G50386 35710	03/08/2017	BATLAS 2020
	<i>Pipistrellus pygmaeus</i>	G49286 35792	04/08/2017	BATLAS 2020
	<i>Pipistrellus pipistrellus</i> , <i>Pipistrellus pygmaeus</i> , <i>Myotis spp.</i>	G38543 36057	18/05/2018	BATLAS 2020
	<i>Myotis daubentonii</i>	G37500 37800	18/07/2024	National Biodiversity Data Centre Bat Records

The roost records identified are outside of the Core Sustenance Zones for each species according to BCT (2020). The Core Sustenance Zone for Soprano pipistrelle is 3 km and the roost record for this species lies outside this zone as it is 3.5 km from the Proposed Wind Farm. The Core Sustenance Zone for *Myotis spp.* ranges from 1 km for Whiskered bat to 2 km for Daubenton's bat up to 4 km for Natterer's bat. The roost record for *Myotis spp.* is outside the zones for this species group as it is 7.4 km from the Proposed Wind Farm. The Core Sustenance Zone for brown Long-eared bat is 3 km and the roost record for this species is outside this zone as it is 5.6 km from the Proposed Wind Farm.

National Bat Database of Ireland

Records from the National Biodiversity Data Centre (NBDC) were reviewed to identify bat species recorded within the relevant 10 km grid squares (hectads) surrounding the Proposed Wind Farm. Nine hectads fall within the 10 km search area: G31, G32, G33, G41, G42, G43, G51, G52 and G53.

Seven bat species were identified from the hectads surrounding the Proposed Wind Farm: brown long-eared bat, common pipistrelle, Leisler's bat, soprano pipistrelle, Daubenton's bat, Natterer's bat and lesser horseshoe bat.

The results of the NBDC hectad search are provided in Table 4-7.

Table 4-7 Bat species recorded within relevant 10 km hectads surrounding the Proposed Wind Farm

Species	Hectads	Database	Designation
Brown Long-eared Bat (<i>Plecotus auritus</i>)	G51, G31, G52, G32, G53	National Bat Database of Ireland	HD Annex IV, WA
Common Pipistrelle (<i>Pipistrellus pipistrellus</i>)	G41, G51, G31, G52, G32, G32, G53, G43, G33	National Bat Database of Ireland	HD Annex IV, WA
Leisler's Bat (<i>Nyctalus leisleri</i>)	G41, G51, G31, G52, G32, G53, G43, G33	National Bat Database of Ireland	HD Annex IV, WA
Soprano Pipistrelle (<i>Pipistrellus pygmaeus</i>)	G41, G51, G31, G52, G42, G32, G53, G43, G33	National Bat Database of Ireland	HD Annex IV, WA
Daubenton's Bat (<i>Myotis daubentonii</i>)	G41, G51, G31, G42, G32, G53, G43, G33	National Bat Database of Ireland	HD Annex IV, WA
Natterer's Bat (<i>Myotis nattereri</i>)	G51, G31 G53	National Bat Database of Ireland	HD Annex IV, WA
Lesser Horseshoe Bat (<i>Rhinolophus hipposideros</i>)	G51	National Bat Database of Ireland	HD Annex II & IV, WA

4.2.5 Bat Species Range

The range maps presented in the 2025 Article 17 Reports (NPWS, 2025) were reviewed in relation to the location of the Proposed Wind Farm, with particular regard to species occurring at or close to the edge of their known range, as these may present greater sensitivity in the context of wind energy developments (NatureScot, 2021).

The Proposed Wind Farm is located outside the current known range of lesser horseshoe bat, *Nathusius' pipistrelle*, Natterer's bat and whiskered bat. The Proposed Wind Farm lies within the known range of all other bat species occurring in Ireland.

4.2.6 Designated Sites

Within Ireland, lesser horseshoe bat is the only bat species for which Special Areas of Conservation (SACs) are designated specifically for bat conservation. The Proposed Wind Farm is situated outside the current known range of this species and no SACs designated for lesser horseshoe bat occur within 10 km of the Proposed Wind Farm.

Natural Heritage Areas (NHAs) and proposed Natural Heritage Areas (pNHAs) may also be relevant to bat conservation. A review of NHAs and pNHAs within 10km of the Proposed Wind Farm did not identify any sites designated for bats.

4.2.7 Landscape Features

4.2.7.1 Ordnance Survey Mapping

A review of Ordnance Survey Ireland mapping, aerial imagery and site photographs provided an overview of the habitats and landscape features present within and surrounding the Proposed Wind Farm. The principal land uses within the Proposed Wind Farm comprise conifer plantation and peatland, with part of the northern section consisting of agricultural grassland.

Overall, these habitat types are characterised by relatively low structural complexity and a limited number of well-connected linear features, thereby restricting the availability of high-quality commuting and foraging habitat for bats.

4.2.7.2 Underground Sites

A review of the Geological Survey Ireland online mapping indicated no subterranean features within the Proposed Wind Farm. Four karst features were identified within 10 km of the Proposed Wind Farm, comprising three springs and one swallow hole. These features are not considered suitable for roosting bats.

A search of the National Monuments Service dataset did not identify any manmade subterranean structures within the Proposed Wind Farm.

A search of the University of Bristol Speleological Society Cave Database for the Republic of Ireland identified no caves within the Site and one cave within 10 km of the Proposed Wind Farm. Moylough Cave, described as a 20m partly collapsed passage, is located approximately 8.2km from the Proposed Project (Irish Grid Reference: G35440 30860). No records of roosting bats are known from Moylough Cave.

4.2.7.3 National Biodiversity Data Centre Bat Landscape Mapping

A review of the NBDC Bat Landscape mapping indicated habitat suitability index values ranging from 9.44 (green) to 21.67 (yellow) across the Proposed Wind Farm. These values indicate low to moderate modelled habitat suitability for bat species within the Proposed Project and surrounding landscape.

4.2.7.4 Additional Projects in the Wider Landscape

Table 4-8 provides an overview of existing, permitted, and proposed wind farms located within 10 km of the Proposed Project. Dunneill Wind Farm and Kingsmountain Wind Farm are not included below

as they are part of the Proposed Project. An assessment of large-scale non wind farm projects can be found in Section 6.5 Chapter 6.

Table 4-8 Wind Farm Developments within 5 km and 10 km of the Proposed turbine locations

Wind Farm	Status	No. of Turbines
Within < 10 km		
Black Lough Wind Farm	Existing	4
Carrowleagh 1 Wind Farm	Existing	13
Cloonkeelaun Wind Farm (Carrowleagh WF Extension)	Existing	3
Cloonkeelaun 2 Wind Farm	Existing	2
Firlough Wind Farm	Permitted	13

4.3 Field Surveys

4.3.1 Bat Habitat Suitability Appraisal

4.3.1.1 Proposed Wind Farm

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

- Conifer plantation (WD4)
- Recently felled woodland (WS5)
- Cutover bog (PB4)
- Upland blanket bog (PB2)
- Improved agricultural grassland (GA1)
- Wet grassland (GS4)
- Dry humic acid grassland (GS3)
- Dry meadows and grassy verges (GS2)
- Spoil and bare ground (ED2)
- Recolonising bare ground (ED3)
- Buildings and artificial surfaces (BL3)
- Scrub (WS1)
- Dense bracken (HD1)
- Hedgerows (WL1)
- Treelines (WL2)
- Drainage ditches (FW4)
- Eroding upland rivers (FW1)
- Depositing lowland rivers (FW2)

The habitats within the Proposed Wind Farm are dominated by conifer plantation (Plate 4-1), with widespread areas of wet grassland (Plate 4-2), recently felled woodland (Plate 4-3), and cutover bog (Plate 4-4), together with upland blanket bog and improved agricultural grassland occurring across the Proposed Wind Farm. Chapter 6 of the main EIAR describes the various habitats within the Proposed Wind Farm in more detail.

The desktop study and walkover surveys were used to assess habitats for their suitability to support foraging, commuting and roosting bats, according to Collins (2023). Bat habitat suitability categories, divided into *High*, *Moderate*, *Low*, *Negligible* or *None*, are described fully in **Appendix 3**.

Areas of spoil and bare ground (ED2), recolonising bare ground (ED3), buildings and artificial surfaces (BL3), and open areas of improved agricultural grassland (GA1) lacking structural connectivity were considered to be of *Negligible* suitability for foraging and commuting bats (Plate 4-7). These areas are

generally open and exposed and lack linear features, shelter or habitat complexity likely to be used by bats as commuting routes or foraging habitat.

Areas of upland blanket bog (PB2), cutover bog (PB4), wet grassland (GS4), dry humic acid grassland (GS3), dry meadows and grassy verges (GS2), dense bracken (HD1) and recently felled woodland (WS5) were considered to be of *Low* suitability for foraging and commuting bats (Plate 4-2; Plate 4-3; Plate 4-4; Plate 4-8). While these habitats may occasionally be used by a small number of foraging bats, they are typically open in nature, offer limited shelter, and do not form strong or continuous linear features within the wider landscape.

Conifer plantation (WD4), scrub (WS1), drainage ditches (FW4) and eroding upland rivers (FW1) were considered to be of *Moderate* suitability for foraging and commuting bats (Plate 4-5; Plate 4-6). In the absence of well-developed hedgerows or treelines, conifer plantation edges and associated linear features represent the primary sources of shelter, navigational structure and connectivity within the Proposed Wind Farm and provide the main commuting and foraging opportunities for bats within the predominantly commercial forestry landscape. No habitats within the Proposed Wind Farm were assessed as offering *High* suitability for commuting or foraging bats.

The existing infrastructure within the Proposed Wind Farm was classified as buildings and artificial surfaces (BL3) (Plate 4-7), including turbines, hardstands, access tracks, met mast and control buildings associated with the Existing Wind Farm. With regard to commuting and foraging bats, turbines, hardstands, access tracks and the met mast were assessed as having *Negligible* suitability due to their artificial and exposed nature.

With regard to roosting bats, buildings and structures within the Proposed Wind Farm, including a stone ruin, bridges and operational wind farm infrastructure (including the Dunneill and Kingsmountain control buildings), were assessed for roosting suitability. All inspected structures were assessed as having *Low* or *Negligible* roosting suitability, indicating limited potential to support roosting bats. No structures with *Moderate* or *High* roosting suitability were identified.

Trees within the Proposed Wind Farm area primarily comprise commercial conifer plantation dominated by Sitka spruce and lodgepole pine, with occasional Japanese larch and limited areas of broadleaved trees along plantation edges. All trees within the Proposed Wind Farm footprint, including those scheduled for felling, were assessed for potential roost features (PRFs) in accordance with Andrews (2018). No PRFs were identified and therefore all trees were assessed as having *None* roosting suitability in line with Collins (2023).

All other habitats within the Proposed Wind Farm were assigned *Negligible* suitability for roosting bats.



Plate 4-1 Conifer plantation near T14 (Moderate)



Plate 4-2 Wet grassland near T15 (Low)



Plate 4-3 Recently-felled plantation near T8 (Low)



Plate 4-4 Cutover bog near T1 and T3 (Low)



Plate 4-5 Watercourse near T13 (Moderate)



Plate 4-6 Scrub near T14 (Moderate)



Plate 4-7 Buildings and artificial surfaces / recolonising ground near T15 (Negligible)



Plate 4-8 Upland blanket bog located near T6.

4.3.1.2 Proposed Grid Connection Route

It is proposed to connect the onsite 110 kV substation to the existing 220 kV Srananagh substation in the townland of Ballysumaghan, Co. Sligo via a 110 kV underground electrical cable. The Proposed Grid Connection Route is approximately 41.6 km in length and is illustrated in Chapter 4, Figure 4-1.

The Proposed Grid Connection Route will be installed predominantly within the existing road network, classified as buildings and artificial surfaces (BL3), with a short section (approximately 130 m) located within the Proposed Wind Farm along Existing Wind Farm access tracks. With regard to commuting and foraging bats, habitats directly affected by the Proposed Grid Connection footprint, comprising buildings and artificial surfaces (BL3), were assessed as having *Negligible* suitability.

Other habitats recorded adjacent to the road network along the Proposed Grid Connection Route include hedgerows (WL1), treelines (WL2), dry meadows and grassy verges (GS2), wet grassland (GS4), improved agricultural grassland (GA1), conifer plantation (WD4) and cutover bog (PB4). Further details of habitats within the wider Proposed Grid Connection Route corridor are provided in Chapter 6 of the EIAR.

Habitats within the wider Proposed Grid Connection Route corridor, including cutover bog (PB4), dry meadows and grassy verges (GS2), wet grassland (GS4) and improved agricultural grassland (GA1), were assessed as offering *Negligible to Low* suitability for commuting and foraging bats due to their generally open nature and limited structural connectivity.

Linear features along the Proposed Grid Connection Route, including conifer plantation (WD4) edges, hedgerows (WL1), treelines (WL2) and occasional mature trees, were assessed as offering *Moderate* suitability for commuting and foraging bats, due to their connectivity with the wider landscape and the presence of linear vegetation providing navigational structure and shelter. However, these features are not directly impacted by the Proposed Grid Connection Route works.

With regard to roosting bats, no buildings, trees or other features capable of supporting bat roosts were identified within the Proposed Grid Connection footprint, and these areas were therefore assessed as having *None* roosting potential.

Watercourse Crossings

The Proposed Grid Connection Route crosses a total of 34 watercourses and 2 no. built service crossing, including crossings within the Proposed Wind Farm. All watercourse crossings comprise existing structures, including culverts and bridges, which were assessed for bat roosting potential during field surveys.

No evidence of bat roosting was recorded at any of the inspected structures during the surveys. Of the assessed watercourse crossing structures, twenty-two were assigned no (*None*) roosting potential, three were assigned *Negligible* potential, eight were assigned *Low* potential, and one crossing was assessed as having *Moderate* roosting potential due to the presence of localised crevices and sheltered features within the structure. The service crossing present did not have suitable infrastructure for roosting bats.

Full details of assessed watercourse crossings and their roosting suitability are provided in **Appendix 6**.

4.3.1.3 Turbine Delivery Accommodation Works

As described in Chapter 4, Section 4.5.3.1 of this EIAR, turbine delivery route accommodation works are required at twenty locations along the route to facilitate the delivery of turbine components during the construction phase. These works include temporary measures such as localised road widening, overruns of roundabout islands and relocation of signage and street furniture.

Vegetation removal or trimming is only required at a subset of these locations. The bat habitat suitability assessment below focuses on those locations where vegetation with potential ecological value is present. The assessment of the vegetation along the turbine delivery route accommodation works was carried out on the 2nd of March 2026.

Location 1 (N15 Drumlonagher Roundabout)

Minor trimming of trees and hedgerows is required. The alder trees present were inspected, and no potential roost features (PRFs) were identified. These trees were assessed as having no (*None*) roosting suitability (Plate 4-9).

Location 10 – N4 to N59 Junction

Vegetation will be trimmed at this location. The hedgerow along the side of the slip road did not provide roosting potential for bats as assessed as having no (*None*) roosting suitability. The beech trees at the opposite side are not being removed for the accommodation works and did not have any potential roosting features and were therefore also assessed as having no (*None*) roosting potential. (Plate 4-10)

Location 11 – N15 to N59 Junction

Minor trimming of hedgerow vegetation is required to allow blade oversail. Trees within the hedgerow were overgrown with young ivy; however, no suitable crevices or PRFs were identified during inspection. These trees were assessed as having no (*None*) roosting suitability (Plate 4-11).

Location 13 – N59 Ballysadare Bridge

Vegetation will be trimmed at this location. The trees present at the south east end of the roundabout were on private property and were assessed from the ground level. These trees were assessed as having no (*None*) roosting potential. There is no other vegetation at this location.

Location 14 – N59 Abbeytown Bend

Hedgerows comprising immature trees will be trimmed to accommodate turbine delivery. A private wall will also be removed which is of concrete construction and does not have any cracks, crevices or gaps present for roosting bats. The hedgerows and the private wall do not provide suitable roosting opportunities for bats and were assessed as having no (*None*) roosting suitability (Plate 4-12).

Location 17 – Dromore West Turn South

Hedgerow vegetation will be removed at this location. The vegetation present included scrub and sparse hedgerow overgrown with brambles which did not have any trees present. Therefore, this was assessed as having no (*None*) roosting suitability.

Location 18 – Right Bend in L2702

Three trees comprising two oak and one beech are to be removed. One oak contained a knot hole and tear-out; however, this was inspected and deemed superficial and did not provide a suitable roosting space for bats (Plate 4-13). These trees were therefore assessed as having no (*None*) roosting suitability.

Location 19 – Left Bend in L2702

At a further bend along the L63072 in Farranmacfarrell, birch trees and hedgerows are to be removed or trimmed to accommodate turbine delivery; no PRFs were present and these trees were assessed as having no (*None*) roosting suitability (Plate 4-14).

Location 20 – L2702/L6309 Junction

At the left turn towards Dunneill and Kingsmountain Wind Farms, birch trees and hedges are to be trimmed or removed; no PRFs were present and these trees were assessed as having no (*None*) roosting suitability (Plate 4-15). Additional pinch point locations at the entrances to the Site comprise conifer plantation and scrub which will be trimmed or removed to accommodate turbine delivery; these habitats were assessed as having no (*None*) roosting suitability for bats (Plates 4-16).

At all other locations, namely Locations 2 to 6, locations 7 to 9 and locations 9, 12, 15 and 16, accommodation works are limited to hardstanding areas, road verges or existing streetscape, and do not require removal of vegetation of ecological relevance to bats.

Overall, hedgerows and treelines present along sections of the turbine delivery route were assessed as providing *Low to Moderate* suitability for commuting and foraging bats, where these features are present and connected within the wider landscape. Scrub habitats were assessed as providing *Low* suitability for foraging and commuting bats. All vegetation within the areas subject to accommodation works was assessed as having no (*None*) roosting suitability, as no PRFs suitable to support roosting bats were identified.



Plate 4-9 Pinch point location 1 – alder trees to be trimmed/removed



Plate 4-10 Pinch point location 10 - immature beech tree with no PRFs present.



Plate 4-11 Pinch point location 11 - Trees within the hedgerow overgrown with ivy.



Plate 4-12 Pinch point location 14 - Trees to be trimmed and private wall to be removed.



Plate 4-13 Pinch point location 18 - oak tree with superficial knot hole and tear out to be removed.



Plate 4-14 Pinch point location 19 - birch trees within the hedgerow to be trimmed.



Plate 4-15 Pinch point location 20 - birch trees to be trimmed/removed



Plate 4-16 Conifer plantation at site entrance to be trimmed/removed.

4.3.2 Roost Surveys

4.3.2.1 Daytime Roost Inspections

Five structures containing features with the potential to support roosting bats were identified and inspected as part of the 2024 baseline surveys for the Proposed Wind Farm. These structures were assessed in accordance with the grading criteria set out in Collins (2023) (**Appendix 3**). Each structure was subject to an external inspection and, where accessible, an internal inspection, to identify potential roosting features and any evidence of bat use.

All five identified structures were assessed as having *Low* bat roost potential and no evidence of bat roosting was recorded at any of these inspected structures. All structures will be retained and avoided as part of the Proposed Project. Further details of the structures are provided below and summarised in Table 4-9.

In addition, watercourse crossing structures, including bridges and culverts associated with the Proposed Grid Connection Route, were inspected during the baseline surveys. The findings of these inspections are presented in Section 4.3.1.2, with full details provided in **Appendix 6**.

Additional structures within the Proposed Wind Farm have been subject to daytime roost inspections as part of previous baseline surveys and post-construction monitoring programmes associated with the Existing Wind Farm and Lifetime Extension projects. The findings of these surveys are presented in Sections 4.2.1 to 4.2.3 and have been considered in the assessment of bat roosting opportunities within the Proposed Wind Farm.

Table 4-9 Structures assessed for bat roost potential during the 2024 baseline surveys for the Proposed Wind Farm

Structure ID	Description	Irish Grid Reference	Nearest Turbine	Distance to nearest turbine (m)	Bat Roost Potential
S1	Derelict stone ruin	G 44004 27332	T4	350	<i>Low</i>
S2	Bridge 1	G 43872 28157	T6	360	<i>Low</i>
S7	Bridge 6	G 44585 25662	T5	600	<i>Low</i>
S8	Bridge 7	G 44065 26993	T1	580	<i>Low</i>
S16	Kingsmountain Control building	G 47500 28570	T12	280	<i>Low</i>

Derelict stone ruin (Structure S1)

The derelict stone ruin is located within the south-western section of the Proposed Wind Farm, approximately 350 m from Turbine 4. The structure is roofless but contains cracks and crevices within the stonework which provide limited potential roosting features (Plates 4-20 and 4-21). These features were inspected using a high-powered torch and endoscope where accessible.

No evidence of bat use was recorded. The structure was assessed as having *Low* bat roost potential in accordance with Collins (2023).



Plate 4-17 old Stone Ruin to the east of T4.



Plate 4-18 Second angle of Old stone ruin - gaps in stonework visible

Kingsmountain Control Building (Structure S16)

The Kingsmountain control building is located in the eastern section of the Proposed Wind Farm, approximately 280 m from Turbine 12. The structure comprises a modern concrete block building with a slate roof and sealed internal spaces (Plates 4-22 to 4-25).

Minor features such as lifting fascia and gaps at the roof interface were noted; however, these are limited and do not provide suitable roosting conditions. The building was inspected internally and externally using a torch and endoscope. No evidence of bat use was recorded. The structure was assessed as having *Low* bat roost potential.



Plate 4-19 Exterior of Kingsmountain control building.



Plate 4-20 Attic space within the control building. No lighting present, torch used to illuminate photo.



Plate 4-21 Fascia lifting along gable of control building.



Plate 4-22 Interior of the control building.

Bridge 1 (Structure S2)

Bridge 1 is located approximately 360 m from Turbine 6. The structure comprises a stone arch bridge with small gaps between stones which provide limited potential roosting features (Plates 4-26 and 4-27). The structure was inspected using a torch and endoscope and no evidence of bat use was recorded. The bridge was assessed as having *Low* bat roost potential.



Plate 4-23 Bridge 1 – a stone arch bridge which is located near T6.



Plate 4-24 Gaps visible between the stones of Bridge 1

Bridge 6 (Structure S7)

Bridge 6 is located approximately 600 m from Turbine 5. The structure contains a small number of crevices within the stonework which provide limited potential roosting features (Plates 4-28 and 4-29).

No evidence of bat use was recorded during detailed inspection using a torch and endoscope. The structure was assessed as having *Low* bat roost potential.



Plate 4-25 Bridge 2 with crevices visible in between the stones



Plate 4-26 Face of Bridge 2 – stone arch bridge.

Bridge 7 (Structure S8)

Bridge 7 is located approximately 580 m from Turbine 1 and is located outside the EIAR site boundary of the Proposed project. The structure contains gaps and crevices within the stonework which provide limited potential roosting features (Plates 4-30 and 4-31).

The structure was inspected using a torch and endoscope and no evidence of bat use was recorded. The structure was assessed as having *Low* bat roost potential.



Plate 4-27 Stone arch Bridge 3 located near T5.



Plate 4-28 Gap in the stonework of the bridge providing roost potential for bats.

4.3.2.2 Ground-Level Tree Assessments

Targeted ground-level tree inspections were undertaken within the Proposed Wind Farm footprint in accordance with Andrews (2018) and Collins (2023), focusing on identifying potential roosting features (PRFs) such as cracks, splits, cavities, lifted bark and evidence of decay.

Trees within the Proposed Wind Farm footprint comprise predominantly commercial conifer plantation, primarily Sitka spruce. Due to their species composition, uniform structure and management regime, these trees do not typically develop features suitable for roosting bats and were assessed as having *None* roosting potential.

Additional inspections were undertaken within areas subject to works, including turbine delivery route accommodation works and localised infrastructure areas. No PRFs were identified within any trees inspected and no evidence of bat use was recorded.

Overall, the tree inspections confirmed that no trees within the Proposed Project footprint, including all areas subject to felling or vegetation clearance, provide suitable roosting opportunities for bats.

4.3.2.3 Emergence Surveys

Emergence surveys were undertaken during the spring and summer of 2024 to further assess the use of structures identified within the Proposed Wind Farm as having potential to support roosting bats. The locations surveyed, survey dates and results recorded during the 2024 survey season are summarised in Table 4-10.

In addition, emergence surveys were undertaken in 2023 as part of previous baseline bat surveys, the results of which are presented in **Appendix 1**. These surveys confirmed the presence of a day roost at the derelict stone ruin (Structure S1), where a brown long-eared bat (*Plecotus auritus*) was recorded emerging during the 2023 autumn survey period.

During the 2024 survey season, the derelict stone ruin (Structure S1), previously identified as having *Low* bat roost potential, was subject to dusk emergence surveys in spring. During this survey, two common pipistrelles (*Pipistrellus pipistrellus*) were observed emerging from gaps within the stonework, confirming continued use of the structure as a night roost.

The Kingsmountain control building (Structure S16), also assessed as having *Low* bat roost potential, was subject to a dusk emergence survey during late summer 2024. No bats were observed emerging from the structure during this survey.

Overall, emergence survey results confirm the continued use of the derelict stone ruin (Structure S1) as a night roost by small numbers of bats, while no evidence of roosting was recorded at other surveyed structures.

Table 4-10 Emergence survey results 2024

Structure ID	Roosting Suitability	Irish Grid Reference	Date Surveyed	Survey Results
S1	<i>Low</i>	G 44004 27332	11 th June 2024	2 Common pipistrelle bats emerged from gaps in stonework
S16	<i>Low</i>	G 47500 28570	17 th September 2024	No bats observed emerging

4.3.3

Manual Transects

Manual transects were undertaken in spring, summer and autumn 2024 with details of additional transects carried out in 2023 are included in **Appendix 1**. Bat activity was recorded in all seasons. A total of 220 bat passes were recorded, including emergence survey activity. In general, Soprano pipistrelle (n=177) was recorded most frequently, followed by Common pipistrelle (n=35). *Myotis spp.* (n=4) and Leisler's bat (n=3) were less frequent with only one brown long-eared bat pass (n=1) recorded (Plate 4-30).

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 4-31 presents the results for individual species per survey period. Figure 4-2 to Figure 4-4 present the spatial distribution of bat activity across surveys. Bat activity was concentrated along the conifer plantation edges with activity near open peatland concentrated along the linear (road/track) habitats. Common and soprano pipistrelle were most frequently recorded in spring and autumn 2024. *Myotis spp.* was only detected during spring and brown long-eared bat was recorded only during the autumn.

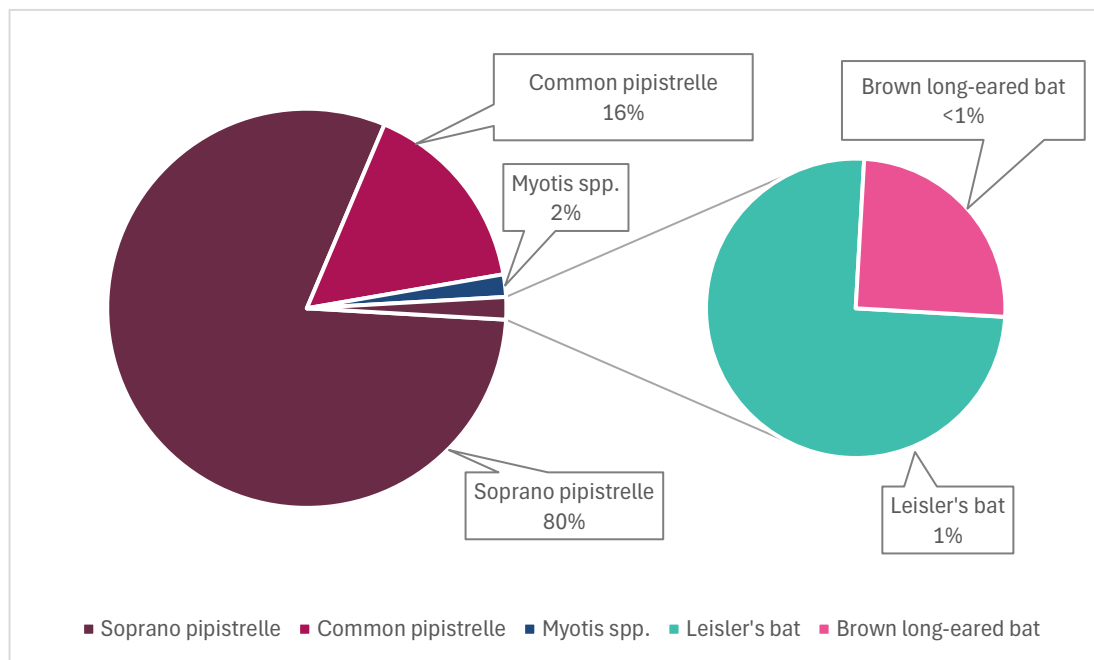


Plate 4-29 Manual Activity Surveys 2024 (Total Species Composition)

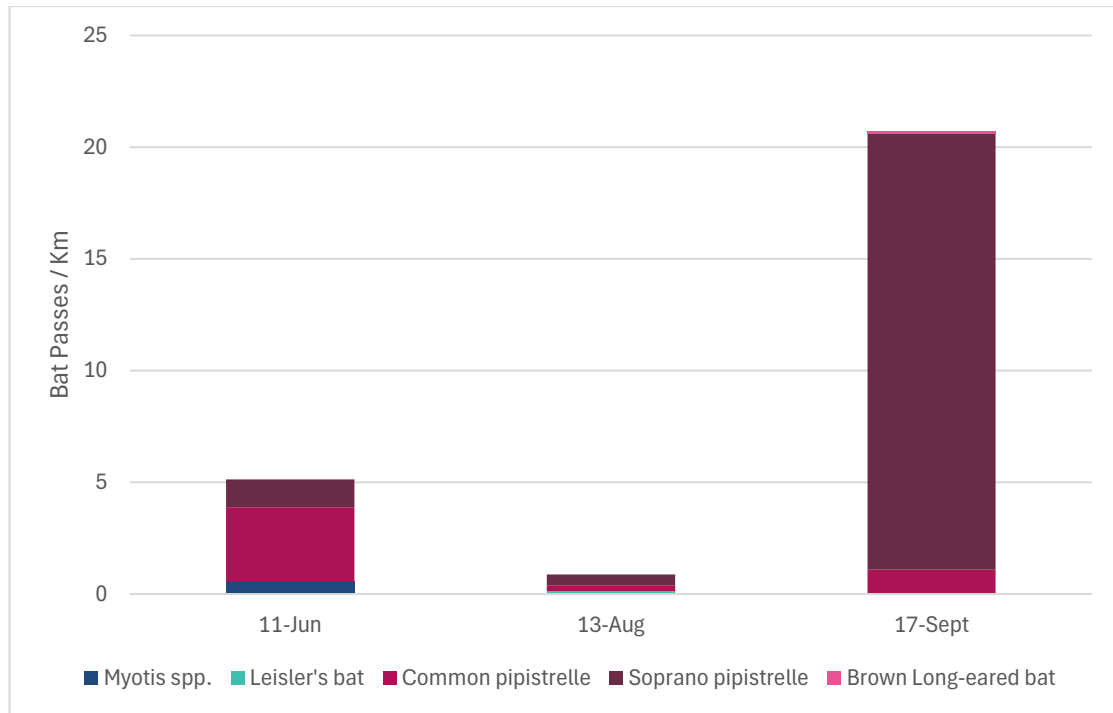


Plate 4-30 Transect Results 2024 – Species Composition Per Survey Period



Map Legend

- EIAR Site Boundary
- Proposed Turbine Layout
- Spring Transect Route 11.06.2024

Spring Manual Results

- Myotis species
- Common pipistrelle
- Soprano pipistrelle

Spatial Reference
Name: IREN95 Irish Transverse Mercator
Datum: IREN95
Projection: Transverse Mercator

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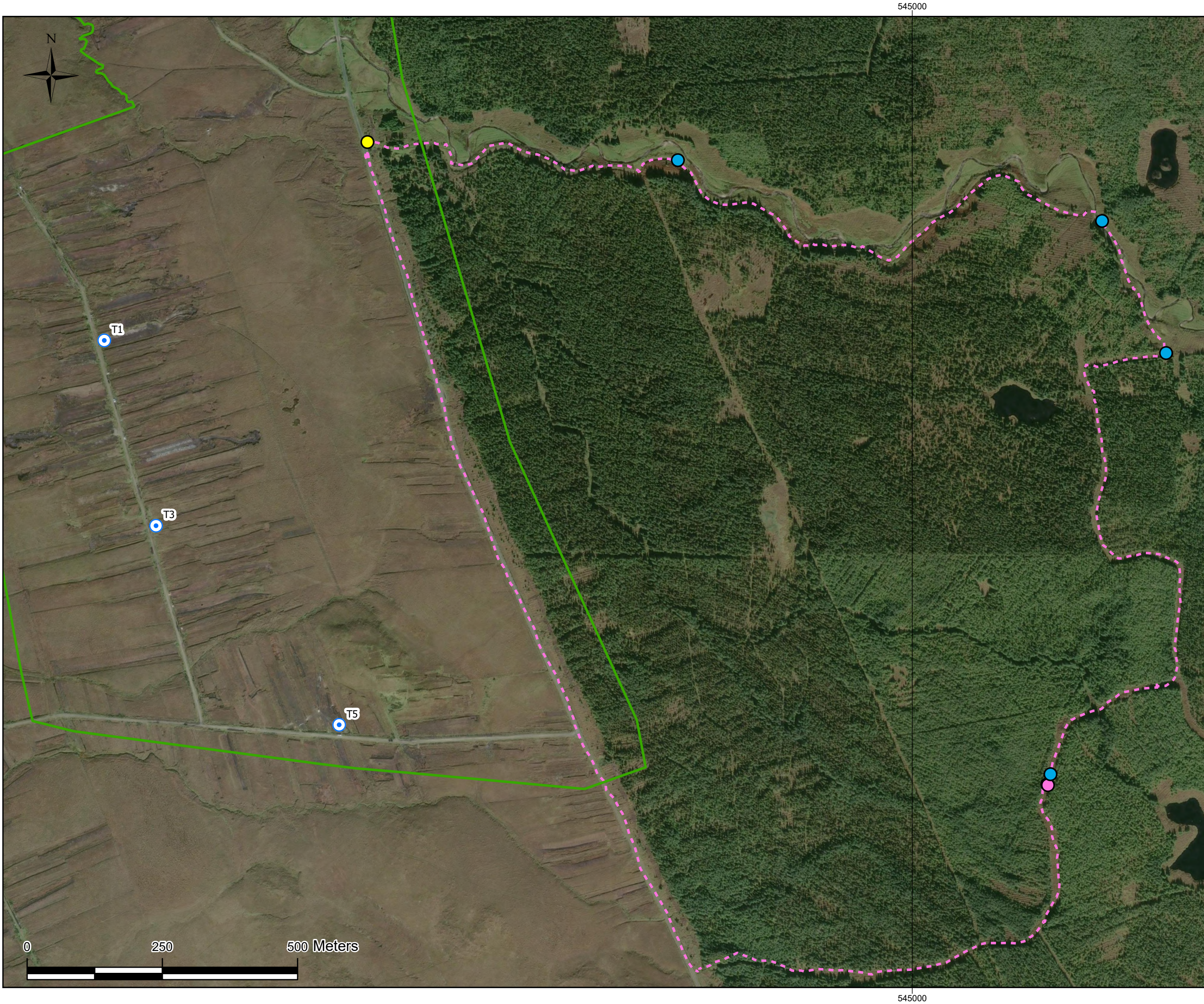
SITE LOCATION - NOT TO SCALE

Spring Manual Results 2024

Project Title
Crumhach Wind Farm,
Co. Sligo

Project No. 230481	Drawing No. 4-2	Scale 1:7,500
Drawn By AM	Checked By MNR	Date 29/06/2026

Email: info@mkofireland.ie / Website: www.mkofireland.ie



Map Legend

- EIAR Site Boundary
- Proposed Turbine Layout
- Summer Transect Route 13.08.2024

Summer Manual Results

- Common pipistrelle
- Soprano pipistrelle
- Leisler's bat

Spatial Reference
Name: IREN95 Irish Transverse Mercator
Datum: IREN95
Projection: Transverse Mercator

SITE LOCATION - NOT TO SCALE

Drawing Title

Summer Manual Results 2024

Project Title

Crumhach Wind Farm,
Co. Sligo

Project No.	Drawing No.	Scale
230481	4-3	1:6,500
Drawn By	Checked By	Date
AM	MNR	29/06/2026

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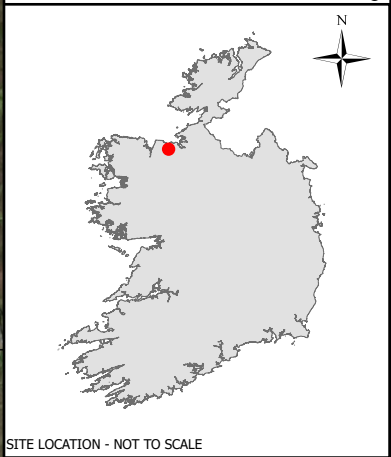
Map Legend

- EIAR Site Boundary
- Proposed Turbine Layout
- Autumn Transect Route 17.09.2024

Autumn Manual Results

- Common pipistrelle
- Soprano pipistrelle
- Leisler's bat
- Brown long-eared bat

Spatial Reference
Name: IREN95 Irish Transverse Mercator
Datum: IREN95
Projection: Transverse Mercator



SITE LOCATION - NOT TO SCALE		
Drawing Title		
Autumn Manual Results 2024		
Project Title		
Crumhach Wind Farm, Co. Sligo		
Project No.	Drawing No.	Scale
230481	4-4	1:10,500
Drawn By	Checked By	Date
AM	MNR	29/06/2026

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4.3.4 Ground-level Static Surveys

In total, 35,102 bat passes were recorded across all deployments. In general, Soprano pipistrelle (n=16,449) occurred most frequently, followed by Common pipistrelle (n=12,637), *Myotis spp.* (n=2,834) and Leisler's bat (n=2,447). Instances of brown long-eared bat (n=730) and Nathusius' pipistrelle (n=5) were recorded less frequently during the 2024 survey period. Plate 4-32 presents relative species composition across all ground-level static detector surveys.

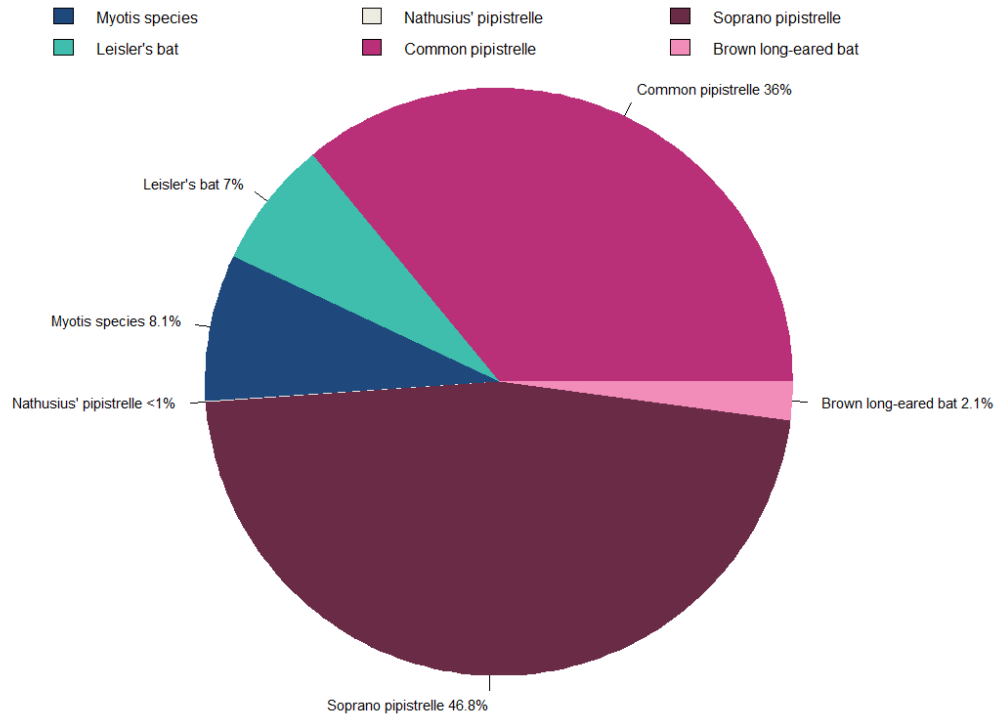


Plate 4-31 2024 Static Detector Surveys: Species Composition Across All Deployments (Total Bat Passes)

Bat activity was calculated as total bat passes per hour (bp/h) per season to account for any bias in survey effort, resulting from varying night lengths between seasons. Plate 4-33 presents these results for each species per season. Spring activity was dominated by common pipistrelle, with additional activity from soprano pipistrelle and Leisler's bat. During summer, soprano pipistrelle was the most active species, followed by *Myotis spp.*, while Leisler's bat activity was at its lowest. Overall activity levels were highest in autumn, primarily driven by soprano and common pipistrelle. Brown long-eared bat activity peaked in autumn, with much lower levels recorded in spring and summer. Nathusius' pipistrelle was detected only rarely across all survey periods.

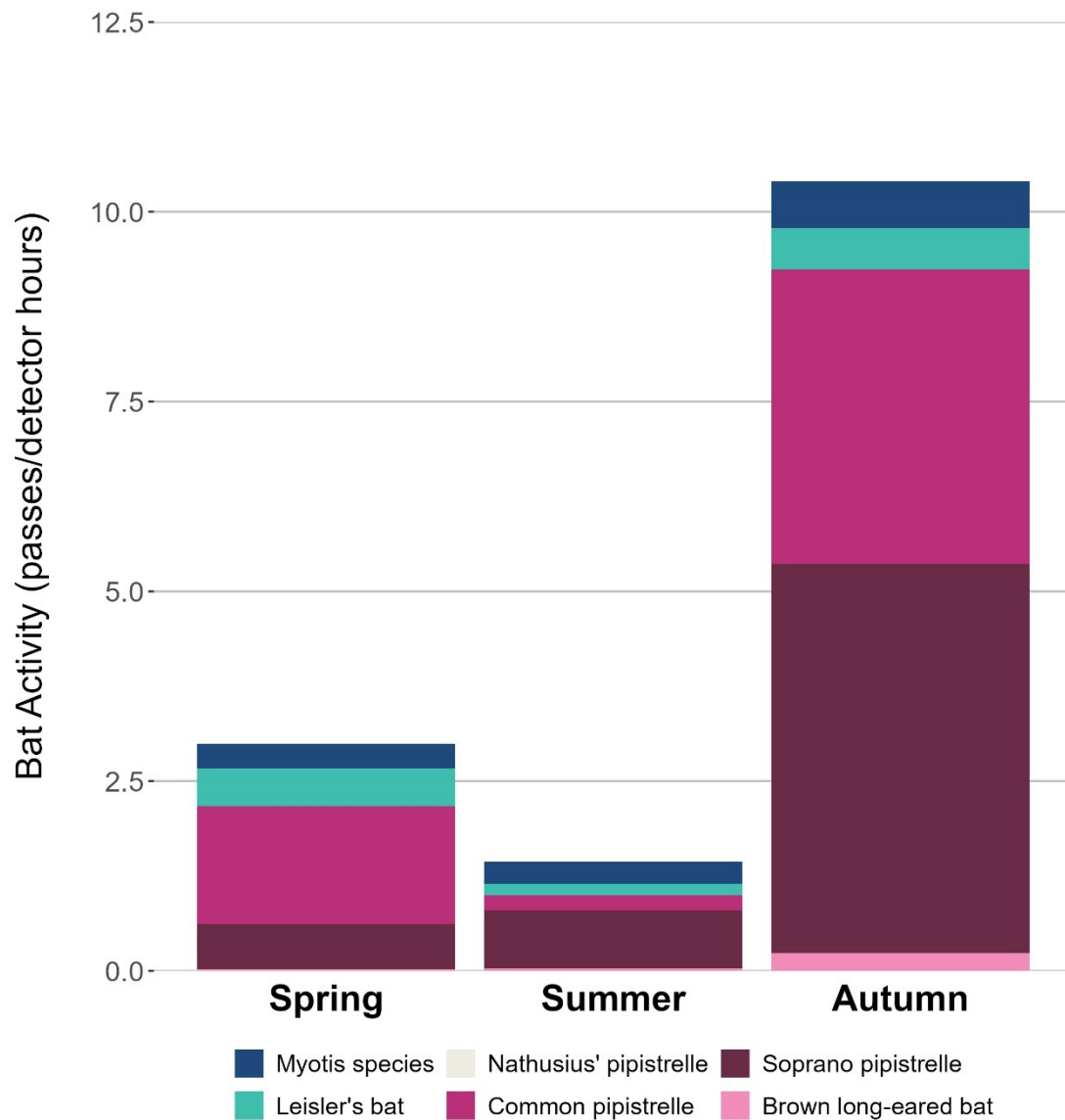


Plate 4-32 2024 Static Detector Surveys: Species Composition Across All Deployments (Total Bat Passes Per Hour, All Nights)

The Median Bat Pass Rate per detector, per survey period is shown in Plates 4-34 & 4-35 (varied axis scale) and demonstrates clear seasonal and spatial variation in bat activity. In spring, activity was highest at D11 with notable levels also at D13, D08 and D09, while the remaining detectors recorded low activity. Summer showed the lowest overall bat activity, with the highest recorded at D11, followed by D09, D13, and D08. Autumn had the highest activity levels, D11 remained the most active site, with notable levels of activity at D08, D09 and D10, and reduced levels elsewhere.

D14 was redeployed in summer 2025 on the same dates as the original deployments in 2024. The activity at this detector location is low in spring and summer with the highest activity recorded in autumn.

The Median Nightly Pass Rate (i.e. total bat passes per hour, per night) was used to determine typical bat activity at the Proposed Wind Farm (Plate 4-36). Activity was often variable between survey nights. 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 4-37 and Plate 4-38 present the weather suitability across the 2024 and 2025 survey periods for the static deployments.

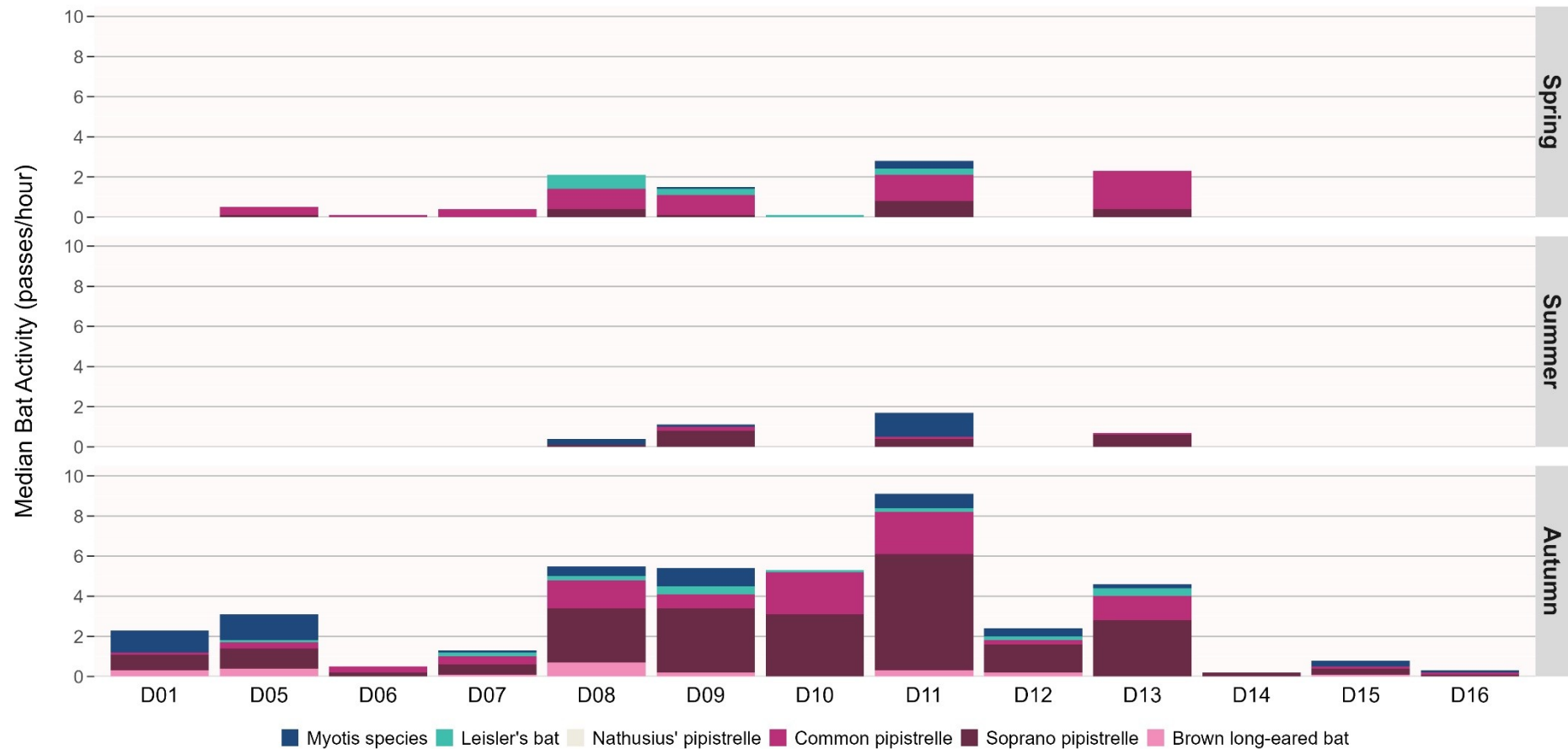


Plate 4-33 Static Detector Surveys: Median Bat Pass Rate (bp/h) Including Absences, Per Location Per Survey Period. *D14 was redeployed in summer 2025 which is included in this graph, the spring and autumn activity is from the 2024 deployments.

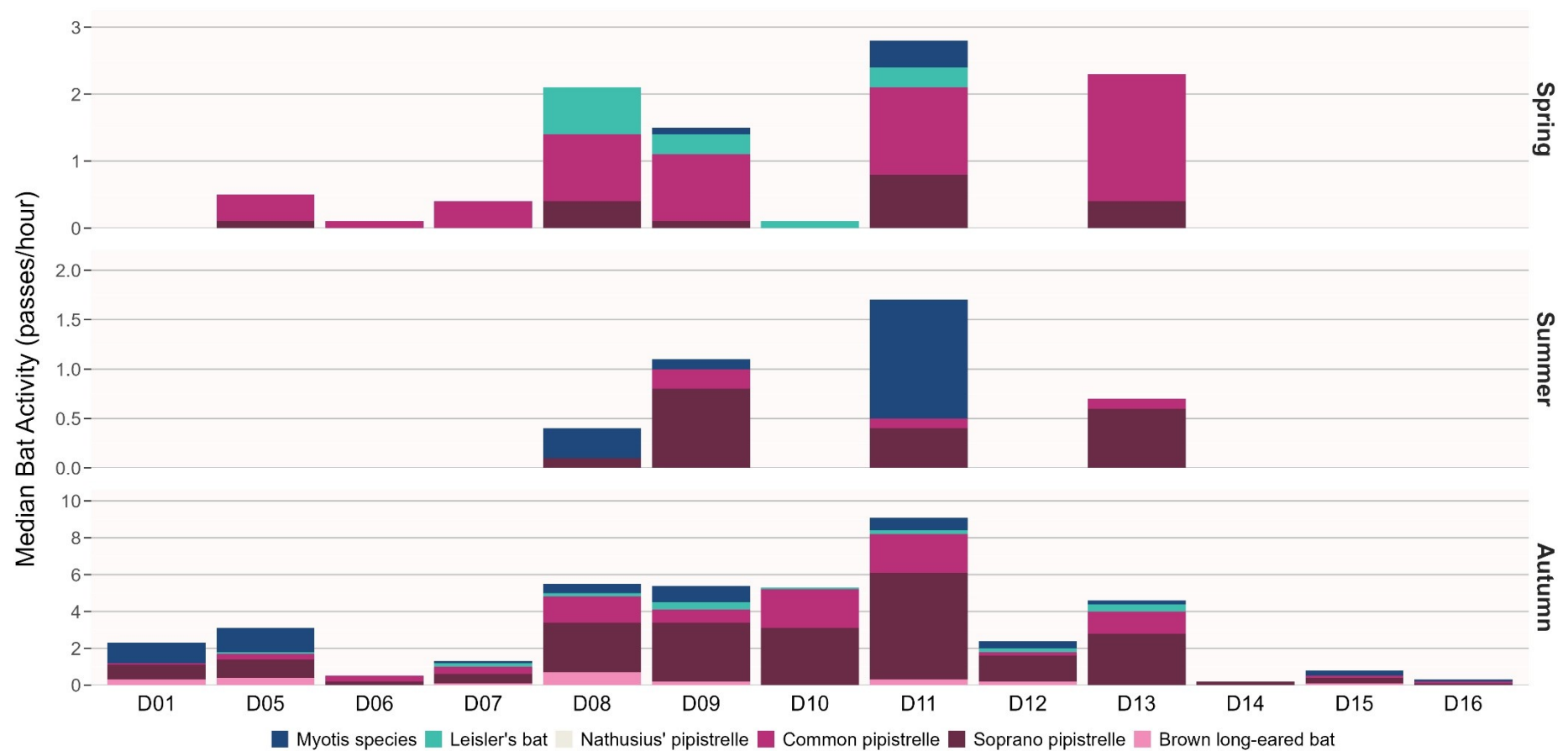


Plate 4-34 Static Detector Surveys: Median Bat Pass Rate (bpph) Including Absences, Per Location Per Survey Period (Varied Axis Scale). *D14 is included in this graph which was redeployed in summer 2025, the spring and autumn activity is from the 2024 deployments.

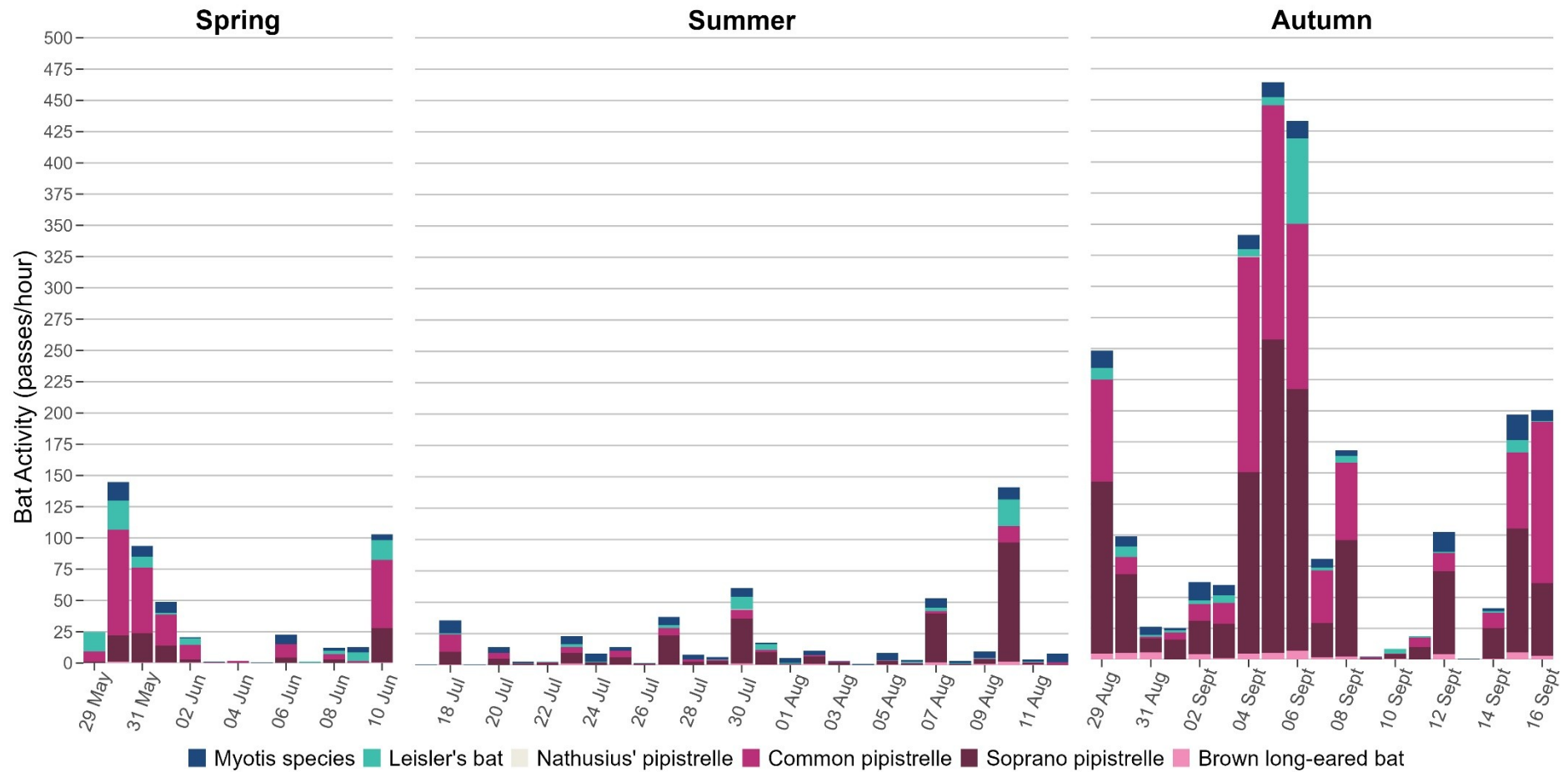


Plate 4-35 Static Detector Surveys: Median Bat Pass Rate (bp/h) Including Absences, Per Season Per Night. *D14 is included in this graph which was redeployed in summer 2025 (17th July – 12th August), all other detectors were deployed in summer 2024 on the same day

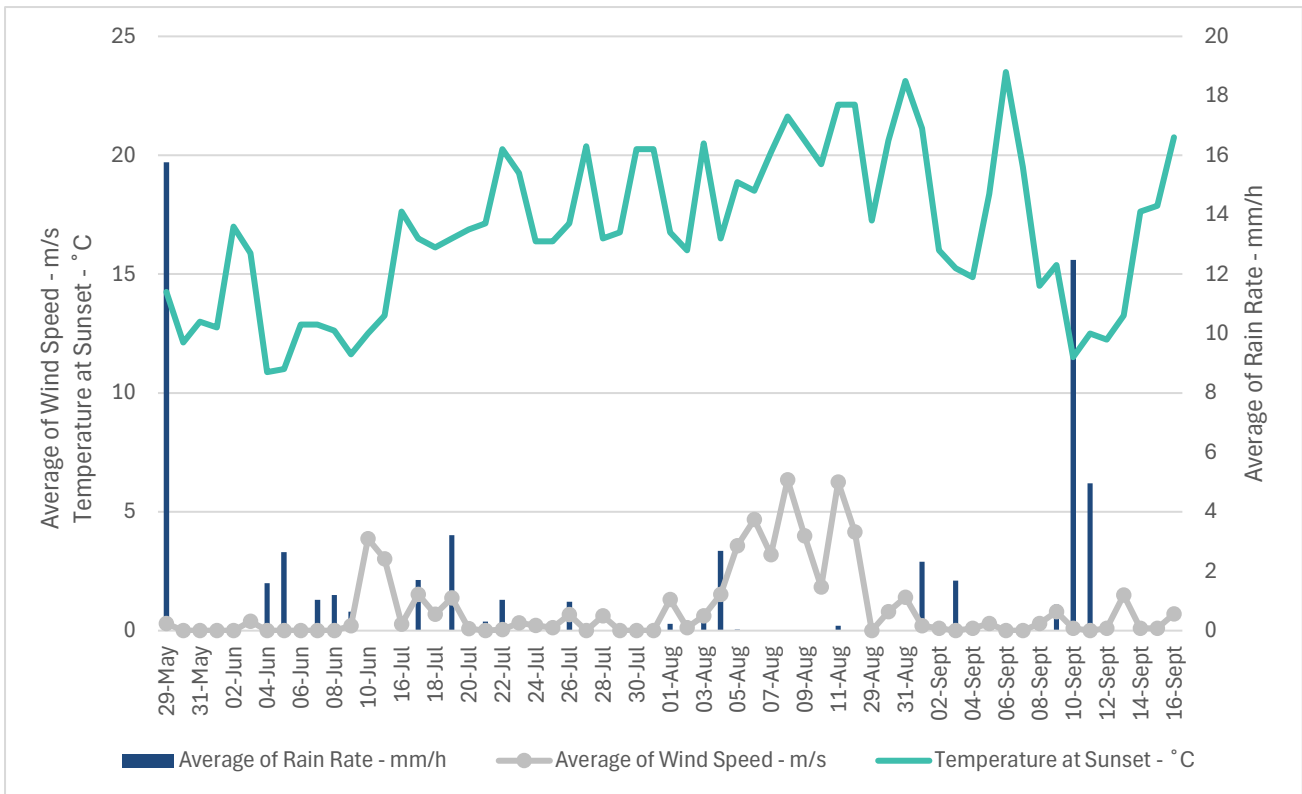


Plate 4-37 Weather suitability across nights of static detector surveys in 2024.

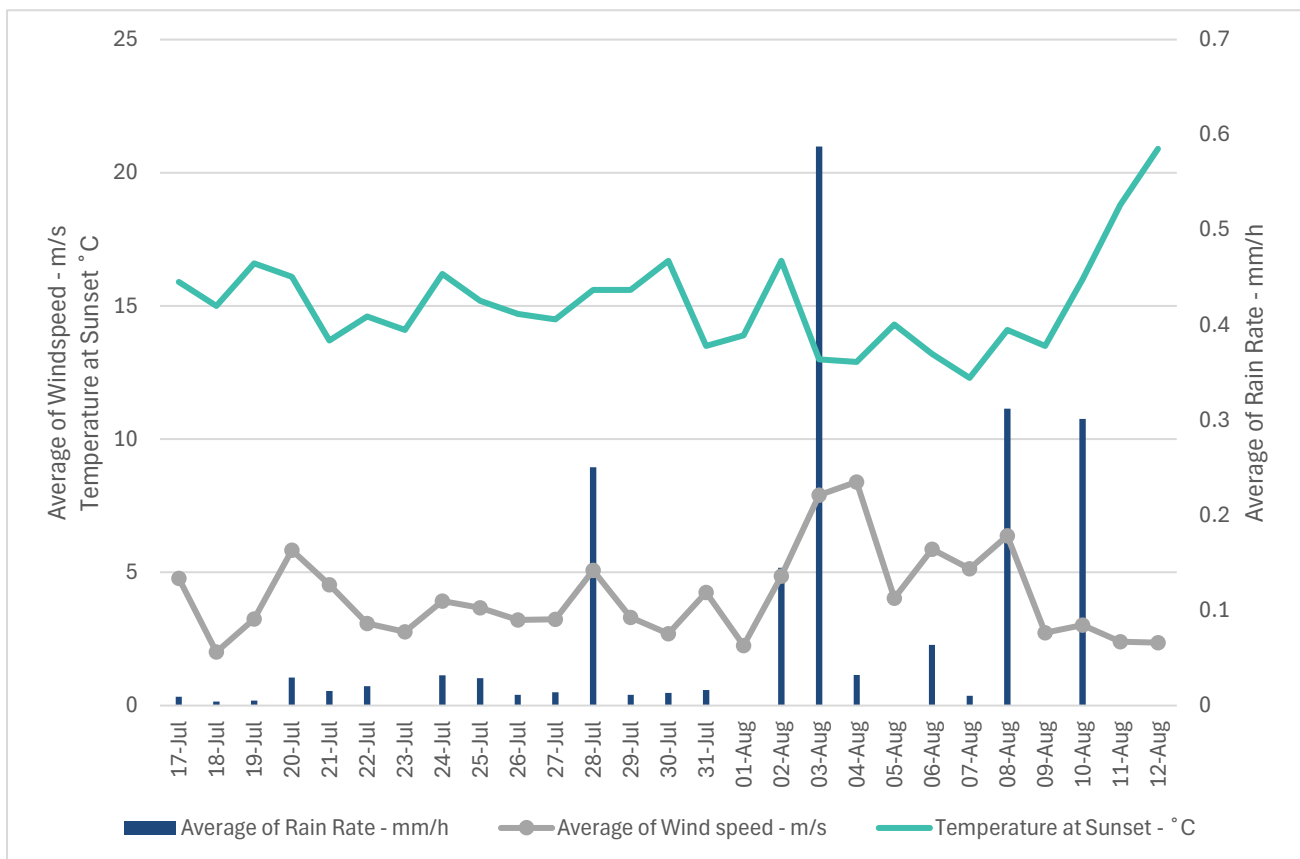


Plate 4-36 Weather suitability across nights of the summer redeployment of D14 in 2025

4.4

Assessment of Bat Activity Levels 2024

4.4.1

Adapted Site-specific Ranges

Low, *Moderate* and *High* activity levels were assigned to median and maximum pass rates (bp/h) identified during spring, summer and autumn at the detectors deployed across the Proposed Wind Farm, 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 typically exhibited *Low* median activity across all seasons with the highest median value being recorded at D08 in spring (0.7 bp/h). Notable maximum values were recorded across all the seasons, with the highest values being recorded in spring at D09 (13.5 bp/h) and in autumn at D10 (10.7 bp/h).

Common pipistrelle demonstrated predominantly *Low* to *Moderate* median activity throughout the year. In autumn, D10 and D11 recorded a *Moderate* median of 2.1 bp/h. A significant outlier was detected at D10 in autumn with a maximum activity of 117.9 bp/h. This detector was situated along a conifer forest edge (WD4). High maximum activity was recorded at D11 in spring (45.6 bp/h) and autumn (38.9 bp/h).

Soprano pipistrelle activity remained mostly within the *Low* to *Moderate* range. A single *High* median value was recorded at D11 in autumn (5.8 bp/h, maximum 59.6 bp/h). Spring and summer median activity was uniformly *Low*, while autumn showed a mix of *Low* to *Moderate* readings. Autumn had the highest maximum activity recorded at D11 (59.6) and D13 (56.2). A significant outlier was identified at D10 in autumn with a maximum activity of 125.1 bp/h.

Myotis species exhibited *Low* median activity across all detectors and seasons. The highest median values were recorded—at D05 in autumn (1.3 bp/h) and D11 in summer (1.2 bp/h). However, notable maximum values were recorded at D11, with 6.8 bp/h in summer and a significant outlier was detected at D11 for spring with a maximum activity of 10.9 bp/h, both within the *High* range. This detector was situated along a treeline of conifer plantation (WD4).

Brown long-eared bats were generally within the *Low* median activity category throughout the year. *Moderate* median activity was recorded in autumn at D06 (0.7 bp/h: maximum 1.8 bp/h). Some detectors had no recordings of the species in spring and summer. High maximum activity was also recorded at D01 and D02 (1.6 bp/h) and D15 (1.4 bp/h).

Nathusius' pipistrelle activity was largely absent, with no recordings of the species mainly in spring and summer. The only exceptions were at D13 in summer, with a *High* maximum of 0.1 bp/h (maximum 5.3 bp/h), and in autumn, with a *High* maximum of 0.1 bp/h recorded at D07, D08, D11 and D15.

Common pipistrelle and Soprano pipistrelle were the most consistently active species across the Proposed Wind Farm, with *Moderate* median records recorded, particularly in autumn. Leisler's bat and *Myotis spp.* Were active across all seasons but showed generally *Low* activity levels across most detectors with some higher site-specific activity. 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 D08, D09, D10 and D11) recording the highest activity rates.

Table 4-11 Median Nightly Bat Activity (bpph) per Species, per Season, per Detector Location 2024 – None, Low, Moderate, High. Outliers are highlighted in Orange.

Species	Season	Bat activity (bpph)	D01	D05	D06	D07	D08	D09	D10	D11	D12	D13	D14	D15	D16
Myotis sp.	Spring	Median	0	0	0	0	0	0.1	0	0.4	-	0	0	0	-
		Maximum	2	1	0.1	0.6	4.3	1.5	0.4	10.9	-	0.3	0.3	0.1	-
	Summer	Median	0	0	0	0	0.3	0.1	0	1.2	0	0	0	0	0
		Maximum	1.6	1.5	0.7	0.3	1.4	1.8	0	6.8	0.7	1.8	0.4	1.2	0.9
	Autumn	Median	1.1	1.3	0	0.1	0.5	0.9	0	0.7	0.4	0.2	0	0.3	0.1
		Maximum	2.7	7.1	0.9	0.7	1.8	2.7	0.3	2.4	1.8	1.1	0.6	3.1	4
Leisler's bat	Spring	Median	0	0	0	0	0.7	0.3	0.1	0.3	0	0	0	0	-
		Maximum	0.4	1.1	2.2	0.4	9.2	13.5	1.8	5.8	0.1	2.2	0.1	0.1	-
	Summer	Median	-	0	0	0	0	0	0	0	0	0	0	0	0
		Maximum	-	1.1	0.8	1.7	1.7	0.7	0	3.1	0.7	1.9	1	2.7	6.6
	Autumn	Median	0	0.1	0	0.2	0.2	0.4	0.1	0.2	0.2	0.4	0	0	0
		Maximum	9.6	7.8	2.2	3.1	9.3	7.3	10.7	5.4	3.5	4.3	0.9	4.2	2.1
Nathusius' pipistrelle	Spring	Median	-	-	-	-	-	-	-	-	-	-	-	-	-
		Maximum	-	-	-	-	-	-	-	-	-	-	-	-	-
	Summer	Median	-	-	-	-	-	-	-	-	-	0	-	-	-
		Maximum	-	-	-	-	-	-	-	-	-	0.1	-	-	-
	Autumn	Median	-	-	-	0	0	-	-	0	-	-	-	0	-
		Maximum	-	-	-	0.1	0.1	-	-	0.1	-	-	-	0.1	-
Common pipistrelle	Spring	Median	0	0.4	0.1	0.4	1	1	0	1.3	0	1.9	-	0	-
		Maximum	2	3.9	5.2	1	5.8	9	0.6	45.6	3.5	23.9	-	0.3	-
	Summer	Median	0	0	0	0	0	0.2	0	0.1	0	0.1	0	0	0
		Maximum	0.9	0.4	0.6	1.9	2	6.8	0.1	2.2	0.6	4.1	0.3	0.3	0.2
	Autumn	Median	0.1	0.3	0.3	0.4	1.4	0.7	2.1	2.1	0.2	1.2	0	0.1	0.1
		Maximum	4.9	3.4	2.5	3.9	5.5	16.4	117.9	38.9	1.8	34.4	1	3	1.3
Soprano pipistrelle	Spring	Median	0	0.1	0	0	0.4	0.1	0	0.8	0	0.4	-	0	-
		Maximum	0.6	1.2	0.9	0.6	2.8	2.5	0.6	10	0.8	12	-	0.6	-
	Summer	Median	0	0	0	0	0.1	0.8	0	0.4	0	0.6	0	0	0
		Maximum	0.9	2.7	1.2	1.8	31	15.1	0.1	6.9	1.9	31.1	1.2	1.7	1.4
	Autumn	Median	0.8	1	0.2	0.5	2.7	3.2	3.1	5.8	1.4	2.8	0.2	0.3	0.1
		Maximum	13.3	21	2	3.1	25.5	7.7	125.1	59.6	8.6	56.2	4.5	6.8	5.8
Brown long-eared bat	Spring	Median	-	0	0	0	0	0	0	0	-	0	-	-	-
		Maximum	-	0.1	0.1	0.3	0.1	0.4	0.3	0.4	-	0.1	-	-	-
	Summer	Median	-	0	0	0	0	0	-	0	0	0	0	0	0

		Maximum	-	0.5	0.1	0.1	0.8	0.3	-	0.6	0.2	0.7	0.2	0.4	0.8
	Autumn	Median	0.3	0.4	0	0.1	0.7	0.2	0	0.3	0.2	0	0	0.1	0
		Maximum	1.6	1.6	0.7	1.1	1.8	0.5	0.4	0.7	0.6	0.4	0.2	1.4	0.8

4.5 Importance of Bat Population Recorded at the Site

Ecological evaluation within this section follows a methodology that is set out in Chapter 3 of the *Guidelines for Assessment of Ecological Impacts of National Roads Schemes* (TII, 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 have been assessed as Ecological Receptors of **Local Importance (Higher Value)** based on the presence of a regularly occurring bat population recorded within the Proposed Wind Farm, including confirmed roosts and use of the site for foraging and commuting.

During the 2023 and 2024 baseline surveys, one derelict stone ruin containing roosting common pipistrelles and a brown long-eared bat was identified within the Proposed Wind Farm. Within the Existing Wind Farm, which forms part of the Proposed Project, three pipistrelle roosts were identified during 2024 surveys at the onsite electrical control building (DS4), a derelict farmhouse (DS1) and an outbuilding shed (DS2) at Dunneill Wind Farm. All three roosts were characterised by a limited number of individuals (six soprano individuals emerged from DS1, two soprano pipistrelles emerged from DS2 and seven common and soprano pipistrelles emerged from DS4 in 2024). During the 2025 post-construction monitoring surveys for Dunneill Wind Farm, the onsite electrical control building (DS4) was confirmed again as a pipistrelle roost with two individuals. These represent three small low-value roosts with less than 10 individuals.

No maternity roosts of high conservation significance were identified within the Site. No roosting site of National Importance (i.e. site supporting greater than 100 individuals) was recorded during previous baseline surveys in 2021 and 2023, operational monitoring at the Existing Wind Farm, or the current 2024 baseline bat surveys.

Overall, the bat assemblage recorded within the Proposed Wind Farm is considered typical of upland forestry and peatland landscapes in Ireland, with no evidence of regionally or nationally important populations.

5. RISK AND IMPACT ASSESSMENT

This risk and impact assessment has been undertaken in accordance with NatureScot (2021) guidance and wind farms present four potential risks to bats:

- Collision mortality, barotrauma and other injuries
- Loss of, 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 utilised to predict the potential effects of the Proposed Project on bats.

5.1 Collision Mortality

5.1.1 Assessment of Site-Risk

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

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

Criteria	Site-specific Evaluation	Site Assessment
Habitat Risk	A total of four confirmed bat roosts have been identified within the Proposed Wind Farm. These comprise a derelict stone ruin used by common pipistrelle and brown long-eared bat (maximum three individuals), a derelict farmhouse used by six soprano pipistrelles, an outbuilding shed used by two soprano pipistrelles, and the onsite electrical control building used by up to seven common and soprano pipistrelles. All roosts support low numbers of bats and are considered small, low-value roosts. No maternity roosts or roosts of National Importance were identified. The Proposed Wind Farm is dominated by open grassland, peatland and commercial conifer plantation. Habitat features of relevance to bats are limited to plantation edges and a small number of linear features, including watercourses and localised treelines, which provide limited commuting and foraging opportunities. Bat activity levels recorded during surveys were generally low to moderate and typical of upland forestry landscapes, with activity largely associated with edge habitats. Overall habitat suitability and connectivity across the Site are limited.	Low
Project Size	Following the criteria set out in NatureScot, 2021 the project is of Medium scale as it consists of >10 turbines (17 no. turbines). Although individual turbine heights exceed 100 m, the overall development remains well below the threshold for a large project under NatureScot (2021). The project has therefore been assessed as being of medium size. There are four existing and one permitted wind energy developments within 10 km of the Site (not including Dunneill Wind Farm and Kingsmountain Wind Farm).	Medium
Overall Site Risk Assessment - Based on a Low habitat risk and Medium project size, the Proposed Project is classified as a Low Site Risk, in accordance with Table 3a of NatureScot (2021).		Low Site Risk (2)

As the Proposed Project involves the repowering of sections of the Existing Wind Farm, changes in turbine design have been considered as part of the site risk assessment. The number of turbines will be reduced from 23 to 17; however, the Proposed Turbines are larger, with increased hub height and rotor diameter compared to the existing turbines at Dunneill and Kingsmountain Wind Farm.

Existing turbines at Dunneill Wind Farm have a ground clearance of approximately 23m, while turbines at Kingsmountain Wind Farm have a ground clearance of approximately 20m. The Proposed Turbines will have an increased ground clearance of approximately 30m, representing an increase of approximately 7m compared to Dunneill Wind Farm and 10m compared to Kingsmountain Wind Farm.

Previous monitoring undertaken at the Existing Wind Farm recorded substantially higher levels of bat activity at ground-level detectors than at at-height detectors (Sections 4.2.1 and 4.2.3), indicating that the majority of recorded bat activity occurred below the upper portion of the rotor-swept zone.

While the increased rotor diameter results in a larger rotor swept area and an expansion of the vertical and horizontal zone of potential interaction, particularly for higher-flying species such as Leisler's bat, the reduction in turbine numbers and increased ground clearance are considered to reduce the likelihood of interaction for low-flying species. While higher-flying species such as Leisler's bat may continue to utilise portions of the rotor-swept zone, operational monitoring has demonstrated relatively low levels of collision mortality despite several years of turbine operation.

Recent research has indicated that ground clearance may be a more important predictor of bat fatality rates than rotor diameter alone, with increased ground clearance associated with lower fatality rates in bats (Garvin et al., 2024). This study provides supporting evidence that increases in ground clearance may reduce collision risk by elevating the rotor-swept zone further above commonly used flight heights.

Post-construction monitoring at the Existing Wind Farm recorded a greater number of pipistrelle fatalities than Leisler's bat fatalities (Sections 4.2.1 to 4.2.3), indicating that pipistrelle species currently represent the species group most susceptible to turbine collision within the Proposed Wind Farm. Given that pipistrelles generally fly at lower heights than Leisler's bat, the proposed increase in ground clearance is considered particularly relevant to the species currently most affected by turbine-related mortality.

5.1.2 Assessment of Collision Risk

As the Proposed Project involves the repowering of sections of the Existing Wind Farm, the assessment is informed by both baseline survey data and site-specific operational monitoring, including collision mortality data from existing turbines within the Proposed Wind Farm.

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 5**), by a cross-tabulation of the site risk level (i.e. Low). 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 Moderate median activity recorded for brown long-eared bat at D08 in autumn, the overall activity levels for the species were low; therefore, no significant collision-related effects are predicted. Loss of habitat is assessed further in Section 5.2 and 5.3. below. Activity levels for these species will continue to be assessed during operational monitoring following the implementation of best practice mitigations provided. Further mitigation will be implemented after Year 1 if deemed necessary.

5.1.2.1 Leisler's bat

The Proposed Wind Farm is within the current range of the Leisler's bat (NPWS, 2025). Leisler's bats are classed as a rarer species of a high population vulnerability which have a high collision risk (Plate 3-2). Leisler's bats were recorded during all activity surveys across the Proposed Wind Farm. 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** in spring, summer, and autumn at median activity levels. Maximum activity ranged from **Moderate** to **High** in all seasons. (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 Proposed Wind Farm, which is primarily conifer plantation, peatland and improved agricultural grassland with treelines and hedgerows at field boundaries with low levels of bat activity recorded during the walked transects undertaken at the Proposed Wind Farm.

Thus, the overall collision risk level for the local population of Leisler's bat is generally assessed as **Low** for typical activity across all seasons. The typical maximum activity was assessed as having a **Medium** collision risk level in all seasons.

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 2024	Low (2)	Low (1)	Typical Risk is Low (2)	Moderate (3)	Peak Risk is Medium (6)
Summer 2024		Low (1)	Typical Risk is Low (2)	Moderate (3)	Peak Risk is Medium (6)
Autumn 2024		Low (1)	Typical Risk is Low (2)	Moderate – High (4)	Peak Risk is Medium (8)

5.1.2.2 Soprano pipistrelle

The Proposed Wind Farm is within range for soprano pipistrelle bat (NPWS, 2025). Soprano pipistrelles are classed as a common species of a medium population vulnerability which have a high potential collision risk (Plate 3-2). Soprano pipistrelle was recorded during activity surveys across the Proposed Wind Farm. 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 summer and **Medium** for autumn. Peak activity levels were **Low-Moderate** in spring and summer and **High** in autumn, 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 Proposed Wind Farm, which is primarily conifer plantation, peatland and improved agricultural grassland with treelines and hedgerows at field boundaries with low levels of bat activity recorded during the walked transects undertaken at the Proposed Wind Farm.

Thus, there is a **Low** collision risk level at typical activity levels for spring, summer and autumn. A **Medium** collision risk level at peak activity levels was assigned to the local population of soprano pipistrelle in autumn, with a **Low** collision risk in spring and summer.

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 2024	Low (2)	Low (1)	Typical Risk is Low (2)	Low-Moderate (2)	Peak Risk is Low (4)
Summer 2024		Low (1)	Typical Risk is Low (2)	Low-Moderate (2)	Peak Risk is Low (4)
Autumn 2024*		Low-Moderate (2)	Typical Risk is Low (4)	High (5)	Peak Risk is Medium (10)

*The autumn maximum value for D10 was identified as an outlier and was excluded from the assessment of Typical Activity as it considerably skews the data, providing an inaccurate representation of the typical activity observed across the Proposed Wind Farm.

5.1.2.3 Common pipistrelle

The Proposed Wind Farm is within the current range of the common pipistrelle bat (NPWS, 2025). Common pipistrelles are classed as a common species of a medium population vulnerability which have a high collision risk (Plate 3-2). Common pipistrelles were recorded during all activity surveys across the Proposed Wind Farm. When assessed in the context of the identified site risk and in line with Table 3b (NatureScot 2021); overall activity risk for common pipistrelle at Typical Activity levels was found to be **Low** across all seasons in 2024. Peak activity levels for common pipistrelle were found to be **Moderate** in spring and autumn and **Low** in summer. (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 Proposed Wind Farm, which is primarily conifer plantation, peatland and improved 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 **Low** collision risk level at typical activity levels and a **Medium** collision risk level at peak activity levels was assigned to the local population of common pipistrelle in Spring and autumn and **Low** collision risk level at peak activity levels in summer.

Table 5-4 Common 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 2024	Low (2)	Low (1)	Typical Risk is Low (2)	Moderate (3)	Peak Risk is Medium (6)
Summer 2024		Low (1)	Typical Risk is Low (2)	Low – Moderate (2)	Peak Risk is Low (4)
Autumn 2024*		Low (1)	Typical Risk is Low (2)	Moderate (3)	Peak Risk is Medium (6)

**The autumn maximum value for D10 was identified as an outlier and was excluded from the assessment of Typical Activity as it considerably skews the data, providing an inaccurate representation of the typical activity observed across the Proposed Wind Farm.*

5.1.2.4 Nathusius' pipistrelle

The Proposed Wind Farm is outside the current known range of Nathusius' pipistrelle (NPWS, 2025), although a small number of bat passes were recorded during the 2024 static detector surveys. Nathusius' pipistrelle is considered a rarer species, of high population vulnerability and high collision risk (Table 3-9). Despite the Proposed Wind Farm being beyond its typical Irish range, detections occurred across several locations at low levels, suggesting occasional presence or exploratory movements rather than sustained use of the Proposed Wind Farm.

When assessed in the context of the site risk and in accordance with Table 3b (NatureScot, 2021), typical activity risk for Nathusius' pipistrelle was **Low** across summer and autumn, with no activity recorded in spring. Peak activity reached **High** levels only in summer and autumn at specific locations, but still resulting in a **Low peak risk** due to the highly localised activity peaks (see Table 5-5 below).

No activity was recorded during walked transects, and detections from static monitoring were infrequent and of low intensity. This is consistent with the surrounding landscape of the Proposed Wind Farm, characterised mainly by conifer plantation, peatland and improved agricultural grassland and located beyond the species' known core distribution.

Accordingly, the typical collision risk to the local population of Nathusius' pipistrelle is considered **Low** across all survey seasons with a **Low peak** risk assessed for all seasons as well.

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 2024	Low (2)	Low (1)	Typical Risk is Low (2)	Low (1)	Peak Risk is Low (2)
Summer 2024		Low (1)	Typical Risk is Low (2)	Low (1)	Peak Risk is Low (2)
Autumn 2024		Low (1)	Typical Risk is Low (2)	Low-Moderate (2)	Peak Risk is Low (4)

5.1.3 Collision Risk Summary

Site-level collision risk for high collision risk bat species was typically **Low to Medium**. Overall bat activity levels were typical of the nature of the Proposed Wind Farm, which is predominantly peatland, conifer plantation and 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.

Following per-detector R-analysis, Detectors D08 (T6), D09 (T7), D10 (T8), D11 (T9) and D13 (T13) recorded **Moderate to High** Maximum Activity levels, particularly in autumn (see Table 5-6). During manual transect surveys, Leisler's bat and Brown long-eared bat activity was sporadic and rare, while soprano and common pipistrelle activity was more evenly distributed across the Proposed Wind Farm. Nathusius' pipistrelle was not recorded during the manual transects.

High median activity was recorded once for soprano pipistrelle at D11 (T9) in autumn.; It is noted that habitats at this location will change during the construction phase of the Proposed Wind Farm with the required implementation of the bat buffers (Section 6.1.3). A monitoring and mitigation strategy has been devised for the Proposed Wind Farm, in line with the case study example provided in Appendix

5 of the NatureScot (2021) 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 2024 for High-risk Bat Species

Detector ID	Turbine	Species	High Median Activity Survey Period
D11	T9	Soprano pipistrelle	Autumn 2024

Post-construction monitoring data from the Existing Wind Farm provide additional context for collision risk. At Dunneill Wind Farm, estimated mortality was 0.55 bats per turbine per year, indicating relatively low collision levels. In contrast, higher mortality rates were recorded at Kingsmountain Wind Farm, estimated at approximately 2.02 bats per turbine per year.

Recorded fatalities across both sites were dominated by pipistrelle species, with two records of Leisler's bat. Fatalities were primarily recorded during the active bat season (May–September), with a concentration in late spring and summer months.

These findings indicate that, while baseline activity levels suggest *Low* to *Medium* collision risk, actual collision mortality can vary across turbines and locations within the Proposed Wind Farm. This supports the need for a precautionary approach, including post-construction monitoring and adaptive mitigation measures, if required.

These results are broadly consistent with the species identified as being at highest collision risk within the Proposed Wind Farm, namely pipistrelle species and Leisler's bat, and provide site-specific evidence that these species are susceptible to turbine-related mortality within the existing wind farm.

Collision risk is associated with the operation of wind turbines and therefore does not represent a significant impact pathway during the decommissioning and repowering phases, when existing turbines will be removed and replacement turbines will not yet be operational. Any effects arising during these phases will instead relate to temporary disturbance associated with construction activities.

In the context of repowering, although the proposed turbines are larger and result in an increased rotor swept area, the reduction in turbine numbers and the increase in ground clearance from approximately 20–23 m to approximately 30 m are considered likely to reduce the potential for increased collision risk associated with the larger turbine dimensions. The effect of repowering is to elevate the lower extent of the rotor-swept zone higher within the air column. Previous monitoring at the Existing Wind Farm recorded substantially higher levels of bat activity at ground-level detectors than at at-height detectors (Sections 4.2.1 and 4.2.3), indicating that bat activity was concentrated closer to ground level. Operational monitoring has also demonstrated relatively low levels of collision mortality despite several years of turbine operation. Taking these factors into account, repowering is not considered likely to result in a material increase in collision risk relative to the Existing Wind Farm.

5.2

Loss of, or Damage to Commuting and Foraging Habitat

Wind farm developments have the potential to result in the loss or modification of habitats used by bats for commuting and foraging, primarily during the construction phase. These impacts may arise through vegetation removal, habitat fragmentation and localised disturbance associated with turbine bases, crane hardstands, access tracks and turbine delivery route accommodation works.

The Proposed Wind Farm is dominated by open and exposed habitats, including peatland, grassland and commercial conifer plantation, which were assessed as providing *Negligible* to *Low* suitability for

commuting and foraging bats. Habitats of greater relevance to bats are limited to localised linear features, including plantation edges, scrub, watercourses and occasional treelines, which provide *Moderate* suitability for commuting and foraging bats within the Proposed Wind Farm.

Direct habitat loss associated with the Proposed Project will primarily affect areas of conifer plantation and peatland habitats of *Negligible* to *Low* suitability. These habitats do not represent key commuting or foraging features for bats and are widely available within the surrounding landscape. As such, the loss of these habitats is not expected to result in a significant reduction in foraging resources or connectivity for the local bat population. The removal of 29.3ha of conifer plantation is not anticipated to result in the loss of high-value bat commuting or foraging habitat. Any localised loss of plantation edge habitat will be limited in extent and will not result in fragmentation at the site scale. Opening up previously closed canopy forestry also has the potential to increase the extent of forestry edge habitat which is known to support both foraging and commuting.

Turbine Delivery Route accommodation works are minor and confined to areas of *Negligible* bat habitat suitability, with no high-value commuting or foraging habitats affected. Similarly, the grid connection works will not result in the loss or degradation of bat commuting or foraging habitat.

During the operational phase, no further direct habitat loss is predicted. Potential indirect effects may arise through operational lighting; however, a site-specific lighting design will be implemented in accordance with best practice guidance to minimise light spill onto adjacent habitats and maintain dark corridors for commuting and foraging bats.

As the Proposed Project involves the repowering of sections of the Existing Wind Farm, much of the Proposed Wind Farm is already subject to disturbance and habitat modification associated with the existing infrastructure. The Proposed Project will result in a reduction in turbine numbers (from 23 to 17) and will utilise existing access infrastructure where possible, thereby limiting the extent of new habitat loss. While some additional habitat removal may be required to facilitate upgraded infrastructure and turbine delivery, this will remain limited in extent and will predominantly affect habitats of lower ecological value for bats.

Removal of the existing turbines and construction of the proposed turbines will result in temporary, localised disturbance to habitats within the Proposed Wind Farm; however, these effects will be short-term and reversible. No significant long-term loss of key commuting or foraging habitats is anticipated as a result of the Proposed Project.

Overall, taking into account the limited extent of suitable bat habitat within the Site, the localised nature of habitat loss, and the implementation of mitigation measures, the Proposed Project is not predicted to result in significant adverse effects on commuting or foraging bats.

5.3

Loss of, or Damage to Roosts

Wind farm developments could have the potential to result in the loss of, or disturbance to, bat roosts through direct impacts to structures or trees supporting roosting bats, or through indirect effects such as noise, vibration and artificial lighting during construction and operation.

A total of four confirmed bat roosts have been identified within the Proposed Wind Farm. These comprise a derelict stone ruin used by common pipistrelle and brown long-eared bat (maximum three individuals), a derelict farmhouse used by six soprano pipistrelles, an outbuilding shed used by two soprano pipistrelles, and the onsite electrical control building used by up to seven common and soprano pipistrelles. All roosts support low numbers of bats and are considered small, low-value roosts. No maternity roosts or roosts of National Importance were identified.

All identified roost structures will be retained and avoided as part of the Proposed Project. No works are proposed that will result in the removal, modification or direct disturbance of these structures. As such, no impacts on identified roosts are anticipated and no derogation licences are required.

The three bridges within the Proposed Wind Farm were assessed as having *Low* roosting suitability and will not be directly affected by the Proposed Project, as works will be confined within existing access tracks. No roosts or evidence of roosts were identified at these bridges during inspections undertaken. While the structures offer limited potential for roosting bats, any noise or vibration generated during construction and operation would not be substantially different from existing traffic-related disturbance to which any roosting bats would already be habituated. As such, the proposed works are unlikely to result in significant disturbance to bats, and a derogation licence is not required.

Trees within the Proposed Project footprint comprise predominantly commercial conifer plantation, which does not typically support suitable roosting features due to its uniform structure and management regime. Targeted inspections of non-conifer trees within works areas did not identify any potential roost features, and all trees affected by the Proposed Project were assessed as having no (*None*) roosting suitability and no roosts were identified. As such, no impacts to tree roosts are anticipated.

The Proposed Grid Connection cabling will be installed predominantly within existing road infrastructure and will not directly affect any structures. Thirty-four watercourse crossings and two service station-built service crossing occurs along the Proposed Grid Connection Route. Of the water crossings assessed, twenty-two had no (*None*) roosting potential, three had *Negligible* roosting potential, eight had *Low* roosting potential and one had *Moderate* roosting potential. No bats were identified roosting within the water crossing structures, and no evidence of roosting was found during the surveys.

All works along the Proposed Grid Connection Route watercourse crossings will be confined to the existing road structure or completed using temporary construction methods such as flatbed formation within the existing road or horizontal directional drilling (HDD) offset from the crossing structures, with no requirement to remove or alter structures that could support bats. Of the eight water crossings that were assessed as having *Low* roosting potential, horizontal directional drilling is proposed adjacent to two of them including: WC24 and WC29. Flatbed formation under is proposed for the one water crossing assessed as having *Moderate* roosting potential: WC35, and the remaining six water crossings assessed as having *Low* roosting potential including: WC7, WC12, WC18, WC21, WC22, WC34 and WC35. No structural modifications are required on existing bridge or culvert infrastructure associated with crossings along the Proposed Grid Connection Route as works will be confined to the existing road infrastructure, and temporary excavations associated with launch and receiver pits for HDD works will be set back from these structures. As such, no loss or damage to potential roosting structures is anticipated as a result of these works. Any potential noise and vibration impacts would be short-term in nature and not likely to be out of character with that associated with existing traffic conditions to which any roosting bats would be accustomed. Therefore, the work is unlikely to result in significant disturbance to bats and a derogation licence is not required.

Although a small amount of hedgerow and tree removal is required to facilitate the Proposed Grid Connection Route, no potential roost features or evidence of bat roosts were identified within these areas. As such, no impacts to bat roosts are anticipated in association with the Proposed Grid Connection Route.

No trees or features with PRF's were identified along the TDR accommodation areas. Accordingly, no roost loss or damage is predicted in association with the TDR.

As the Proposed Project involves the repowering of sections of the Existing Wind Farm, the Proposed Wind Farm is already subject to operational disturbance. The Proposed Project will not introduce new impacts to known roost locations beyond those currently experienced, and no additional loss of roosting habitat is anticipated. Decommissioning of existing turbines and construction of the proposed turbines will result in temporary, localised disturbance; however, no works will occur at or within roost structures, and therefore no significant effects on roosting bats are predicted.

Overall, taking into account the low conservation significance of identified roosts, their retention within the Site, and the implementation of mitigation measures, the Proposed Project is not predicted to result in significant adverse effects on bat roosts.

5.4 Displacement of Individuals or Populations

Displacement of bats may occur where individuals avoid areas due to disturbance associated with construction activities, operational noise, artificial lighting or the presence of turbines. This can result in reduced use of otherwise suitable commuting or foraging habitats within the Site.

Construction activities associated with the Proposed Project, including underground cabling works undertaken using HDD, are localised and temporary in nature and will not result in the fragmentation of bat habitat or a reduction in habitat availability. No bat roosts were identified at or in the immediate vicinity of HDD locations. During the construction phase, temporary disturbance arising from noise, vibration, increased human activity and artificial lighting may lead to localised avoidance of areas in close proximity to works. However, given that the majority of habitats within the Site were assessed as offering *Negligible* to *Low* suitability for commuting and foraging bats, and that areas of *Moderate* suitability are limited and not extensive, any displacement effects are expected to be localised, temporary and reversible.

Rock breaking and blasting activities, where required, will be confined to borrow pit locations and will not occur in proximity to identified roost structures. The nearest borrow pit location is approximately 320m from the nearest roost. These activities will be managed in accordance with the construction methodology and relevant noise control measures outlined in Chapter 12 and are not expected to result in disturbance to roosting bats.

Artificial lighting has the potential to affect bat behaviour by altering commuting routes and foraging activity, particularly for light-sensitive species such as brown long-eared bat and *Myotis spp.* A site-specific lighting design will be implemented in accordance with best practice guidance to minimise light spill onto adjacent habitats, retain dark corridors and avoid illumination of key features such as retained linear habitats and roost structures. With these measures in place, significant displacement effects associated with lighting are not anticipated.

During operation, bats may exhibit avoidance behaviour in the vicinity of turbines; however, this effect is typically limited to a small area surrounding turbine bases and does not result in displacement at the population level. Baseline surveys and post-construction monitoring at the Existing Wind Farm indicate that bat activity within the Proposed Wind Farm is generally *Low* to *Moderate* and concentrated along habitat edges, with no evidence of intensive use of the Proposed Wind Farm by large numbers of bats. In addition, the Proposed Project includes a reduced overall number of turbines compared to the existing operational layout and does not include replacement of the Dunneill North turbines, thereby reducing the overall operational turbine footprint within the wider landscape and further limiting the potential for displacement effects on bats.

As the Proposed Project involves the repowering of sections of the Existing Wind Farm, the Site is already subject to operational disturbance. The reduction in turbine numbers and retention of existing infrastructure where possible will limit any increase in disturbance. While the Proposed Turbines are larger, the increase in ground clearance (from approximately 20–23 m to approximately 30 m) is expected to reduce interaction with low-flying bat species, which dominate activity at the Proposed Wind Farm. The effect of repowering is therefore to shift the zone of interaction higher within the air column rather than increasing disturbance at lower levels where most bat activity occurs.

Removal of existing turbines and construction of the Proposed Turbines will result in temporary, localised disturbance; however, these effects will be short-term and will not result in long-term displacement of bats from the Proposed Wind Farm.

Overall, taking into account the limited suitability of habitats within the Proposed Wind Farm, the availability of similar habitats in the wider landscape and the implementation of mitigation measures, the Proposed Project is not predicted to result in significant displacement of bats at either the local or population level.

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). Methodology and mitigation outlined in Chapter 12: Noise and Vibration will be followed to minimise noise and vibration during construction.

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 2700K).

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 predicted; however, if in the course of this monitoring, any potential for significant effects on bats is identified, the site-specific mitigation measures will be reviewed and any changes necessary will be implemented to avoid any such impacts.

6.1.3 Bat Felling Buffers

In accordance with NatureScot (2021), NIEA (2021) and BCI (2026), a minimum 50 m buffer is applied between turbine blade tips and habitat features used by bats (e.g. hedgerows, treelines and woodland edges), to reduce the risk of bat activity occurring within the rotor-swept zone.

While larger buffers (100–200 m) have been recommended in Eurobats Publication No. 6 and NIEA guidance for woodland habitats, these are not currently supported by consistent empirical evidence in the UK and Ireland and are therefore not applied as standard.

A 50 m buffer between turbine blade tip and the nearest habitat feature will be implemented, based on the turbine specification (tip height: 176.6 -180 m; rotor diameter: 133.2-150 m; hub height: 105-110 m). The worst-case scenario turbine specifications were used to calculate the felling radius using the lowest hub height and the longest blade length. Following this precautionary approach the lowest hub height (105m) and the longest blade length (75m) were used during the calculations. These buffers were calculated using the Natural England formula (Plate 6-1) and have been incorporated into the turbine layout. The application of these buffers forms a key embedded mitigation measure to reduce collision risk, particularly for high-risk species such as Leisler's bat and pipistrelle species, which utilise linear landscape features for commuting but also forage more widely in open habitats. Maintaining separation from these features reduces the likelihood of bats moving through the rotor-swept zone during commuting movements.

To facilitate these buffers, areas of conifer plantation and other vegetation will be removed within the Proposed Wind Farm. These areas will be maintained as vegetation-free (i.e. less than 2 m in height) throughout the operational life of the Proposed Project. This ensures that no new edge habitats or linear features develop within the buffer zone that could attract bat activity towards turbine locations.

In accordance with NatureScot (2021), NIEA (2021) and BCI (2026), linear features within the buffer zone will be removed or managed such that they do not function as commuting or foraging corridors for bats. This includes the removal or reduction of vegetation associated with treelines, hedgerows and woodland edges, and the management of other features, such as stone walls, where necessary, to ensure they do not provide continuous linear guidance or enhanced foraging opportunities for bats within the turbine risk zone.

This approach ensures that habitat features which could otherwise attract bat activity are not present within the rotor-swept area, thereby reducing the likelihood of bat–turbine interactions.

It is necessary to calculate the distance between the edge of the habitat feature and the centre of the turbine (b), using the following formula:

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

Where, bl = blade length, hh = hub height, fh = feature height all in metres.

An example calculation is provided below, where $b = 69.3$ m (Plate 6-1).

In the case of the Proposed Wind Farm, the required bat felling buffer equates to approximately **81 m** from the turbine base to the nearest habitat feature. Bat buffers meeting this requirement will be established and maintained around all proposed turbines.

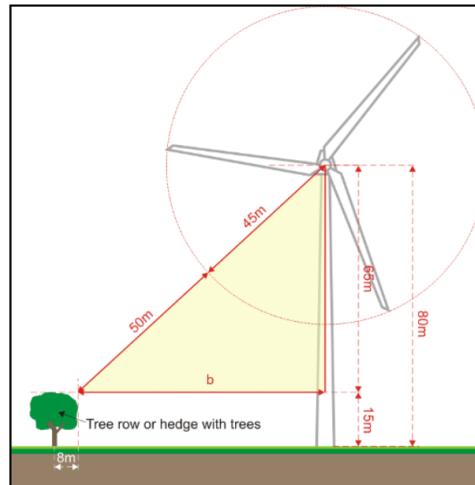


Plate 6-1 Calculate buffer distances (Natural England, 2014).

6.1.4 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).

Blade feathering below the turbine cut-in speed is expected to be implemented automatically through the turbine control system. Feathering will be limited to periods and locations as follows:

> Seasonal Application:

Feathering will be applied during the main bat activity season (typically April–October) when bats are active and at potential increased risk of collision. Blade feathering will not be applied during winter months (November - March) when bats are largely inactive.

> Spatial Targeting:

Feathering will be implemented only at turbines located in areas of high bat activity, as identified through baseline surveys. Turbines positioned in habitats unsuitable for bats (e.g., extensive bare peat, exposed upland areas with no foraging or commuting value) will not require feathering at low wind speeds. Section 6.1.3 of this report outlines areas which recorded high bat activity for high collision risk bat species.

Should any variations in activity or risk levels be identified during post-construction monitoring, this will be adjusted accordingly as part of the mitigation and monitoring strategy

In the event that blade feathering is not available for the selected turbine model, an equivalent operational measure will be implemented to ensure that turbines do not rotate at low wind speeds when electricity generation is not occurring. This may include operational controls such as manual stop or stop-on-demand procedures during periods when turbines would otherwise idle below cut-in speed.

6.2 Bat Monitoring Plan

Overall risk levels for high collision risk bat species were typically **Low** to **Medium**. This risk level is reflective of the nature of the Proposed Wind Farm, characterised by open grassland, peatland and commercial conifer plantation with limited treelines and hedgerows delineating field boundaries with and low-moderate levels of bat activity.

However, taking a precautionary approach and given that **Medium** collision risk was recorded at peak activity levels, an adaptive monitoring and mitigation strategy has been devised for the Proposed Wind Farm, 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 Wind Farm on bat activity and collision mortality, at least 3 years of post-construction monitoring is proposed. Post-construction monitoring will include static detector surveys, walked survey transects and carcass 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 turbines, activity periods and weather parameters, as well as a potential increase in buffers. For the purposes of this assessment, a threshold of **greater than one bat per turbine per year** is defined as a level at which collision mortality may be considered significant, in line with NIEA (2021) guidance.

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)

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

Carcass searches

Carcass searches, to monitor and record bat fatalities, shall be conducted at each turbine in accordance with NIEA (2021) 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 (NatureScot 2021). If human led searches are used under circumstances where it is not possible to use a trained dog detection team, it is recommended by emerging guidance and journals that searcher efficiency rates are greater than 80%. As rates of less than 50% are considered unsuitable and can result in false readings.

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- curtailment 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 Effect

Taking into account the sensitive design of the Proposed Project and the implementation of best practice mitigation and adaptive post-construction monitoring measures, no significant residual effects on bats are predicted with regard to:

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

6.4 Cumulative Effects

The Proposed Project was considered in combination with other projects and/or plans (existing approved and pending decision), in the surrounding area that could result in cumulative impacts on bats. This included a review of online Planning Registers and served to identify past, present and future plans and projects, their activities and their predicted environmental effects. The projects and/or plans considered are detailed in Section 2.9 in Chapter 2 of the EIAR.

Following the detailed assessment provided in the preceding sections, it is concluded that, the Proposed Project will not result in any residual adverse effects on bats, when considered on its own. There are four existing and one permitted wind farms located within 10km of the Proposed Wind Farm (not including Dunneill Wind Farm and Kingsmountain Wind Farm). No potential for the Proposed Project

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

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

7.

CONCLUSION

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

All potential impacts, including collision risk, roost loss, displacement, and habitat fragmentation, have been assessed in detail. Appropriate design measures and targeted mitigation have been integrated into the project to avoid or reduce impacts.

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

8.

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APPENDIX 1

2023 BAT SURVEYS

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1. INTRODUCTION

This appendix presents the methods and results of baseline bat surveys undertaken at the Proposed Wind Farm site during 2023. The surveys were undertaken to establish baseline information on bat activity within the Site, identify potential roosting features, and inform the assessment of potential impacts associated with the Proposed Project.

Surveys were designed and implemented in accordance with the guidance contained within *Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation* (NatureScot, 2021), which represented current best practice guidance for bat surveys at wind farm developments at the time the surveys were undertaken.

The survey programme comprised:

- bat habitat suitability appraisal
- roost inspections
- dusk emergence surveys
- manual activity surveys
- ground-level static detector surveys

The information presented in this appendix provides supplementary detail to the 2024 baseline surveys and has been considered alongside those surveys in the ecological impact assessment presented in the EIAR.

2. METHODS

2.1 Bat Habitat Suitability Appraisal

Bat walkover surveys were carried out throughout 2023. During these surveys, habitats within the Site were assessed for their suitability to support roosting, foraging and commuting bats. Connectivity with the wider landscape was also considered. The appraisal was undertaken across the entire Proposed Wind Farm site during field walkover surveys, based on the turbine layout and site boundary available at the time of survey in 2023.

Suitability was assessed according to Collins (2016), which was the most up-to-date guidance at the time. This guidance provides a grading protocol for roosting habitats and for commuting and foraging areas. Suitability categories are divided into *High*, *Moderate*, *Low* and *Negligible*, as defined in the relevant guidance. This approach is consistent with subsequent guidance (Collins, 2023), and suitability categories remain directly comparable.

Bat habitat suitability appraisal was carried out in 2023 to classify habitats, assess bat roost potential, and identify features of value for foraging and commuting bats. Surveys were undertaken systematically across the Proposed Wind Farm site (Table 2-1).

Table 2-1 Bat survey dates (2023)

Dedicated Bat Survey Dates
20 th April 2023
10 th May 2023
15 th June 2023
13 th July 2023
17 th August 2023
5 th September 2023

2.2 Roost Surveys

Daytime Roost Inspections

A search for roosts was undertaken within 200 m plus the maximum proposed rotor radius (i.e. 75 m) of the Proposed Turbines, in accordance with NatureScot (2021). The aim was to determine the presence of roosting bats and identify the need for further survey work or mitigation.

During the habitat suitability appraisal and subsequent field surveys, structures occurring within the Proposed Wind Farm site and associated infrastructure corridors were inspected for their potential to support roosting bats. These structures included bridges associated with site access tracks and watercourse crossings, operational wind farm buildings located within the Proposed Wind Farm site, and a derelict stone ruin identified during the walkover surveys.

In total, one derelict stone ruin, twelve bridges and three operational wind farm buildings were inspected during the 2023 surveys (Table 2-2). These sixteen structures were subject to detailed inspection of the exterior and interior (where accessible) to identify evidence of bat use, including live or dead specimens, droppings, feeding remains, urine splashes, fur oil staining or audible vocalisations.

No trees with potential roost features were identified within the Proposed Wind Farm site following bat habitat suitability appraisal.

Table 2-2 Structures inspected during daytime roost surveys (2023)

Structure ID	Structure Type	Irish Grid Reference	Nearest Turbine	Distance to nearest turbine (m)
S1	Derelict stone ruin	G 44004 27332	T4	350
S2	Bridge 1	G 43872 28157	T6	360
S3	Bridge 2	G 43942 27622	T4	300
S4	Bridge 3	G 43986 27297	T4	350
S5	Bridge 4	G 44779 25212	T5	1040
S6	Bridge 5	G 44504 29230	T5	1050
S7	Bridge 6	G 44585 25662	T5	600
S8	Bridge 7	G 44065 26993	T1	580
S9	Bridge 8	G 44916 22351	T5	3800
S10	Bridge 9	G 44878 23810	T5	2350
S11	Bridge 10	G 44873 23974	T5	2100
S12	Bridge 11	G 44857 24136	T5	2000
S13	Bridge 12	G 44870 24422	T5	1700
S14	Operational Wind Farm building	G 46465 28791	T11	300
S15	Dunneill Onsite Electrical Control building	G 45191 28913	T8	330
S16	Kingsmountain Control building	G 47500 28570	T12	280

Emergence Surveys

Emergence surveys at dusk were carried out which focused on the potential roost features (PRFs) identified during the bat habitat appraisal. During these surveys, surveyors were equipped with Batlogger M bat detectors (Elekon AG, Lucerne, Switzerland). This detector model was also used during the subsequent survey programme and allowed echolocation calls to be recorded for later verification. The emergence surveys commenced at least 15 minutes before sunset and concluded approximately 1 hour and 30 minutes after sunset. Table 2-3 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 and features used). All bat echolocation was recorded for subsequent analysis to confirm species identifications.

Surveyors were positioned at PRFs identified during the daytime roost inspection surveys with a focus on potential access points and roosting features. The purpose was to identify any bat species present, the number of individuals emerging, access points used and potential roost locations within the structure. Surveys were undertaken in weather conditions considered suitable for bat activity in accordance with best practice guidance.

Table 2-3 Emergence survey effort (2023)

Date	Surveyors	Sunset	Weather Conditions
20 th April 2023	Ryan Connors & Laura Gránicz	20:47	10-7 °C, dry, calm/light breeze
5 th September 2023	Ryan Connors & Laura Gránicz	20:20	15-10 °C, dry, light breeze

2.3 Manual Transects

Manual activity surveys comprised walked and partially driven transects after dusk. A series of representative transect routes were selected throughout the Site. The purpose of manual transects was to supplement static detector data and provide behavioural and spatial context to bat activity. Transect routes were prepared with reference to the proposed turbine layout, desktop and walkover survey results, as well as any health and safety considerations and access limitations. As such, transect routes generally followed existing forestry tracks and access roads within the Site. Transect routes are presented in Figure 2-1.

Transects were walked or driven by two surveyors, recording bats in real time. The driven transect followed the methodology described by Roche *et al.* (2012). Dusk transect surveys began approximately 90 minutes after sunset, immediately following the completion of emergence surveys where these were undertaken, and were completed for up to three hours after sunset. This timing is consistent with standard transect survey methodology. 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.

Transect surveys were undertaken in spring, summer and autumn of 2023. Table 2-4 summarises survey effort in relation to manual transects.

Table 2-4 Manual transect survey effort (2023)

Date	Surveyors	Sunset	Start-End Time	Weather Conditions	Length of Walked/Driven transect (km)
20 th April 2023	Laura Gránicz & Ryan Connors	20:47	22:17 - 23:48	7-10°C; dry; calm-light breeze	9.2
15 th June 2023	Laura Gránicz & Ryan Connors	22:10	22:10 - 01:10	16-17°C; dry; calm-moderate	8.4
5 th September 2023	Laura Gránicz & Ryan Connors	20:20	21:50 - 23:26	15°C; dry; light breeze	16.2
Total Survey Effort					33.8 km

2.4 Ground-level Static Surveys

For developments of up to 10 turbines, NatureScot guidance recommends one detector per turbine, with an additional detector deployed for every three turbines thereafter.

An initial deployment of 14 static detectors was undertaken during the early spring survey period. Following a revision of the turbine layout during the spring season, additional detector locations were identified and deployed to ensure that all proposed turbine locations and representative habitats were adequately covered. This resulted in a refined detector network comprising a total of 16 detector locations. This finalised layout was subsequently maintained during the summer and autumn survey periods to ensure consistency in spatial coverage and data collection across seasons.

Automated bat detectors were deployed for at least 10 nights of suitable weather in spring (April–May), 20 nights in summer (June–mid August) and 10 nights in autumn (mid-August–October) (NatureScot, 2021; NIEA, 2021). Detector locations were selected to represent the range of habitats and landscape features present within the Proposed Wind Farm site and in proximity to proposed turbine locations.

Figure 2-1 illustrates the location of ground-level static detectors in relation to the final turbine layout. Detector locations are summarised in Table 2-5. The nearest turbine references presented in Table 2-5 and the turbine layout shown in Figure 2-1 relate to the final proposed turbine layout assessed in the EIAR, rather than the layout in place at the time of the 2023 surveys.

Table 2-5 Ground-level static detector locations (2023)

Detector ID	Location (Irish Grid Reference)	Habitat Context	Linear Feature within 50 m	Nearest Turbine
D01	G 45461 25120	Raised bog (PB1), Conifer plantation (WD4)	Forestry edge	-
D02	G 45451 26014	Conifer plantation (WD4)	None	-
D03	G 45643 26665	Raised bog (PB1), Conifer plantation (WD4)	None	-
D04	G 44085 27279	Conifer plantation (WD4)	Forestry edge	T4
D05	G 43539 26378	Raised bog (PB1)	None	T3
D06	G 43458 27842	Raised bog (PB1)	None	T2
D07	G 44040 28273	Raised bog (PB1), Conifer plantation (WD4)	Forestry edge	T6
D08	G 44610 28954	Conifer plantation (WD4)	Forestry edge	T7
D09	G 44588 26161	Raised bog (PB1), Conifer plantation (WD4)	Forestry edge	T5
D10	G 45208 28618	Raised bog (PB1), Conifer plantation (WD4)	Forestry edge	T8
D11	G 45483 28085	Conifer plantation (WD4)	Forestry edge	T9
D12	G 46765 28887	Raised bog (PB1), Conifer plantation (WD4)	Forestry edge	T11
D13	G 48224 28107	Raised bog (PB1), Conifer plantation (WD4)	Forestry edge	T15
D14	G 48839 27498	Raised bog (PB1) adjacent to turbine hardstand	None	T16
D15	G 47445 29002	Raised bog (PB1)	None	T12/T13
D16	G 48325 28229	Raised bog (PB1) adjacent to turbine hardstand	None	T15

Full spectrum bat detectors, Song Meter SM4BAT (Wildlife Acoustics, Maynard, MA, USA), were employed using settings recommended for bat surveys, 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. Detector settings and deployment protocols were consistent with best practice guidance for static acoustic bat surveys.

Onsite weather monitoring was undertaken concurrently with static detector deployments. One Vantage Pro 2 (Davis Instruments, CA, USA) was deployed each season and night-time hourly data was tracked remotely to ensure a sufficient number of 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). This ensured that activity data were derived from conditions suitable for bat activity and comparable between seasons. Table 2-6 summarises survey effort achieved in 2023.

Table 2-6 Ground-level static detector survey effort (2023)

Season	Survey Period	Total Survey Nights	Nights with Appropriate Weather
Spring	20 th April – 15 th June 2023	46	41
Summer	15 th June – 13 th July 2023	28	26
Autumn	17 th August – 5 th September 2023	19	16
Total Survey Effort		93	83

545000

830000

825000

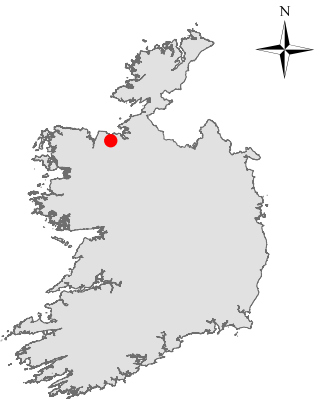
545000



Map Legend

- EIAR Site Boundary
- Turbine Layout
- 2023 Static Detector Locations
- Spring Transect Route - 20.04.2023
- Autumn Transect Route 2026.03.24
- Summer Transect Route 15.06.2023

Spatial Reference
Name: IREN95 Irish Transverse Mercator
Datum: IREN95
Projection: Transverse Mercator



SITE LOCATION - NOT TO SCALE

Transect Routes and
Static Detector Locations 2023

Project Title
Crumhach Wind Farm,
Co. Sligo

Project No. 230481	Drawing No. 2-1	Scale 1:20,000
Drawn By AM	Checked By MNR	Date 25/06/2026



Email: info@mkoireland.ie Website: www.mkoireland.ie

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2.5 Bat Call Analysis

All recordings from 2023 were later analysed using bat call analysis software Kaleidoscope Pro v.5.1.9 (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 (Russ, 2012). Automated classifications generated by Kaleidoscope Pro were used as an initial screening tool only and were subject to subsequent manual verification. Where calls could not be reliably identified to species level, recordings were classified to genus level (e.g. *Myotis* spp.) in accordance with best practice.

2.6 Assessment of Bat Activity Levels

Activity was standardised as *bat passes per hour (bp/h)* to account for variable night length. The median nightly bp/h was used to represent typical levels of activity (Lintott & Mathews, 2018).

Ecobat (mammal.org.uk; Lintott *et al.*, 2018) is the recommended tool for benchmarking activity levels (NatureScot, 2021). However, the platform was unavailable at the time of analysis due to scheduled maintenance. Therefore, activity levels were assessed using site-specific thresholds adapted from Mathews *et al.* (2016), with categories defined by quartiles of maximum nightly pass rates. This approach provides a proportionate means of distinguishing relative activity levels within the Site in the absence of cross-site benchmarking. To avoid bias in the derivation of activity thresholds, statistical outliers identified through box-plot analysis were excluded prior to calculating quartile values. Site-specific activity thresholds applied to the 2023 dataset are presented in Table 2-7.

Table 2-7 Site-specific activity thresholds as bat passes per hour (bp/h)

Assessment Level	Activity Threshold as Bat Passes per Hour (bp/h) for Bat Species				
	Myotis spp.	Leisler's bat	Common and soprano pipistrelle	Nathusius' pipistrelle	Brown long-eared bat
Low	<1.63	<1.83	<1.46	<0.10	<0.95
Moderate	1.63 – 4.88	1.83 – 5.48	1.46 – 4.39	0.10 – 0.30	0.95 – 2.85
High	>4.88	>5.48	>4.3	>0.30	>2.85

3. RESULTS

3.1 Bat Habitat Suitability Appraisal

Results from the desktop review and daytime bat walkover surveys were used to establish a baseline understanding of habitat suitability within the Proposed Wind Farm site for foraging, commuting and roosting bats, in accordance with Collins (2016). Habitats were assigned to suitability categories of *High*, *Moderate*, *Low* or *Negligible*, as defined in the relevant guidance. The appraisal was undertaken across the entire Proposed Wind Farm site during daytime bat walkover surveys.

Habitats within the Proposed Wind Farm site are dominated by raised bog (PB1) and commercial conifer plantation (WD4), with limited habitat diversity across the Site. These habitats are generally exposed and lack structural complexity, with only localised areas of habitat heterogeneity associated with forestry edges and infrastructure.

With regard to foraging and commuting bats, large areas of exposed raised bog were assessed as having *Low* suitability, reflecting habitats that are suitable for occasional foraging but offer limited shelter and connectivity. Similarly, areas of conifer plantation were assessed as providing generally *Low* suitability in isolation; however, plantation edges and forestry tracks provide the primary linear features within the Site. These features offer some degree of shelter and connectivity and were therefore assessed as having *Moderate* suitability for commuting and foraging bats within the context of the wider Site.

Overall, habitat connectivity across the Proposed Wind Farm site is limited, with an absence of well-developed linear features such as hedgerows or riparian corridors. As such, bat activity is likely to be concentrated along forestry edges and transitional habitat zones, with more limited use of open peatland areas.

With regard to roosting bats, most trees within the Proposed Wind Farm site comprise commercial conifer species. These trees are generally immature to semi-mature, even-aged, and managed for timber production, and therefore lack structural features typically associated with bat roosting, such as cavities, cracks, splits or areas of decay. Accordingly, no trees with potential roost features (PRFs) were identified during daytime bat walkover surveys and all trees within the Proposed Wind Farm were assessed as having *Negligible* roosting potential for bats.

A number of built structures were identified within the Proposed Wind Farm site, including a derelict stone ruin, several bridges and operational wind farm buildings. These structures were subject to detailed inspection as part of the roost assessment surveys. The majority of structures were assessed as having *Negligible* or *Low* suitability to support roosting bats.

3.2 Roost Surveys

Daytime Roost Inspections

A total of sixteen structures were inspected during daytime bat walkover surveys undertaken in 2023. These comprised one derelict stone ruin (Structure S1), twelve bridges (Structures S2 – S13) and three operational wind farm buildings (Structures S14 – S16). The results of the daytime roost inspections and associated roost suitability assessments are presented in Table 3-1.

The derelict stone ruin (Structure S1; Plate 3-1) comprised an abandoned stone structure with numerous crevices and sheltered internal voids suitable for roosting bats. While no direct evidence of bat use was recorded during the daytime inspection, the structure was assessed as having *Low* suitability and was therefore subject to further assessment through dusk emergence surveys.

Of the remaining fifteen structures, eight bridges (Structures S2 & S7 - S13) were assessed as having *Low* suitability for roosting bats, based on the presence of crevices and gaps suitable to support small numbers of roosting bats. An example of a bridge assessed as having *Low* suitability is presented in Plate 3-2.

Of the remaining seven structures, comprising four bridges (Structures S3 - S6) were assessed as having *Negligible* suitability for roosting bats. An example of a bridge assessed as having *Negligible* suitability is presented in Plate 3-3. Of the three operational wind farm buildings, one was assessed as having *Negligible* suitability (Structure S14) and is shown in Plate 3-4, while two were assessed as having *Low* suitability (Structures S15 & S16).

No evidence of bat roosting was recorded during daytime inspections at any of the inspected structures including the stone ruin, bridges and operational wind farm buildings. The results indicate that the majority of structures within the Proposed Wind Farm site offer *Negligible* to *Low* suitability for roosting bats.

Table 3-1 Structures inspected during daytime roost surveys and roost suitability assessment (2023)

Structure ID	Structure Type	Roost Suitability	Irish Grid Reference	Nearest Turbine	Distance to nearest turbine (m)	Relevant to Current Proposed Project
S1	Derelict stone ruin	<i>Low</i>	G 44004 27332	T4	350	Yes (retained; outside works footprint)
S2	Bridge 1	<i>Low</i>	G 43872 28157	T6	360	Yes (road upgrade)
S3	Bridge 2	<i>Negligible</i>	G 43942 27622	T4	300	Yes (road upgrade)
S4	Bridge 3	<i>Negligible</i>	G 43986 27297	T4	350	Yes (road upgrade)
S5	Bridge 4	<i>Negligible</i>	G 44779 25212	T5	1040	No
S6	Bridge 5	<i>Negligible</i>	G 44504 29230	T5	1050	No
S7	Bridge 6	<i>Low</i>	G 44585 25662	T5	600	No
S8	Bridge 7	<i>Low</i>	G 44065 26993	T1	580	Yes (road upgrade)
S9	Bridge 8	<i>Low</i>	G 44560 24160	T5	3800	No
S10	Bridge 9	<i>Low</i>	G 44560 23900	T5	2350	No
S11	Bridge 10	<i>Low</i>	G 44560 23730	T5	2100	No
S12	Bridge 11	<i>Low</i>	G 44590 23600	T5	2000	No
S13	Bridge 12	<i>Low</i>	G 44630 22150	T5	1700	No
S14	Operational Wind Farm building	<i>Negligible</i>	G 46465 28791	T11	300	Yes (retained)
S15	Dunneill Onsite Electrical Control building	<i>Low</i>	G 45191 28913	T8	330	Yes (retained)
S16	Kingsmountain Control building	<i>Low</i>	G 47500 28570	T12	280	Yes (retained)



Plate 3-1 Derelict stone ruin (Structure S1) within the Proposed Wind Farm site, showing crevices suitable for roosting bats.



Plate 3-2 Example of a bridge assessed as having *Low* suitability for roosting bats, showing crevices and gaps suitable for occasional use by small numbers of bats.



Plate 3-3 Example of a bridge structure within the Proposed Wind Farm site, showing limited structural features and assessed as having Negligible suitability for roosting bats.



Plate 3-4 Example of operational wind farm infrastructure, comprising fenced compound and associated control equipment, assessed as having Negligible suitability for roosting bats.

Emergence Surveys

Dusk emergence surveys were undertaken at one structure identified during daytime inspections as having potential to support roosting bats (Structure S1).

A single bat roost was confirmed at Structure S1 during the autumn survey period, when one brown long-eared bat (*Plecotus auritus*) was observed emerging from the stonework shortly after sunset. The bat emerged from a gap within the lower section of the stone wall, approximately 0.3–0.5 m above ground level.

No bats were observed emerging during the spring survey, and no evidence of use by multiple individuals or a maternity roost was recorded. The roost is therefore considered to support a single bat or a small number of roosting bats. The confirmed roost is located within the Proposed Wind Farm site boundary, approximately 348 m southeast of T4, and lies outside the direct footprint of proposed works.

No emergence surveys were undertaken at other structures within the Site. While a number of bridges were assessed as having *Low* suitability for roosting bats, these structures were generally low in height and all potential roosting features (e.g. crevices and gaps) were fully visible and accessible during daytime inspections. It was therefore possible to confidently determine the absence of roosting bats without the requirement for further survey. In addition, no works are proposed to the bridge structures that would affect their structural integrity or potential roosting features.

In contrast, Structure S1 comprised a taller stone ruin with deeper and less accessible crevices within the stonework, and therefore required emergence surveys to confirm the presence or absence of roosting bats.

The results of the emergence surveys are summarised in Table 3-2.

Table 3-2 Emergence survey results (2023)

Structure ID	Roosting Suitability	Irish Grid Reference	Date Surveyed	Survey Results
S1	<i>Low</i>	G 44004 27332	20 th April 2023	No bats observed emerging
S1	<i>Low</i>	G 44004 27332	5 th September 2023	Brown-long eared bat emerged from gap in stonework

3.3 Manual Transect Surveys

Manual bat activity transect surveys were undertaken during the spring, summer and autumn survey periods of 2023. Bat activity was recorded during all survey seasons. A total of 294 bat passes were recorded during manual surveys, including activity recorded in association with dusk emergence surveys, where transects immediately followed emergence survey completion. Overall, soprano pipistrelle was the most frequently recorded species (n=202), followed by Leisler's bat (n=35) and common pipistrelle (n=34). Lower levels of activity were recorded for *Myotis* spp. (n=16) and brown long-eared bat (n=7). The overall species composition recorded during manual surveys is presented in Plate 3-5.

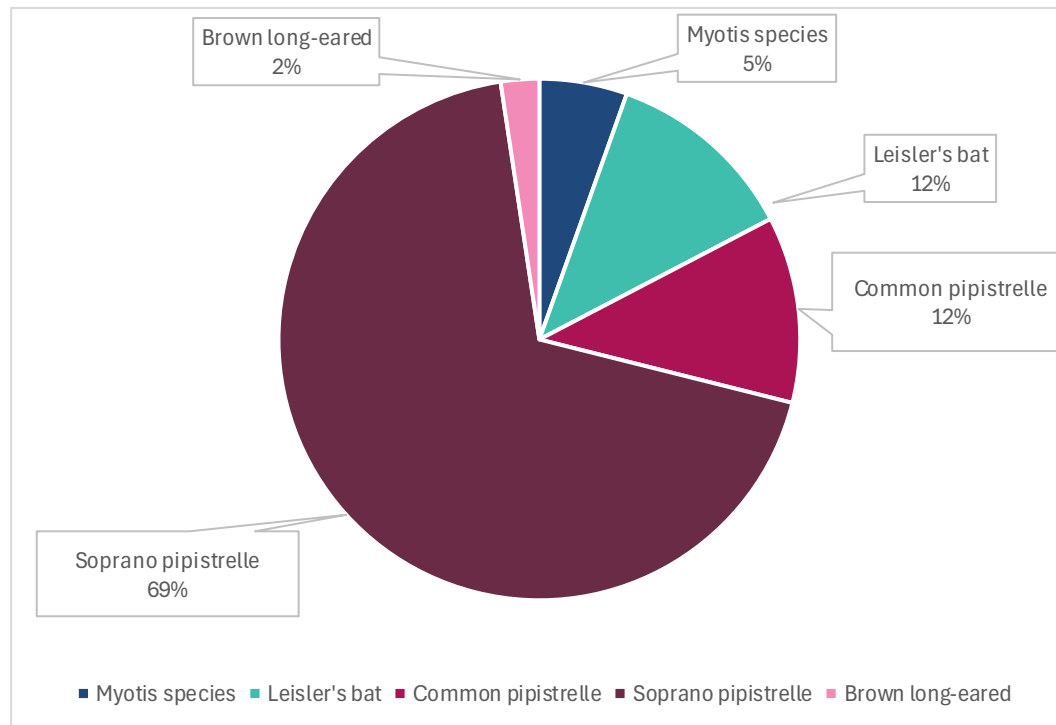


Plate 3-5 Total species composition from manual activity surveys across 2023 survey period

Transect survey results for individual species and survey periods are presented in Table 3-3. To account for differences in survey effort, transect results were standardised and expressed as bat passes per kilometre surveyed (Plate 3-6). Overall bat activity recorded during manual transect surveys was highest during the spring survey period, followed by summer and autumn, both in terms of activity levels and species diversity. The spatial distribution of bat activity recorded during spring, summer and autumn manual transect surveys is illustrated in Figures 3-1 to 3-3.

Table 3-3 Total bat passes per species and season recorded during manual transects in 2023.

	Spring	Summer	Autumn
Total Bat Passes	225	52	17
<i>Myotis</i> spp.	8	6	2
Leisler's bat	30	5	-
Common pipistrelle	5	29	-
Soprano pipistrelle	179	8	15
Brown long-eared bat	3	4	-

Species composition and activity levels varied between survey periods. Soprano pipistrelle activity was most pronounced during the spring transect survey, while common pipistrelle was recorded more frequently during the summer transect. Spatially, bat activity was largely associated with linear features such as forestry edges, tracks and transitional habitats between conifer plantation and open bog. Open areas of raised bog exhibited lower levels of activity, reflecting the exposed nature of these habitats and their limited suitability for commuting and foraging bats.

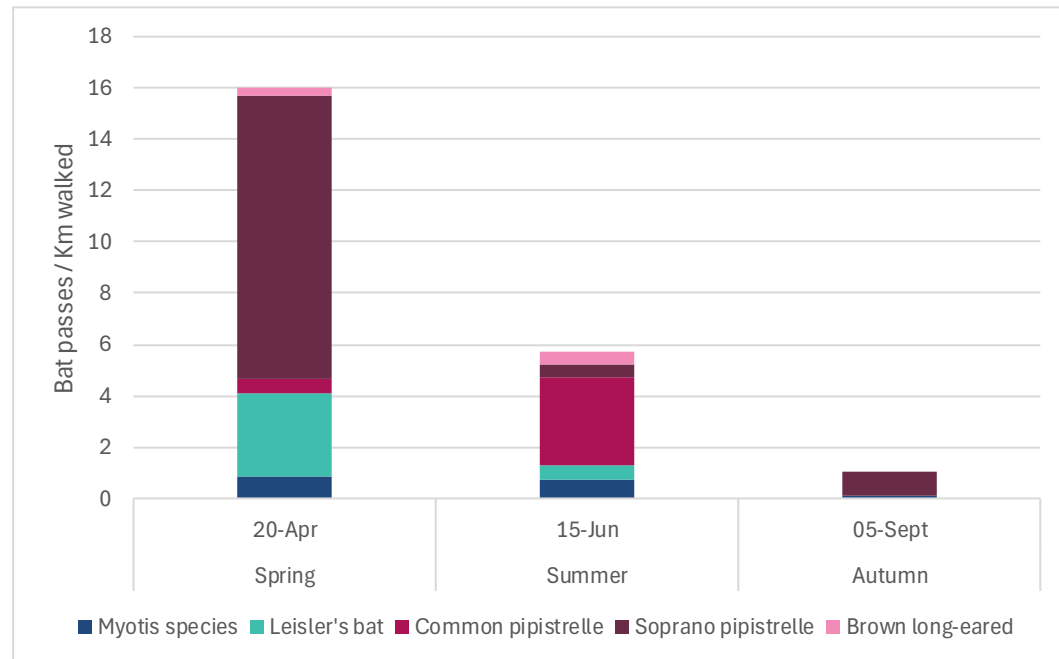
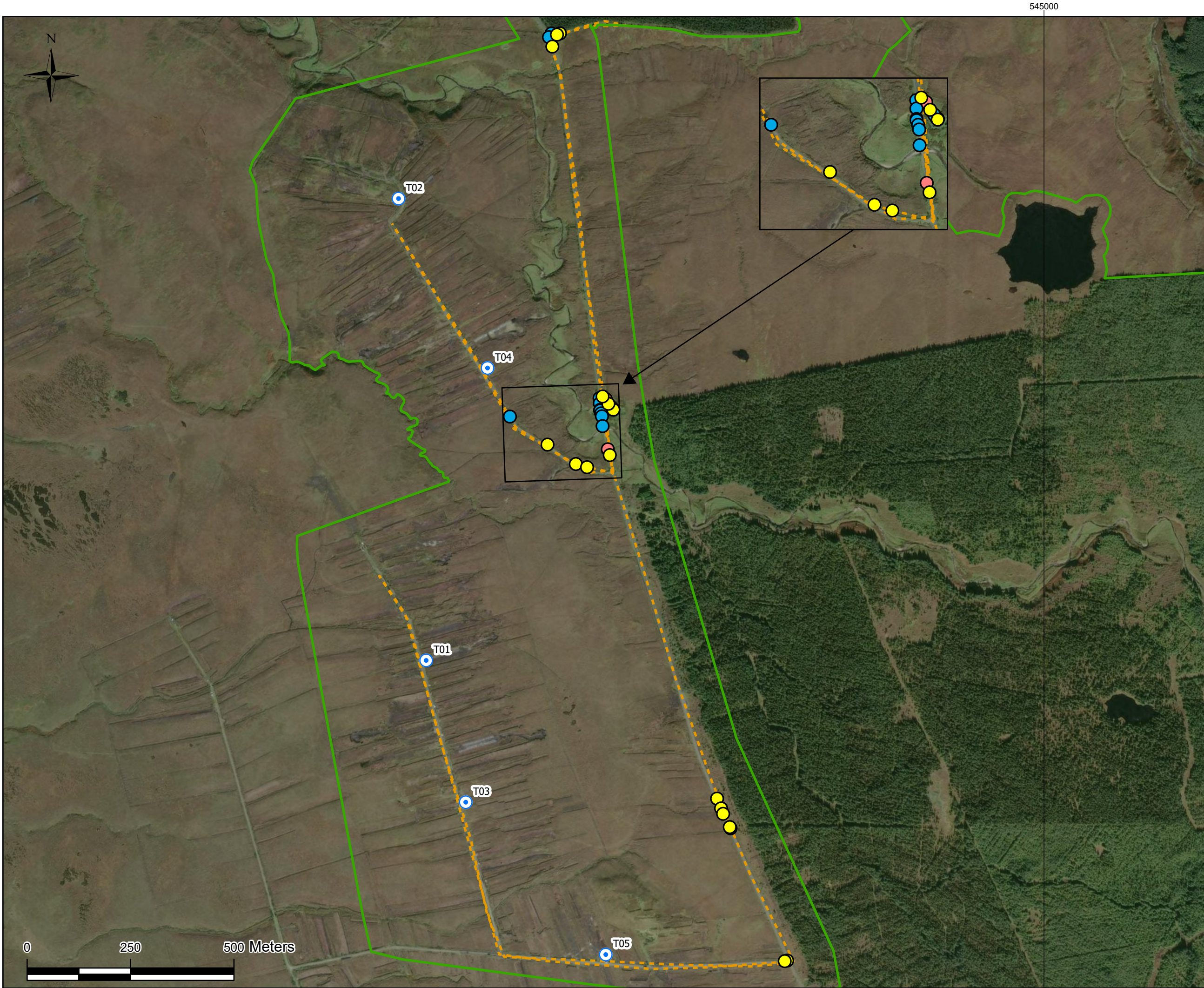


Plate 3-6 Species composition per survey period during 2023 manual transect surveys



- Map Legend
- ElAR Site Boundary
 - Turbine Layout
 - Spring Transect Route - 20.04.2023
 - Myotis species
 - Soprano pipistrelle
 - Brown long-eared bat
 - Leisler's bat

Spatial Reference
Name: IRENET95 Irish Transverse Mercator
Datum: IRENET95
Projection: Transverse Mercator



SITE LOCATION - NOT TO SCALE

Drawing Title

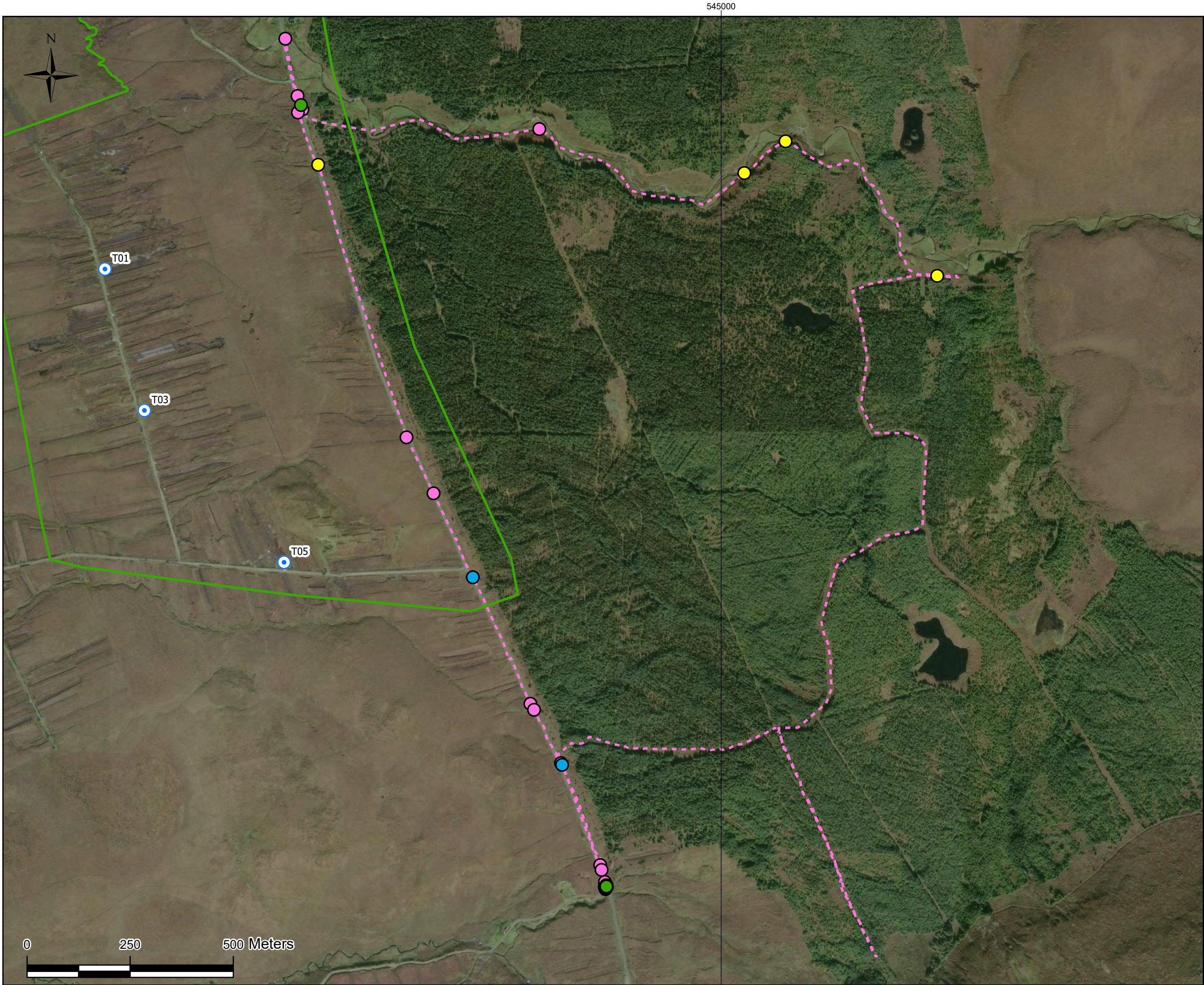
Spring Manual Results 2023

Project Title

Crumhach Wind Farm,
Co. Sligo

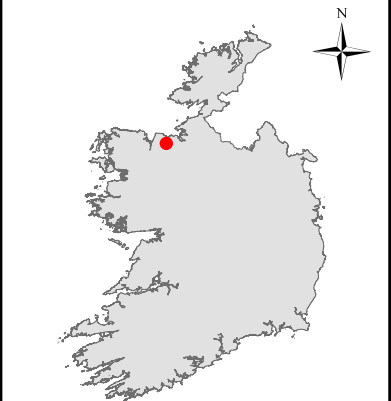
Project No.	Drawing No.	Scale
230481	3-1	1:8,500
Drawn By	Checked By	Date
AM	MNR	25/06/2026

Email: info@mkofireland.ie / Website: www.mkofireland.ie



- Map Legend
- EIAR Site Boundary
 - Turbine Layout
 - Summer Transect Route 15.06.2023
 - Myotis species
 - Common pipistrelle
 - Soprano pipistrelle
 - Leisler's bat
 - Brown long-eared bat

Spatial Reference
Name: IRENET95 Irish Transverse Mercator
Datum: IRENET95
Projection: Transverse Mercator



SITE LOCATION - NOT TO SCALE

Drawing Title
Summer Manual Results 2023

Project Title
**Crumhach Wind Farm,
Co. Sligo**

Project No.	Drawing No.	Scale
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Drawn By	Checked By	Date
AM	MNR	25/06/2026

Email: info@mkofireland.ie Website: www.mkofireland.ie

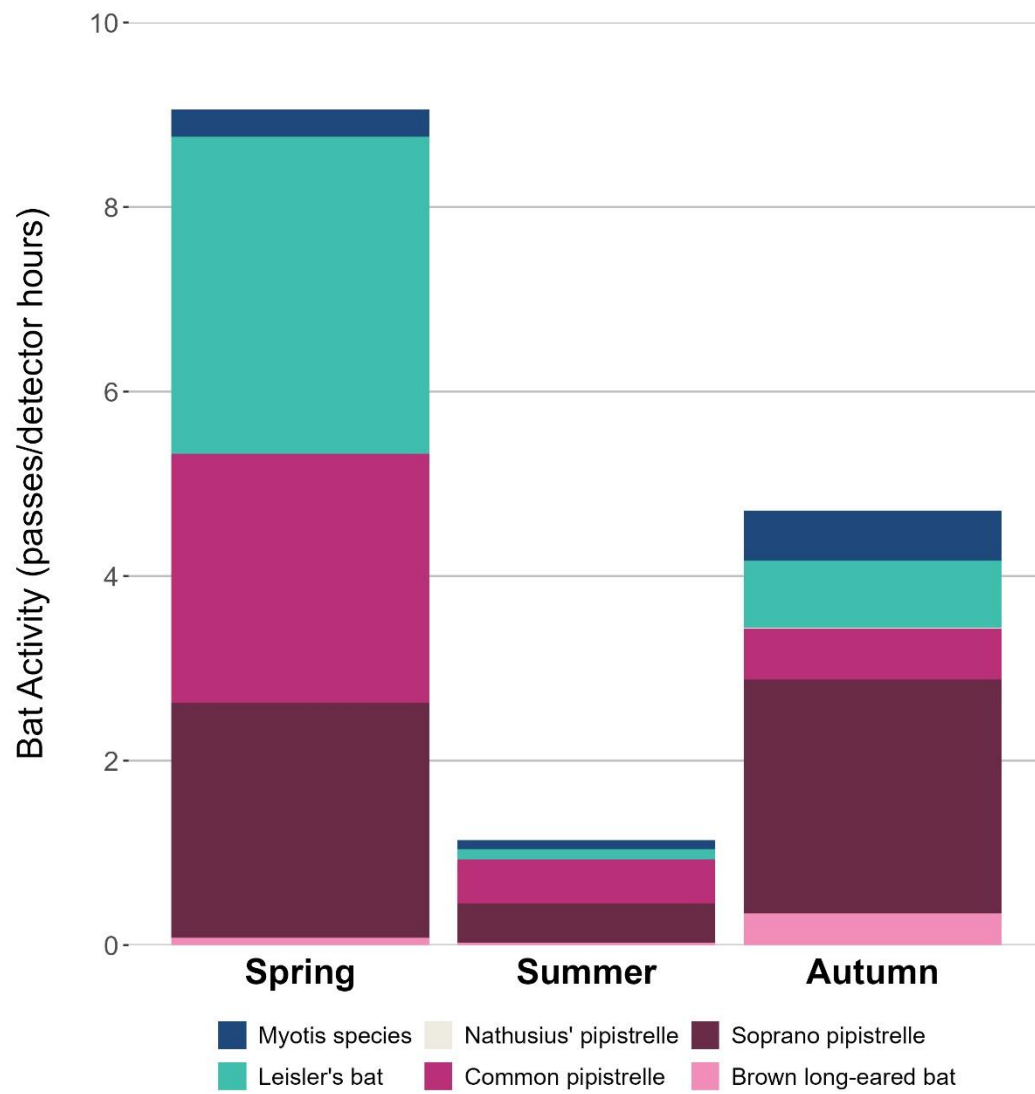


Plate 3-8 Static detector surveys 2023: Seasonal bat activity levels (bat passes per hour)



Map Legend

EIAR Site Boundary

Proposed Turbine Layout

Autumn Transect Route
05.09.2023

Soprano pipistrelle

Spatial Reference
Name: IREN95 Irish Transverse Mercator
Datum: IREN95
Projection: Transverse Mercator

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SITE LOCATION - NOT TO SCALE

Drawing Title		
Autumn Manual Results 2023		
Project Title		
Crumhach Wind Farm, Co. Sligo		
Project No.	Drawing No.	Scale
230481	3-3	1:16,500
Drawn By	Checked By	Date
AM	MNR	30/06/2026

MKO

Email: info@mkofireland.ie Website: www.mkofireland.ie

3.4 Ground-level Static Surveys

In total, 56,554 bat passes were recorded in 2023. In general, Leisler's bat (n=18,936), soprano pipistrelle (n=18,706) and common pipistrelle (n=13,673) occurred most frequently. Instances of *Myotis* spp. (n=1,813) and brown long-eared bat (n=1,317) were recorded less frequently while observations of Nathusius' pipistrelle (n=23) were rare. Plate 3-7 presents species composition across all ground-level static detectors.

Bat activity was standardised as bat passes per hour (bp/h) to account for variation in night length between seasons (Plate 3-8). Activity levels were highest during spring, followed by lower levels in autumn and summer. Species composition remained broadly consistent across seasons, with pipistrelle species and Leisler's bat dominating throughout. However, seasonal variation in relative activity was evident, with Leisler's bat and common pipistrelle contributing proportionally more to activity in spring, while soprano pipistrelle became more dominant in autumn. *Myotis* spp. and brown long-eared bat were recorded at low levels throughout, with slightly increased activity in autumn.

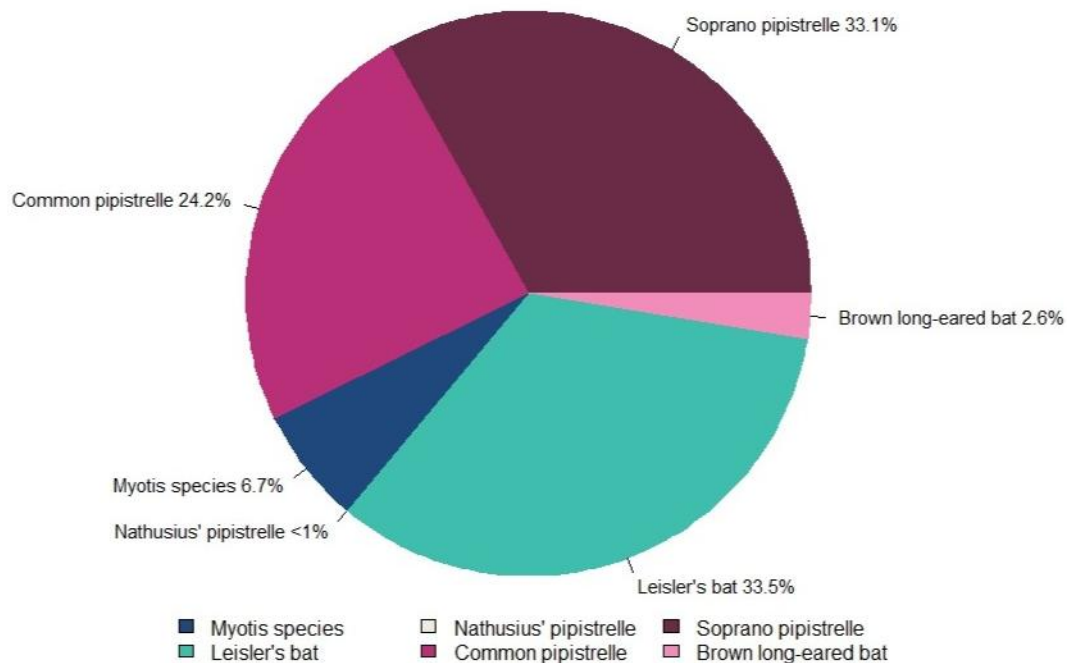


Plate 3-7 Static detector surveys 2023: Overall species composition (total bat passes)

Median nightly activity (bp/h) was used to characterise typical bat activity at each detector location (Lintott & Mathews, 2018). Spatial variation in activity was evident across the Site (Plate 3-9). During the spring survey period, several detectors (D01, D02, D03, D05, D06, D07, D11 and D13) were dominated by Leisler's bat, while D12 recorded the highest overall activity, comprising a mix of soprano and common pipistrelle and Leisler's bat. In summer, activity levels were generally lower across the Site, with D08 recording the highest activity, dominated by common pipistrelle. During autumn, the highest activity levels were recorded at D07 and D08, with activity comprising a broader species assemblage, including soprano and common pipistrelle, Leisler's bat, *Myotis* spp. and brown long-eared bat. Most other detector locations recorded consistently low levels of activity across all seasons.

Overall, ground-level static surveys indicate a bat assemblage dominated by common and widespread pipistrelle species and Leisler's bat, with seasonal variation and localised peaks in activity associated with specific detector locations.



Plate 3-9 Static detector surveys 2023: Median bat passes per hour (bp/h) per detector and survey period (varied axis scale)

3.5

Assessment of Bat Activity Levels 2023

Low, *Moderate* and *High* bat activity levels were assigned to median and maximum bat pass rates (bp/h) recorded during spring, summer and autumn at each detector location, using site-specific thresholds adapted from Mathews et al. (2016). This approach allows activity levels to be interpreted relative to the local bat assemblage. The results of this assessment are presented in Table 3-4.

Leisler's bat generally exhibited *Low* median activity levels across detector locations and seasons, with occasional *Moderate* median activity recorded at a small number of detectors during spring (D02, D07 and D11), with the highest median value recorded at D11 (3.10 bp/h). Maximum nightly activity values showed greater variability, with frequent *High* peaks recorded during spring, fewer in autumn, and none in summer. The highest maximum activity was recorded at D01 (83.40 bp/h) and D11 (83.30 bp/h) during spring. This contrast between *Low* median activity and elevated maximum values indicates intermittent peaks in activity rather than sustained or consistently high site use by this species.

Common pipistrelle exhibited predominantly *Low* median activity levels across the Site during summer and autumn. In spring, however, *Moderate* to *High* median activity was recorded at several locations, including D10 (4.75 bp/h) and D12 (7.45 bp/h), with additional *Moderate* activity at D04 and D15. Maximum nightly activity ranged from *Low* to *High* across all seasons, with the highest value recorded at D12 during spring (65.20 bp/h). *High* maximum activity events were most frequent during spring. Overall, activity patterns indicate that common pipistrelle use of the Site is typically *Low*, with occasional short-duration peaks at specific locations, particularly during spring.

Soprano pipistrelle similarly exhibited predominantly *Low* median activity levels, with *Moderate* and *High* median activity recorded at a limited number of detector locations. *High* median activity was recorded at D12 during spring (19.90 bp/h) and at D07 and D08 during autumn. Maximum activity values ranged from *Low* to *High*, with autumn characterised by more consistent *Moderate* to *High* peaks. The highest maximum activity was recorded at D12 during spring (53.50 bp/h). As with common pipistrelle, these results indicate that activity is generally *Low* but influenced by intermittent higher-activity nights.

Nathusius' pipistrelle was recorded infrequently across the Site, with *Low* median activity levels where present. Maximum activity levels were generally *Moderate*, with a single *High* value recorded at D01 (0.40 bp/h) during spring. The limited spatial and seasonal occurrence of this species indicates occasional and irregular use of the Site.

Myotis spp. exhibited *Low* median activity levels across all detector locations and seasons. Maximum activity values were predominantly *Low*, with occasional *Moderate* and *High* values recorded during spring and autumn. The highest activity was recorded at D04 during autumn (6.50 bp/h) and at D12 during spring (6.00 bp/h). These results indicate generally limited use of the Site, with slightly increased activity during autumn.

Brown long-eared bat also exhibited consistently *Low* median activity levels. Maximum activity values were predominantly *Low*, with more frequent *Moderate* values recorded during autumn and a single *High* value at D04 (3.80 bp/h). Overall, activity levels indicate limited use of the Site, with a modest seasonal increase during autumn.

Overall, the activity level assessment indicates that bat activity across the Site is predominantly *Low*, with localised *Moderate* to *High* activity occurring intermittently at specific detector locations and during particular survey periods, most notably in spring and autumn. These elevated activity levels are not consistent across the Site and are primarily driven by short-duration peaks rather than sustained high levels of activity.

Table 3-4 Median and maximum nightly bat activity (bp/h) per species, per season, per detector location (2023) classified as None, Low, Moderate and High

Species	Season	bp/h	D01	D02	D03	D04	D05	D06	D07	D08	D09	D10	D11	D12	D13	D14	D15	D16
Myotis spp.	Spring	Median	0.2	0.1	0.2	0.5	0.0	0.0	0.0	0.2	0.1	0.5	0.0	0.4	0.0	0.0	0.1	0.0
		Maximum	1.7	0.4	1.6	1.6	0.2	0.4	1.1	0.3	0.6	2.4	0.2	6.0	0.4	0.9	1.3	0.7
	Summer	Median	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0
		Maximum	0.4	0.3	0.6	0.3	0.1	0.1	0.6	1.2	0.3	1.0	0.4	0.4	1.0	0.9	0.4	0.3
	Autumn	Median	0.2	0.1	0.6	0.7	0.1	0.0	0.5	0.7	0.2	0.2	0.0	0.2	0.6	0.0	0.1	0.0
		Maximum	3.9	0.9	2.5	6.5	0.5	0.6	1.8	3.1	1.7	3.0	0.5	1.5	3.6	1.2	1.2	0.4
Leisler's bat	Spring	Median	0.9	2.4	1.7	0.7	0.2	0.3	2.3	0.6	0.3	1.1	3.1	0.6	1.5	0.0	0.9	0.1
		Maximum	83.4	44.4	16.6	6.0	3.4	1.9	27.4	13.3	4.2	11.4	83.3	3.6	52.7	25.4	6.0	11.3
	Summer	Median	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Maximum	0.6	0.7	1.1	2.4	0.8	0.9	1.0	0.7	2.0	3.2	1.8	1.3	3.8	0.1	2.0	0.1
	Autumn	Median	0.0	0.1	0.1	0.2	0.4	0.1	0.7	0.2	0.3	0.4	0.1	0.1	0.4	0.1	0.2	0.0
		Maximum	4.1	2.6	10.3	2.7	6.2	5.1	5.7	2.3	2.3	3.1	1.2	1.6	2.6	28.1	5.3	2.8
Nathusius' pipistrelle	Spring	Median	0.0	-	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	-	-	-	-
		Maximum	0.4	-	-	-	-	0.1	0.2	-	0.1	0.1	0.1	0.3	-	-	-	-
	Summer	Median	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Maximum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Autumn	Median	-	-	0.0	-	0.0	-	-	0.0	-	0.0	-	-	-	-	0.0	-
		Maximum	-	-	0.2	-	0.1	-	-	0.1	-	0.1	-	-	-	-	0.1	-
Common pipistrelle	Spring	Median	0.0	0.0	0.0	2.6	0.0	0.0	0.4	0.1	1.1	4.8	0.0	7.5	0.0	0.0	3.7	0.1
		Maximum	2.1	0.2	2.4	10.8	0.8	5.3	14.6	9.3	2.5	30.4	0.8	65.2	3.6	23.0	23.2	38.7
	Summer	Median	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.7	0.0	0.1	0.0	0.2	0.0	0.0	0.0	0.0
		Maximum	0.4	1.2	0.7	0.7	4.5	1.9	6.2	23.5	2.3	2.6	7.6	7.2	0.0	0.0	0.9	0.0
	Autumn	Median	0.1	0.0	0.0	0.1	0.2	0.9	1.4	0.9	0.0	0.2	0.0	0.1	0.0	0.1	0.9	0.0
		Maximum	1.3	0.6	2.1	1.8	4.1	6.1	6.5	3.9	0.8	1.6	0.2	0.4	1.3	0.8	5.7	0.5
Soprano pipistrelle	Spring	Median	0.0	0.0	0.0	2.1	0.0	0.0	0.4	0.7	1.0	4.7	0.0	12.9	0.0	0.0	2.05	0.0
		Maximum	0.9	0.5	1.5	7.7	0.3	2.5	7.6	18.4	3.9	14.3	1.1	53.5	3.3	10.3	12.3	9.4
	Summer	Median	0.0	0.0	0.0	0.2	0.0	0.0	0.3	0.4	0.1	0.4	0.0	0.4	0.0	0.0	0.0	0.0
		Maximum	0.4	0.7	0.9	2.3	1.0	1.3	3.6	5.4	1.9	6.3	6.8	23.0	0.1	0.1	0.6	0.0
	Autumn	Median	0.2	0.1	0.2	2.3	0.2	1.3	5.0	6.4	0.2	1.4	0.0	0.4	0.2	0.1	2.6	0.0
		Maximum	3.8	3.6	11.0	13.4	6.4	14.0	20.9	26.0	4.0	13.2	0.9	1.8	3.0	7.1	47.5	1.9
Brown long-eared bat	Spring	Median	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
		Maximum	1.7	0.3	0.4	0.6	0.2	0.2	0.3	0.1	0.3	1.1	0.1	0.5	0.3	0.1	0.4	0.1
	Summer	Median	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-
		Maximum	0.1	0.1	0.3	0.3	0.3	0.3	0.4	0.3	0.4	0.4	0.1	0.1	0.6	0.3	0.3	-
	Autumn	Median	0.2	0.0	0.3	0.5	0.1	0.0	0.3	0.4	0.6	0.2	0.0	0.1	0.1	0.0	0.0	0.0
		Maximum	1.6	0.6	1.9	3.8	1.2	0.6	1.3	1.5	2.1	1.8	0.4	0.8	2.1	0.5	0.3	0.4

4. CONCLUSION

Bat surveys undertaken in 2023 established a robust baseline of bat activity within the Proposed Wind Farm site, carried out in accordance with NatureScot (2021) guidance for medium-risk wind farm sites. The 2023 baseline surveys confirmed the presence of a single brown long-eared bat (*Plecotus auritus*) roost within a derelict stone ruin and identified forestry edges and transitional habitats between conifer plantation and raised bog as the principal features supporting commuting and foraging activity for edge-adapted species within the Site.

Bat activity recorded during the 2023 survey period exhibited clear seasonal patterns, with the highest levels of activity recorded during the spring survey period, followed by lower levels in autumn and summer. Activity across the Site was dominated by Leisler's bat (*Nyctalus leisleri*) and pipistrelle species, particularly soprano and common pipistrelle, with lower levels of activity recorded for *Myotis* spp. and brown long-eared bat. Nathusius' pipistrelle (*Pipistrellus nathusii*) was recorded infrequently and at very low levels.

Leisler's bat, an open-air forager, was recorded widely across the Site and contributed substantially to overall activity levels, particularly during spring. In contrast, pipistrelle activity was more closely associated with forestry edges and transitional habitats, reflecting the importance of these features for commuting and foraging within the Site. Activity within more exposed areas of raised bog was generally lower, particularly for edge-adapted species.

Overall bat activity recorded during the 2023 baseline surveys was predominantly *Low*, with localised instances of *Moderate* and occasional *High* activity recorded at specific detector locations and during particular survey periods. These elevated activity levels were not consistent across the Site and were driven by short-duration peaks rather than sustained high levels of activity.

Overall, the 2023 baseline surveys indicate that bat activity at the Proposed Wind Farm is characterised by widespread use of the Site by common and widespread species, including both open-air and edge-foraging bats, with generally *Low* levels of activity and localised variation associated with habitat features. The 2023 baseline data provide a robust characterisation of bat activity at the Site and, when considered alongside the 2024 survey results presented in the EIAR, contribute to a consistent understanding of bat activity patterns. These datasets have informed the impact assessment and the development of appropriate mitigation measures for the Proposed Project.

5.

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APPENDIX 2

FATALITY MONITORING METHODOLOGY

1.1 Appendix 2: Fatality Monitoring Methodology

Introduction

Fatality monitoring was undertaken to estimate the number and species of bat fatalities attributable to turbine collisions at the operational Dunneill and Kingsmountain Wind Farms, both of which form part of the wider Crumhach Wind Farm development context. Dog-lead searches were carried out by a trained dog-and-handler team to locate bat carcasses beneath turbines. The overall search methodology, together with the trials used to determine carcass detection probability and carcass persistence, and the approach to mortality estimation across the full turbine array, are described briefly in the sections below. The methodology is the same for both Wind Farms across all survey periods.

Carcass Searches

Carcass searches were conducted on monthly basis. Searches were carried out within a 50m radius around each turbine base, with the trained dog systematically covering the search area.

All turbines at both wind farms were surveyed during each monthly monitoring visit. When a bat carcass was discovered, the following information was recorded: GPS location, a site photograph, distance from the turbine, and the date and time of discovery. Carcass condition was categorised as one of the following:

- **Intact** – carcass fully intact or minimally decomposed
- **Scavenged** – evidence of feeding or partial removal by a scavenger

Searcher Efficiency and Carcass Persistence Trials

To ensure a more accurate estimation of the total number of fatalities, dog-lead searches were calibrated to account for the dog's ability to find bat carcasses (searcher efficiency) and the likelihood of scavenging of carcasses by animals (carcass persistence). The methodology for the searcher efficiency and carcass persistence trials were the same for both wind farms.

The searcher efficiency trial was conducted by planting carcasses within the site and allowing the dog to search for them. Searcher efficiency was then based on the percentage retrieval success. One worker left carcasses in trial plots to be searched by the dog and handler team at a later date. This aided in hiding any scent of the worker laying the carcasses and allowed time for scavenging to occur.

Carcass persistence was measured by placing carcasses at a series of locations and monitoring them over a 40-day period or until no remains meeting the assessment criteria were present. Scavenger removal rates were calculated from the time to disappearance and were used to adjust the mortality estimate for carcass availability over time.

Mortality Estimation

Collision-related mortality at the Dunneill and Kingsmountain Wind Farms were estimated using the GenEst model software package (version 1.4.9; Dalthorp *et al.*, 2023). The model integrates observed carcass records with searcher efficiency and carcass persistence trial results to estimate the likely number of fatalities during the monitoring period.

The search schedule parameters used in the model corresponded to the survey effort for each site. The density-weighted proportion was set to 1 for all turbines and the fractional change in searcher efficiency was set to 1. A 90% confidence level was applied, and 1,000 iterations were run to generate mortality estimates.



APPENDIX 3

BAT HABITAT SUITABILITY APPRAISIAL

BAT HABITAT SUITABILITY ASSESSMENT

Guidelines for assessing the potential suitability of a site for bats, based on the presence of habitat features within the landscape (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*	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 4

SITE RISK ASSESSMENT

SITE RISK ASSESSMENT

Table 3a: Stage 1 - Initial site risk assessment

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

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

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

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

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



APPENDIX 5

OVERALL SITE RISK ASSESSMENT

OVERALL SITE RISK ASSESSMENT

Table 3b: Stage 2 – Overall Risk Assessment

Site Risk Level (from Table 3a)	Ecobat activity category (or equivalent justified categorisation)					
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)
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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).



APPENDIX 6

WATERCOURSE CROSSING INFRASTRUCTURE

Appendix 6: Watercourse Crossing Infrastructure – Bat Roost Suitability Assessment

Proposed Grid Connection Route Water Crossing Infrastructure

The Proposed Grid Connection Route will traverse 34 no. watercourses and 2 no. built service crossing. The crossing points were assessed for bat roosting potential in September 2025 and March 2026. A range of roosting suitability levels was recorded across the inspected structures: twenty-two crossings had no (*None*) roosting potential, three had *Negligible* potential, eight had *Low* potential, and only one water crossing was assessed as having *Moderate* roosting potential. No evidence of bat roosts was identified at any of the structures. The detailed findings are presented below. Details of the water crossings can be found in Table 4-5 of Chapter 4 of the main EIAR.

Table 1 Bat Roost Suitability of bridges/culverts along the Proposed Grid Connection Route

Crossing	Grid Reference	Bridge/Culvert type	Photo	Bat Roost Potential	Extent of Works
WC1 (36 (in reference to numbering in Table 4-7 of Chapter 4 of the main EIAR. Applicable to all crossings))	G 67868 26836	Service Crossing			Horizontal Directional Drilling (HDD)

WC2 (34)	G 43881 29178	Concrete Pipe				Concrete pipe not visible, vegetation overgrown. No (<i>None</i>) roosting potential for bats	Standard Formation Crossing under Culvert
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WC3 (33)	G 44508 29221	Stone Arch Bridge			Double arch smooth concrete bridge with no gaps, cracks or crevices that provide roosting potential. Overall, no (<i>None</i>) roosting potential.	Horizontal Directional Drilling (HDD)
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WC4 (32)	G 45025 29368	Concrete Pipe		Too heavily vegetated to see nature of bridge. Concrete pipes provide no PRF's for roosting bats. Overall, no (<i>None</i>) roosting potential.	Standard Formation Crossing under Culvert
WC5 (31)	G 45994 29627	Stone Arch Bridge		Heavily vegetated stone bridge, well pointed bridge face and roof, heavily vegetated- soft rush, ivy, bramble, nettle- <i>Negligible</i> roosting potential.	Horizontal Directional Drilling (HDD)

WC6 (30)	G 45864 30490	Stone Culvert		Plastic pipe culvert, overgrown vegetation in front of it. No (<i>None</i>) roosting potential.	Standard Formation Crossing under Culvert
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WC7 (29)	G 45761 31093	Stone Culvert		Stone structure, dark long tunnel, holes/ crevices in stone work, vegetated, bramble- <i>Low</i> roosting potential	Standard Formation Crossing under Culvert
WC8 (28)	G 45743 31515	Stone Arch bridge		Too heavily vegetated (bramble) to see nature of bridge. No access for bats due to dense vegetation overgrowth blocking the bridge structure - No (<i>None</i>) roosting potential.	Horizontal Directional Drilling (HDD)

WC9 (27)	G 45914 31981	Concrete Pipe			Too heavily vegetated with gorse bramble ash. No access for bats due to dense vegetation overgrowth blocking the bridge structure. No (<i>None</i>) roosting potential.	Standard Formation Crossing under Culvert
WC10 (26)	G 45943 32321	Stone Culvert			No gaps, cracks or crevices, heavily vegetated with ivy, bramble, harts tongue fern cleavers- No (<i>None</i>) roosting potential.	Standard Formation Crossing under Culvert

WC11 (25)	G 46358 33097	Stone Arch Bridge		Well pointed concrete bridge, no gaps, cracks or crevices, no vegetation cover - No (None) roosting potential.	Horizontal Directional Drilling (HDD)
WC12 (24)	G 48732 32607	Stone Arch bridge		Well pointed bridge face with no visible cracks or crevices. Some well pointed stonework in the barrel of the bridge, with a small number of holes, cracks and crevices present. Overall, <i>Low</i> roosting potential.	Standard Formation Crossing under Culvert

					
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WC13 (23)	G 50809 32478	Stone Arch Bridge		Well pointed concrete/ brick structure, no gaps, cracks or crevices in roof or bridge face, no vegetation- No (<i>None</i>) roosting potential.	Horizontal Directional Drilling (HDD)
WC14 (22)	G 53762 33102	Stone Arch Bridge		Well pointed bridge, no gaps, cracks or crevices for bats, vegetation cover - No (<i>None</i>) roosting potential.	Horizontal Directional Drilling (HDD)

WC15 (20)	G 54338 32978	Stone Arch bridge		Metal fencing, smooth concrete well pointed face, concrete box culvert, no vegetation, no gaps, cracks or crevices – No (<i>None</i>) roosting potential.	Horizontal Directional Drilling (HDD)
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WC16 (21)	G 56092 32256	Stone Arch bridge		Well pointed concrete structure, no gaps, cracks or crevices, no vegetation cover. The structures roof has a smooth, solid concrete surface with no gaps, cracks or crevices. - overall No (<i>None</i>) roosting potential.	Horizontal Directional Drilling (HDD)
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WC17 (19)	G 57153 31697	Stone Culvert				Stone culvert not visible – possibly goes under road. No access for bats. No (<i>None</i>) roosting potential.	Standard Formation Crossing under Culvert
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WC18 (18)	G 57810 31360	Concrete Pipe - Concrete box culvert		Well pointed flat roof, some stone work around bridge with holes/ crevices, long dark tunnel, some ivy cover - overall <i>Low</i> roosting potential.	Standard Formation Crossing under Culvert
WC19 (17)	G 59785 29997	Concrete Bridge – plastic pipe culvert		Pipe culvert under road, and well pointed, smooth concrete bridge face, two arches, little vegetation, some ivy, old bridge with stone roof and walls, not well pointed with some holes and crevices and ivy cover. Overall, no (<i>None</i>) roosting potential	Standard Formation Crossing over Culvert

WC20 (16)	G 60458 29482	Stone Culvert		Well pointed bridge face, concrete bricks and concrete pipe culvert, heavily vegetated with ivy, bramble, no holes or crevices – No (<i>None</i>) roosting potential.	Standard Formation Crossing under Culvert
WC21 (15)	G 61089 28892	Concrete Pipe		Heavily vegetated stone bridge at one side, water crossing culverted under road, concrete culvert, some stone work, not well pointed with holes and crevices, some vegetation cover – Overall, <i>Low</i> roosting potential	Standard Formation Crossing under Culvert

WC22 (14)	G 61818 28302	Stone Arch Bridge			Well pointed stone structure at bridge face and roof, some shallow holes and crevices, no vegetation cover, no linear treeline/ riparian vegetation for commuting or foraging - Overall <i>Low</i> roosting potential	Standard Formation Crossing under Culvert
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WC23 (13)	G 62281 28193	Concrete Pipe				No clear bridge or crossing under road recorded in the area, heavily vegetated watercourse inaccessible to walk upstream. Concrete pipes provide no potential roosting features– Overall, no (<i>None</i>) roosting potential	Standard Formation Crossing under Culvert
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WC24 (12)	G 63016 28368	Plastic Pipe - Stone Arch Bridge		Stone bridge face and roof, some small shallow crevices, extensively ivy covered and bramble, water levels up to roof top, watercourse heavily vegetated with bramble, ash, alder – Overall, <i>Low</i> roosting suitability	Horizontal Directional Drilling (HDD)
WC25 (11)	G 67174 28585	Stone Arch Bridge		Well pointed stone face bridge, stone roof, heavily vegetated, very high-water levels up to the roof of the bridge, overall <i>Negligible</i> roosting potential.	Horizontal Directional Drilling (HDD)

WC26 (10)	G 67251 28465	Stone Culvert			Heavily vegetated stone culvert. No crevices gaps, cracks or crevices visible, overall <i>Negligible</i> roosting potential.	Standard Formation Crossing under Culvert
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WC27 (9)	G 67967 26536	Stone Arch Bridge		Seven well pointed stone arches, no gaps, cracks or crevices, no vegetation cover, metal railing - no (<i>None</i>) roosting potential	Horizontal Directional Drilling (HDD)
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WC28 (35)	G 68473 26063	Service Crossing			No structure present here.	Horizontal Directional Drilling (HDD)
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WC29 (8)	G 69481 25931	Stone Arch Bridge		Well pointed stone bridge, 3 arches, no gaps, cracks or crevices, little vegetation cover - overall <i>Low</i> roosting potential	Horizontal Directional Drilling (HDD)
WC30 (7)	G 69977 26449	Concrete pipe		Watercourse pipe culverted under road, very heavily vegetated, some stone work covered in dense vegetation - overall, no (<i>None</i>) roosting potential.	Standard Formation Crossing under Culvert

WC31 (6)	G 70862 26867	Stone Arch Bridge		Well pointed stone bridge, flat, smooth concrete culvert structure- no gaps, cracks or crevices, no vegetation cover- Overall, No (<i>None</i>) roosting and commuting/ foraging potential	Horizontal Directional Drilling (HDD)
WC32 (5)	G 71020 26770	Stone bridge – concrete box culvert		Well pointed stone bridge structure, no gaps, cracks or crevices, no vegetation cover. Large concrete box culvert, no cracks or crevices, ivy cover. Overall, no (<i>None</i>) roosting potential	Horizontal Directional Drilling (HDD)

WC33 (4)	G 71089 26686	Stone Arch Bridge – Concrete pipe		Well pointed bridge structure, no gaps, cracks or crevices in roof or bridge face, three concrete culverts under road, no vegetation cover, no linear or riparian vegetation on either side of watercourse- Overall, no (<i>None</i>) roosting potential.	Standard Formation Crossing under Culvert
WC34 (3)	G 71258 26488	Plastic Pipe		Concrete culvert providing no roosting potential, bridge face half well pointed concrete, other half stone work with some gaps and crevices, some vegetation cover - Overall <i>Low</i> roosting potential.	Standard Formation Crossing under Culvert

WC35 (2)	G 71358 26406	Stone Culvert		Stone bridge, stone work has some gaps, cracks and crevices in roof and stone walls, two arches, bridge face heavily vegetated, no evidence of bats found – Overall, <i>Moderate</i> suitability for roosting bats	Standard Formation Crossing under Culvert
WC36 (1)	G 72404 25613	Stone Arch Bridge		Well pointed bridge structure, no gaps, cracks or crevices visible on bridge face or roof, no evidence of bats found, concrete pillar on top of bridge wall face, no vegetation cover – Overall, no (<i>None</i>) roosting potential.	Horizontal Directional Drilling (HDD)